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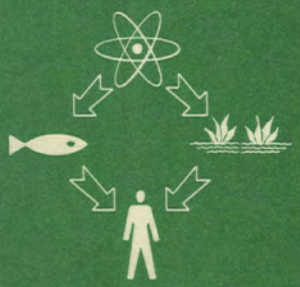

Environmental Sciences Division Publication No. 660

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A METHODOLOGY FOR CALCULATING RADIATION DOSES FROM RADIOACTIVITY RELEASED TO THE ENVIRONMENT

Compiled by

G. G. Killough
Larry R. McKay

With Contributions by
Oak Ridge National Laboratory Staff
as Noted in the Text

Environmental Sciences Division Publication No. 660

MARCH 1976

OAK RIDGE NATIONAL LABORATORY
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A Methodology for Calculating Radiation Doses from Radioactivity Released to the Environment, Compiled by G. G. Killough and L. R. McKay

ABSTRACT

This document represents a compilation of the principal environmental transport and dosimetry models developed, adapted, and implemented by the Radiological Analyses and Applications Group of the Environmental Sciences Division of the Oak Ridge National Laboratory. The transport of released radioactivity through the natural environment is discussed in four sections: atmospheric dispersion, resuspension of material by wind action, terrestrial transport, and movement of material in underground water seepage. The discussion of dose to man and biota is divided into internal and external exposure sections. And finally, a developmental model (CONDOS) which estimates the dose to a population resulting from the manufacture, storage, distribution, use, and disposal of consumer products which contain radioactivity is described. Numerous tables are included.

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FOREWORD

Following the historic Calvert Cliffs court decision in July, 1971, requiring the Atomic Energy Commission to perform detailed environmental assessments for all factors affecting the environment, the Atomic Energy Commission enlisted the help of three national laboratories to complete the required technical assessments and to incorporate them into the environmental impact statements required under the National Environmental Policy Act (NEPA) of 1969. Oak Ridge National Laboratory and its Environmental Sciences Division were given leading roles in the areas of ecological and radiological impacts; these roles continue to the present.

This document represents a compilation of the principal environmental transport and dosimetry models and computer codes developed and presently in use by the Radiological Analyses and Applications Group of the Environmental Sciences Division. The techniques, models, and computer codes covered in this report embrace a methodology which has evolved in response to NEPA, and which continues to change because of improvements in environmental data bases, changes in philosophy, responses to commentors and interveners' questions, and a desire on the part of the staff to improve the radiological analysis wherever possible.

The methodology described in this document has been developed over a number of years with support from the Atomic Energy Commission formerly and now from the U. S. Energy Research and Development Administration and the U. S. Nuclear Regulatory Commission. It is not to be considered as an official methodology of the U. S. Government, however. Although most of the models have already been used in environmental impact statements, there is no guarantee that the present methodology will be acceptable for future statements.

Comments on this document should be addressed to

Dr. Stephen V. Kaye, Project Supervisor
Radiological Analyses and Applications Project
Environmental Sciences Division
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830

A Methodology for Calculating Radiation Doses from Radioactivity Released to the Environment, Compiled by G. G. Killough and L. R. McKay

EXECUTIVE SUMMARY

Introduction

This document represents a compilation of the principal environmental transport and dosimetry models developed, adapted, and implemented by the Radiological Analyses and Applications Group of the Environmental Sciences Division of the Oak Ridge National Laboratory. These models and techniques, and the computer codes which implement them, embrace a methodology which has evolved, in large part, in response to the National Environmental Policy Act of 1969, and which continues to change because of modeling advances, improvements in data bases, and changes in philosophy.

The transport of released radioactivity through the natural environment to man is discussed in four sections: atmospheric transport, resuspension of material by wind action, terrestrial transport, and movement of material in underground water seepage. The discussion of dose to man and biota is divided into external and internal exposure sections. And finally, a developmental model (CONDOS) is described which estimates the dose to a population resulting from the manufacture, storage, distribution, use, and disposal of consumer products which contain radioactivity.

Environmental Transport of Radionuclides

Atmospheric Transport. The AIRDOS computer code estimates annual population doses and the maximum individual doses in an area which result from releases of radionuclides into the atmosphere. The modes of exposure by man modeled in AIRDOS are: (1) inhalation of radionuclides in the air, (2) immersion in air containing radionuclides, (3) exposure to ground surfaces contaminated by deposited radionuclides, (4) ingestion of food produced in the affected area, and (5) immersion in contaminated water.

The area surrounding the points of release is covered by a 20 x 20-square grid with grid size specified as input data. For each of the 400 squares, human population, numbers of beef and dairy cattle, and identification of the square as to whether it produces food crops or is a water area are required as input data.

Meteorological data are supplied as input for the atmospheric dispersion model used to estimate concentrations of the radionuclides in air and the rates of deposition on ground or water surfaces.

Other inputs include dose conversion factors for external and internal exposures. Such factors may be computed with the EXREM III and INREM codes.

The basic equation of the atmospheric dispersion model implemented in AIRDOS is Pasquill's[1] equation as modified by Gifford.[2] Plume rise due to momentum is estimated with the equation of Rupp et al.,[3] and Briggs' equations[4] are applied to the prediction of the rise of a hot plume resulting from buoyancy. AIRDOS accounts for deposition and scavenging and incorporates a module based on the terrestrial model (TERMOD) of Booth and Kaye to simulate the movement of radionuclides through terrestrial pathways. Exposure of man by ingestion of fish or other food produced from water areas is not included in the present version of AIRDOS.

External doses from gamma radiation from overhead plumes are not estimated; such exposure may be important, however, in the immediate vicinity of a nuclear facility and must be estimated separately where conditions warrant.

Resuspension of Radioactive Material by Wind Action. A model is described which treats the movement by wind of particulates once they have been deposited upon the ground. The analysis of the potential spreading of radioactive spills and the atmospheric transport of uranium mill tailings dust containing long-lived radioactive isotopes are examples of the possible usefulness of such a model.

The suspension rate is assumed to be proportional to the saltation rate, which is calculated from an expression of Bagnold.[5] The ground level concentration of dust downwind from the resuspension site is computed from the Gaussian plume equation[6] with a modification to account for plume depletion.[7] Results of sample calculations are given.

Terrestrial Transport. The terrestrial pathways model is implemented as TERMOD, a generalized systems analysis coupled-compartment code intended for predictions of radionuclide intakes by man through consumption of milk, beef, and plant parts contaminated directly by deposited radionuclides as well as uptake from the soil. TERMOD is written in the BASIC language for use in a conversational mode with the DEC PDP-10 time sharing system.

The model assumes that radionuclide deposition is the only source compartment and that man is the only receptor compartment of interest. Radioactivity is transferred from the source compartment to man through three main food sources: food crops, meat, and milk. For most but not all situations, the calculations with TERMOD are believed to be conservative.

Tabulations of parameters and of intake rates per unit deposition for the three pathways (above-surface food crops, milk, and beef) are given.

Movement of Radioactive Material in Underground Water Seepage. One of the pathways by which radioactive materials may be transported in the environment is by their movement through the soil into groundwater. A two-part computer code, SOGMOD, was developed by Duguid and Reeves[8,9] to predict the time-spatial relationships of contaminant transport by groundwater. The first part provides numerical solution to the equation governing moisture infiltration and redistribution in unsaturated-saturated media; the second part gives numerical solution to the transport equation. Both parts use Galerkin finite-element methods to obtain numerical solutions of the governing equations. Both adsorption and radioactive decay are considered. The output from SOGMOD is the concentration of a given radionuclide at nodal points within a cross section at successive time increments.

Estimation of External Radiation Dose

Dose to Man. The discussion of external dose to man is developed with reference to three basic exposure modes: (1) submersion of an individual in contaminated water; (2) immersion in contaminated air; and (3) irradiation by exposure to a contaminated ground surface. The EXREM III computer code, which offers its user a number of options for simulating external exposure episodes involving one or more of these exposure media, estimates the dose rate and the total dose from beta, positron, electron, x-ray, and gamma radiation. Multiple environmental releases can be simulated, and exposure can begin at any time after the first release. EXREM III considers contributions from nuclide decay chains. The data base of the code consists of nuclear data for more than 200 radionuclides, and much of this information is presented in a series of tables. Edited output from a sample run of the code is shown.

For readers without access to a computer, several tabulations of dose-rate and dose factors for the three exposure media are provided, together with examples to illustrate their use. In addition to surface dose rates, tables of photon depth dose-rate factors for several reference organs are given for each environmental exposure medium.

Dose to Biota. The external dose rates from beta and gamma radiation to an organism submersed continuously in a body of radionuclide-contaminated water are tabulated for 104 radionuclides from dose rates computed with the EXREM III computer code. The contamination is assumed to be the result of the release of a radionuclide from a nuclear facility into a body of water at a constant rate; no environmental processes for removal of radioactivity from the water are assumed. The dose-rate factors include the contributions of radioactive daughter products whenever these are formed. The BIORAD computer code uses these factors to estimate external doses to biota; BIORAD is discussed in a later section.

Estimation of Internal Radiation Dose

Dose to Man. The internal dosimetry models of Publication 2 of the International Commission on Radiological Protection[10] (ICRP) form the basis of the INREM computer code, which estimates the doses to various reference organs of man following inhalation or ingestion, or both, of one or more radionuclides. Except for lungs and G. I. tract, each organ's metabolism of a radionuclide is modeled as a single compartment with first-order removal. Detailed submission of biological data in the input will facilitate estimation of dose as a function of the age of the exposed individual. The intake rate may be specified as an initial pulse or as a piecewise-linear function of time.

The data base includes 259 radionuclides, for which the physical and biological input parameters are tabulated. Also tabulated for each of these radionuclides are inhalation and ingestion dose conversion factors (i.e., the 50-year dose commitment from an initial unit intake) for lungs, G. I. tract, and other organs for which element-specific metabolic data are available.

Revised dosimetry models for a number of radionuclides were suggested by ICRP Publications 10[11] and 10A,[12] and these models were implemented by the INDOS codes. These codes differ from INREM in the following principal respects: (1) They are written for conversational interaction in a time-sharing environment for execution on the DEC PDP-10 system. (2) Their metabolic models for organs other than the lungs or G. I. tract may consist of several parallel first-order compartments. (3) They are restricted to a succession of single intakes at specified times or a continuous intake at a constant rate throughout the dose integration period. (4) They do not model the lungs or G. I. tract.

Critical-organ inhalation and ingestion dose conversion factors for 29 radionuclides were computed with the INDOS codes and tabulated in this section of the report.

Dose to Biota. Aquatic biota living in the vicinity of nuclear facilities can be exposed to radioactivity released in liquid effluents and receive radiation dose from internal emitters assimilated from food and absorbed from water. Some aquatic organisms concentrate radionuclides in their tissues to levels higher than the respective concentrations in the ambient water. For a given organism and radionuclide, a bioaccumulation factor is defined as the activity per gram of organism divided by the activity per ml of water, where both concentrations are presumed to be in steady state. Bioaccumulation factors derived from several sources are tabulated in this section of the report.

The BIORAD computer code, written in BASIC and designed for conversational use through remote terminal access to the DEC PDP-10 system, estimates doses to aquatic plants, invertebrates, fish, and terrestrial animals dependent on aquatic food supplies. The user inputs a concentration of the selected radionuclide in water or in sediment. Tables of

BIORAD-computed internal dose-rate factors for fresh-water and marine biota for 104 radionuclides are provided in this section of the report.

Estimation of Individual and Population Doses from Consumer Products that Contain Radioactive Materials

The CONDOS Methodology. As an aid in assessing the potential radiological impacts of consumer products which contain radionuclides, a model of the life span of a consumer product has been developed, together with a computer code (CONDOS) which calculates radiation doses to man which result from exposure to the product during one or more of the stages in the product's life. The model treats five stages (distribution, transport, use, disposal, and emergencies) in the life of a product and provides a framework for description of the exposure events. These descriptions identify homogeneous groups of exposed persons and thus facilitate the selection of individuals who represent the exposed population groups. Both internal and external components of the dose are calculated.

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1 Introduction

This report presents the outline and selected detail of a methodology for making estimates of radiation doses to man and biota following the release of liquid, gaseous, and particulate radioactive matter from nuclear facilities. The models and data bases described herein have been applied to a number of environmental assessments by the Radiological Analysis and Assessments Group of the Oak Ridge National Laboratory's (ORNL) Environmental Sciences Division. Many of the individual topics have been treated in separate reports and in the open literature; for some time, however, the need has been expressed for a comprehensive treatment which would unify these apparently disparate accounts into a single document, where the discussion of the techniques might proceed in the special context of the problems of environmental assessment, and their interrelation might be clarified. It is hoped that the present report represents a step toward this goal and will provide a basis for refinement and further development.

The environmental transport and dosimetry models discussed here may reasonably be considered to be generally applicable when proper account is taken of the assumptions which underlie them. They are believed to possess a degree of conservatism, in the sense that they tend to lead to overestimation of the ultimate dose rate or dose commitment to man or biota, but every effort has been made to minimize such conservatism.

Wherever possible, sample calculations have been included to illustrate the methods and use of the tables which accompany the text. It is hoped that this approach will enhance the usefulness of the report for

readers who are unable to utilize the computer programs which implement the models; such readers should be aware, however, that such a lack of access imposes a substantial limitation upon their ability to apply the methodology. Conversely, all readers should recognize that no collection of computer programs is capable of automating fully the process of making an environmental radiological impact assessment; considerable experience must support the judgments which articulate the numerous aspects of the exercise and arrive at the final interpretation of results.

Listings of computer codes alluded to in the text have been omitted from this report. Some of the codes are available from the Radiation Shielding Information Center, Oak Ridge National Laboratory, P. O. Box X, Oak Ridge, Tennessee 37830; others have not been made available for distribution because of incomplete documentation and potential difficulties of implementing them on other computer systems.

Some of the textual and tabular material in this report has been excerpted from published technical reports of ORNL, with the permission of the authors. The compilers accept responsibility for such inaccuracies as editorial revision might have introduced.

2 Environmental Transport of Radionuclides

2.1 Atmospheric Transport

2.1.1 Description of the AIRDOS Computer Code

AIRDOS[1] is a FORTRAN IV computer code used to estimate annual population doses (man-rems) and the maximum annual individual doses in an area as a result of releases of radionuclides from a nuclear facility. The code can estimate doses resulting from simultaneous releases of as many as 36 radionuclides from as many as 6 plant stacks or roof vents. Pathways of exposure to man included in AIRDOS are (1) inhalation of radionuclides in air, (2) immersion in air containing radionuclides, (3) exposure to ground surfaces contaminated by deposited radionuclides, (4) ingestion of food produced in the area, and (5) immersion in contaminated water. Doses are estimated for 11 organs, including the total body.

The area surrounding the nuclear facility may be arranged as a 20 x 20 square grid with the facility at the center. The grid size is specified as input data. Human population, numbers of beef cattle and dairy cattle, and identification as to whether the area is used for food crops, or is a water area are required as input data for each of the 400 grid squares.

Meteorological data are supplied as input for the atmospheric dispersion model used to estimate concentrations of the radionuclides in air and the rates of deposition on ground or water surfaces. A terrestrial model developed by Booth and Kaye[2] is used in AIRDOS to estimate ingestion of radionuclides through food chains to man. Ingestion of fish or other food produced from water areas is not included in the present version of AIRDOS.

External doses from gamma radiation from overhead plumes are not estimated. This additional external exposure may be important in the immediate vicinity of a nuclear facility, especially under stable atmospheric conditions. Therefore, it should be estimated separately where conditions warrant and added to the external doses estimated by AIRDOS.

Population doses are summarized in the output tables of AIRDOS in a number of ways -- by nuclides, pathways, and organs. If more than 36 radionuclides must be considered in a source term, two or more computer runs can be made and the data in the summary tables from each run simply added together. The highest individual doses in the area for each organ are tabulated for each radionuclide and the highest organ doses from all radionuclides in the source term are listed. The location of the highest individual dose is specified.

2.1.1.1 Model Equations

2.1.1.1.1 Atmospheric Dispersion

The basic equation used to estimate atmospheric dispersion in AIRDOS is Pasquill's Equation[3] as modified by Gifford:[4]

$$\chi = \frac{Q}{2\pi\sigma_y\sigma_z\mu} \exp\left[-\frac{1}{2}\left(\frac{y}{\sigma_y}\right)^2\right] \left\{\exp\left[-\frac{1}{2}\left(\frac{z-H}{\sigma_z}\right)^2\right] + \exp\left[-\frac{1}{2}\left(\frac{z+H}{\sigma_z}\right)^2\right]\right\} \qquad (2\text{-}1)$$

where

χ = concentration in air at the centerline of a plume X meters downwind from the point of release (curies/m^3),

Q = uniform emission rate from the stack (curies/sec),

μ = mean wind speed (m/sec),

σ_y = horizontal dispersion coefficient (m),

σ_z = vertical dispersion coefficient (m),

H = effective stack height (physical stack height, h, plus the plume rise, Δh) (m),

y = crosswind distance (m), and

z = vertical distance (m).

The downwind distance, X, comes into Eq. (2-1) through σ_y and σ_z, which are functions of X as well as the atmospheric stability category applicable during emission from the stack. Pasquill[3] described six atmospheric stability categories ranging from A (very unstable) to F (very stable). A seventh category, G (extremely stable) has been included in AIRDOS. Values for σ_y and σ_z as functions of X for each of the six original Pasquill categories are the most recent values recommended by the Air Resources Atmospheric Turbulence and Diffusion Laboratory.[5] The values used for category G were extrapolated from values for categories A through F.

Three options are available in AIRDOS to estimate plume rise, Δh, for Eq. (1). These are

1. Briggs'[6] Equations can be used to estimate plume rise resulting from buoyancy for cases in which hot plumes are emitted from a stack. The rate of heat release from the stack and the average air temperature are required input data for this option. In addition, the vertical temperature gradient of the air for atmospheric stability categories E, F, and G are required.

2. The equation of Rupp et al.[7] can be used to estimate plume rise caused by momentum of emitted stack gases. This equation is

$$\Delta h \simeq 1.5\ vd/\mu \qquad (2\text{-}2)$$

in which

Δh = plume rise (m),

v = effluent gas velocity (m/sec),

d = stack diameter (m), and

μ = wind velocity (m/sec).

3. Plume rise is designated by the user for each of the seven atmospheric stability categories.

Option (2) would usually be used for nuclear plants for which gaseous effluents are near ambient temperatures. Option (3) may be used if the user desires to compute plume rise by another formula.

For part of each year a stable layer of air will exist above a less stable layer. This effect, referred to as a lid, restricts vertical dispersion and results in a higher air concentration at ground level than would exist in the absence of a lid. In the AIRDOS code it is assumed that a plume is not affected by the lid until the downwind distance, X, becomes equal to 2 X_L where X_L is the value of X for which $\sigma_z = 0.47L$ (L is the height of the lid).[8] For greater values of X, vertical dispersion is restricted and the air concentration of the radionuclide is mixed uniformly from ground level to the lid.

Radionuclides released as particulates may be substantially affected by gravity during plume travel. A value for the gravitational

fall velocity, V_g, for each radionuclide is required input data. This value is zero for gases and usually zero for most particulates. For dense or large particulates, however, a positive value is used for V_g, and this results in computing a downward tilt for the plume. This is accomplished in AIRDOS by decreasing the effective stack height in Eq. (2-1) by the expression $V_g X/\mu$. A built-in protection prevents the plume from going below ground level.

Particulates will deposit on ground or water surfaces at a rate that is the product of their concentration in air at ground level and the deposition velocity (m/sec). Deposition velocities are dependent on surface characteristics. Measured values show wide scatter, averaging about 0.01 m/sec, a value often used for particulates for which reliable measured values are not available. It seems likely that particles which are falling as a result of gravity will deposit on surfaces at a rate at least as great as their rate of fall. It is recommended, accordingly, that any value used for the deposition velocity of a radionuclide be at least as great as its gravitational fall velocity. Gases and vapors which react with surface vegetation or dissolve in surface water may also be assigned deposition velocities.

Scavenging of radionuclides in a plume is the process through which rain or snow washes out particles or dissolves gases and deposits them on ground or water surfaces. The fraction of particles or soluble gases removed by scavenging from a vertical column of air per unit time during rain or snow is Φ, the scavenging coefficient. If Φ has the units of sec^{-1}, the rate of deposition on a surface is

$$R = \Phi\ Ch \quad pCi/cm^2\text{-}sec \qquad (2\text{-}3)$$

where C is the average concentration in the vertical column (pCi/cm^3) and h is the height of the vertical column in centimeters.

The scavenging coefficient used in AIRDOS for each radionuclide is the sum of the washout, rainout, and snowout coefficients for particles or the coefficient for dissolving of gases in rain drops. The average concentration in the vertical column used in Eq. (2-3) is computed through the use of Eq. (2-1). The value of h is the distance from the ground to the bottom of the inversion layer (lid). A discussion of methods used to estimate scavenging coefficients can be found in Meteorology and Atomic Energy -- 1968 (Ref. 9).

The rate of deposition is the sum of the rate from dry deposition and the rate from scavenging processes. Surface concentrations for a 50-year deposition time, based on radioactive decay constants and environmental decay constants, when known, are used to estimate gamma doses from surfaces. Deposition rates are used in the terrestrial model in AIRDOS to estimate internal 50-year dose commitments through ingestion of food produced in the area.

Depletion of the plume resulting from deposition is estimated by replacing Q, the release rate in Eq. (2-1), by Q', a reduced release rate which is Q - D where D is the correction for the amount of the radionuclide deposited by the plume from the point of release to the point of consideration. Computer subroutines are used in AIRDOS to estimate Q'/Q for dry deposition. The exponential factor $e^{-\Phi t}$ is used to correct for plume depletion by scavenging processes.

The code makes use of Eq. (2-1) to compute annual average concentrations in air and rates of deposition on ground and water surfaces

for each of 16 compass directions emanating from the stacks of the facility. The annual frequencies for the 16 wind directions, true average and reciprocal-averaged wind speeds for each direction, and annual frequencies of the seven atmospheric stability categories for each wind direction are required as input data. The resulting concentrations from Eq. (2-1) are averaged over each of the 16 sectors and then converted to a square grid specification. The averaging is accomplished as follows: For each value of X, the downwind distance used for Eq. (2-1), a series of χ values are calculated as a function of y, the crosswind distance. These χ values are then averaged over the 22.5° sector. Radioactive decay during plume travel is taken into account in AIRDOS.

2.1.1.1.2 Dose Estimation

Doses are estimated both for individuals located at and beyond the site boundary of the facility releasing the radioactivity, and for the populations living within specified distances from the radioactivity release point. Assumptions and dose conversion factors used in the calculations are presented in later sections of this document.

Individual Dose

Dose conversion factors for external doses from immersion in contaminated air, submersion in contaminated water as by swimming in a home pool subjected to surface deposition from plumes, and exposure to contaminated ground surfaces are supplied as AIRDOS input data. When radionuclide decay chains are involved, equilibrium conditions

are assumed and the dose conversion factors for parent radionuclides include dose contributions due to daughter radionuclides.

In AIRDOS the external dose to each organ is estimated as equivalent to the total-body dose, and it is added to the 50-year internal dose commitment resulting from inhalation and ingestion for each organ. A version of AIRDOS is in preparation which will estimate external doses to each reference organ separately.

Dose conversion factors for internal doses from inhalation and ingestion are supplied as AIRDOS input data for each radionuclide for total body and for each reference organ for that radionuclide. For those organs not in the reference organ list, internal doses are estimated through the use of the dose conversion factors for total body.

Population Dose

The total dose received by an exposed population due to releases from a facility is estimated by summation of individual dose estimates within the population. Two methods are currently used in the estimation of population dose from most nuclear facilities. One method involves describing the geographical area surrounding a facility as a circle, with the facility site at the center of the circle, which is then subdivided into 16 wedge-shaped sectors of 22.5° each (corresponding to the 16 compass directions). In addition, annuli representing distances from the site, and typically extending up to 50 miles, are delineated. The combination of annular and sector markings delineates numerous segments. For each segment, the average individual total-body dose estimated for the midpoint of the segment is multiplied by the population contained within that segment to estimate the population dose. Summing all the

segment population doses yields an estimate of population dose for the facility.

The second method, that utilized almost exclusively in research studies and environmental reports and statements undertaken by the Environmental Sciences Division, involves using a grid square system, by which a facility site is located in the center of a 20 x 20 grid system. The average individual total-body dose is estimated for the midpoint of each grid square, multiplied by the population residing within the geographic area described by that square, and the population doses for each grid square accumulated to estimate total population dose. This system was employed to generate the population dose estimates presented in the AIRDOS sample problem (Section 2.1.1.2).

Typically the average individual doses are expressed in rem, the population in numbers of persons, and the population dose, logically, in terms of man-rems. For example, if the average total-body dose to an individual living at the midpoint of a grid square containing 1000 people was estimated to be 1 millirem (0.001 rem), then the estimated population dose for that grid square would be 0.001 rem x 1000 persons or 1 man-rem. Although estimates of population dose relate to total-body doses, population organ doses may be attained by substitution of average organ doses instead of total-body dose estimates. Since most statutory dose limits are based on a year of exposure, the corresponding units of population dose most often encountered are man-rems/year. Because of the simple relationship that exists between population, average individual dose, and population dose, one may easily solve

for one given the other two, if, for example, cross-checks are desired.

START 2.1.1.2 AIRDOS Sample Problem

To demonstrate the capabilities of the AIRDOS code, a sample problem is shown in Tables 2-1 through 2-3. Tables 2-1 and 2-2 present a listing of radionuclide-independent and -dependent variables, respectively, while Table 2-3 shows representative code output. Each person living in the area is assumed to ingest beef, milk, and vegetable crops produced within the entire 400-square grid surrounding the nuclear facility. If the 400 grid area does not produce enough of these three foods to supply the population within the area, the deficit for each of the three foods is assumed to be supplied by imported uncontaminated food. By application of appropriate dose-conversion factors contained in Table 2-2, radiation doses by organ and by exposure pathway are calculated with AIRDOS.

2.2 Resuspension of Radioactive Material by Wind Action

It is becoming increasingly important to evaluate the future impact of current and proposed industrial operations upon the surrounding environment. The atmospheric transport of contaminants is one important aspect of this overall evaluation for a particular installation. Several models have been developed to determine the dispersion and removal of pollutants emitted from point sources[10] and urban area sources.[11] Another type of atmospheric transport model which treats the movement by wind of toxic substances once

they have been deposited upon the ground is described in this section. One case for which this model could be useful is the analysis of the future spread of a radioactive ground spill; a second case is the atmospheric transport of uranium mill tailings dust containing long-lived radioactive isotopes. In particular, it is of interest to know the concentration of respirable particulates downwind from the site to estimate the potential dose to the lungs. Fine particles (silt and clay sizes) may be brought into suspension indirectly due to the motion of sand grains.

2.2.1 Model Equations

The equations developed to model the resuspension of particles by wind action employ symbols contained in the following list, with the respective units, expressed in terms of length (L), mass (M), and time (T) included with each symbol.

Symbol	Definition (Units)
m	mass of a sand grain (M)
g	gravitational acceleration (LT^{-2})
α	sand grain pivot angle
d	diameter of a sand grain (L)
η	density of grains (ML^{-3})
ρ	density of air (ML^{-3})
β	drag force constant
k	von Karman's constant

z_0	distance above ground for which wind speed approaches zero (L)
V_*	friction velocity (LT^{-1})
v	wind speed at a height z above the ground (LT^{-1})
z	height (L) above ground for measurement of wind speed v
v_t	threshold wind speed (LT^{-1})
D	standard grain diameter (L)
C	experimental saltation constant
q	saltation rate ($ML^{-1}T^{-1}$)
Q_s	dust suspension rate ($ML^{-2}T^{-1}$)
$\overline{Q}_s$	effective dust suspension rate modified by dry deposition ($ML^{-2}T^{-1}$)
K	ratio of suspension to saltation (L^{-1})
S(x,y)	ground level air concentration (ML^{-3})
W_0	weight of suspended dust (ML^1T^{-2})
m_D	mass of suspended dust (M)
E	energy required to extricate a mass of dust m_D (ML^2T^{-2})
γ	scale factor to relate aerosol flux measurements at different heights
σ_y, σ_z	y and z atmospheric stability coefficients to express plume dispersion (L)
h	effective height for dust emission (L)
r	radius of a dust particle (L)
f	deposition velocity (LT^{-1})

As the wind speed begins to increase across a tailings area, individual grains will begin to roll and bounce across the surface in

a process known as saltation. The threshold wind speed for the onset of saltation may be found[12,13] by setting the moment about the sand grain pivot point due to the particle weight (mg) equal to the moment due to the drag force F_D (Fig. 2-1).

$$mg \sin\alpha \frac{d}{2} = F_D \cos\alpha \frac{d}{2}$$

If one replaces the particle weight by the gravitational attraction less the buoyancy force, the preceeding equation may be rewritten:

$$\frac{(\eta-\rho)\pi d^3 g}{6} \sin\alpha = F_D \cos\alpha \qquad (2\text{-}4)$$

where

m = mass of the sand grain,

g = gravitational acceleration,

α = sand grain pivot angle,

d = sand grain diameter,

η = density of grains, and

ρ = density of the air.

The drag force felt by the grain is given by

$$F_D = \beta\rho V_*^2 d^2 \qquad (2\text{-}5)$$

where

β = a constant depending upon the shape of the particle and the extent to which it protrudes above the laminar boundary layer.

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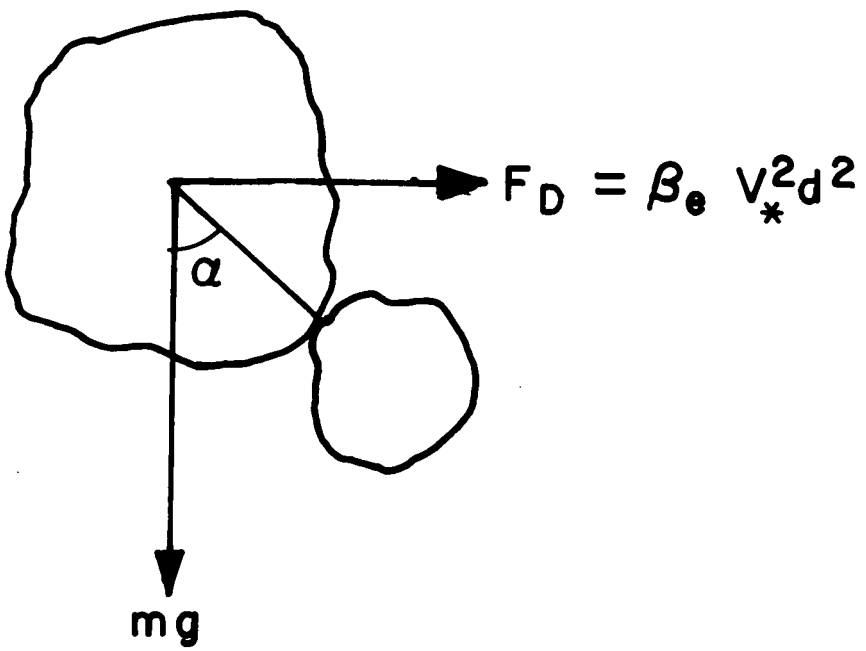

Fig. 2-1. Force diagram for an individual sand grain.

The friction velocity V_* can be given in terms of the wind velocity profile above the ground.[14]

$$V_* = \frac{kv}{\log_e\left(\frac{z}{z_0}\right)} \tag{2-6}$$

where

v = wind speed at a height z above the ground,

z_0 = roughness height (approximately 1 cm during saltation), and

k = 0.4 (von Karman's constant).

By combining Eqs. (2-4), (2-5), and (2-6) and solving for V, we obtain an expression for the threshold wind speed (v_t) necessary for saltation:

$$v_t = \frac{A}{k}\sqrt{\frac{\eta-\rho}{\rho}\, gd}\, \log_e\left(\frac{z}{z_0}\right) \tag{2-7}$$

where

A = average value of $\sqrt{\frac{\pi}{6\beta}\ \tan(\alpha)}$ ($\approx$ 0.1 for air)

By equating the momentum lost by the air with that necessary to keep the sand grains in motion, Bagnold[12] derives the following expression for the saltation rate q:

$$q = \left(\frac{k}{\log_e \frac{z}{z_0}}\right)^3 C\sqrt{\frac{d}{D}}\ \frac{\rho}{g}\,(v-v_t)^3 \quad \text{for } v > v_t \tag{2-8}$$

$$q = 0 \text{ for } v < v_t$$

where

d = average grain size for the area in question,

D = standard grain diameter (250 microns),

v = wind speed at height z, and

C = experimental constant depending upon particle size distribution (nearly uniform sand, C = 1.5; naturally graded sand, C = 1.8; wide range of grain sizes C = 2.8).

Although Eq. (2-7) indicates that the threshold wind speed decreases with decreasing particle diameter, this expression is no longer valid for particle diameters below 80 microns. Dust-sized material cannot be directly transported into the air by turbulent diffusion since the drag force on such small particles partially submerged in the laminar boundary layer is not concentrated on an individual particle. The process of dust suspension is instead assumed to take place as a direct consequence of the saltation mechanism. We may suggest a dimensional argument for determining the functional relationship between saltation and suspension rates. The number of ground impacts of saltating particles per unit area per unit time will be directly proportional to the saltation rate of and inversely proportional to the distance between ground impacts. The distance between ground impacts has been measured by Bagnold[12] as a function of wind speed. From these data the range of the sand grains can be shown to vary approximately as $v^{1.7}$. The number of cohesive "bonds" which may be broken between the fine particles and the sand grains should be proportional to the kinetic energy ($1/2\ mv^2$) of the saltating grain. The suspension rate Q_s should then be roughly proportional to the saltation rate g.

$$Q_s(\mathrm{gm/m^2/sec}) = K(\mathrm{m^{-1}})q(\mathrm{gm/m/sec}) \tag{2-9}$$

$$K = \frac{\gamma g}{\left(\frac{E}{m_D}\right)} \tag{2-10}$$

$$= \frac{\gamma w_D}{E}$$

where

w_D = weight of a mass of suspended dust m_D;

E = energy required to break loose a mass of dust m_D and lift it through the laminar boundary layer which is usually a few microns in thickness; and

γ = dimensionless scale factor which will depend upon the height above the ground for which the aerosol flux is measured in addition to the wind speed and concentration profiles.

The magnitude of $\frac{E}{m_D}$ would in turn depend upon the moisture content of the soil and the particle size distribution. From the studies of agricultural erosion by Gillette et al.[15] one can infer a value for K of about $10^{-5}\mathrm{m}^{-1}$ for aerosols in the size range of 0.4-6 microns at a distance of 3.75 meters above the ground. Dust particles larger than 6 microns settle out while those smaller than 0.4 microns tend to form rather stable aggregates which are difficult to break apart by impaction. This value of K is based upon only one simultaneous determination of suspension and saltation rates and should really be measured for the particular area in question or calculated from a microscopic model

which treats the impaction process in more detail. More measurements are also needed to actually specify the functional dependence (if indeed one exists) between the suspension and saltation rates. There is some recent experimental evidence which supports the saltation-suspension proportionality assumption for the case of plutonium resuspension from a contaminated soil area.[14]

The ground level air concentration of dust downwind from the tailings site can be calculated by use of the Gaussian plume equation[10] with a modification to account for plume depletion[16] due to dry deposition. The ground level air concentration $\delta S(x,y)$ at a distance x downwind and a distance y crosswind from an element of area δA is given by

$$\delta S(x,y) = \frac{\overline{Q}_s \delta A}{\pi \sigma_y \sigma_z v} \exp\left(\frac{-y^2}{2\sigma_y^2}\right) \exp\left(\frac{-h^2}{2\sigma_z^2}\right) \qquad (2\text{-}11)$$

where

$\overline{Q}_s = Q_s \exp[-\frac{f}{v} g(x)]$,

$g(x) = (\frac{2}{\pi})^{1/2} \int_0^x dx' \exp\left(\frac{-h^2}{2\sigma_z^2(x')}\right) \Big/ \sigma_z(x')$,

f = deposition velocity,

σ_y, σ_z = y and z stability coefficients (m) to express plume dispersion, and

h = effective source height for dust emission (3.75 m to correspond to average measurement height used by Gillette et al.).[15]

2.2.2 Sample Calculations

For an initial application of the model we consider a square tailings area of side L to be an area source with the wind blowing with speed v and direction perpendicular to one of the sides (Fig. 2-2). Let us divide this square into many parallel strips, each of which is in turn subdivided into small square areas. It is then possible to write the following expression for the ground level air concentration of dust $S(x_0,y_0)$ at the point (x_0,y_0) with the origin of coordinates located in the center of the square.

$$S(x_0,y_0) = \int_{x_0-L/2}^{x_0+L/2} dx \int_{-L/2-y_0}^{L/2-y_0} \frac{dy\ \overline{Q}_s}{\pi\sigma_y\sigma_z v} \exp\left(\frac{-y^2}{2\sigma_y^2}\right) \exp\left(\frac{-h^2}{2\sigma_z^2}\right) \tag{2-12}$$

As a sample calculation we compute hourly saltation rates and ground level air concentrations of dust for a dry tailings area 200m on a side during a windstorm whose wind speed as a function of time is given by the triangular distribution[17] shown in Fig. 2-3. The first step in the calculation is to determine for each hourly wind speed value the largest particle diameter for which saltation can occur. With this upper bound for the particle diameter together with the lower bound of 80 microns, the average hourly saltation diameters are calculated from the following particle size distribution.

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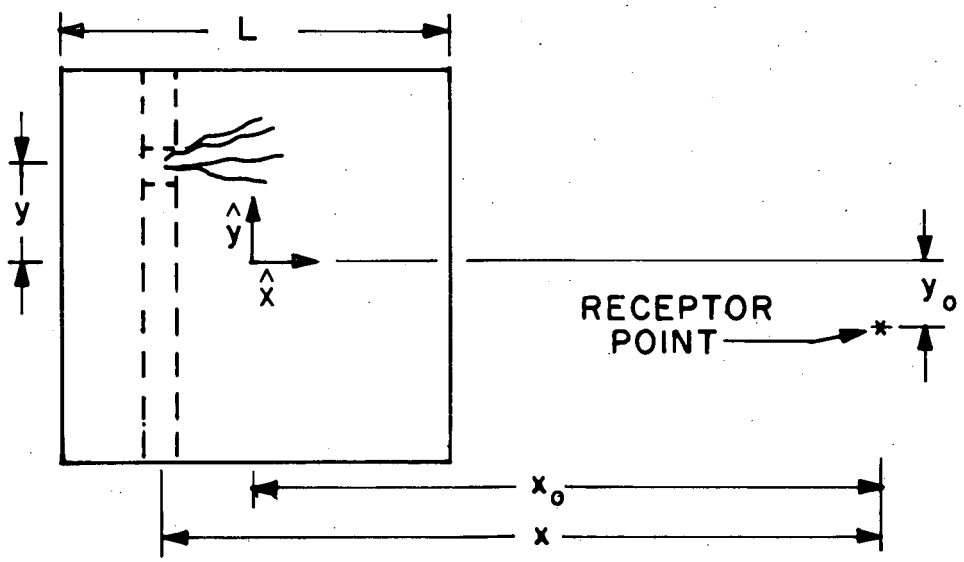

Fig. 2-2. Diagram of an idealized tailings area.

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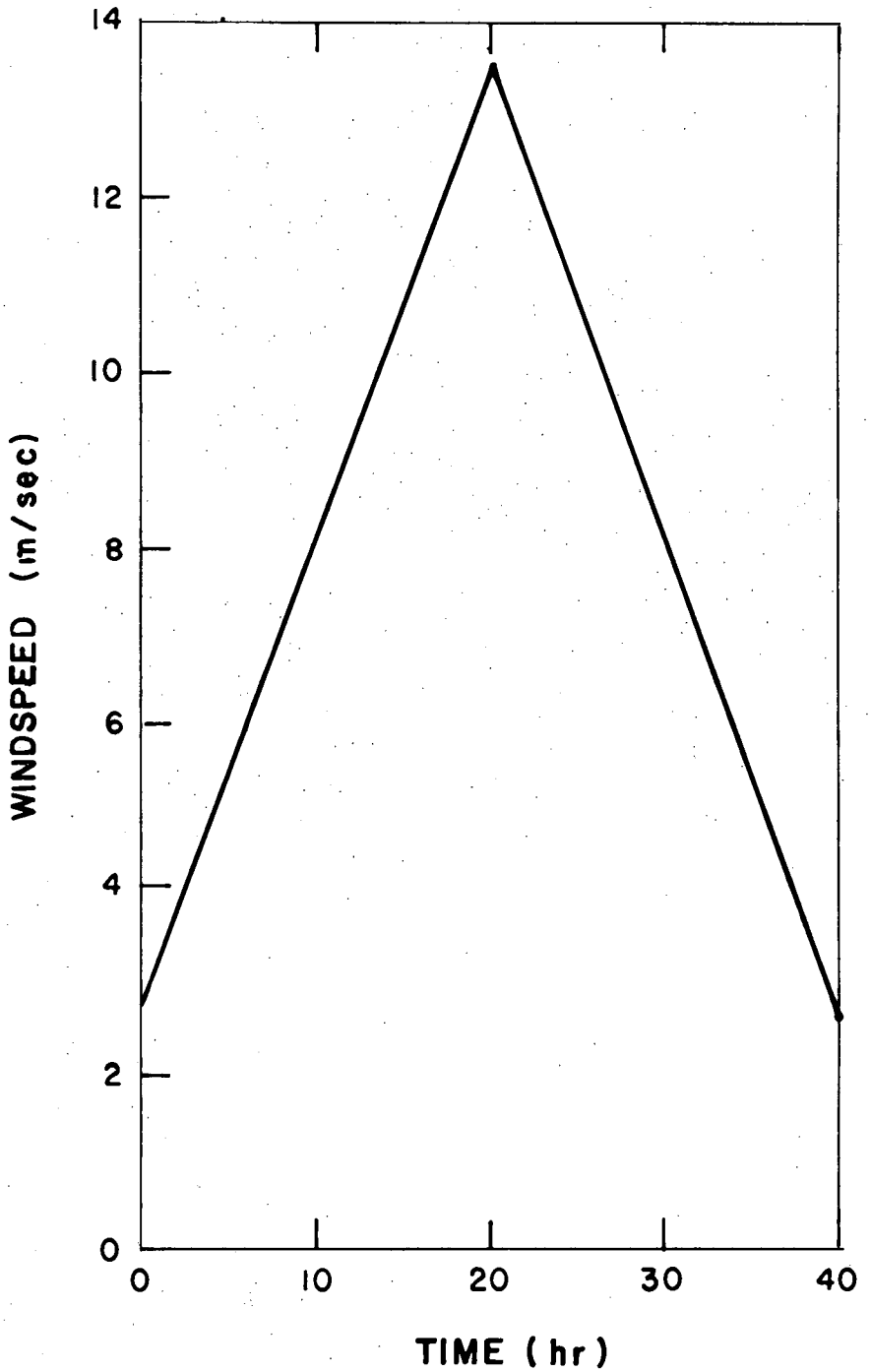

Fig. 2-3. Wind speed as a function of time for a typical dust storm.

Particle Size Distribution (by Weight)

Diameter Range (Microns)	Percentage
0-5[a]	20
6-80	20
81-300	30
301-600[b]	30

Once the average saltation particle size is found, the saltation and suspension rates can be computed. In the present calculation the total suspension rate Q_s (by weight) is uniformly distributed over the 0-5 micron diameter range, which is the same range considered by Gillette et al.[15]

The atmospheric stability coefficients σ_y and σ_z are parameterized in terms of an expression determined by Briggs[18] from a fit to experimental plume dispersion data. For a "C" stability (slightly unstable), σ_y and σ_z are given by

$$\sigma_y = \frac{0.11x}{\sqrt{1 + 0.0001x}}$$

$$\sigma_z = \frac{0.08x}{\sqrt{1 + 0.0002x}}$$

The remaining input variables with their numerical values are given below:

---

[a]The 0 to 5 micron diameter size class is selected to estimate air concentration of potentially respirable particles (< 5.0 μ).

[b]Grinding of uranium ore gives maximum diameter of tailings particles of approximately 600 microns.

η (density of particulates) = 2.6 gm/cm^3,

ρ (density of air) = 0.122×10^{-2} gm/cm^3,

f (deposition velocity) = 1 cm/sec (rough average[7] of deposition over grassland),

h = 3.75 m (average measurement height used by Gillette et al.[15]),

L = 200 m,

y_0 = 0, and

z_0 = 1 cm.

The resultant saltation and suspension rates for tailings dust and ground level air concentrations [S(100 m, 0), S(1000 m, 0), and S(10000 m, 0)] as a function of time are given in Figs. 2-4 through 2-6. Results given here for checking the program are not necessarily those most pertinent to an area's source materials and meteorology.

The calculations do emphasize in a quantitative manner how much of the estimated transportation of material by saltation occurs during a few hours of highest wind during the middle of a windstorm - as much as may occur in many weeks or months if sandstorms are exceptional. Because transport increases as the cube of wind velocity, average winds for a region are meaningful only insofar as they are correlated with peak winds.

Particles of silt and clay are readily transported by much lighter winds than are required for intense sand transport. However, the present calculation is based upon a model which depends on the sand transport to initiate upward motion of the finer fractions into the layers of air which can sustain motion. If there is disturbance of fine materials (as by foot

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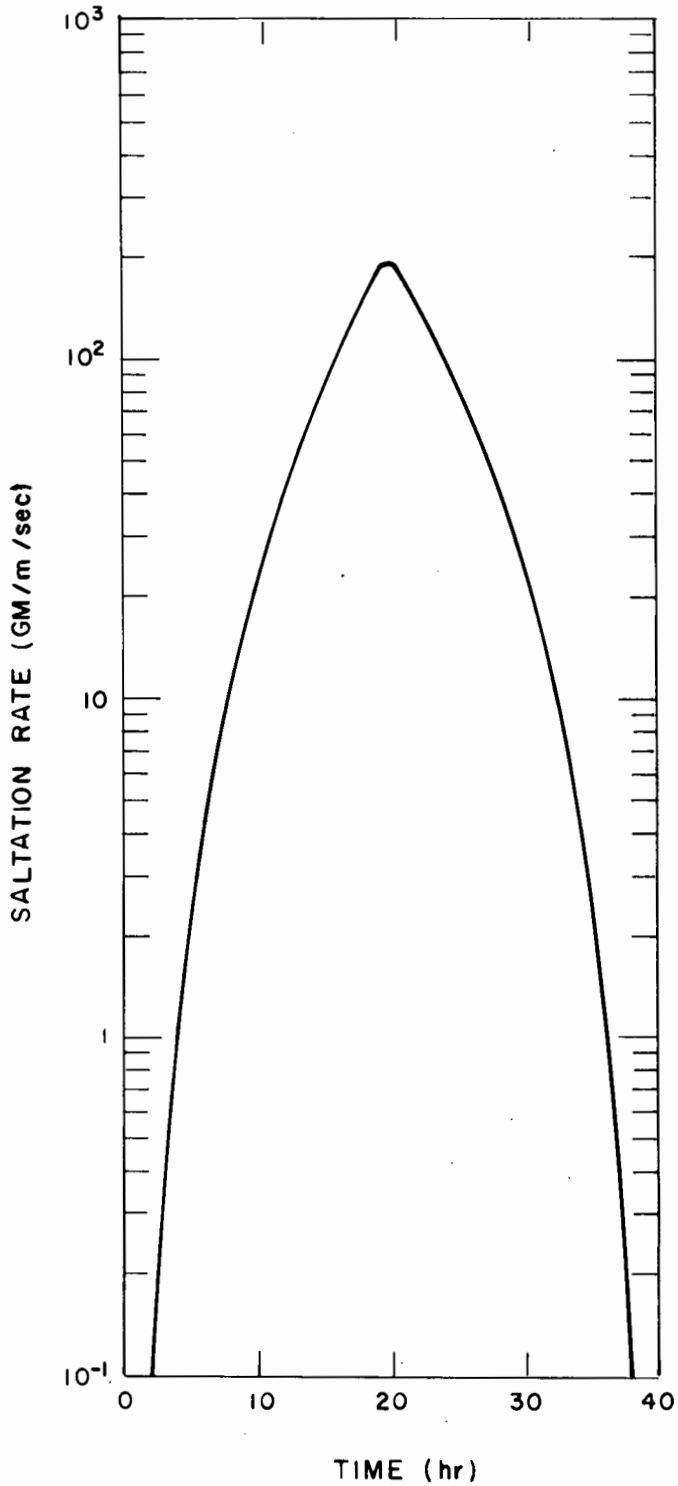

Fig. 2-4. Saltation as a function of time calculated from the wind speed curve shown in Fig. 2-3.

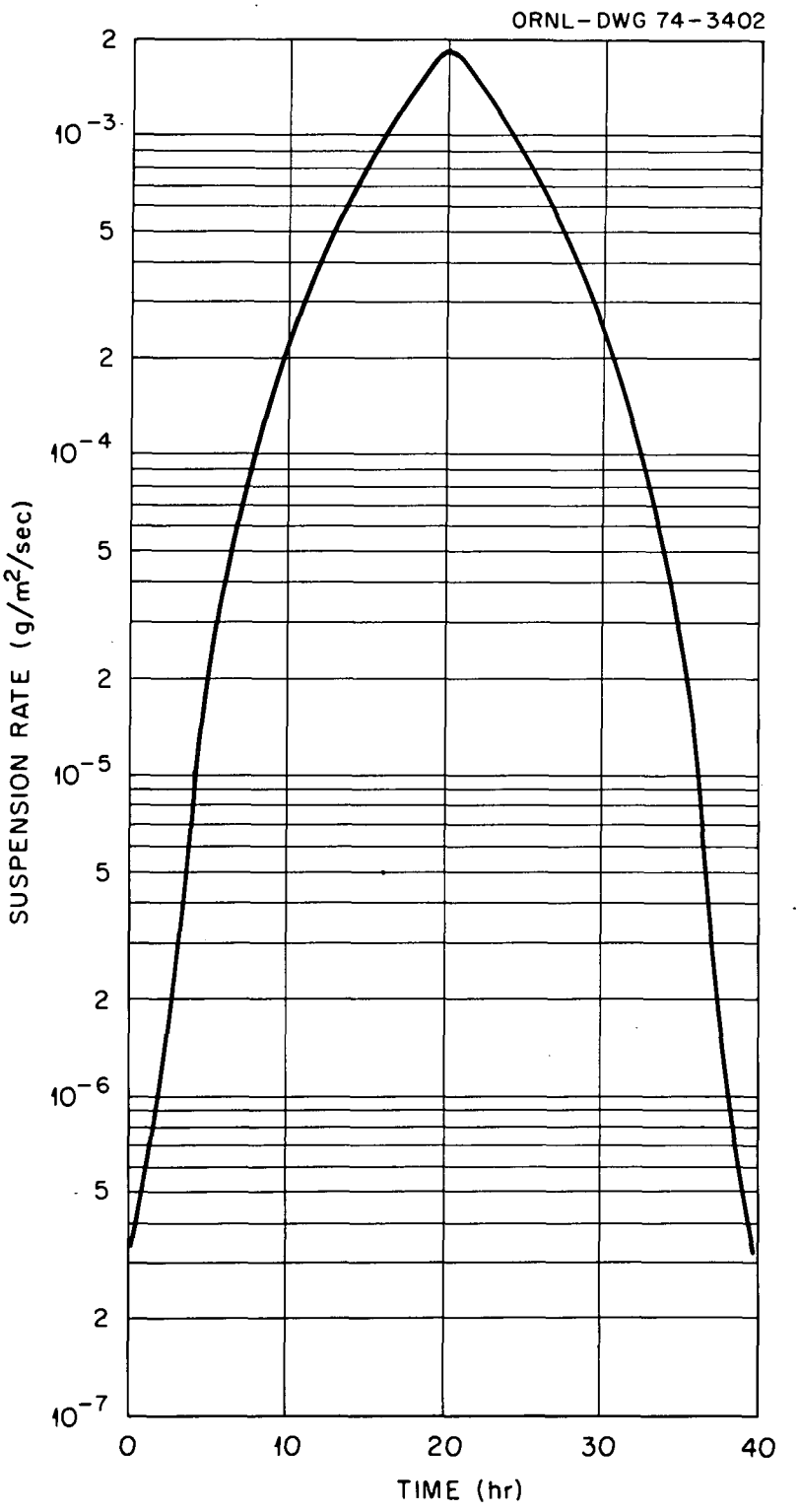

Fig. 2-5. Suspension rate for dust (0-5 microns) calculated from Eq. (2-9) and the saltation rate given by Fig. 2-4.

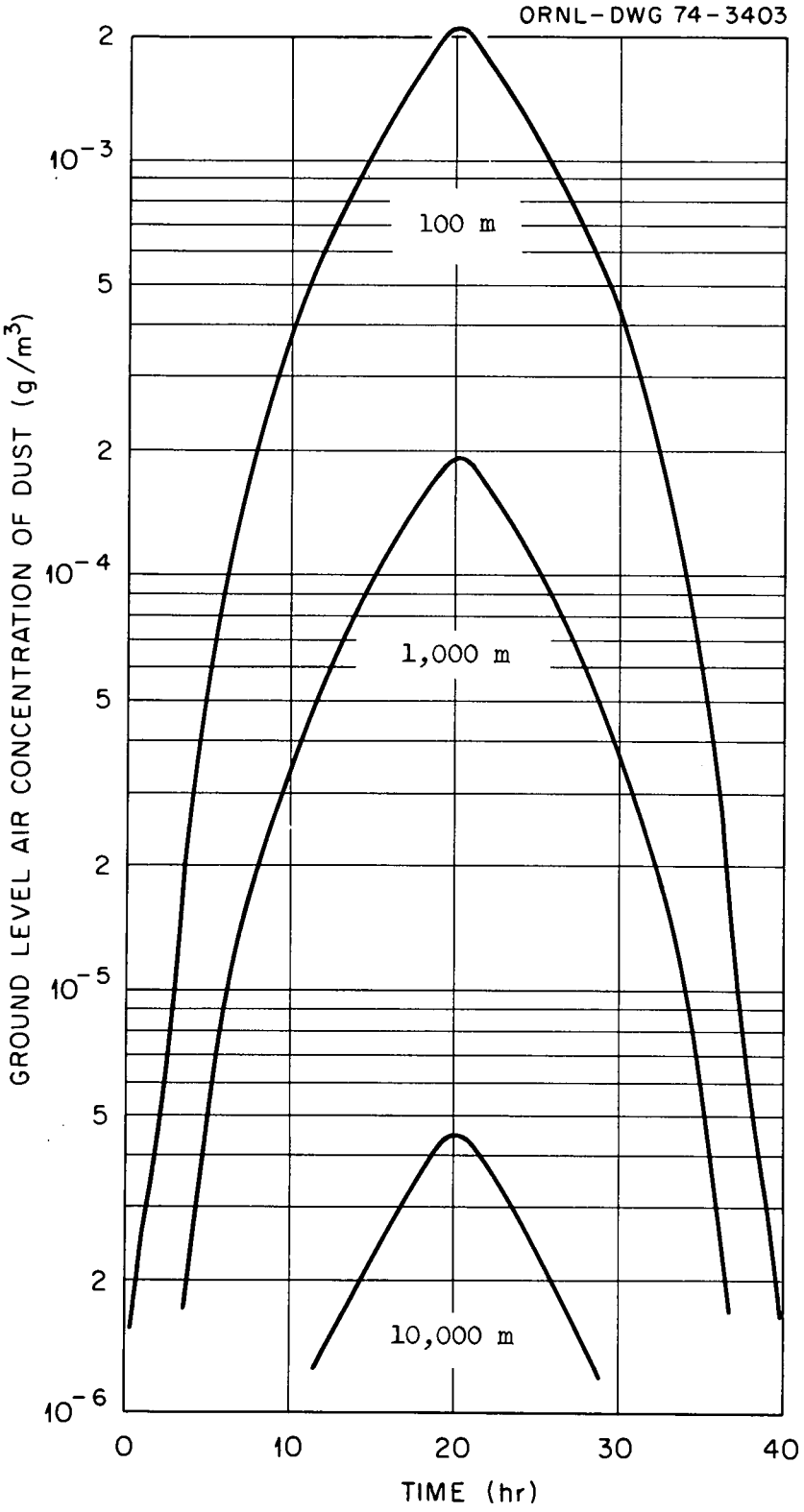

Fig. 2-6. Ground-level air concentrations of dust (average particle diameter 3 microns) at distances of 100, 1000, 10,000 m from the center of a square tailings area (200 m on a side).

or vehicle traffic over dry or hard surfaces) then there could be significant transport when the wind velocity was still too low to cause resuspension by the mode of saltation impact suggested here. The data for a typical problem solved by this resuspension code is shown in Table 2-4, with the output presented in Table 2-5.

For a second application of the model we shall consider Radium-226 ground level air concentrations measured in the vicinity of an actual uranium mill tailings pile at Tuba City, Arizona. This area was the subject of a four day study during May 1967 by the Southwestern Radiological Health Laboratory.[19] A diagram of the tailings area showing the location of three of the air sampling stations (1, 7, and 10) is given in Fig. 2-7. This figure also shows the average air concentrations of Radium-226 (in pCi/m^3) measured during the four-day period. The predominant wind direction at the site was reported to be from the west for most of the period and the wind speeds were estimated at 15 to 30 mi/hr. The Radium-226 concentration in the tailings material was reported to be 980 pCi/g. As shown in Fig. 2-7, the tailings area is composed of carbonate and acid tailings. The particle size distributions of acid and carbonate tailings from a similar area[a] are given below.

---

[a]Particle size distributions were determined from tailings samples collected from two acid leach and one carbonate leach mills.

Acid		Carbonate	
Diameter Range (microns)	Percentage	Diameter Range (microns)	Percentage
0-10	10	0-10	30
11-80	24	11-80	23
81-300	31	81-300	22
301-600	35	301-600	25

The suspension to saltation ratio and the deposition velocity for suspended particulates were again taken to be 10^{-5} m^{-1} and 1 cm/sec, respectively. The physical extent of the tailings area was approximated by fitting squares of different size. The "C" atmospheric stability was chosen for the calculation to approximate a sunny windy day. The predicted ground level air concentrations of Radium-226 at the three stations as a function of wind speed (measured at 1 m) are given in Fig. 2-8 in addition to the average measured concentrations for the four-day period. The predicted concentration for station 1 is low and the value for station 10 has been overestimated. One reason for this could be that the average wind direction during the period has a more northward component. In any case the results are not inconsistent with the model predictions, viz., estimated values are within a factor of 2 to 15 of observed, when we consider that the suspension to saltation ratio may easily vary by an order of magnitude from one site to another. Clearly any further modeling efforts in this area must await more accurate and detailed measurements of suspension fluxes in relation to meteorological events.

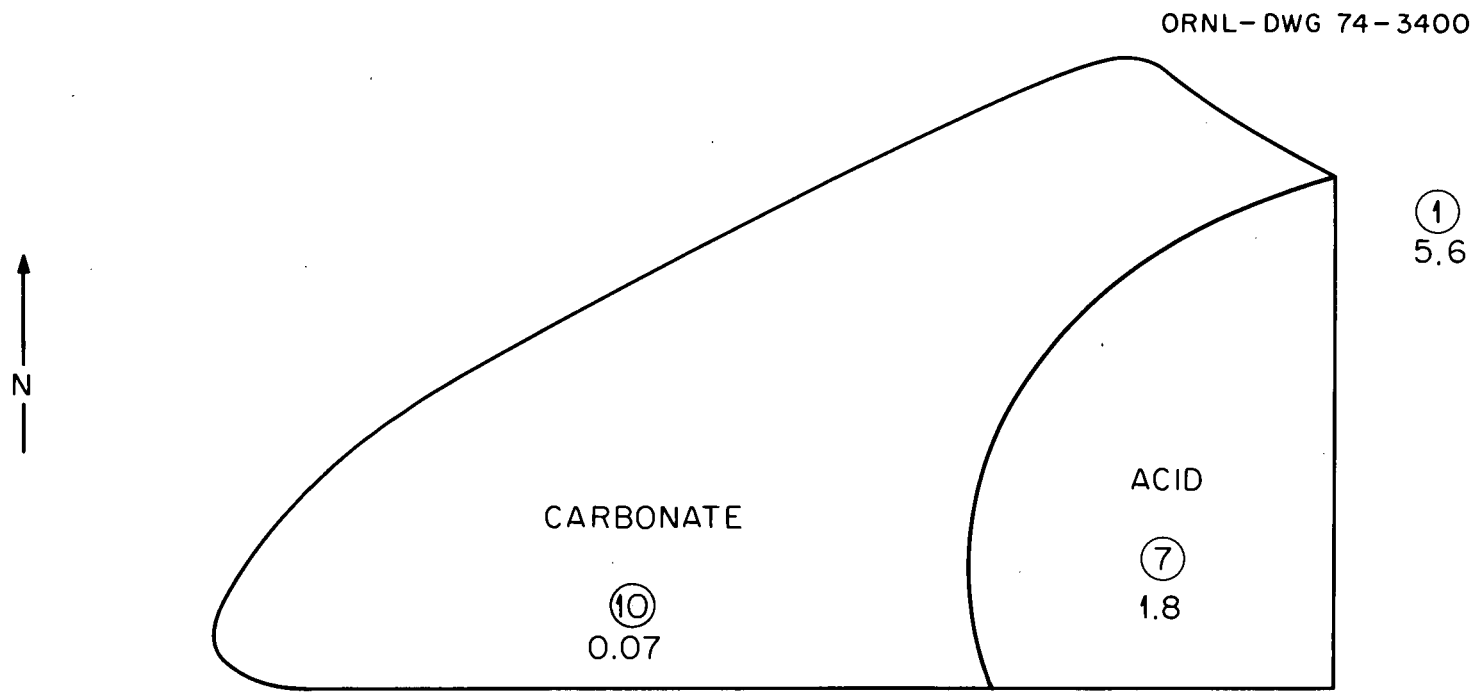

Fig. 2-7. Diagram of the Tuba City tailings area showing the location of air sampling stations (1, 7, and 10) in addition to average ground-level air concentrations of radium-226 in pCi/m^3. Dimensions of tailings pile approximately to the same scale given in Ref. 19.

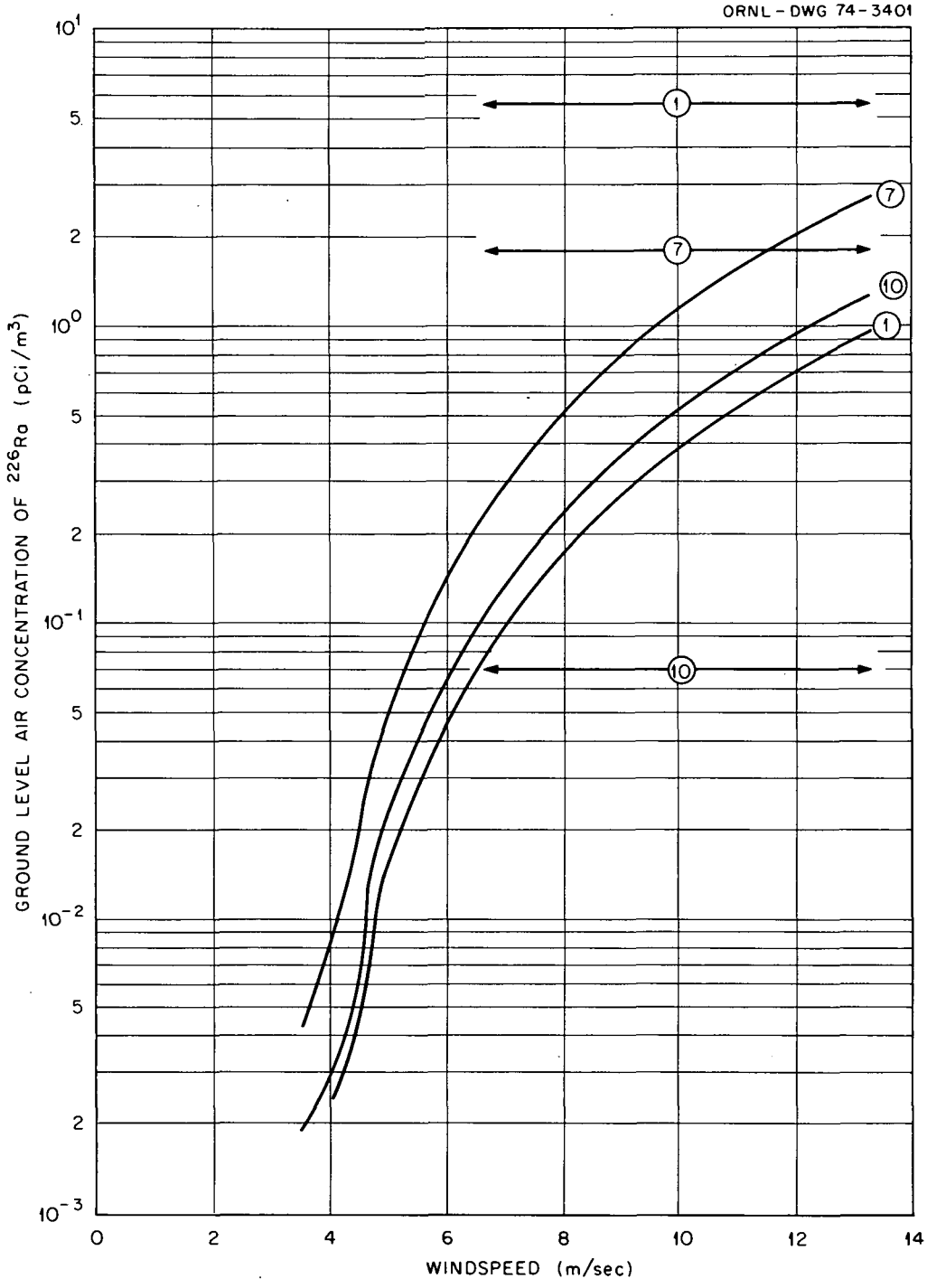

Fig. 2-8. Predicted concentrations of radium-226 activity in air for three stations near the Tuba City uranium mill for different wind speeds assuming a "C" stability. Also shown are the measured values for the stations.

2.3 Terrestrial Transport

2.3.1 Description of the TERMOD Computer Code

TERMOD[20] is a generalized systems analysis coupled-compartment code intended for predictions of radionuclide intakes by man through consumption of milk, beef, and plant parts contaminated directly by deposited radionuclides as well as by uptake from the soil. A standard data base for 75 radionuclides is included in the code. The code is sufficiently versatile for application to all radionuclides released to a variety of terrestrial environments, because the interactive nature of the code allows site- and nuclide-specific parameters to be specified from a remote terminal.

The code has been used in numerous estimates of transfer of radioactive materials through the terrestrial environment, including those required for environmental impact statements for nuclear facilities. The following sections are excerpted from the Proceedings of the Third National Symposium on Radioecology,[20] which describes the model in full.

The TERMOD code is written in BASIC language for use in a conversational mode at a remote terminal and is designed to be run on the DEC PDP-10 computer system.

2.3.1.1. Description of the Methodology

In developing the model illustrated by Fig. 2-9, we assumed that radionuclide deposition is the only source compartment and that man is

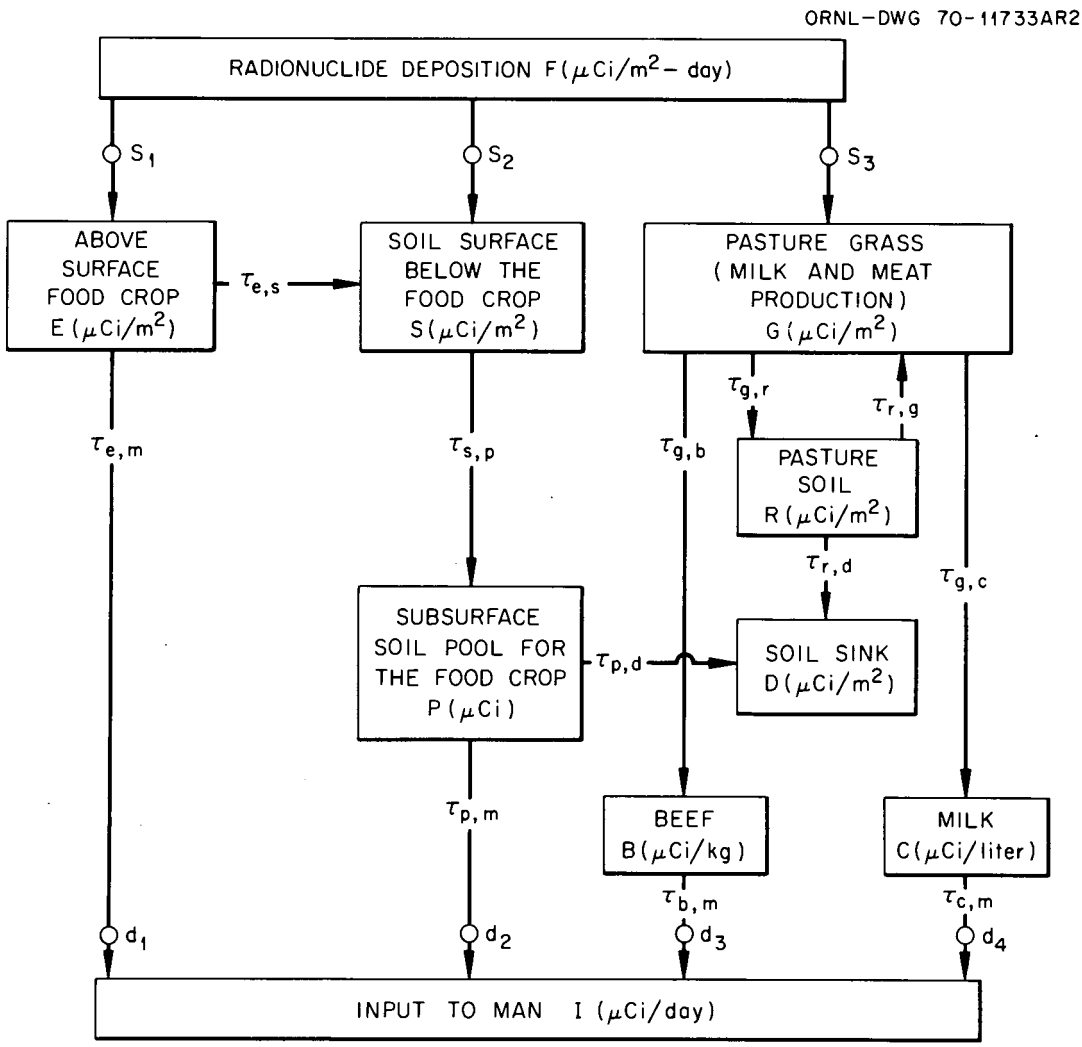

Fig. 2-9. Coupled compartment diagram of the terrestrial food pathways by which deposited radioactivity can be transferred to man.

the only receptor compartment of interest. Radioactivity is transferred from the source compartment to the receptor compartment (man) through three main food sources: food crops, meat, and milk. These foods could be produced at two different locations; that is, man's food crops could be produced at one location and his beef and milk at a different location. A fraction S_1 of the initial radionuclide input is deposited on the above-surface food crop, fraction S_2 is deposited on the soil surface not covered by this food crop, and fraction S_3 is deposited on the pasture grass.

The food crops include fruits, vegetables, and grains. The compartment labeled "Above-Surface Food Crop" includes all food crops exposed directly to the deposited radionuclides. Radioactivity in this compartment was considered to be immediately available for uptake by man. The radioactivity passes from the above-surface food crop compartment to the soil surface below with an environmental half-time of usually <30 days.[21] Passage from the soil surface compartment to the subsurface pool compartment can take several years. Transfer of radioactivity from this latter compartment provides the long-term source to man.

Feedback coupling from the subsurface pool to the above-surface food was not considered explicitly, since this pathway is included in the transfer from the subsurface pool to man. Movement of the radioactivity to a point below the root zone of the food crop is modeled as transfer from the subsurface soil pool to the soil sink.

Radioactivity can be transferred from pasture grass to man through his intake of beef or milk. In Fig. 2-9 a feedback loop to the grass through the soil compartment is included to account for the movement of radioactivity into the soil and its subsequent uptake by grass roots.

The radioactivity can also migrate below the root zone of the grass to the soil sink.

The subsurface pool and above-surface food compartments simulate two pathways (possibly by the same crop) by which man can ingest radioactivity through consumption of foods other than milk and meat. The pool compartment simulates uptake of radioactivity via the soil-root pathway, with equilibrium transfer to the edible food crop, and final consumption by man. The edible parts of the crop are implied in the transfer coefficient connecting the pool to man and are not explicitly included because of a lack of quantitative information for all nuclides and because of man's intake rate of radioactivity via this pathway is dominated by the dynamics of the pool compartment.

The above-surface food compartment simulates truck crops, fresh fruits, and other perishable foodstuffs growing at the time of initial deposition. Radioactivity enters the above-surface food crop by deposition and is retained either by external adhesion to, or foliar absorption into, the crop's edible parts. This crop was assumed to be continuously harvested during and after radionuclide deposition, with biomass removal balanced by crop growth.

If the food crop is completely harvested and stored a few days after radionuclide deposition, this can be simulated by setting to zero the transfer coefficient which connects the above-surface food to the bare soil. Crops planted on the contaminated land subsequent to the radionuclide deposition would not be contaminated by the above-surface food pathway in our model, since their above-ground edible portion would not be exposed to the initial deposition. These crops

would, however, be contaminated by root uptake of radioactivity which migrated into the subsurface pool compartment.

The milk compartment variable C(t) (μCi/liter) is the concentration of radioactivity in milk produced by a cow grazing on the contaminated pasture. This compartment simulates the udder of a cow. In this model the radioactivity is transferred from the grass directly to the milk. This simulation was used because the milk of grazing cows can be in transient equilibrium with the forage radioactivity after two days[22] and because data were not available to derive a more detailed milk-pathway model for each radionuclide.

The beef compartment variable B(t) (μCi/kg) is the radioactivity in the meat or muscle of cattle grazing on the contaminated pasture. As in the milk compartment, the transfer of radioactivity is directly from the grass to the meat. Radioactivity leaves the beef compartment because of radioactivity decay, biological elimination, and slaughter of the cattle. The mass in the beef compartment remains constant, because uncontaminated cattle are added to the herd, and growth of the cattle is assumed to balance the slaughter.

Each "d" factor, d_1, d_2, d_3, and d_4, is a product of dietary factors and decontamination factors. The dietary factors account for differences between the diet of the population under study and that of reference man. These variations may be due to factors such as age or ethnic characteristics. Decontamination factors include all losses of radioactivity between harvest and consumption. Physical mechanisms of decontamination include washing, peeling or shelling the above-surface food, cooking the meat, and processing the milk. Radioactive decay was expressed in the d factors

by the term $e^{-\lambda_R h_k}$, where h_k is the time in days between harvest and consumption of food from the kth pathway.

For most but not all situations, the calculations with TERMOD are probably conservative because (1) man's total food supply was derived from the contaminated land, (2) radioactivity transfers from the immediate environment by wind redistribution, water runoff, etc., were neglected, (3) the entire food needs of the cattle were derived from the contaminated pasture, and (4) the only loss mechanisms included were radioactive decay, movement to the soil sink, and metabolic turnover in the cattle.

However, several, sometimes nonconservative, simplifying assumptions were made. For example, the only feedback loop modeled explicitly is from pasture soil to pasture grass. Cattle excretions were not returned to the pasture soil, and feedback in the food crop-soil subsystem was incorporated into the direct transfer from pool to man. Likewise, radioactivity uptake by cattle from air inhalation and water consumption was neglected. These assumptions were made because (1) more detailed modeling efforts on selected nuclides (^{131}I, ^{137}Cs, and ^{90}Sr) indicated they were of second-order importance,[22] and (2) inclusion of more feedback loops would require more elaborate modeling, particularly of the cattle-pasture subsystem for which coefficients were unavailable for many nuclides.

2.3.1.2 Model Equations

Three transfer coefficients, $\tau_{g,b}$, $\tau_{g,c}$, and $\tau_{p,m}$ (Fig. 2-9), were considered a function of the element being modeled (i.e., the

numerical value assigned each of these coefficients is different for each element). Conversely, the transfer coefficient $\tau_{e,m}$ was not considered a function of each element, but since it was derived from several parameters, its derivation is included below. A single value or a set of values was selected for the rest of the transfer coefficients (i.e., they were not considered a function of the radionuclide). These were selected with the objective that (1) the model be realistically conservative, (2) the dependent variables simulate a realistic dynamic behavior, and (3) the biomass and radioactivity be conserved. That not all of the transfer coefficients were different for each element or radionuclide reflects a lack of quantitative information about the movement of all radionuclides to man by the pathways considered.

Formulation of the system equations. The equations (definitions of the terms, their units, and sample numerical values if constant are given in Table 2-6) describing the transfer of deposited radionuclides to man as depicted in Fig. 2-9 are:

$$\frac{dE}{dt} = (S_1)F(t) - \left(\lambda_R + \frac{\tau_{e,m}}{A} + \tau_{e,s}\right)E \ , \qquad (2\text{-}13)$$

$$\frac{dS}{dt} = \tau_{e,s}E - (\lambda_R + \tau_{s,p})S + (S_2)F(t) \ , \qquad (2\text{-}14)$$

$$\frac{dP}{dt} = A\tau_{s,p}S - (\lambda_R + \tau_{p,m} + \tau_{p,d})P \ , \qquad (2\text{-}15)$$

$$\frac{dG}{dt} = S_3F(t) - \left(\lambda_R + \tau_{g,r} + \frac{V_c}{A_g D_g}\right)G + \tau_{r,g}R \ , \qquad (2\text{-}16)$$

$$\frac{dR}{dt} = \tau_{g,r}G - (\lambda_R + \tau_{r,g} + \tau_{r,d})R \ , \tag{2-17}$$

$$\frac{dD}{dt} = \tau_{r,d}R + \frac{\tau_{p,d}}{A} P - \lambda_R D \ , \tag{2-18}$$

$$\frac{dC}{dt} = \tau_{g,c}G - (\lambda_R + \tau_{milk})C \ , \tag{2-19}$$

$$\frac{dB}{dt} = \tau_{g,b}G - (\lambda_R + \tau_{beef})B \ , \tag{2-20}$$

$$I = d_1\tau_{e,m}E + d_2\tau_{p,m}P + d_3\tau_{b,m}B + d_4\tau_{c,m}C \ , \tag{2-21}$$

$$\frac{dM}{dt} = I - (\lambda_R + \lambda_e)M \ , \tag{2-22}$$

$$F(t) = F_0\delta(t) \ . \tag{2-23}$$

These equations express the change with time of the radioactivity in each compartment as the difference between inputs to the compartment and losses from the compartment. Each gain or loss term in the equation for a compartment is represented in Fig. 2-9 as a connecting arrow between that compartment and another compartment with its corresponding transfer coefficient.

<u>Derivations of $\tau_{p,m}$, $\tau_{g,c}$, and $\tau_{g,b}\cdot\tau_{p,m}$.</u> The transfer coefficient $\tau_{p,m}$ was derived for standard man ($d_2 = 1$) from the ratio of the equilibrium concentrations of stable nuclides in soil to their total-body concentrations in man as reported by Ng et al.[23] and the ICRP,[24] respectively. A constant source Q of a particular nuclide was substituted for $A\tau_{s,p}S$ as the input to the subsurface pool, and equilibrium

conditions were established in this compartment and in man, with $\tau_{e,m}$, $\tau_{c,m}$, and $\tau_{b,m}$ set equal to zero to ensure conservatism in the model. The expression for the equilibrium concentration in the subsurface pool and the expression for the equilibrium concentration in man were determined from the time-dependent forms of Eqs. (2-15) and (2-22):

$$0 = Q - (\tau_{p,m} + \tau_{p,d})P_{eq} , \qquad (2\text{-}24)$$

$$0 = \tau_{p,m}P_{eq} - \lambda_e M_{eq} , \qquad (2\text{-}25)$$

where λ_R is zero, since the stable form of the element was considered in this derivation. Units of grams were used for P_{eq} and M_{eq} in our determination of the transfer rate of the stable element from the soil to man. Equation (2-25) was solved for $\tau_{p,m}$:

$$\tau_{p,m} = (M_{eq}/P_{eq})\lambda_e , \qquad (2\text{-}26)$$

where we assumed that λ_e would not be changed by the slight additional intake of the nuclide in question.

To determine M_{eq} and P_{eq}, the gram weight of soil available per man for food production was defined as V_s, the gram weight of the nuclide of interest in the soil per 10^6 g of soil as C_s, the density of the soil as ρ (1.4 g/cm^3), the surface area required per man for food crops as A (10^3 m^2), and the plow layer depth as d (20 cm).

The equation for V_s was written as

$$V_s = A(m^2/\text{person}) \times 10^4(cm^2/m^2) \times d(cm) \times \rho(g/cm^3) = 2.8 \times 10^8 \text{ g/person} . \qquad (2\text{-}27)$$

From the definition of C_s, the relationship between P_{eq} and V_s is

$$P_{eq} = \left(\frac{C_s}{10^6}\right) V_s \ . \qquad (2\text{-}28)$$

The values of C_s were taken from Table 4 of the report by Ng et al.[23] The values of M_{eq} for most of the nuclides are listed in Table 6 of the report by the ICRP,[24] and they apply to a 70-kg standard man. The values of M_{eq} for nuclides not included in this table were derived from the equation

$$M_{eq} = (C_B) \times 70 \times 10^3/10^6 \ , \qquad (2\text{-}29)$$

where the values for C_B, the elemental concentrations in man (ppm), were taken from Table 5C of Ng's handbook.

For this derivation of $\tau_{p,m}$ we assumed that man's total dietary needs were supplied by the pool, which is correct for $d_1 = d_3 = d_4 = 0$ but conservative for any other diet. This conservatism can be removed (except perhaps for water) by stipulating that man's dietary needs be balanced by his ingestion, which requires that $I_{eq} = \lambda_e M_{eq}$ [$dM/dt = \lambda_R = 0$ in Eq. (2-22)] and places a constraint upon the d factors.

$\underline{\tau_{g,c}}$. Derivation of $\tau_{g,c}$ required consideration of the intake of radioactivity by a cow. The term G/D_g(μCi/kg) is the radioactivity per dry weight (kg) of grass. Multiplication of this term by V_c, the dry weight of grass consumed by a cow each day (kg/day), yields the amount of radioactivity transferred to a cow each day from consumption of grass.

The loss term from the grass compartment due to grass consumption by a cow is expressed on a per-unit-area basis as required in Eq. (2-16)

by division by A_g, the pasture area utilized per cow (10^4 m^2). Growth of grass is assumed to balance this loss of grass from grazing by the cow.

The units of $\tau_{g,c}$ are m^2/liter-day, and this transfer coefficient must include a factor that represents the fraction of the total uptake of a particular nuclide that is transferred to the udder per liter of milk in the udder. The total uptake by a cow has been shown to be $(V_c/D_g)G$. Thus $\tau_{g,c}$ is some fraction f_m' times (V_c/D_g) divided by U, the udder capacity in liters. The constant f_m' for each nuclide was derived from the tabulated values of f_m in Table 3 of Ng et al.[23] Parameter f_m is defined by the expression

$$f_m \text{ (days/liter)} = \frac{\text{kg of element in milk}}{\text{liter of milk}} \Bigg/ \frac{\text{kg of element input to cow}}{\text{day}}$$

Multiplication of f_m by the milk produced per cow per day, V_m (liters/day), yields

$$f_m' \text{ (dimensionless)} = V_m f_m = \frac{\text{kg of element in milk}}{\text{day}} \Bigg/ \frac{\text{kg of element input to cow}}{\text{day}}$$

which is the fraction desired. The expression for $\tau_{g,c}$ is

$$\tau_{g,c}\left(\frac{m^2}{\text{liter-day}}\right) = \frac{f_m V_m}{U}\left(\frac{V_c}{D_g}\right) = 2.0\left(f_m \frac{V_c}{D_g}\right), \qquad (2\text{-}30)$$

since $V_m/U = 2.0$.

$\underline{\tau_{g,b}}$. The transfer coefficient $\tau_{g,b}$ was derived from the equilibrium concentrations of the elements in grass and in beef. We defined M_b as the mass of beef (muscle) on a steer at slaughter and f_b as the fraction of a steer's elemental uptake that is used in producing meat. Then

$$\tau_{g,b}\left(\frac{m^2}{kg\text{-}day}\right) = \frac{f_b(V_c/D_g)}{M_b} . \qquad (2\text{-}31)$$

To determine f_b, the increase with time of the mass of an element in the steer's muscle was expressed as

$$\frac{dM_m}{dt} C_b = \text{net input} = V_c\left(\frac{kg}{day}\right) \times C_p f_b , \qquad (2\text{-}32)$$

where M_m is the mass of the steer's muscle, C_p is the concentration of the same element in grass as listed in Table 10A by Ng et al.,[23] and C_b is the concentration of that element in beef as listed in Table 10B by Ng et al. The dry weight of feed resulting in a reasonable average weight gain of ∿0.4 kg/day for an ∿450-kg fattening steer is given by Morrison[25] as ∿10 kg. When this situation exists, dM_m/dt equals a constant value, that is, K_b (kg/day), and Eq. (2-32) can be solved for f_b:

$$f_b = K_b C_b / 4 V_c C_p . \qquad (2\text{-}33)$$

The factor 4 in Eq. (2-33) is included here for convenience and converts V_c from dry weight to wet weight (assuming dry weight is 25% of wet weight), which makes V_c comparable to K_b.

A second determination of f_b was made when the stable-nuclide excretion rate from the steer's muscle τ_{exc} was known. Equilibrium conditions were assumed in the grass and meat compartments, and Eq. (2-20) (with $\lambda_R = 0$, τ_{beef} replaced with τ_{exc}, and $dB/dt = 0$) was solved for B_{eq}:

$$B_{eq} = \tau_{g,b} G_{eq} / \tau_{exc} \ , \qquad (2\text{-}34)$$

where B_{eq} is grams of the stable nuclide per wet kg of beef, and G_{eq} is grams of the stable nuclide in a square meter of grass. Substitution of (2-31) into Eq. (2-34) and use of the expressions

$$G_{eq} = 4 D_g C_p / 1000 \ , \qquad (2\text{-}35)$$

$$B_{eq} = C_b / 1000 \qquad (2\text{-}36)$$

yielded the second expression from which f_b was determined:

$$f_b = M_b \tau_{exc} C_b / 4 C_p V_c . \qquad (2\text{-}37)$$

Equation (2-33) was derived by assuming that dilution of the nuclide concentration in beef as due only to the steer's growth. Equation (2-37) was derived by applying the additional assumption of nuclide excretion from the steer's muscle, which is primarily a metabolic property. Thus, K_b/M_b is a lower limit for τ_{exc} in a fattening steer, since the former expression neglects metabolic turnover.

Thus two sets of constants were available for use in Eq. (2-20): (1) τ_{beef} and $\tau_{g,b}$ as determined by Eqs. (2-31) and (2-33), and (2) τ_{exc} replacing τ_{beef} and $\tau_{g,b}$ as given by Eqs. (2-31) and (2-37). If $K_b/M_b \approx \tau_{beef}$ (i.e., cattle growth balances slaughter), then the time-integrated, total μCi input to man by the meat pathway is the same

with either set of constants. With $K_b/M_b = 0.002$ and $\tau_{beef} = 0.00381$, use of the first set of constants predicts approximately twice the time-integrated, total μCi input to man as does use of the second set of constants. Also, since $\tau_{exc} > K_b/M_b$, a lower uptake rate would be predicted by the first set of constants than by the second set. The second set of constants would more nearly predict the correct dynamics of the uptake, since τ_{exc} is an experimentally measured quantity. The second set of constants is preferred, because their use enables a more realistic estimate of the total uptake of the radionuclide.

Derivation of $\tau_{e,m}$. The transfer of radioactivity from the above-surface food compartment to man has units of μCi/day. Thus $\tau_{e,m}$ must have units of m^2/day [see Eq. (2-21)]. With an intake of food by man of V in units of kg/day, an areal density of the food crop of D_f (kg/m^2), and a food-growing surface area per man of A (m^2), this source to man becomes

$$\tau_{e,m}\left(\frac{m^2}{d}\right) \times E\left(\frac{\mu Ci}{m^2}\right) = \frac{V\left(\frac{kg}{day}\right) \times E\left(\frac{\mu Ci}{m^2}\right)}{D_f\left(\frac{kg}{m^2}\right)} \qquad (2\text{-}38)$$

The term E/D_f is the concentration of radioactivity (μCi/kg) deposited on the above-surface food crop. The loss term from the above-surface food compartment is $\tau_{e,m}/A$. From the numerical values assigned to V, D_f, and A, the value of $\tau_{e,m}/A$ is 0.0025, or 0.25% of the above-surface food was assumed to be consumed by a man each day. This loss in mass was assumed to be replaced by new growth of the food crop.

We also assumed that the above-surface food is harvested continuously and uniformly over the area A. If this latter assumption is not true,

and if $\tau_{e,m}/A$ is comparable in magnitude to $\lambda_R + \tau_{e,s}$, then this model should be modified to account for the way in which the above-surface food is grown and harvested.

Transfer coefficients not treated as a function of the element. Many of the coefficients in this model were assigned numerical values that were the same for all elements and radionuclides because (1) data were not available for each element from which unique transfer coefficients could be calculated; (2) the transfer for which the coefficient applied was a biomass transfer that was independent of the element or radionuclide under study; and (3) although a unique transfer coefficient could have been calculated for each element, this transfer coefficient would have had a negligible effect on the total input to man of the radionuclide under study. The main objective in the selection of transfer coefficients not treated as a function of the element was that they be reasonable and conservative.

When the total transfer of a radionuclide to man was highly dependent on any fixed transfer coefficient (one that was not a function of the element), the transfer was calculated several times using a range of values for this transfer coefficient. For example, rather than determining a value of $\tau_{s,p}$ for each nuclide, we calculated I(t) for three standard $\tau_{s,p}$ values of 0.0693, 0.00693, and 0.000693.

A 14-day environmental half-time was assumed for the transfer from the grass to the soil and from the food crop to the soil surface.[26] This assumption enabled determination of $\tau_{g,r}$ and $\tau_{e,s}$. Feedback of the radioactivity from the soil compartment was assumed to be 1% year,[27] which determined $\tau_{r,g}$. A loss rate of 4%/year from the soil compartments

to the soil below the roots was included in the model as transfer to the soil sink[27] which enabled determination of $\tau_{p,d}$ and $\tau_{r,d}$.

The parameter τ_{milk} (2.0 days^{-1}) signifies that the udder is emptied of milk twice each day, and τ_{beef} signifies that a fraction of the beef herd is continuously being slaughtered. The total mass in the compartment is constant, because uncontaminated steers were assumed to be added to the herd to balance the slaughter. The transfer coefficients $\tau_{c,m}$ and $\tau_{b,m}$ apply to a standard diet consisting of a daily intake of 1 litter of milk and 0.3 kg of beef. The numerical values for the fixed coefficients and their units are included in Table 2-6.

Solution of the equations. The time-dependent input to man of activity I(t) is

$$
\begin{aligned}
I(t) = {} & d_1 S_1 \tau_{e,m} F_0 e^{-\lambda_a t} - \frac{S_1 A \tau_{s,p} \tau_{e,s} F_0 \tau_{p,m} d_2}{(\lambda_s - \lambda_p)(\lambda_a - \lambda_s)(\lambda_p - \lambda_a)} \Big[(\lambda_a - \lambda_s) e^{-\lambda_p t} \\
& + (\lambda_p - \lambda_a) e^{-\lambda_s t} + (\lambda_s - \lambda_p) e^{-\lambda_a t} \Big] + \frac{S_2 A \tau_{s,p} F_0}{(\lambda_s - \lambda_p)} d_2 \tau_{p,m} \left(e^{-\lambda_p t} - e^{-\lambda_s t} \right) \\
& + d_4 S_3 \tau_{c,m} F_0 \tau_{g,c} \left[\frac{(\lambda_c - \lambda_r)(\lambda_1 - \lambda_2) e^{-\lambda_c t} + (\lambda_1 - \lambda_r)(\lambda_2 - \lambda_c) e^{-\lambda_1 t}}{(\lambda_c - \lambda_1)(\lambda_1 - \lambda_2)(\lambda_2 - \lambda_c)} \right. \\
& \left. + \frac{(\lambda_2 - \lambda_r)(\lambda_c - \lambda_1) e^{-\lambda_2 t}}{(\lambda_c - \lambda_1)(\lambda_1 - \lambda_2)(\lambda_2 - \lambda_c)} \right] + S_3 \tau_{b,m} F_0 \tau_{g,b} d_3 \\
& \times \left[\frac{(\lambda_b - \lambda_r)(\lambda_1 - \lambda_2) e^{-\lambda_b t} + (\lambda_1 - \lambda_r)(\lambda_2 - \lambda_b) e^{-\lambda_1 t} + (\lambda_2 - \lambda_r)(\lambda_b - \lambda_1) e^{-\lambda_2 t}}{(\lambda_b - \lambda_1)(\lambda_1 - \lambda_2)(\lambda_2 - \lambda_b)} \right]
\end{aligned}
\tag{2-39}
$$

where

$$
\lambda_1 = \frac{(\lambda_g + \lambda_r) + \sqrt{(\lambda_g + \lambda_r)^2 - 4(\lambda_g \lambda_r - \tau_{r,g} \tau_{g,r})}}{2} \tag{2-40}
$$

$$\lambda_2 = \frac{(\lambda_g + \lambda_r) - \sqrt{(\lambda_g + \lambda_r)^2 - 4(\lambda_g\lambda_r - \tau_{r,g}\tau_{g,r})}}{2} , \qquad (2\text{-}41)$$

$$\lambda_r = \lambda_R + \tau_{r,g} + \tau_{r,d} , \qquad (2\text{-}42)$$

$$\lambda_c = \lambda_R + \tau_{milk} , \qquad (2\text{-}43)$$

$$\lambda_b = \lambda_R + \tau_{beef} , \qquad (2\text{-}44)$$

$$\lambda_a = \lambda_R + \frac{\tau_{e,m}}{A} + \tau_{e,s} , \qquad (2\text{-}45)$$

$$\lambda_p = \lambda_R + \tau_{p,m} + \tau_{p,d} , \qquad (2\text{-}46)$$

$$\lambda_s = \lambda_R + \tau_{s,p} , \qquad (2\text{-}47)$$

$$\lambda_g = \lambda_R + \tau_{g,r} + \frac{V_c}{A_g D_g} . \qquad (2\text{-}48)$$

2.3.1.3 Parameters

The parameters, other than the radioactive half-life, used to estimate the intake of radioactive materials and the movement of radioactivity through the terrestrial environment are either element dependent or independent. Element-dependent parameters are shown in Table 2-7, and the intake values which were used in the dose calculations are presented in Table 2-8.

2.3.1.4 Carbon-14 and Tritium

The environmental transport and dosimetry of ^{14}C and tritium require special treatments, which are discussed in the following paragraphs.

Tritium. Estimates of radiation doses due to dietary intake of ^3H are made with the following assumptions.

Tritium is released into the atmosphere, which is assumed to have an average specific humidity of 8 g H_2O (= 0.889 g H) per cubic meter. This leads to a hydrogen specific activity of

$$\frac{\chi \text{ Ci m}^{-3}}{(0.889 + \chi \cdot 1.04 \times 10^{-4}) \text{ g H m}^{-3}} \simeq 1.12\chi \text{ Ci (g H)}^{-1}$$

where 1.04×10^{-4} is the number of grams of hydrogen per Ci of ^3H.

Man's daily water intake is 1300 g (145 g H) in food and 1200 g (134 g H) in drinking water. If food is assumed to be in equilibrium with the specific activity of ^3H in the atmosphere, the annual dose rate from tritium per unit atmospheric concentration (χ = 1 Ci m^{-3}) is

$$\begin{aligned} &1.12 \text{ Ci (g H)}^{-1} \times 145 \text{ g H d}^{-1} \times 10^6 \ \mu\text{Ci Ci}^{-1} \times 365 \text{ d yr}^{-1} \\ &\quad \times \ 6.156 \times 10^{-5} \text{ rem } (\mu\text{Ci ingested})^{-1} \times 10^3 \text{ mrem rem}^{-1} \\ &\quad = 3.65 \times 10^9 \text{ mrem yr}^{-1} \ (\text{Ci m}^{-3})^{-1}. \end{aligned}$$

If drinking water is assumed to be in equilibrium with the atmospheric specific activity of ^3H, the corresponding dose-rate factor is 3.37×10^9 mrem yr^{-1} per Ci m^{-3}.

For generic dose calculations in which the source and amount of drinking water available is unknown, it is assumed that atmospheric ^3H is diluted by a factor of 10^2. Therefore the dose rate for ^3H ingested via food and drinking water is 3.68×10^9 mrem yr^{-1} per Ci m^{-3}.

Carbon-14. The method used for calculating the radiation dose to man from a steady release of ^{14}C into the atmosphere as CO_2 is based on the assumption that the specific activity in human tissue is equal to the average steady-state value in the atmosphere. About 99% of the resulting dose is attributable to the ingestion (dietary) exposure mode.

It is assumed that the atmosphere contains 0.16 g C m^{-3} and that 1 Ci ^{14}C = 0.223 g C. Then the ^{14}C activity per g C in the atmosphere is

$$\chi/(0.16 + \chi \cdot 0.223) \simeq \chi/0.16 \quad \text{Ci (g C)}^{-1} ,$$

where χ is the concentration of ^{14}C in the atmosphere (Ci m^{-3}).

An organ of man in steady-state equilibrium with this atmospheric specific activity will have a burden B (μCi) of ^{14}C expressed by

$$B = 10^6 M_C \chi/0.16 = (6.25 \times 10^6) M_C \chi \quad (\mu\text{Ci}) ,$$

where 10^6 = μCi Ci^{-1} and M_C = g C in the organ. Dose-rate factors calculated for χ = 1 Ci m^{-3} are as follows:

Reference organ	mrem yr^{-1} / Ci m^{-3}
Total body	1.28×10^{12}
Skeleton	
Bone	7.90×10^{11}
R. marrow	2.22×10^{12}

Reference organ	mrem yr^{-1} / Ci m^{-3}
Lung	5.60×10^{11}
Liver	8.09×10^{11}
Kidneys	7.24×10^{11}
Spleen	6.22×10^{11}
Thyroid	5.87×10^{11}
Testes	4.97×10^{11}
G. I. tract	1.03×10^{12} [a]

[a]Dose is delivered by contents of lower intestine plus ^{14}C content of the tissue.

2.3.1.5 TERMOD Sample Problem

A representative printout of a TERMOD estimate of intake and intake rate of ^{131}I is shown in Table 2-9.

2.4 Movement of Radioactive Material in Underground Water Seepage

One of the pathways by which liquid radioactive materials may be transported in the environment is by their movement through the soil into groundwater. This pathway need not be considered for nuclear fuel reprocessing plants where there is no liquid effluent, but it must be considered where there may be underground seepage, such as beneath uranium mill tailings ponds.

A two-part computer code,[28,29] SOGMOD, was developed by J. O. Duguid and M. Reeves to predict the time-spatial relationships of contaminant transport by groundwater. The first part provides numerical solution to the equation governing moisture infiltration and redistribution in unsaturated-saturated media; the second part gives numerical solution to the contaminant transport equation. Both parts use Galerkin finite-element methods to obtain numerical solutions of the governing equations. The velocity output of the first part is used in the second part. In this analysis both adsorption and radioactive decay are considered. The output from SOGMOD is the concentration of a given radionuclide at nodal points within a cross section at successive time increments.

SOGMOD is written in FORTRAN IV for an IBM 360-91 computer system.

2.4.1 Model Equations

The saturated-unsaturated flow equations that govern the flow of water through the porous medium are

$$\nabla \cdot [\overline{\overline{K}}(h) \cdot (\nabla h + \nabla z)] = [\frac{\theta}{n} \alpha' + \theta \beta' + \frac{d\theta}{dh}] \frac{dh}{dt} \qquad (2\text{-}49)$$

and

$$\overline{V} = \overline{\overline{K}} \cdot \nabla(h + z)$$

where

α' = modified coefficient of compressibility of the granular skeleton (cm^{-1}),

β' = modified coefficient of compressibility of water (cm^{-1}),

θ = moisture content by volume,

$\frac{d\theta}{dh}$ = specific moisture capacity (cm^{-1}),

h = pressure head (cm),

$\overline{\overline{K}}$ = hydraulic conductivity tensor (cm/sec),

n = porosity,

t = time (sec),

$\overline{V}$ = velocity vector (cm/sec),

z = elevation head (cm).

The equation is nonlinear because of the functional relationship of the moisture content and conductivity coefficients and thus an analytical solution may not be obtained. However, the computer code, which uses Galerkin's method in conjunction with finite elements, allows a numerical solution of this equation.

The transport equation which governs the movement of radionuclides through the medium is shown as Eq. (2-50):

$$(1 + K_d \rho_b/n) \frac{\partial}{\partial t} (\theta C) = \nabla \cdot (\theta \overline{\overline{D}} \cdot \nabla C) - \nabla \cdot (\overline{V} C) - (1 + K_d \rho_b/n) \cdot (\alpha' \frac{\partial h}{\partial t} + \lambda) \theta C \qquad (2\text{-}50)$$

where

λ = decay constant of the tracer,

ρ_b = bulk density of the medium (g/cm^3),

C = mass of tracer per unit volume of fluid ($\mu Ci/ml$),

$\overline{\overline{D}}$ = coefficient of dispersion (cm^2/sec),

K_d = distribution coefficient (ml/g),

t = time (sec), and

$\overline{V}$ = fluid velocity vector (cm/sec).

2.4.2 Sample Problems

Sample problems which demonstrate the use of SOGMOD, as well as full listings of both component computer codes, appear in the two ORNL technical reports[28,29] which describe in full detail this methodology for predicting the time-spatial relationships of contaminant transport by groundwater.

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TABLES FOR CHAPTER 2

TABLE 2-1 RADIONUCLIDE-INDEPENDENT VARIABLES FOR AIRDOS

LIST OF INPUT VALUES FOR RADIONUCLIDE-INDEPENDENT VARIABLES

NUMBER OF NUCLIDES CONSIDERED	2
INHALATION RATE OF MAN (CUBIC CENTIMETERS/HR)	0.8330E 06
DILUTION FACTOR FOR WATER FOR SWIMMING (CM)	0.1524E 03
FRACTION OF TIME SPENT SWIMMING	0.1000E-01
SOIL SURFACE AREA REQUIRED TO FURNISH FOOD CROPS FOR ONE MAN (SQUARE METERS)	0.1000E 04
PASTURE AREA PER COW (SQUARE METERS)	0.1000E 05
DRY WEIGHT AREAL DENSITY OF MANS ABOVE-SURFACE FOOD (KGS PER SQUARE METER)	0.1000E 00
DRY-WEIGHT AREAL GRASS DENSITY (KGS PER SQUARE METER)	0.1500E 00
DEPTH OF PLOW LAYER (CM)	0.2000E 02
RATE OF INCREASE OF STEER MUSCLE MASS (KG PER DAY)	0.4000E 00
MUSCLE MASS OF STEER AT SLAUGHTER (KG)	0.2000E 03
SOIL DENSITY (GRAMS PER CUBIC CENTIMETER)	0.1400E 01
FALLOUT CORRECTION FACTOR FOR ABOVE-SURFACE FOOD	0.1000E 00
FALLOUT CORRECTION FACTOR FOR SOIL SURFACE BELOW FOOD	0.9000E 00
FALLOUT CORRECTION FACTOR FOR PASTURE	0.1000E 01
FRACTION OF BEEF HERD SLAUGHTERED PER DAY	0.3810E-02
TRANSFER RATE OF MILK FROM UDDER (PER DAY)	0.2000E 01
BEEF CONSUMPTION OF MAN (KG/DAY)	0.3000E 00
MILK CONSUMPTION OF MAN (LITERS/DAY)	0.1000E 01
TRANSFER RATE--ABOVE-SURFACE FOOD TO SOIL SURFACE (PER DAY)	0.4950E-01
TRANSFER RATE--PASTURE GRASS TO PASTURE SOIL (PER DAY)	0.4950E-01
TRANSFER RATE--SOIL POOL TO SOIL SINK (PER DAY)	0.1096E-03
TRANSFER RATE--PASTURE SOIL TO SOIL SINK (PER DAY)	0.1096E-03
TRANSFER RATE--PASTURE SOIL TO PASTURE GRASS (PER DAY)	0.2740E-04
TRANSFER RATE--SOIL SURFACE TO SOIL POOL (PER DAY)	0.6931E-03
MILK CAPACITY OF THE UDDER (LITERS)	0.5500E 01
VEGETABLE FOOD CONSUMPTION OF MAN (KG/DAY)	0.2500E 00
GRASS CONSUMPTION OF COW (KG/DAY)	0.1000E 02
MILK PRODUCTION OF COW (LITERS/DAY)	0.1100E 02

COMPUTED VALUES FOR THE AREA

TOTAL POPULATION	3773767.0
TOTAL NUMBER OF BEEF CATTLE	4000000
TOTAL NUMBER OF MILK CATTLE	4000000
TOTAL AREA OF VEGETABLE FOOD CROPS (SQUARE METERS)	0.2560E 11
PERCENT OF AREA USED TO PRODUCE VEGETABLE FOOD CROPS	100.0
TOTAL BEEF CONSUMPTION (KG PER YEAR)	0.4132E 09
TOTAL BEEF PRODUCTION (KG PER YEAR)	0.1113E 10
TOTAL MILK CONSUMPTION (LITERS/YEAR)	0.1377E 10
TOTAL MILK PRODUCTION (LITERS/YEAR)	0.1606E 11
TOTAL VEGETABLE FOOD CONSUMPTION (KG PER YEAR)	0.3444E 09
TOTAL VEGETABLE FOOD PRODUCED (KG PER YEAR)	0.2560E 10
DIETARY CORRECTION FACTOR FOR ABOVE-SURFACE FOOD	0.2500E 00
DIETARY CORRECTION FACTOR FOR UPTAKE FROM SOIL	0.1000E 01
DIETARY CORRECTION FACTOR FOR BEEF	0.1000E 01
DIETARY CORRECTION FACTOR FOR MILK	0.1000E 01

TABLE 2-2 RADIONUCLIDE-DEPENDENT VARIABLES FOR AIRDOS

LIST OF INPUT DATA FOR NUCLIDE KR-85

CONCENTRATION OF THE ELEMENT IN MAN (PPM)	0.1000E-01
CONCENTRATION OF THE ELEMENT IN MEAT (PPM)	0.3000E-03
CONCENTRATION OF THE ELEMENT IN FORAGE (PPM)	0.3000E-03
CONCENTRATION OF THE ELEMENT IN SOIL (PPM)	0.1000E-03
RADIOACTIVE DECAY CONSTANT (PER DAY)	0.1780E-03
ENVIRONMENTAL DECAY CONSTANT--SURFACE (PER DAY)	0.0
ENVIRONMENTAL DECAY CONSTANT--WATER (PER DAY)	0.0
TURNOVER RATE OF THE STABLE ISOTOPE IN MAN (PER DAY)	0.0
FRACTION OF ISOTOPE INGESTED BY A COW AND SECRETED (DAYS/LITER)	0.2000E-01
EQUILIBRIUM MASS OF STABLE ELEMENT IN SOIL FROM SURFACE TO DEPTH OF PLOW LAYER (GRAMS)	0.7000E-03
EXCRETION RATE OF STABLE ISOTOPE FROM MUSCLE OF STEER (PER DAY)	0.0
EQUILIBRIUM GROUND CONCENTRATION AT MAN (MICROCURIE-HR/SQUARE CM)	0.0
EQUILIBRIUM AIR CONCENTRATION AT MAN (MICROCURIE-HR/CUBIC CM)	0.8948E-12
EQUILIBRIUM CONCENTRATION AT WATER SURFACE (MICROCURIE-HR/SQUARE CM)	0.0
EQUILIBRIUM GROUND CONCENTRATION AT FOOD CROPS (MICROCURIE-HR/SQUARE CM)	0.0
EQUILIBRIUM GROUND CONCENTRATION AT PASTURE (MICROCURIE-HR/SQUARE CM)	0.0

DOSE CONVERSION FACTORS

ORGAN	INHALATION (REMS/MICROCURIE)	INGESTION (REMS/MICROCURIE)	SUBMERSION IN AIR (REMS-CUBIC CM/ MICROCURIE-HR)	SURFACE EXPOSURE (REMS-SQUARE CM/ MICROCURIE-HR)	SUBMERSION IN WATER (REMS-CUBIC CM/ MICROCURIE-HR)
TOT.BODY	0.100E-11	0.0	0.209E 01	0.371E-03	0.444E-02

LIST OF INPUT DATA FOR NUCLIDE RU-103

CONCENTRATION OF THE ELEMENT IN MAN (PPM)	0.1000E-02
CONCENTRATION OF THE ELEMENT IN MEAT (PPM)	0.1000E-02
CONCENTRATION OF THE ELEMENT IN FORAGE (PPM)	0.5000E-04
CONCENTRATION OF THE ELEMENT IN SOIL (PPM)	0.1000E-02
RADIOACTIVE DECAY CONSTANT (PER DAY)	0.1750E-01
ENVIRONMENTAL DECAY CONSTANT--SURFACE (PER DAY)	0.0
ENVIRONMENTAL DECAY CONSTANT--WATER (PER DAY)	0.0
TURNOVER RATE OF THE STABLE ISOTOPE IN MAN (PER DAY)	0.9420E-01
FRACTION OF ISOTOPE INGESTED BY A COW AND SECRETED (DAYS/LITER)	0.1000E-05
EQUILIBRIUM MASS OF STABLE ELEMENT IN SOIL FROM SURFACE TO DEPTH OF PLOW LAYER (GRAMS)	0.6000E-02
EXCRETION RATE OF STABLE ISOTOPE FROM MUSCLE OF STEER (PER DAY)	0.0
EQUILIBRIUM GROUND CONCENTRATION AT MAN (MICROCURIE-HR/SQUARE CM)	0.4208E-05
EQUILIBRIUM AIR CONCENTRATION AT MAN (MICROCURIE-HR/CUBIC CM)	0.8522E-12
EQUILIBRIUM CONCENTRATION AT WATER SURFACE (MICROCURIE-HR/SQUARE CM)	0.4208E-05
EQUILIBRIUM GROUND CONCENTRATION AT FOOD CROPS (MICROCURIE-HR/SQUARE CM)	0.3820E-06
EQUILIBRIUM GROUND CONCENTRATION AT PASTURE (MICROCURIE-HR/SQUARE CM)	0.3820E-06

DOSE CONVERSION FACTORS

ORGAN	INHALATION (REMS/MICROCURIE)	INGESTION (REMS/MICROCURIE)	SUBMERSION IN AIR (REMS-CUBIC CM/ MICROCURIE-HR)	SURFACE EXPOSURE (REMS-SQUARE CM/ MICROCURIE-HR)	SUBMERSION IN WATER (REMS-CUBIC CM/ MICROCURIE-HR)
TOT.BODY	0.771E-03	0.857E-04	0.491E 03	0.896E-01	0.104E 01
BONE	0.156E-02	0.187E-03	0.491E 03	0.896E-01	0.104E 01
KIDNEYS	0.645E-02	0.774E-03	0.491E 03	0.896E-01	0.104E 01
LUNGS	0.756E-01	0.0	0.491E 03	0.896E-01	0.104E 01
GI TRACT	0.107E-01	0.243E-01	0.491E 03	0.896E-01	0.104E 01

TABLE 2-3 AIRDOS SAMPLE PROBLEM

OUTPUT OF AIRDOS

OPTIONS SELECTED--

RADIONUCLIDE CONCENTRATIONS LISTED ARE SECTOR-AVERAGED VALUES
SPECIFIC PLUME RISE USED FOR EACH AIR STABILITY CLASS (METERS)-
A 20.0 B 20.0 C 20.0 D 20.0 E 10.0 F 10.0 G 10.0

PLANT BOUNDARIES (METERS)--NORTH 3000.0 WEST 3000.0 SOUTH 3000.0 EAST 3000.0

METEOROLOGICAL AND PLANT INFORMATION SUPPLIED TO PROGRAM----

NUMBER OF STACKS IN THE PLANT	1
AVERAGE AIR TEMPERATURE (DEG K)	286.1
AVERAGE VERTICAL TEMPERATURE GRADIENT OF THE AIR IN STABILITY CLASS E (DEG K/METERS)	0.0728
AVERAGE VERTICAL TEMPERATURE GRADIENT OF THE AIR IN STABILITY CLASS F (DEG K/METERS)	0.1090
AVERAGE VERTICAL TEMPERATURE GRADIENT OF THE AIR IN STABILITY CLASS G (DEG K/METERS)	0.1455

STACK INFORMATION--

	STACK NUMBER					
	1	2	3	4	5	6
HEIGHT (METERS)	100.0					
DIAMETER (METERS)	5.0					
EFFLUENT VELOCITY (METERS/SEC)	10.0					
RATE OF HEAT EMISSION (CAL/SECOND)	0.50E 08					

FREQUENCY OF ATMOSPHERIC STABILITY CLASSES FOR EACH DIRECTION

SECTOR	FRACTION OF TIME IN EACH STABILITY CLASS						
	A	B	C	D	E	F	G
1	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
2	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
3	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
4	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
5	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
6	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
7	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
8	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
9	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
10	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
11	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
12	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
13	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
14	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
15	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0
16	0.0	0.1728	0.1453	0.2928	0.0	0.3906	0.0

HEIGHT OF LID- 0 METERS

RELEASE RATES FOR RADIONUCLIDES

STACK	NUCLIDE	RELEASE RATE (PCI/SEC)
1	KR-85	0.500E 04
1	RU-103	0.500E 04

DEPOSITION PARAMETERS

NUCLIDE	GRAVITATIONAL FALL VELOCITY (METERS/SEC)	DEPOSITION VELOCITY (METERS/SEC)	SCAVENGING COEFFICIENT (1/SEC)
KR-85	0.0	0.0	0.0
RU-103	0.0	0.01300	0.0

FREQUENCIES OF WIND DIRECTIONS AND RECIPROCAL-AVERAGED WIND SPEEDS

WIND TOWARD	FREQUENCY	WIND SPEEDS FOR EACH STABILITY CLASS (METERS/SEC)						
		A	B	C	D	E	F	G
1	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
2	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
3	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
4	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
5	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
6	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
7	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
8	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
9	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
10	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
11	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
12	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
13	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
14	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
15	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0
16	0.063	0.0	2.09	2.54	2.46	0.0	2.26	0.0

WIND DIRECTIONS ARE NUMBERED COUNTERCLOCKWISE STARTING AT 1 FOR DUE NORTH

FREQUENCIES OF WIND DIRECTIONS AND TRUE-AVERAGE WIND SPEEDS

WIND TOWARD	FREQUENCY	WIND SPEEDS FOR EACH STABILITY CLASS (METERS/SEC)						
		A	B	C	D	E	F	G
1	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
2	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
3	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
4	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
5	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
6	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
7	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
8	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
9	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
10	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
11	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
12	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
13	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
14	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
15	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0
16	0.063	0.0	3.49	4.04	4.38	0.0	4.02	0.0

WIND DIRECTIONS ARE NUMBERED COUNTERCLOCKWISE STARTING AT 1 FOR DUE NORTH

ESTIMATED RADIONUCLIDE CONCENTRATIONS

AREA COLUMN	AREA ROW	NUCLIDE	AIR CONCENTRATION (PCI/CC)	GROUND DEPOSITION RATE (PCI/SQUARE CM-SEC)
1	1	KR-85	0.558E-11	0.0
1	1	RU-103	0.301E-11	0.301E-11
1	2	KR-85	0.582E-11	0.0
1	2	RU-103	0.323E-11	0.323E-11
1	3	KR-85	0.606E-11	0.0
1	3	RU-103	0.346E-11	0.346E-11
1	4	KR-85	0.631E-11	0.0
1	4	RU-103	0.369E-11	0.369E-11
1	5	KR-85	0.656E-11	0.0
1	5	RU-103	0.392E-11	0.392E-11
1	6	KR-85	0.680E-11	0.0
1	6	RU-103	0.413E-11	0.413E-11

AREA COLUMN	AREA ROW	NUCLIDE	AIR CONCENTRATION (PCI/CC)	GROUND DEPOSITION RATE (PCI/SQUARE CM-SEC)
1	7	KR-85	0.701E-11	0.0
1	7	RU-103	0.433E-11	0.433E-11
1	8	KR-85	0.718E-11	0.0
1	8	RU-103	0.448E-11	0.448E-11
1	9	KR-85	0.731E-11	0.0
1	9	RU-103	0.459E-11	0.459E-11
1	10	KR-85	0.738E-11	0.0
1	10	RU-103	0.466E-11	0.466E-11
1	11	KR-85	0.738E-11	0.0
1	11	RU-103	0.466E-11	0.466E-11
1	12	KR-85	0.731E-11	0.0
1	12	RU-103	0.459E-11	0.459E-11
1	13	KR-85	0.718E-11	0.0
1	13	RU-103	0.448E-11	0.448E-11
1	14	KR-85	0.701E-11	0.0
1	14	RU-103	0.433E-11	0.433E-11
1	15	KR-85	0.680E-11	0.0
1	15	RU-103	0.413E-11	0.413E-11
1	16	KR-85	0.656E-11	0.0
1	16	RU-103	0.392E-11	0.392E-11
1	17	KR-85	0.631E-11	0.0
1	17	RU-103	0.369E-11	0.369E-11
1	18	KR-85	0.606E-11	0.0
1	18	RU-103	0.346E-11	0.346E-11
1	19	KR-85	0.582E-11	0.0
1	19	RU-103	0.323E-11	0.323E-11
1	20	KR-85	0.558E-11	0.0
1	20	RU-103	0.301E-11	0.301E-11
2	1	KR-85	0.582E-11	0.0
2	1	RU-103	0.323E-11	0.323E-11
2	2	KR-85	0.609E-11	0.0
2	2	RU-103	0.349E-11	0.349E-11
2	3	KR-85	0.639E-11	0.0
2	3	RU-103	0.376E-11	0.376E-11
2	4	KR-85	0.670E-11	0.0
2	4	RU-103	0.404E-11	0.404E-11
2	5	KR-85	0.701E-11	0.0
2	5	RU-103	0.433E-11	0.433E-11
2	6	KR-85	0.731E-11	0.0
2	6	RU-103	0.459E-11	0.459E-11
2	7	KR-85	0.760E-11	0.0
2	7	RU-103	0.485E-11	0.485E-11
2	8	KR-85	0.785E-11	0.0
2	8	RU-103	0.507E-11	0.507E-11
2	9	KR-85	0.804E-11	0.0
2	9	RU-103	0.524E-11	0.524E-11
2	10	KR-85	0.813E-11	0.0
2	10	RU-103	0.532E-11	0.532E-11
2	11	KR-85	0.813E-11	0.0
2	11	RU-103	0.532E-11	0.532E-11
2	12	KR-85	0.804E-11	0.0
2	12	RU-103	0.524E-11	0.524E-11
2	13	KR-85	0.785E-11	0.0
2	13	RU-103	0.507E-11	0.507E-11
2	14	KR-85	0.760E-11	0.0
2	14	RU-103	0.485E-11	0.485E-11
2	15	KR-85	0.731E-11	0.0
2	15	RU-103	0.459E-11	0.459E-11
2	16	KR-85	0.701E-11	0.0
2	16	RU-103	0.433E-11	0.433E-11
2	17	KR-85	0.670E-11	0.0
2	17	RU-103	0.404E-11	0.404E-11
2	18	KR-85	0.639E-11	0.0
2	18	RU-103	0.376E-11	0.376E-11
2	19	KR-85	0.609E-11	0.0
2	19	RU-103	0.349E-11	0.349E-11
2	20	KR-85	0.582E-11	0.0
2	20	RU-103	0.323E-11	0.323E-11
3	1	KR-85	0.606E-11	0.0
3	1	RU-103	0.346E-11	0.346E-11
3	2	KR-85	0.639E-11	0.0
3	2	RU-103	0.376E-11	0.376E-11
3	3	KR-85	0.675E-11	0.0
3	3	RU-103	0.409E-11	0.409E-11
3	4	KR-85	0.713E-11	0.0
3	4	RU-103	0.443E-11	0.443E-11
3	5	KR-85	0.753E-11	0.0
3	5	RU-103	0.479E-11	0.479E-11
3	6	KR-85	0.794E-11	0.0
3	6	RU-103	0.515E-11	0.515E-11
3	7	KR-85	0.834E-11	0.0
3	7	RU-103	0.550E-11	0.550E-11
3	8	KR-85	0.869E-11	0.0
3	8	RU-103	0.581E-11	0.581E-11
3	9	KR-85	0.896E-11	0.0
3	9	RU-103	0.604E-11	0.604E-11
3	10	KR-85	0.910E-11	0.0
3	10	RU-103	0.617E-11	0.617E-11
3	11	KR-85	0.910E-11	0.0
3	11	RU-103	0.617E-11	0.617E-11
3	12	KR-85	0.896E-11	0.0
3	12	RU-103	0.604E-11	0.604E-11

AREA COLUMN	AREA ROW	NUCLIDE	AIR CONCENTRATION (PCI/CC)	GROUND DEPOSITION RATE (PCI/SQUARE CM-SEC)
3	13	KR-85	0.869E-11	0.0
3	13	RU-103	0.581E-11	0.581E-11
3	14	KR-85	0.834E-11	0.0
3	14	RU-103	0.550E-11	0.550E-11
3	15	KR-85	0.794E-11	0.0
3	15	RU-103	0.515E-11	0.515E-11
3	16	KR-85	0.753E-11	0.0
3	16	RU-103	0.479E-11	0.479E-11
3	17	KR-85	0.713E-11	0.0
3	17	RU-103	0.443E-11	0.443E-11
3	18	KR-85	0.675E-11	0.0
3	18	RU-103	0.409E-11	0.409E-11
3	19	KR-85	0.639E-11	0.0
3	19	RU-103	0.376E-11	0.376E-11
3	20	KR-85	0.606E-11	0.0
3	20	RU-103	0.346E-11	0.346E-11
4	1	KR-85	0.631E-11	0.0
4	1	RU-103	0.369E-11	0.369E-11
4	2	KR-85	0.670E-11	0.0
4	2	RU-103	0.404E-11	0.404E-11
4	3	KR-85	0.713E-11	0.0
4	3	RU-103	0.443E-11	0.443E-11
4	4	KR-85	0.760E-11	0.0
4	4	RU-103	0.485E-11	0.485E-11
4	5	KR-85	0.813E-11	0.0
4	5	RU-103	0.532E-11	0.532E-11
4	6	KR-85	0.869E-11	0.0
4	6	RU-103	0.581E-11	0.581E-11
4	7	KR-85	0.925E-11	0.0
4	7	RU-103	0.630E-11	0.630E-11
4	8	KR-85	0.976E-11	0.0
4	8	RU-103	0.675E-11	0.675E-11
4	9	KR-85	0.102E-10	0.0
4	9	RU-103	0.710E-11	0.710E-11
4	10	KR-85	0.104E-10	0.0
4	10	RU-103	0.729E-11	0.729E-11
4	11	KR-85	0.104E-10	0.0
4	11	RU-103	0.729E-11	0.729E-11
4	12	KR-85	0.102E-10	0.0
4	12	RU-103	0.710E-11	0.710E-11
4	13	KR-85	0.976E-11	0.0
4	13	RU-103	0.675E-11	0.675E-11
4	14	KR-85	0.925E-11	0.0
4	14	RU-103	0.630E-11	0.630E-11
4	15	KR-85	0.869E-11	0.0
4	15	RU-103	0.581E-11	0.581E-11
4	16	KR-85	0.813E-11	0.0
4	16	RU-103	0.532E-11	0.532E-11
4	17	KR-85	0.760E-11	0.0
4	17	RU-103	0.485E-11	0.485E-11
4	18	KR-85	0.713E-11	0.0
4	18	RU-103	0.443E-11	0.443E-11
4	19	KR-85	0.670E-11	0.0
4	19	RU-103	0.404E-11	0.404E-11
4	20	KR-85	0.631E-11	0.0
4	20	RU-103	0.369E-11	0.369E-11
5	1	KR-85	0.656E-11	0.0
5	1	RU-103	0.392E-11	0.392E-11
5	2	KR-85	0.701E-11	0.0
5	2	RU-103	0.433E-11	0.433E-11
5	3	KR-85	0.753E-11	0.0
5	3	RU-103	0.479E-11	0.479E-11
5	4	KR-85	0.813E-11	0.0
5	4	RU-103	0.532E-11	0.532E-11
5	5	KR-85	0.882E-11	0.0
5	5	RU-103	0.592E-11	0.592E-11
5	6	KR-85	0.958E-11	0.0
5	6	RU-103	0.659E-11	0.659E-11
5	7	KR-85	0.104E-10	0.0
5	7	RU-103	0.729E-11	0.729E-11
5	8	KR-85	0.112E-10	0.0
5	8	RU-103	0.797E-11	0.797E-11
5	9	KR-85	0.118E-10	0.0
5	9	RU-103	0.853E-11	0.853E-11
5	10	KR-85	0.122E-10	0.0
5	10	RU-103	0.886E-11	0.886E-11
5	11	KR-85	0.122E-10	0.0
5	11	RU-103	0.886E-11	0.886E-11
5	12	KR-85	0.118E-10	0.0
5	12	RU-103	0.853E-11	0.853E-11
5	13	KR-85	0.112E-10	0.0
5	13	RU-103	0.797E-11	0.797E-11
5	14	KR-85	0.104E-10	0.0
5	14	RU-103	0.729E-11	0.729E-11
5	15	KR-85	0.958E-11	0.0
5	15	RU-103	0.659E-11	0.659E-11
5	16	KR-85	0.882E-11	0.0
5	16	RU-103	0.592E-11	0.592E-11
5	17	KR-85	0.813E-11	0.0
5	17	RU-103	0.532E-11	0.532E-11
5	18	KR-85	0.753E-11	0.0
5	18	RU-103	0.479E-11	0.479E-11

AREA COLUMN	AREA ROW	NUCLIDE	AIR CONCENTRATION (PCI/CC)	GROUND DEPOSITION RATE (PCI/SQUARE CM-SEC)
5	19	KR-85	0.701E-11	0.0
5	19	RU-103	0.433E-11	0.433E-11
5	20	KR-85	0.656E-11	0.0
5	20	RU-103	0.392E-11	0.392E-11
6	1	KR-85	0.680E-11	0.0
6	1	RU-103	0.413E-11	0.413E-11
6	2	KR-85	0.731E-11	0.0
6	2	RU-103	0.459E-11	0.459E-11
6	3	KR-85	0.794E-11	0.0
6	3	RU-103	0.515E-11	0.515E-11
6	4	KR-85	0.869E-11	0.0
6	4	RU-103	0.581E-11	0.581E-11
6	5	KR-85	0.958E-11	0.0
6	5	RU-103	0.659E-11	0.659E-11
6	6	KR-85	0.106E-10	0.0
6	6	RU-103	0.750E-11	0.750E-11
6	7	KR-85	0.118E-10	0.0
6	7	RU-103	0.853E-11	0.853E-11
6	8	KR-85	0.130E-10	0.0
6	8	RU-103	0.962E-11	0.962E-11
6	9	KR-85	0.141E-10	0.0
6	9	RU-103	0.106E-10	0.106E-10
6	10	KR-85	0.148E-10	0.0
6	10	RU-103	0.112E-10	0.112E-10
6	11	KR-85	0.148E-10	0.0
6	11	RU-103	0.112E-10	0.112E-10
6	12	KR-85	0.141E-10	0.0
6	12	RU-103	0.106E-10	0.106E-10
6	13	KR-85	0.130E-10	0.0
6	13	RU-103	0.962E-11	0.962E-11
6	14	KR-85	0.118E-10	0.0
6	14	RU-103	0.853E-11	0.853E-11
6	15	KR-85	0.106E-10	0.0
6	15	RU-103	0.750E-11	0.750E-11
6	16	KR-85	0.958E-11	0.0
6	16	RU-103	0.659E-11	0.659E-11
6	17	KR-85	0.869E-11	0.0
6	17	RU-103	0.581E-11	0.581E-11
6	18	KR-85	0.794E-11	0.0
6	18	RU-103	0.515E-11	0.515E-11
6	19	KR-85	0.731E-11	0.0
6	19	RU-103	0.459E-11	0.459E-11
6	20	KR-85	0.680E-11	0.0
6	20	RU-103	0.413E-11	0.413E-11
7	1	KR-85	0.701E-11	0.0
7	1	RU-103	0.433E-11	0.433E-11
7	2	KR-85	0.760E-11	0.0
7	2	RU-103	0.485E-11	0.485E-11
7	3	KR-85	0.834E-11	0.0
7	3	RU-103	0.550E-11	0.550E-11
7	4	KR-85	0.925E-11	0.0
7	4	RU-103	0.630E-11	0.630E-11
7	5	KR-85	0.104E-10	0.0
7	5	RU-103	0.729E-11	0.729E-11
7	6	KR-85	0.118E-10	0.0
7	6	RU-103	0.853E-11	0.853E-11
7	7	KR-85	0.136E-10	0.0
7	7	RU-103	0.101E-10	0.101E-10
7	8	KR-85	0.156E-10	0.0
7	8	RU-103	0.119E-10	0.119E-10
7	9	KR-85	0.177E-10	0.0
7	9	RU-103	0.138E-10	0.138E-10
7	10	KR-85	0.191E-10	0.0
7	10	RU-103	0.151E-10	0.151E-10
7	11	KR-85	0.191E-10	0.0
7	11	RU-103	0.151E-10	0.151E-10
7	12	KR-85	0.177E-10	0.0
7	12	RU-103	0.138E-10	0.138E-10
7	13	KR-85	0.156E-10	0.0
7	13	RU-103	0.119E-10	0.119E-10
7	14	KR-85	0.136E-10	0.0
7	14	RU-103	0.101E-10	0.101E-10
7	15	KR-85	0.118E-10	0.0
7	15	RU-103	0.853E-11	0.853E-11
7	16	KR-85	0.104E-10	0.0
7	16	RU-103	0.729E-11	0.729E-11
7	17	KR-85	0.925E-11	0.0
7	17	RU-103	0.630E-11	0.630E-11
7	18	KR-85	0.834E-11	0.0
7	18	RU-103	0.550E-11	0.550E-11
7	19	KR-85	0.760E-11	0.0
7	19	RU-103	0.485E-11	0.485E-11
7	20	KR-85	0.701E-11	0.0
7	20	RU-103	0.433E-11	0.433E-11
8	1	KR-85	0.718E-11	0.0
8	1	RU-103	0.448E-11	0.448E-11
8	2	KR-85	0.785E-11	0.0
8	2	RU-103	0.507E-11	0.507E-11
8	3	KR-85	0.869E-11	0.0
8	3	RU-103	0.581E-11	0.581E-11
8	4	KR-85	0.976E-11	0.0
8	4	RU-103	0.675E-11	0.675E-11

AREA COLUMN	AREA ROW	NUCLIDE	AIR CONCENTRATION (PCI/CC)	GROUND DEPOSITION RATE (PCI/SQUARE CM-SEC)
8	5	KR-85	0.112E-10	0.0
8	5	RU-103	0.797E-11	0.797E-11
8	6	KR-85	0.130E-10	0.0
8	6	RU-103	0.962E-11	0.962E-11
8	7	KR-85	0.156E-10	0.0
8	7	RU-103	0.119E-10	0.119E-10
8	8	KR-85	0.191E-10	0.0
8	8	RU-103	0.151E-10	0.151E-10
8	9	KR-85	0.234E-10	0.0
8	9	RU-103	0.190E-10	0.190E-10
8	10	KR-85	0.271E-10	0.0
8	10	RU-103	0.225E-10	0.225E-10
8	11	KR-85	0.271E-10	0.0
8	11	RU-103	0.225E-10	0.225E-10
8	12	KR-85	0.234E-10	0.0
8	12	RU-103	0.190E-10	0.190E-10
8	13	KR-85	0.191E-10	0.0
8	13	RU-103	0.151E-10	0.151E-10
8	14	KR-85	0.156E-10	0.0
8	14	RU-103	0.119E-10	0.119E-10
8	15	KR-85	0.130E-10	0.0
8	15	RU-103	0.962E-11	0.962E-11
8	16	KR-85	0.112E-10	0.0
8	16	RU-103	0.797E-11	0.797E-11
8	17	KR-85	0.976E-11	0.0
8	17	RU-103	0.675E-11	0.675E-11
8	18	KR-85	0.869E-11	0.0
8	18	RU-103	0.581E-11	0.581E-11
8	19	KR-85	0.785E-11	0.0
8	19	RU-103	0.507E-11	0.507E-11
8	20	KR-85	0.718E-11	0.0
8	20	RU-103	0.448E-11	0.448E-11
9	1	KR-85	0.731E-11	0.0
9	1	RU-103	0.459E-11	0.459E-11
9	2	KR-85	0.804E-11	0.0
9	2	RU-103	0.524E-11	0.524E-11
9	3	KR-85	0.896E-11	0.0
9	3	RU-103	0.604E-11	0.604E-11
9	4	KR-85	0.102E-10	0.0
9	4	RU-103	0.710E-11	0.710E-11
9	5	KR-85	0.118E-10	0.0
9	5	RU-103	0.853E-11	0.853E-11
9	6	KR-85	0.141E-10	0.0
9	6	RU-103	0.106E-10	0.106E-10
9	7	KR-85	0.177E-10	0.0
9	7	RU-103	0.138E-10	0.138E-10
9	8	KR-85	0.234E-10	0.0
9	8	RU-103	0.190E-10	0.190E-10
9	9	KR-85	0.330E-10	0.0
9	9	RU-103	0.282E-10	0.282E-10
9	10	KR-85	0.454E-10	0.0
9	10	RU-103	0.403E-10	0.403E-10
9	11	KR-85	0.454E-10	0.0
9	11	RU-103	0.403E-10	0.403E-10
9	12	KR-85	0.330E-10	0.0
9	12	RU-103	0.282E-10	0.282E-10
9	13	KR-85	0.234E-10	0.0
9	13	RU-103	0.190E-10	0.190E-10
9	14	KR-85	0.177E-10	0.0
9	14	RU-103	0.138E-10	0.138E-10
9	15	KR-85	0.141E-10	0.0
9	15	RU-103	0.106E-10	0.106E-10
9	16	KR-85	0.118E-10	0.0
9	16	RU-103	0.853E-11	0.853E-11
9	17	KR-85	0.102E-10	0.0
9	17	RU-103	0.710E-11	0.710E-11
9	18	KR-85	0.896E-11	0.0
9	18	RU-103	0.604E-11	0.604E-11
9	19	KR-85	0.804E-11	0.0
9	19	RU-103	0.524E-11	0.524E-11
9	20	KR-85	0.731E-11	0.0
9	20	RU-103	0.459E-11	0.459E-11
10	1	KR-85	0.738E-11	0.0
10	1	RU-103	0.466E-11	0.466E-11
10	2	KR-85	0.813E-11	0.0
10	2	RU-103	0.532E-11	0.532E-11
10	3	KR-85	0.910E-11	0.0
10	3	RU-103	0.617E-11	0.617E-11
10	4	KR-85	0.104E-10	0.0
10	4	RU-103	0.729E-11	0.729E-11
10	5	KR-85	0.122E-10	0.0
10	5	RU-103	0.886E-11	0.886E-11
10	6	KR-85	0.148E-10	0.0
10	6	RU-103	0.112E-10	0.112E-10
10	7	KR-85	0.191E-10	0.0
10	7	RU-103	0.151E-10	0.151E-10
10	8	KR-85	0.271E-10	0.0
10	8	RU-103	0.225E-10	0.225E-10
10	9	KR-85	0.454E-10	0.0
10	9	RU-103	0.403E-10	0.403E-10
10	10	KR-85	0.102E-09	0.0
10	10	RU-103	0.973E-10	0.973E-10

AREA COLUMN	AREA ROW	NUCLIDE	AIR CONCENTRATION (PCI/CC)	GROUND DEPOSITION RATE (PCI/SQUARE CM-SEC)
10	11	KR-85	0.102E-09	0.0
10	11	RU-103	0.973E-10	0.973E-10
10	12	KR-85	0.454E-10	0.0
10	12	RU-103	0.403E-10	0.403E-10
10	13	KR-85	0.271E-10	0.0
10	13	RU-103	0.225E-10	0.225E-10
10	14	KR-85	0.191E-10	0.0
10	14	RU-103	0.151E-10	0.151E-10
10	15	KR-85	0.148E-10	0.0
10	15	RU-103	0.112E-10	0.112E-10
10	16	KR-85	0.122E-10	0.0
10	16	RU-103	0.886E-11	0.886E-11
10	17	KR-85	0.104E-10	0.0
10	17	RU-103	0.729E-11	0.729E-11
10	18	KR-85	0.910E-11	0.0
10	18	RU-103	0.617E-11	0.617E-11
10	19	KR-85	0.813E-11	0.0
10	19	RU-103	0.532E-11	0.532E-11
10	20	KR-85	0.738E-11	0.0
10	20	RU-103	0.466E-11	0.466E-11
11	1	KR-85	0.738E-11	0.0
11	1	RU-103	0.466E-11	0.466E-11
11	2	KR-85	0.813E-11	0.0
11	2	RU-103	0.532E-11	0.532E-11
11	3	KR-85	0.910E-11	0.0
11	3	RU-103	0.617E-11	0.617E-11
11	4	KR-85	0.104E-10	0.0
11	4	RU-103	0.729E-11	0.729E-11
11	5	KR-85	0.122E-10	0.0
11	5	RU-103	0.886E-11	0.886E-11
11	6	KR-85	0.148E-10	0.0
11	6	RU-103	0.112E-10	0.112E-10
11	7	KR-85	0.191E-10	0.0
11	7	RU-103	0.151E-10	0.151E-10
11	8	KR-85	0.271E-10	0.0
11	8	RU-103	0.225E-10	0.225E-10
11	9	KR-85	0.454E-10	0.0
11	9	RU-103	0.403E-10	0.403E-10
11	10	KR-85	0.102E-09	0.0
11	10	RU-103	0.973E-10	0.973E-10
11	11	KR-85	0.102E-09	0.0
11	11	RU-103	0.973E-10	0.973E-10
11	12	KR-85	0.454E-10	0.0
11	12	RU-103	0.403E-10	0.403E-10
11	13	KR-85	0.271E-10	0.0
11	13	RU-103	0.225E-10	0.225E-10
11	14	KR-85	0.191E-10	0.0
11	14	RU-103	0.151E-10	0.151E-10
11	15	KR-85	0.148E-10	0.0
11	15	RU-103	0.112E-10	0.112E-10
11	16	KR-85	0.122E-10	0.0
11	16	RU-103	0.886E-11	0.886E-11
11	17	KR-85	0.104E-10	0.0
11	17	RU-103	0.729E-11	0.729E-11
11	18	KR-85	0.910E-11	0.0
11	18	RU-103	0.617E-11	0.617E-11
11	19	KR-85	0.813E-11	0.0
11	19	RU-103	0.532E-11	0.532E-11
11	20	KR-85	0.738E-11	0.0
11	20	RU-103	0.466E-11	0.466E-11
12	1	KR-85	0.731E-11	0.0
12	1	RU-103	0.459E-11	0.459E-11
12	2	KR-85	0.804E-11	0.0
12	2	RU-103	0.524E-11	0.524E-11
12	3	KR-85	0.896E-11	0.0
12	3	RU-103	0.604E-11	0.604E-11
12	4	KR-85	0.102E-10	0.0
12	4	RU-103	0.710E-11	0.710E-11
12	5	KR-85	0.118E-10	0.0
12	5	RU-103	0.853E-11	0.853E-11
12	6	KR-85	0.141E-10	0.0
12	6	RU-103	0.106E-10	0.106E-10
12	7	KR-85	0.177E-10	0.0
12	7	RU-103	0.138E-10	0.138E-10
12	8	KR-85	0.234E-10	0.0
12	8	RU-103	0.190E-10	0.190E-10
12	9	KR-85	0.330E-10	0.0
12	9	RU-103	0.282E-10	0.282E-10
12	10	KR-85	0.454E-10	0.0
12	10	RU-103	0.403E-10	0.403E-10
12	11	KR-85	0.454E-10	0.0
12	11	RU-103	0.403E-10	0.403E-10
12	12	KR-85	0.330E-10	0.0
12	12	RU-103	0.282E-10	0.282E-10
12	13	KR-85	0.234E-10	0.0
12	13	RU-103	0.190E-10	0.190E-10
12	14	KR-85	0.177E-10	0.0
12	14	RU-103	0.138E-10	0.138E-10
12	15	KR-85	0.141E-10	0.0
12	15	RU-103	0.106E-10	0.106E-10
12	16	KR-85	0.118E-10	0.0
12	16	RU-103	0.853E-11	0.853E-11

AREA COLUMN	AREA ROW	NUCLIDE	AIR CONCENTRATION (PCI/CC)	GROUND DEPOSITION RATE (PCI/SQUARE CM-SEC)
12	17	KR-85	0.102E-10	0.0
12	17	RU-103	0.710E-11	0.710E-11
12	18	KR-85	0.896E-11	0.0
12	18	RU-103	0.604E-11	0.604E-11
12	19	KR-85	0.804E-11	0.0
12	19	RU-103	0.524E-11	0.524E-11
12	20	KR-85	0.731E-11	0.0
12	20	RU-103	0.459E-11	0.459E-11
13	1	KR-85	0.718E-11	0.0
13	1	RU-103	0.448E-11	0.448E-11
13	2	KR-85	0.785E-11	0.0
13	2	RU-103	0.507E-11	0.507E-11
13	3	KR-85	0.869E-11	0.0
13	3	RU-103	0.581E-11	0.581E-11
13	4	KR-85	0.976E-11	0.0
13	4	RU-103	0.675E-11	0.675E-11
13	5	KR-85	0.112E-10	0.0
13	5	RU-103	0.797E-11	0.797E-11
13	6	KR-85	0.130E-10	0.0
13	6	RU-103	0.962E-11	0.962E-11
13	7	KR-85	0.156E-10	0.0
13	7	RU-103	0.119E-10	0.119E-10
13	8	KR-85	0.191E-10	0.0
13	8	RU-103	0.151E-10	0.151E-10
13	9	KR-85	0.234E-10	0.0
13	9	RU-103	0.190E-10	0.190E-10
13	10	KR-85	0.271E-10	0.0
13	10	RU-103	0.225E-10	0.225E-10
13	11	KR-85	0.271E-10	0.0
13	11	RU-103	0.225E-10	0.225E-10
13	12	KR-85	0.234E-10	0.0
13	12	RU-103	0.190E-10	0.190E-10
13	13	KR-85	0.191E-10	0.0
13	13	RU-103	0.151E-10	0.151E-10
13	14	KR-85	0.156E-10	0.0
13	14	RU-103	0.119E-10	0.119E-10
13	15	KR-85	0.130E-10	0.0
13	15	RU-103	0.962E-11	0.962E-11
13	16	KR-85	0.112E-10	0.0
13	16	RU-103	0.797E-11	0.797E-11
13	17	KR-85	0.976E-11	0.0
13	17	RU-103	0.675E-11	0.675E-11
13	18	KR-85	0.869E-11	0.0
13	18	RU-103	0.581E-11	0.581E-11
13	19	KR-85	0.785E-11	0.0
13	19	RU-103	0.507E-11	0.507E-11
13	20	KR-85	0.718E-11	0.0
13	20	RU-103	0.448E-11	0.448E-11
14	1	KR-85	0.701E-11	0.0
14	1	RU-103	0.433E-11	0.433E-11
14	2	KR-85	0.760E-11	0.0
14	2	RU-103	0.485E-11	0.485E-11
14	3	KR-85	0.834E-11	0.0
14	3	RU-103	0.550E-11	0.550E-11
14	4	KR-85	0.925E-11	0.0
14	4	RU-103	0.630E-11	0.630E-11
14	5	KR-85	0.104E-10	0.0
14	5	RU-103	0.729E-11	0.729E-11
14	6	KR-85	0.118E-10	0.0
14	6	RU-103	0.853E-11	0.853E-11
14	7	KR-85	0.136E-10	0.0
14	7	RU-103	0.101E-10	0.101E-10
14	8	KR-85	0.156E-10	0.0
14	8	RU-103	0.119E-10	0.119E-10
14	9	KR-85	0.177E-10	0.0
14	9	RU-103	0.138E-10	0.138E-10
14	10	KR-85	0.191E-10	0.0
14	10	RU-103	0.151E-10	0.151E-10
14	11	KR-85	0.191E-10	0.0
14	11	RU-103	0.151E-10	0.151E-10
14	12	KR-85	0.177E-10	0.0
14	12	RU-103	0.138E-10	0.138E-10
14	13	KR-85	0.156E-10	0.0
14	13	RU-103	0.119E-10	0.119E-10
14	14	KR-85	0.136E-10	0.0
14	14	RU-103	0.101E-10	0.101E-10
14	15	KR-85	0.118E-10	0.0
14	15	RU-103	0.853E-11	0.853E-11
14	16	KR-85	0.104E-10	0.0
14	16	RU-103	0.729E-11	0.729E-11
14	17	KR-85	0.925E-11	0.0
14	17	RU-103	0.630E-11	0.630E-11
14	18	KR-85	0.834E-11	0.0
14	18	RU-103	0.550E-11	0.550E-11
14	19	KR-85	0.760E-11	0.0
14	19	RU-103	0.485E-11	0.485E-11
14	20	KR-85	0.701E-11	0.0
14	20	RU-103	0.433E-11	0.433E-11
15	1	KR-85	0.680E-11	0.0
15	1	RU-103	0.413E-11	0.413E-11
15	2	KR-85	0.731E-11	0.0
15	2	RU-103	0.459E-11	0.459E-11

AREA COLUMN	AREA ROW	NUCLIDE	AIR CONCENTRATION (PCI/CC)	GROUND DEPOSITION RATE (PCI/SQUARE CM-SEC)
15	3	KR-85	0.794E-11	0.0
15	3	RU-103	0.515E-11	0.515E-11
15	4	KR-85	0.869E-11	0.0
15	4	RU-103	0.581E-11	0.581E-11
15	5	KR-85	0.958E-11	0.0
15	5	RU-103	0.659E-11	0.659E-11
15	6	KR-85	0.106E-10	0.0
15	6	RU-103	0.750E-11	0.750E-11
15	7	KR-85	0.118E-10	0.0
15	7	RU-103	0.853E-11	0.853E-11
15	8	KR-85	0.130E-10	0.0
15	8	RU-103	0.962E-11	0.962E-11
15	9	KR-85	0.141E-10	0.0
15	9	RU-103	0.106E-10	0.106E-10
15	10	KR-85	0.148E-10	0.0
15	10	RU-103	0.112E-10	0.112E-10
15	11	KR-85	0.148E-10	0.0
15	11	RU-103	0.112E-10	0.112E-10
15	12	KR-85	0.141E-10	0.0
15	12	RU-103	0.106E-10	0.106E-10
15	13	KR-85	0.130E-10	0.0
15	13	RU-103	0.962E-11	0.962E-11
15	14	KR-85	0.118E-10	0.0
15	14	RU-103	0.853E-11	0.853E-11
15	15	KR-85	0.106E-10	0.0
15	15	RU-103	0.750E-11	0.750E-11
15	16	KR-85	0.958E-11	0.0
15	16	RU-103	0.659E-11	0.659E-11
15	17	KR-85	0.869E-11	0.0
15	17	RU-103	0.581E-11	0.581E-11
15	18	KR-85	0.794E-11	0.0
15	18	RU-103	0.515E-11	0.515E-11
15	19	KR-85	0.731E-11	0.0
15	19	RU-103	0.459E-11	0.459E-11
15	20	KR-85	0.680E-11	0.0
15	20	RU-103	0.413E-11	0.413E-11
16	1	KR-85	0.656E-11	0.0
16	1	RU-103	0.392E-11	0.392E-11
16	2	KR-85	0.701E-11	0.0
16	2	RU-103	0.433E-11	0.433E-11
16	3	KR-85	0.753E-11	0.0
16	3	RU-103	0.479E-11	0.479E-11
16	4	KR-85	0.813E-11	0.0
16	4	RU-103	0.532E-11	0.532E-11
16	5	KR-85	0.882E-11	0.0
16	5	RU-103	0.592E-11	0.592E-11
16	6	KR-85	0.958E-11	0.0
16	6	RU-103	0.659E-11	0.659E-11
16	7	KR-85	0.104E-10	0.0
16	7	RU-103	0.729E-11	0.729E-11
16	8	KR-85	0.112E-10	0.0
16	8	RU-103	0.797E-11	0.797E-11
16	9	KR-85	0.118E-10	0.0
16	9	RU-103	0.853E-11	0.853E-11
16	10	KR-85	0.122E-10	0.0
16	10	RU-103	0.886E-11	0.886E-11
16	11	KR-85	0.122E-10	0.0
16	11	RU-103	0.886E-11	0.886E-11
16	12	KR-85	0.118E-10	0.0
16	12	RU-103	0.853E-11	0.853E-11
16	13	KR-85	0.112E-10	0.0
16	13	RU-103	0.797E-11	0.797E-11
16	14	KR-85	0.104E-10	0.0
16	14	RU-103	0.729E-11	0.729E-11
16	15	KR-85	0.958E-11	0.0
16	15	RU-103	0.659E-11	0.659E-11
16	16	KR-85	0.882E-11	0.0
16	16	RU-103	0.592E-11	0.592E-11
16	17	KR-85	0.813E-11	0.0
16	17	RU-103	0.532E-11	0.532E-11
16	18	KR-85	0.753E-11	0.0
16	18	RU-103	0.479E-11	0.479E-11
16	19	KR-85	0.701E-11	0.0
16	19	RU-103	0.433E-11	0.433E-11
16	20	KR-85	0.656E-11	0.0
16	20	RU-103	0.392E-11	0.392E-11
17	1	KR-85	0.631E-11	0.0
17	1	RU-103	0.369E-11	0.369E-11
17	2	KR-85	0.670E-11	0.0
17	2	RU-103	0.404E-11	0.404E-11
17	3	KR-85	0.713E-11	0.0
17	3	RU-103	0.443E-11	0.443E-11
17	4	KR-85	0.760E-11	0.0
17	4	RU-103	0.485E-11	0.485E-11
17	5	KR-85	0.813E-11	0.0
17	5	RU-103	0.532E-11	0.532E-11
17	6	KR-85	0.869E-11	0.0
17	6	RU-103	0.581E-11	0.581E-11
17	7	KR-85	0.925E-11	0.0
17	7	RU-103	0.630E-11	0.630E-11
17	8	KR-85	0.976E-11	0.0
17	8	RU-103	0.675E-11	0.675E-11

AREA COLUMN	ROW	NUCLIDE	AIR CONCENTRATION (PCI/CC)	GROUND DEPOSITION RATE (PCI/SQUARE CM-SEC)
17	9	KR-85	0.102E-10	0.0
17	9	RU-103	0.710E-11	0.710E-11
17	10	KR-85	0.104E-10	0.0
17	10	RU-103	0.729E-11	0.729E-11
17	11	KR-85	0.104E-10	0.0
17	11	RU-103	0.729E-11	0.729E-11
17	12	KR-85	0.102E-10	0.0
17	12	RU-103	0.710E-11	0.710E-11
17	13	KR-85	0.976E-11	0.0
17	13	RU-103	0.675E-11	0.675E-11
17	14	KR-85	0.925E-11	0.0
17	14	RU-103	0.630E-11	0.630E-11
17	15	KR-85	0.869E-11	0.0
17	15	RU-103	0.581E-11	0.581E-11
17	16	KR-85	0.813E-11	0.0
17	16	RU-103	0.532E-11	0.532E-11
17	17	KR-85	0.760E-11	0.0
17	17	RU-103	0.485E-11	0.485E-11
17	18	KR-85	0.713E-11	0.0
17	18	RU-103	0.443E-11	0.443E-11
17	19	KR-85	0.670E-11	0.0
17	19	RU-103	0.404E-11	0.404E-11
17	20	KR-85	0.631E-11	0.0
17	20	RU-103	0.369E-11	0.369E-11
18	1	KR-85	0.606E-11	0.0
18	1	RU-103	0.346E-11	0.346E-11
18	2	KR-85	0.639E-11	0.0
18	2	RU-103	0.376E-11	0.376E-11
18	3	KR-85	0.675E-11	0.0
18	3	RU-103	0.409E-11	0.409E-11
18	4	KR-85	0.713E-11	0.0
18	4	RU-103	0.443E-11	0.443E-11
18	5	KR-85	0.753E-11	0.0
18	5	RU-103	0.479E-11	0.479E-11
18	6	KR-85	0.794E-11	0.0
18	6	RU-103	0.515E-11	0.515E-11
18	7	KR-85	0.834E-11	0.0
18	7	RU-103	0.550E-11	0.550E-11
18	8	KR-85	0.869E-11	0.0
18	8	RU-103	0.581E-11	0.581E-11
18	9	KR-85	0.896E-11	0.0
18	9	RU-103	0.604E-11	0.604E-11
18	10	KR-85	0.910E-11	0.0
18	10	RU-103	0.617E-11	0.617E-11
18	11	KR-85	0.910E-11	0.0
18	11	RU-103	0.617E-11	0.617E-11
18	12	KR-85	0.896E-11	0.0
18	12	RU-103	0.604E-11	0.604E-11
18	13	KR-85	0.869E-11	0.0
18	13	RU-103	0.581E-11	0.581E-11
18	14	KR-85	0.834E-11	0.0
18	14	RU-103	0.550E-11	0.550E-11
18	15	KR-85	0.794E-11	0.0
18	15	RU-103	0.515E-11	0.515E-11
18	16	KR-85	0.753E-11	0.0
18	16	RU-103	0.479E-11	0.479E-11
18	17	KR-85	0.713E-11	0.0
18	17	RU-103	0.443E-11	0.443E-11
18	18	KR-85	0.675E-11	0.0
18	18	RU-103	0.409E-11	0.409E-11
18	19	KR-85	0.639E-11	0.0
18	19	RU-103	0.376E-11	0.376E-11
18	20	KR-85	0.606E-11	0.0
18	20	RU-103	0.346E-11	0.346E-11
19	1	KR-85	0.582E-11	0.0
19	1	RU-103	0.323E-11	0.323E-11
19	2	KR-85	0.609E-11	0.0
19	2	RU-103	0.349E-11	0.349E-11
19	3	KR-85	0.639E-11	0.0
19	3	RU-103	0.376E-11	0.376E-11
19	4	KR-85	0.670E-11	0.0
19	4	RU-103	0.404E-11	0.404E-11
19	5	KR-85	0.701E-11	0.0
19	5	RU-103	0.433E-11	0.433E-11
19	6	KR-85	0.731E-11	0.0
19	6	RU-103	0.459E-11	0.459E-11
19	7	KR-85	0.760E-11	0.0
19	7	RU-103	0.485E-11	0.485E-11
19	8	KR-85	0.785E-11	0.0
19	8	RU-103	0.507E-11	0.507E-11
19	9	KR-85	0.804E-11	0.0
19	9	RU-103	0.524E-11	0.524E-11
19	10	KR-85	0.813E-11	0.0
19	10	RU-103	0.532E-11	0.532E-11
19	11	KR-85	0.813E-11	0.0
19	11	RU-103	0.532E-11	0.532E-11
19	12	KR-85	0.804E-11	0.0
19	12	RU-103	0.524E-11	0.524E-11
19	13	KR-85	0.785E-11	0.0
19	13	RU-103	0.507E-11	0.507E-11
19	14	KR-85	0.760E-11	0.0
19	14	RU-103	0.485E-11	0.485E-11

AREA COLUMN	AREA ROW	NUCLIDE	AIR CONCENTRATION (PCI/CC)	GROUND DEPOSITION RATE (PCI/SQUARE CM-SEC)
19	15	KR-85	0.731E-11	0.0
19	15	RU-103	0.459E-11	0.459E-11
19	16	KR-85	0.701E-11	0.0
19	16	RU-103	0.433E-11	0.433E-11
19	17	KR-85	0.670E-11	0.0
19	17	RU-103	0.404E-11	0.404E-11
19	18	KR-85	0.639E-11	0.0
19	18	RU-103	0.376E-11	0.376E-11
19	19	KR-85	0.609E-11	0.0
19	19	RU-103	0.349E-11	0.349E-11
19	20	KR-85	0.582E-11	0.0
19	20	RU-103	0.323E-11	0.323E-11
20	1	KR-85	0.558E-11	0.0
20	1	RU-103	0.301E-11	0.301E-11
20	2	KR-85	0.582E-11	0.0
20	2	RU-103	0.323E-11	0.323E-11
20	3	KR-85	0.606E-11	0.0
20	3	RU-103	0.346E-11	0.346E-11
20	4	KR-85	0.631E-11	0.0
20	4	RU-103	0.369E-11	0.369E-11
20	5	KR-85	0.656E-11	0.0
20	5	RU-103	0.392E-11	0.392E-11
20	6	KR-85	0.680E-11	0.0
20	6	RU-103	0.413E-11	0.413E-11
20	7	KR-85	0.701E-11	0.0
20	7	RU-103	0.433E-11	0.433E-11
20	8	KR-85	0.718E-11	0.0
20	8	RU-103	0.448E-11	0.448E-11
20	9	KR-85	0.731E-11	0.0
20	9	RU-103	0.459E-11	0.459E-11
20	10	KR-85	0.738E-11	0.0
20	10	RU-103	0.466E-11	0.466E-11
20	11	KR-85	0.738E-11	0.0
20	11	RU-103	0.466E-11	0.466E-11
20	12	KR-85	0.731E-11	0.0
20	12	RU-103	0.459E-11	0.459E-11
20	13	KR-85	0.718E-11	0.0
20	13	RU-103	0.448E-11	0.448E-11
20	14	KR-85	0.701E-11	0.0
20	14	RU-103	0.433E-11	0.433E-11
20	15	KR-85	0.680E-11	0.0
20	15	RU-103	0.413E-11	0.413E-11
20	16	KR-85	0.656E-11	0.0
20	16	RU-103	0.392E-11	0.392E-11
20	17	KR-85	0.631E-11	0.0
20	17	RU-103	0.369E-11	0.369E-11
20	18	KR-85	0.606E-11	0.0
20	18	RU-103	0.346E-11	0.346E-11
20	19	KR-85	0.582E-11	0.0
20	19	RU-103	0.323E-11	0.323E-11
20	20	KR-85	0.558E-11	0.0
20	20	RU-103	0.301E-11	0.301E-11

NOTE- THE AREA SURROUNDING THE PLANT IS A SQUARE WITH AN AREA OF 25600.0 SQUARE KILOMETERS WITH THE PLANT LOCATED AT THE CENTER. THE SQUARE AREA IS ALIGNED DUE NORTH-SOUTH AND EAST-WEST. THE 400 SMALLER SQUARES, WHICH ARE EACH 8000.0 METERS ON A SIDE, ARE IDENTIFIED BY COLUMN AND ROW. COLUMNS ARE NUMBERED FROM 1 TO 20 FROM WEST TO EAST. ROWS ARE NUMBERED FROM 1 TO 20 FROM SOUTH TO NORTH.

SUMMARY OF AREA SURROUNDING PLANT

AREA COLUMN	AREA ROW	NO. BEEF CATTLE	NO. MILK CATTLE	FOOD CROPS	WATER AREA	POPULATION
1	1	10000	10000	1	0	0.0
1	2	10000	10000	1	0	0.0
1	3	10000	10000	1	0	0.0
1	4	10000	10000	1	0	0.0
1	5	10000	10000	1	0	0.0
1	6	10000	10000	1	0	0.0
1	7	10000	10000	1	0	0.0
1	8	10000	10000	1	0	0.0
1	9	10000	10000	1	0	4572.2
1	10	10000	10000	1	0	11430.5
1	11	10000	10000	1	0	11430.5
1	12	10000	10000	1	0	11430.5
1	13	10000	10000	1	0	13716.7
1	14	10000	10000	1	0	9144.4
1	15	10000	10000	1	0	13716.7
1	16	10000	10000	1	0	13716.7
1	17	10000	10000	1	0	11430.5

AREA		NO. BEEF CATTLE	NO. MILK CATTLE	FOOD CROPS	WATER AREA	POPULATION
COLUMN	ROW					
1	18	10000	10000	1	0	11430.5
1	19	10000	10000	1	0	11430.5
1	20	10000	10000	1	0	4572.2
2	1	10000	10000	1	0	0.0
2	2	10000	10000	1	0	0.0
2	3	10000	10000	1	0	0.0
2	4	10000	10000	1	0	0.0
2	5	10000	10000	1	0	0.0
2	6	10000	10000	1	0	0.0
2	7	10000	10000	1	0	0.0
2	8	10000	10000	1	0	4572.2
2	9	10000	10000	1	0	11430.5
2	10	10000	10000	1	0	11430.5
2	11	10000	10000	1	0	11102.8
2	12	10000	10000	1	0	12405.5
2	13	10000	10000	1	0	11750.0
2	14	10000	10000	1	0	9791.7
2	15	10000	10000	1	0	13708.3
2	16	10000	10000	1	0	11750.0
2	17	10000	10000	1	0	12405.5
2	18	10000	10000	1	0	11102.8
2	19	10000	10000	1	0	11430.5
2	20	10000	10000	1	0	11430.5
3	1	10000	10000	1	0	4572.2
3	2	10000	10000	1	0	0.0
3	3	10000	10000	1	0	0.0
3	4	10000	10000	1	0	0.0
3	5	10000	10000	1	0	0.0
3	6	10000	10000	1	0	0.0
3	7	10000	10000	1	0	4572.2
3	8	10000	10000	1	0	11430.5
3	9	10000	10000	1	0	13716.7
3	10	10000	10000	1	0	10447.2
3	11	10000	10000	1	0	13708.3
3	12	10000	10000	1	0	13708.3
3	13	10000	10000	1	0	11750.0
3	14	10000	10000	1	0	11750.0
3	15	10000	10000	1	0	15666.7
3	16	10000	10000	1	0	11750.0
3	17	10000	10000	1	0	13708.3
3	18	10000	10000	1	0	13708.3
3	19	10000	10000	1	0	10447.2
3	20	10000	10000	1	0	13716.7
4	1	10000	10000	1	0	11430.5
4	2	10000	10000	1	0	4572.2
4	3	10000	10000	1	0	0.0
4	4	10000	10000	1	0	0.0
4	5	10000	10000	1	0	0.0
4	6	10000	10000	1	0	4572.2
4	7	10000	10000	1	0	11430.5
4	8	10000	10000	1	0	13716.7
4	9	10000	10000	1	0	14036.1
4	10	10000	10000	1	0	13708.3
4	11	10000	10000	1	0	11750.0
4	12	10000	10000	1	0	13632.0
4	13	10000	10000	1	0	13555.6
4	14	10000	10000	1	0	10147.7
4	15	10000	10000	1	0	13047.0
4	16	10000	10000	1	0	13555.6
4	17	10000	10000	1	0	13632.0
4	18	10000	10000	1	0	11750.0
4	19	10000	10000	1	0	13708.3
4	20	10000	10000	1	0	14036.1
5	1	10000	10000	1	0	13716.7
5	2	10000	10000	1	0	11430.5
5	3	10000	10000	1	0	4572.2
5	4	10000	10000	1	0	0.0
5	5	10000	10000	1	0	0.0
5	6	10000	10000	1	0	11430.5
5	7	10000	10000	1	0	11430.5
5	8	10000	10000	1	0	10447.2
5	9	10000	10000	1	0	13708.3
5	10	10000	10000	1	0	13199.7
5	11	10000	10000	1	0	13555.6
5	12	10000	10000	1	0	13047.0
5	13	10000	10000	1	0	13047.0
5	14	10000	10000	1	0	13047.0
5	15	10000	10000	1	0	15946.3
5	16	10000	10000	1	0	13047.0
5	17	10000	10000	1	0	13047.0
5	18	10000	10000	1	0	13555.6
5	19	10000	10000	1	0	13199.7
5	20	10000	10000	1	0	13708.3
6	1	10000	10000	1	0	10447.2
6	2	10000	10000	1	0	11430.5
6	3	10000	10000	1	0	11430.5
6	4	10000	10000	1	0	0.0
6	5	10000	10000	1	0	4572.2
6	6	10000	10000	1	0	11430.5
6	7	10000	10000	1	0	11102.8
6	8	10000	10000	1	0	13708.3
6	9	10000	10000	1	0	11750.0

AREA		NO. BEEF CATTLE	NO. MILK CATTLE	FOOD CROPS	WATER AREA	POPULATION
COLUMN	ROW					
6	10	10000	10000	1	0	13555.6
6	11	10000	10000	1	0	13047.0
6	12	10000	10000	1	0	12910.0
6	13	10000	10000	1	0	9599.7
6	14	10000	10000	1	0	8532.3
6	15	10000	10000	1	0	9845.0
6	16	10000	10000	1	0	9599.7
6	17	10000	10000	1	0	12910.0
6	18	10000	10000	1	0	13047.0
6	19	10000	10000	1	0	13555.6
6	20	10000	10000	1	0	11750.0
7	1	10000	10000	1	0	13708.3
7	2	10000	10000	1	0	11102.8
7	3	10000	10000	1	0	11430.5
7	4	10000	10000	1	0	4572.2
7	5	10000	10000	1	0	9144.4
7	6	10000	10000	1	0	11430.5
7	7	10000	10000	1	0	12405.5
7	8	10000	10000	1	0	13708.3
7	9	10000	10000	1	0	13632.0
7	10	10000	10000	1	0	13047.0
7	11	10000	10000	1	0	12910.0
7	12	10000	10000	1	0	7876.0
7	13	10000	10000	1	0	10501.3
7	14	10000	10000	1	0	11814.0
7	15	10000	10000	1	0	13126.6
7	16	10000	10000	1	0	10501.3
7	17	10000	10000	1	0	7876.0
7	18	10000	10000	1	0	12910.0
7	19	10000	10000	1	0	13047.0
7	20	10000	10000	1	0	13632.0
8	1	10000	10000	1	0	13708.3
8	2	10000	10000	1	0	12405.5
8	3	10000	10000	1	0	11430.5
8	4	10000	10000	1	0	9144.4
8	5	10000	10000	1	0	9144.4
8	6	10000	10000	1	0	13716.7
8	7	10000	10000	1	0	11750.0
8	8	10000	10000	1	0	11750.0
8	9	10000	10000	1	0	13555.6
8	10	10000	10000	1	0	13047.0
8	11	10000	10000	1	0	9599.7
8	12	10000	10000	1	0	10501.3
8	13	10000	10000	1	0	12018.6
8	14	10000	10000	1	0	8490.0
8	15	10000	10000	1	0	9118.8
8	16	10000	10000	1	0	12018.6
8	17	10000	10000	1	0	10501.3
8	18	10000	10000	1	0	9599.7
8	19	10000	10000	1	0	13047.0
8	20	10000	10000	1	0	13555.6
9	1	10000	10000	1	0	11750.0
9	2	10000	10000	1	0	11750.0
9	3	10000	10000	1	0	13716.7
9	4	10000	10000	1	0	9144.4
9	5	10000	10000	1	0	13716.7
9	6	10000	10000	1	0	13716.7
9	7	10000	10000	1	0	13708.3
9	8	10000	10000	1	0	15666.7
9	9	10000	10000	1	0	13047.0
9	10	10000	10000	1	0	15946.3
9	11	10000	10000	1	0	9845.0
9	12	10000	10000	1	0	13126.6
9	13	10000	10000	1	0	9118.8
9	14	10000	10000	1	0	8561.1
9	15	10000	10000	1	0	8561.1
9	16	10000	10000	1	0	8490.0
9	17	10000	10000	1	0	11814.0
9	18	10000	10000	1	0	8532.3
9	19	10000	10000	1	0	13047.0
9	20	10000	10000	1	0	10147.7
10	1	10000	10000	1	0	11750.0
10	2	10000	10000	1	0	9791.7
10	3	10000	10000	1	0	9144.4
10	4	10000	10000	1	0	9144.4
10	5	10000	10000	1	0	9144.4
10	6	10000	10000	1	0	9144.4
10	7	10000	10000	1	0	9791.7
10	8	10000	10000	1	0	11750.0
10	9	10000	10000	1	0	10147.7
10	10	10000	10000	1	0	13047.0
10	11	10000	10000	1	0	8532.3
10	12	10000	10000	1	0	11814.0
10	13	10000	10000	1	0	8490.0
10	14	10000	10000	1	0	8561.1
10	15	10000	10000	1	0	8561.1
10	16	10000	10000	1	0	9118.8
10	17	10000	10000	1	0	13126.6
10	18	10000	10000	1	0	9845.0
10	19	10000	10000	1	0	15946.3
10	20	10000	10000	1	0	13047.0
11	1	10000	10000	1	0	15666.7

AREA		NO. BEEF CATTLE	NO. MILK CATTLE	FOOD CROPS	WATER AREA	POPULATION
COLUMN	ROW					
11	2	10000	10000	1	0	13708.3
11	3	10000	10000	1	0	13716.7
11	4	10000	10000	1	0	13716.7
11	5	10000	10000	1	0	9144.4
11	6	10000	10000	1	0	13716.7
11	7	10000	10000	1	0	11750.0
11	8	10000	10000	1	0	11750.0
11	9	10000	10000	1	0	13555.6
11	10	10000	10000	1	0	13047.0
11	11	10000	10000	1	0	9599.7
11	12	10000	10000	1	0	10501.3
11	13	10000	10000	1	0	12018.6
11	14	10000	10000	1	0	9118.8
11	15	10000	10000	1	0	8490.0
11	16	10000	10000	1	0	12018.6
11	17	10000	10000	1	0	10501.3
11	18	10000	10000	1	0	9599.7
11	19	10000	10000	1	0	13047.0
11	20	10000	10000	1	0	13555.6
12	1	10000	10000	1	0	11750.0
12	2	10000	10000	1	0	11750.0
12	3	10000	10000	1	0	13716.7
12	4	10000	10000	1	0	9144.4
12	5	10000	10000	1	0	9144.4
12	6	10000	10000	1	0	11430.5
12	7	10000	10000	1	0	12405.5
12	8	10000	10000	1	0	13708.3
12	9	10000	10000	1	0	13632.0
12	10	10000	10000	1	0	13047.0
12	11	10000	10000	1	0	12910.0
12	12	10000	10000	1	0	7876.0
12	13	10000	10000	1	0	10501.3
12	14	10000	10000	1	0	13126.6
12	15	10000	10000	1	0	11814.0
12	16	10000	10000	1	0	10501.3
12	17	10000	10000	1	0	7876.0
12	18	10000	10000	1	0	12910.0
12	19	10000	10000	1	0	13047.0
12	20	10000	10000	1	0	13632.0
13	1	10000	10000	1	0	13708.3
13	2	10000	10000	1	0	12405.5
13	3	10000	10000	1	0	11430.5
13	4	10000	10000	1	0	9144.4
13	5	10000	10000	1	0	4572.2
13	6	10000	10000	1	0	11430.5
13	7	10000	10000	1	0	11102.8
13	8	10000	10000	1	0	13708.3
13	9	10000	10000	1	0	11750.0
13	10	10000	10000	1	0	13555.6
13	11	10000	10000	1	0	13047.0
13	12	10000	10000	1	0	12910.0
13	13	10000	10000	1	0	9599.7
13	14	10000	10000	1	0	9845.0
13	15	10000	10000	1	0	8532.3
13	16	10000	10000	1	0	9599.7
13	17	10000	10000	1	0	12910.0
13	18	10000	10000	1	0	13047.0
13	19	10000	10000	1	0	13555.6
13	20	10000	10000	1	0	11750.0
14	1	10000	10000	1	0	13708.3
14	2	10000	10000	1	0	11102.8
14	3	10000	10000	1	0	11430.5
14	4	10000	10000	1	0	4572.2
14	5	10000	10000	1	0	0.0
14	6	10000	10000	1	0	11430.5
14	7	10000	10000	1	0	11430.5
14	8	10000	10000	1	0	10447.2
14	9	10000	10000	1	0	13708.3
14	10	10000	10000	1	0	13199.7
14	11	10000	10000	1	0	13555.6
14	12	10000	10000	1	0	13047.0
14	13	10000	10000	1	0	13047.0
14	14	10000	10000	1	0	15946.3
14	15	10000	10000	1	0	13047.0
14	16	10000	10000	1	0	13047.0
14	17	10000	10000	1	0	13047.0
14	18	10000	10000	1	0	13555.6
14	19	10000	10000	1	0	13199.7
14	20	10000	10000	1	0	13708.3
15	1	10000	10000	1	0	10447.2
15	2	10000	10000	1	0	11430.5
15	3	10000	10000	1	0	11430.5
15	4	10000	10000	1	0	0.0
15	5	10000	10000	1	0	0.0
15	6	10000	10000	1	0	4572.2
15	7	10000	10000	1	0	11430.5
15	8	10000	10000	1	0	13716.7
15	9	10000	10000	1	0	14036.1
15	10	10000	10000	1	0	13708.3
15	11	10000	10000	1	0	11750.0
15	12	10000	10000	1	0	13632.0
15	13	10000	10000	1	0	13555.6

AREA		NO. BEEF CATTLE	NO. MILK CATTLE	FOOD CROPS	WATER AREA	POPULATION
COLUMN	ROW					
15	14	10000	10000	1	0	13047.0
15	15	10000	10000	1	0	10147.7
15	16	10000	10000	1	0	13555.6
15	17	10000	10000	1	0	13632.0
15	18	10000	10000	1	0	11750.0
15	19	10000	10000	1	0	13708.3
15	20	10000	10000	1	0	14036.1
16	1	10000	10000	1	0	13716.7
16	2	10000	10000	1	0	11430.5
16	3	10000	10000	1	0	4572.2
16	4	10000	10000	1	0	0.0
16	5	10000	10000	1	0	0.0
16	6	10000	10000	1	0	0.0
16	7	10000	10000	1	0	4572.2
16	8	10000	10000	1	0	11430.5
16	9	10000	10000	1	0	13716.7
16	10	10000	10000	1	0	10447.2
16	11	10000	10000	1	0	13708.3
16	12	10000	10000	1	0	13708.3
16	13	10000	10000	1	0	11750.0
16	14	10000	10000	1	0	15666.7
16	15	10000	10000	1	0	11750.0
16	16	10000	10000	1	0	11750.0
16	17	10000	10000	1	0	13708.3
16	18	10000	10000	1	0	13708.3
16	19	10000	10000	1	0	10447.2
16	20	10000	10000	1	0	13716.7
17	1	10000	10000	1	0	11430.5
17	2	10000	10000	1	0	4572.2
17	3	10000	10000	1	0	0.0
17	4	10000	10000	1	0	0.0
17	5	10000	10000	1	0	0.0
17	6	10000	10000	1	0	0.0
17	7	10000	10000	1	0	0.0
17	8	10000	10000	1	0	4572.2
17	9	10000	10000	1	0	11430.5
17	10	10000	10000	1	0	11430.5
17	11	10000	10000	1	0	11102.8
17	12	10000	10000	1	0	12405.5
17	13	10000	10000	1	0	11750.0
17	14	10000	10000	1	0	13708.3
17	15	10000	10000	1	0	9791.7
17	16	10000	10000	1	0	11750.0
17	17	10000	10000	1	0	12405.5
17	18	10000	10000	1	0	11102.8
17	19	10000	10000	1	0	11430.5
17	20	10000	10000	1	0	11430.5
18	1	10000	10000	1	0	4572.2
18	2	10000	10000	1	0	0.0
18	3	10000	10000	1	0	0.0
18	4	10000	10000	1	0	0.0
18	5	10000	10000	1	0	0.0
18	6	10000	10000	1	0	0.0
18	7	10000	10000	1	0	0.0
18	8	10000	10000	1	0	0.0
18	9	10000	10000	1	0	4572.2
18	10	10000	10000	1	0	11430.5
18	11	10000	10000	1	0	11430.5
18	12	10000	10000	1	0	11430.5
18	13	10000	10000	1	0	13716.7
18	14	10000	10000	1	0	13716.7
18	15	10000	10000	1	0	9144.4
18	16	10000	10000	1	0	13716.7
18	17	10000	10000	1	0	11430.5
18	18	10000	10000	1	0	11430.5
18	19	10000	10000	1	0	11430.5
18	20	10000	10000	1	0	4572.2
19	1	10000	10000	1	0	0.0
19	2	10000	10000	1	0	0.0
19	3	10000	10000	1	0	0.0
19	4	10000	10000	1	0	0.0
19	5	10000	10000	1	0	0.0
19	6	10000	10000	1	0	0.0
19	7	10000	10000	1	0	0.0
19	8	10000	10000	1	0	0.0
19	9	10000	10000	1	0	0.0
19	10	10000	10000	1	0	0.0
19	11	10000	10000	1	0	4572.2
19	12	10000	10000	1	0	9144.4
19	13	10000	10000	1	0	9144.4
19	14	10000	10000	1	0	13716.7
19	15	10000	10000	1	0	9144.4
19	16	10000	10000	1	0	9144.4
19	17	10000	10000	1	0	9144.4
19	18	10000	10000	1	0	4572.2
19	19	10000	10000	1	0	0.0
19	20	10000	10000	1	0	0.0
20	1	10000	10000	1	0	0.0
20	2	10000	10000	1	0	0.0
20	3	10000	10000	1	0	0.0
20	4	10000	10000	1	0	0.0
20	5	10000	10000	1	0	0.0

AREA		NO. BEEF CATTLE	NO. MILK CATTLE	FOOD CROPS	WATER AREA	POPULATION
COLUMN	ROW					
20	6	10000	10000	1	0	0.0
20	7	10000	10000	1	0	0.0
20	8	10000	10000	1	0	0.0
20	9	10000	10000	1	0	0.0
20	10	10000	10000	1	0	0.0
20	11	10000	10000	1	0	4572.2
20	12	10000	10000	1	0	9144.4
20	13	10000	10000	1	0	9144.4
20	14	10000	10000	1	0	9144.4
20	15	10000	10000	1	0	13716.7
20	16	10000	10000	1	0	9144.4
20	17	10000	10000	1	0	9144.4
20	18	10000	10000	1	0	4572.2
20	19	10000	10000	1	0	0.0
20	20	10000	10000	1	0	0.0

FOR FOOD CROPS--0= NONE OR MINIMAL AND 1= FOOD CROPS PRODUCED
FOR WATER AREAS--0= NONE OR MINIMAL AND 1= MAJOR WATER AREA PRESENT

DOSE TO EACH ORGAN THROUGH EACH PATHWAY FOR EACH RADIONUCLIDE (MAN-REMS/YEAR)

RANK	NUCLIDE	PATHWAY	TOT.BODY	GI TRACT	BONE	THYROID	LUNGS	MUSCLE	KIDNEYS	LIVER	SPLEEN	TESTES	OVARIES
1	RU-103	INHAL.	0.21E-03	0.29E-02	0.42E-03	0.21E-03	0.20E-01	0.21E-03	0.17E-02	0.21E-03	0.21E-03	0.21E-03	0.21E-03
		SUBM AIR	0.16E-03	0.16E-03	0.16E-03	0.16E-03	0.16E-03	0.16E-03	0.16E-03	0.16E-03	0.16E-03	0.16E-03	0.16E-03
		SURFACE	0.14E 00	0.14E 00	0.14E 00	0.14E 00	0.14E 00	0.14E 00	0.14E 00	0.14E 00	0.14E 00	0.14E 00	0.14E 00
		INGEST.	0.16E-01	0.45E 01	0.34E-01	0.16E-01	0.0	0.16E-01	0.14E 00	0.16E-01	0.16E-01	0.16E-01	0.16E-01
		SWIMMING	0.96E-15	0.96E-15	0.96E-15	0.96E-15	0.96E-15	0.96E-15	0.96E-15	0.96E-15	0.96E-15	0.96E-15	0.96E-15
2	KR-85	INHAL.	0.36E-12	0.36E-12	0.36E-12	0.36E-12	0.36E-12	0.36E-12	0.36E-12	0.36E-12	0.36E-12	0.36E-12	0.36E-12
		SUBM AIR	0.90E-06	0.90E-06	0.90E-06	0.90E-06	0.90E-06	0.90E-06	0.90E-06	0.90E-06	0.90E-06	0.90E-06	0.90E-06
		SURFACE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		INGEST.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		SWIMMING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PERCENT OF TOT.BODY DOSE BY EACH PATHWAY

NUCLIDE	PATHWAY	DOSE(MAN-REMS)	PERCENT OF TOTAL
RU-103	INHAL.	0.209E-03	0.1
	SUBM AIR	0.160E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
KR-85	INHAL.	0.359E-12	0.0
	SUBM AIR	0.901E-06	100.0
	SURFACE	0.0	0.0
	INGEST.	0.0	0.0
	SWIMMING	0.0	0.0

PERCENT OF GI TRACT DOSE BY EACH PATHWAY

NUCLIDE	PATHWAY	DOSE(MAN-REMS)	PERCENT OF TOTAL
RU-103	INHAL.	0.289E-02	0.1
	SUBM AIR	0.160E-03	0.0
	SURFACE	0.144E 00	3.1
	INGEST.	0.445E 01	96.8
	SWIMMING	0.958E-15	0.0
KR-85	INHAL.	0.359E-12	0.0
	SUBM AIR	0.901E-06	100.0
	SURFACE	0.0	0.0
	INGEST.	0.0	0.0
	SWIMMING	0.0	0.0

PERCENT OF BONE DOSE BY EACH PATHWAY

NUCLIDE	PATHWAY	DOSE(MAN-REMS)	PERCENT OF TOTAL
RU-103	INHAL.	0.422E-03	0.2
	SUBM AIR	0.160E-03	0.1
	SURFACE	0.144E 00	80.5
	INGEST.	0.343E-01	19.2
	SWIMMING	0.958E-15	0.0
KR-85	INHAL.	0.359E-12	0.0
	SUBM AIR	0.901E-06	100.0
	SURFACE	0.0	0.0
	INGEST.	0.0	0.0
	SWIMMING	0.0	0.0

PERCENT OF THYROID DOSE BY EACH PATHWAY

NUCLIDE	PATHWAY	DOSE(MAN-REMS)	PERCENT OF TOTAL
RU-103	INHAL.	0.209E-03	0.1
	SUBM AIR	0.160E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
KR-85	INHAL.	0.359E-12	0.0
	SUBM AIR	0.901E-06	100.0
	SURFACE	0.0	0.0
	INGEST.	0.0	0.0
	SWIMMING	0.0	0.0

PERCENT OF LUNGS DOSE BY EACH PATHWAY

NUCLIDE	PATHWAY	DOSE(MAN-REMS)	PERCENT OF TOTAL
RU-103	INHAL.	0.205E-01	12.4
	SUBM AIR	0.160E-03	0.1
	SURFACE	0.144E 00	87.5
	INGEST.	0.0	0.0
	SWIMMING	0.958E-15	0.0
KR-85	INHAL.	0.359E-12	0.0
	SUBM AIR	0.901E-06	100.0
	SURFACE	0.0	0.0
	INGEST.	0.0	0.0
	SWIMMING	0.0	0.0

PERCENT OF MUSCLE DOSE BY EACH PATHWAY

NUCLIDE	PATHWAY	DOSE(MAN-REMS)	PERCENT OF TOTAL
RU-103	INHAL.	0.209E-03	0.1
	SUBM AIR	0.160E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
KR-85	INHAL.	0.359E-12	0.0
	SUBM AIR	0.901E-06	100.0
	SURFACE	0.0	0.0
	INGEST.	0.0	0.0
	SWIMMING	0.0	0.0

PERCENT OF KIDNEYS DOSE BY EACH PATHWAY

NUCLIDE	PATHWAY	DOSE(MAN-REMS)	PERCENT OF TOTAL
RU-103	INHAL.	0.175E-02	0.6
	SUBM AIR	0.160E-03	0.1
	SURFACE	0.144E 00	50.0
	INGEST.	0.142E 00	49.3
	SWIMMING	0.958E-15	0.0
KR-85	INHAL.	0.359E-12	0.0
	SUBM AIR	0.901E-06	100.0
	SURFACE	0.0	0.0
	INGEST.	0.0	0.0
	SWIMMING	0.0	0.0

PERCENT OF LIVER DOSE BY EACH PATHWAY

NUCLIDE	PATHWAY	DOSE(MAN-REMS)	PERCENT OF TOTAL
RU-103	INHAL.	0.209E-03	0.1
	SUBM AIR	0.160E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
KR-85	INHAL.	0.359E-12	0.0
	SUBM AIR	0.901E-06	100.0
	SURFACE	0.0	0.0
	INGEST.	0.0	0.0
	SWIMMING	0.0	0.0

PERCENT OF SPLEEN DOSE BY EACH PATHWAY

NUCLIDE	PATHWAY	DOSE(MAN-REMS)	PERCENT OF TOTAL
RU-103	INHAL.	0.209E-03	0.1
	SUBM AIR	0.160E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
KR-85	INHAL.	0.359E-12	0.0
	SUBM AIR	0.901E-06	100.0
	SURFACE	0.0	0.0
	INGEST.	0.0	0.0
	SWIMMING	0.0	0.0

PERCENT OF TESTES DOSE BY EACH PATHWAY

NUCLIDE	PATHWAY	DOSE(MAN-REMS)	PERCENT OF TOTAL
RU-103	INHAL.	0.209E-03	0.1
	SUBM AIR	0.160E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
KR-85	INHAL.	0.359E-12	0.0
	SUBM AIR	0.901E-06	100.0
	SURFACE	0.0	0.0
	INGEST.	0.0	0.0
	SWIMMING	0.0	0.0

PERCENT OF OVARIES DOSE BY EACH PATHWAY

NUCLIDE	PATHWAY	DOSE(MAN-REMS)	PERCENT OF TOTAL
RU-103	INHAL.	0.209E-03	0.1
	SUBM AIR	0.160E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
KR-85	INHAL.	0.359E-12	0.0
	SUBM AIR	0.901E-06	100.0
	SURFACE	0.0	0.0
	INGEST.	0.0	0.0
	SWIMMING	0.0	0.0

DOSE TO EACH ORGAN FROM ALL PATHWAYS

NUCLIDE	ORGAN	DOSE(MAN-REMS)
RU-103	TOT.BODY	0.160E 00
	GI TRACT	0.460E 01
	BONE	0.179E 00
	THYROID	0.160E 00
	LUNGS	0.165E 00
	MUSCLE	0.160E 00
	KIDNEYS	0.288E 00
	LIVER	0.160E 00
	SPLEEN	0.160E 00
	TESTES	0.160E 00
	OVARIES	0.160E 00
KR-85	TOT.BODY	0.901E-06
	GI TRACT	0.901E-06
	BONE	0.901E-06
	THYROID	0.901E-06
	LUNGS	0.901E-06
	MUSCLE	0.901E-06
	KIDNEYS	0.901E-06
	LIVER	0.901E-06
	SPLEEN	0.901E-06
	TESTES	0.901E-06
	OVARIES	0.901E-06

TOTAL DOSE FOR EACH PATHWAY

ORGAN	PATHWAY	DOSE(MAN-REMS)	PERCENT
TOT.BODY	INHAL.	0.209E-03	0.1
	SUBM AIR	0.161E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
GI TRACT	INHAL.	0.289E-02	0.1
	SUBM AIR	0.161E-03	0.0
	SURFACE	0.144E 00	3.1
	INGEST.	0.445E 01	96.8
	SWIMMING	0.958E-15	0.0
BONE	INHAL.	0.422E-03	0.2
	SUBM AIR	0.161E-03	0.1
	SURFACE	0.144E 00	80.5
	INGEST.	0.343E-01	19.2
	SWIMMING	0.958E-15	0.0
THYROID	INHAL.	0.209E-03	0.1
	SUBM AIR	0.161E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
LUNGS	INHAL.	0.205E-01	12.4
	SUBM AIR	0.161E-03	0.1
	SURFACE	0.144E 00	87.5
	INGEST.	0.0	0.0
	SWIMMING	0.958E-15	0.0
MUSCLE	INHAL.	0.209E-03	0.1
	SUBM AIR	0.161E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
KIDNEYS	INHAL.	0.175E-02	0.6
	SUBM AIR	0.161E-03	0.1
	SURFACE	0.144E 00	50.0
	INGEST.	0.142E 00	49.3
	SWIMMING	0.958E-15	0.0

LIVER	INHAL.	0.209E-03	0.1
	SUBM AIR	0.161E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
SPLEEN	INHAL.	0.209E-03	0.1
	SUBM AIR	0.161E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
TESTES	INHAL.	0.209E-03	0.1
	SUBM AIR	0.161E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0
OVARIES	INHAL.	0.209E-03	0.1
	SUBM AIR	0.161E-03	0.1
	SURFACE	0.144E 00	89.9
	INGEST.	0.157E-01	9.8
	SWIMMING	0.958E-15	0.0

HIGHEST INDIVIDUAL DOSES IN AREA FOR EACH NUCLIDE

NUCLIDE	ORGAN	DOSE (REMS)	LOCATION		
			GRID	COLUMN	ROW
KR-85	TOT.BODY	0.187E-11	2	10	10
	GI TRACT	0.187E-11	2	10	10
	BONE	0.187E-11	2	10	10
	THYROID	0.187E-11	2	10	10
	LUNGS	0.187E-11	2	10	10
	MUSCLE	0.187E-11	2	10	10
	KIDNEYS	0.187E-11	2	10	10
	LIVER	0.187E-11	2	10	10
	SPLEEN	0.187E-11	2	10	10
	TESTES	0.187E-11	2	10	10
	OVARIES	0.187E-11	2	10	10
RU-103	TOT.BODY	0.382E-06	2	10	10
	GI TRACT	0.156E-05	2	10	10
	BONE	0.388E-06	2	10	10
	THYROID	0.382E-06	2	10	10
	LUNGS	0.431E-06	2	10	10
	MUSCLE	0.382E-06	2	10	10
	KIDNEYS	0.420E-06	2	10	10
	LIVER	0.382E-06	2	10	10
	SPLEEN	0.382E-06	2	10	10
	TESTES	0.382E-06	2	10	10
	OVARIES	0.382E-06	2	10	10

NO. 1 IS A 10 BY 10 SQUARE WITH THE SIDE OF EACH GRID 600.0 METERS
NO. 2 IS A 20 BY 20 SQUARE WITH THE SIDE OF EACH GRID 8000.0 METERS

HIGHEST INDIVIDUAL DOSES IN AREA

ORGAN	DOSE (REMS)
TOT.BODY	0.382E-06
GI TRACT	0.156E-05
BONE	0.388E-06
THYROID	0.382E-06
LUNGS	0.431E-06
MUSCLE	0.382E-06
KIDNEYS	0.420E-06
LIVER	0.382E-06
SPLEEN	0.382E-06
TESTES	0.382E-06
OVARIES	0.382E-06

TABLE 2-4 RESUSPENSION CODE SAMPLE PROBLEM INPUT DATA

1					*NP, no. of diff. particle sizes*
4					*NCAT, no. of particle size categories*
0.	6.	80.	300.	600.	*Particle size category boundaries, 0-6, 6-80, 80-300, 300-600*
20.	20.	30.	30.		*Percentage, by weight, of total no. of particles in each category*
3.					*Average diameter of particle*
3.					*Range on either side of diameter for mass-volume calculations*
100.					*Weight of particle*
2.60					*Sand particle density*
2.7	13.5	2.7	40.	20.	*Wind speeds at beginning (2.7), height (13.5), and end (2.7) of dust storm, duration (40 hr), time of max windspeed (20 hr)*
.01					*Velocity of fall*
2 1.8					*Type of sand (2), saltation constant (1.8)*
0.1	1.22E-03	100.	1.		*Sand particle threshold vel. prop. const. (0.1), density of air, height of wind speed meas. (100 cm), surface roughness (1 cm)*
1.0E-5					*Proportionality constant between saltation and suspension*
3					*Stability type*
3					*No. of distances at which conc. calc. to be made*
100.	1000.	10000.			*Distances for ground level conc. calc. (meters)*
100	200.	0.			*No. of down-wind segments for conc. calc., side of source square (1000 m), crosswind distance (0)*
3.75					*Effective height of the source*

TABLE 2-5 RESUSPENSION CODE SAMPLE PROBLEM

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NUMBER OF AEROSOL PARTICLE SIZE TYPES CONSIDERED=    1

NUMBER OF GROUND PARTICLE SIZE CATEGORIES IN HISTOGRAM=    4


PARTICLE SIZE DISTRIBUTION(BY WEIGHT)

PERCENTAGE OF PARTICLES IN THE RANGE   0.0   TO   6.00  MICRONS= 20.00
PERCENTAGE OF PARTICLES IN THE RANGE   6.00  TO  80.00  MICRONS= 20.00
PERCENTAGE OF PARTICLES IN THE RANGE  80.00  TO 300.00  MICRONS= 30.00
PERCENTAGE OF PARTICLES IN THE RANGE 300.00  TO 600.00  MICRONS= 30.00


AIRBORNE DUST SIZE INFORMATION


CENTROID FOR PARTICLE SIZE TYPE   1  =  3.00  MICRONS
DIAMETER RANGE FOR SIZE TYPE   1  =  0.0   TO    6.00  MICRONS


DENSITY OF SAND PARTICLES=  2.60



WINDSPEED AT BEGINNING OF DUST STORM=   2.70  METERS/SEC
WINDSPEED AT HEIGHT OF STORM=  13.50  METERS/SEC
WINDSPEED AT END OF STORM=   2.70  METERS/SEC
DURATION OF STORM=  40.00  HOURS
TIME OF MAXIMUM WINDSPEED=  20.00  HOURS


HOURLY WINDSPEED VALUES

WINDSPEED DURING HOUR   1  =   2.97  METERS/SEC
WINDSPEED DURING HOUR   2  =   3.51  METERS/SEC
WINDSPEED DURING HOUR   3  =   4.05  METERS/SEC
WINDSPEED DURING HOUR   4  =   4.59  METERS/SEC
WINDSPEED DURING HOUR   5  =   5.13  METERS/SEC
WINDSPEED DURING HOUR   6  =   5.67  METERS/SEC
WINDSPEED DURING HOUR   7  =   6.21  METERS/SEC
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WINDSPEED DURING HOUR  8  =   6.75  METERS/SEC
WINDSPEED DURING HOUR  9  =   7.29  METERS/SEC
WINDSPEED DURING HOUR 10  =   7.83  METERS/SEC
WINDSPEED DURING HOUR 11  =   8.37  METERS/SEC
WINDSPEED DURING HOUR 12  =   8.91  METERS/SEC
WINDSPEED DURING HOUR 13  =   9.45  METERS/SEC
WINDSPEED DURING HOUR 14  =   9.99  METERS/SEC
WINDSPEED DURING HOUR 15  =  10.53  METERS/SEC
WINDSPEED DURING HOUR 16  =  11.07  METERS/SEC
WINDSPEED DURING HOUR 17  =  11.61  METERS/SEC
WINDSPEED DURING HOUR 18  =  12.15  METERS/SEC
WINDSPEED DURING HOUR 19  =  12.69  METERS/SEC
WINDSPEED DURING HOUR 20  =  13.23  METERS/SEC
WINDSPEED DURING HOUR 21  =  13.23  METERS/SEC
WINDSPEED DURING HOUR 22  =  12.69  METERS/SEC
WINDSPEED DURING HOUR 23  =  12.15  METERS/SEC
WINDSPEED DURING HOUR 24  =  11.61  METERS/SEC
WINDSPEED DURING HOUR 25  =  11.07  METERS/SEC
WINDSPEED DURING HOUR 26  =  10.53  METERS/SEC
WINDSPEED DURING HOUR 27  =   9.99  METERS/SEC
WINDSPEED DURING HOUR 28  =   9.45  METERS/SEC
WINDSPEED DURING HOUR 29  =   8.91  METERS/SEC
WINDSPEED DURING HOUR 30  =   8.37  METERS/SEC
WINDSPEED DURING HOUR 31  =   7.83  METERS/SEC
WINDSPEED DURING HOUR 32  =   7.29  METERS/SEC
WINDSPEED DURING HOUR 33  =   6.75  METERS/SEC
WINDSPEED DURING HOUR 34  =   6.21  METERS/SEC
WINDSPEED DURING HOUR 35  =   5.67  METERS/SEC
WINDSPEED DURING HOUR 36  =   5.13  METERS/SEC
WINDSPEED DURING HOUR 37  =   4.59  METERS/SEC
WINDSPEED DURING HOUR 38  =   4.05  METERS/SEC
WINDSPEED DURING HOUR 39  =   3.51  METERS/SEC
WINDSPEED DURING HOUR 40  =   2.97  METERS/SEC


DEPOSITION VELOCITY FOR SIZE TYPE   1  =  0.10E-01  METERS/SEC


SAND IS OF TYPE   2  SAITATION CONSTANT C =   1.80


INFORMATION FOR THRESHOID DIAMETER CAICULATICNS
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SAND PARTICLE THRESHOLD VELOCITY PROPORTIONALITY CONSTANT= 0.10
DENSITY OF AIR= 0.122E-02 GRAMS/CM**3
HEIGHT FOR WIND SPEED MEASUREMENT= 100.00 CM
SURFACE ROUGHNESS= 1.00 CM

THRESHOLD DIAMETERS(FOR SURFACE CREEP) FOR EACH HOUR OF THE STORM

THRESHOLD DIAMETER FOR HOUR	1	WINDSPEED	2.970	METERS/SEC	=	0.320E	03	MICRONS
THRESHOLD DIAMETER FOR HOUR	2	WINDSPEED	3.510	METERS/SEC	=	0.446E	03	MICRONS
THRESHOLD DIAMETER FOR HOUR	3	WINDSPEED	4.050	METERS/SEC	=	0.594E	03	MICRONS
THRESHOLD DIAMETER FOR HOUR	4	WINDSPEED	4.590	METERS/SEC	=	0.763E	03	MICRONS
THRESHOLD DIAMETER FOR HOUR	5	WINDSPEED	5.130	METERS/SEC	=	0.953E	03	MICRONS
THRESHOLD DIAMETER FOR HOUR	6	WINDSPEED	5.670	METERS/SEC	=	0.116E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	7	WINDSPEED	6.210	METERS/SEC	=	0.140E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	8	WINDSPEED	6.750	METERS/SEC	=	0.165E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	9	WINDSPEED	7.290	METERS/SEC	=	0.192E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	10	WINDSPEED	7.830	METERS/SEC	=	0.222E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	11	WINDSPEED	8.370	METERS/SEC	=	0.254E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	12	WINDSPEED	8.910	METERS/SEC	=	0.288E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	13	WINDSPEED	9.450	METERS/SEC	=	0.323E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	14	WINDSPEED	9.990	METERS/SEC	=	0.361E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	15	WINDSPEED	10.530	METERS/SEC	=	0.402E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	16	WINDSPEED	11.070	METERS/SEC	=	0.444E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	17	WINDSPEED	11.610	METERS/SEC	=	0.488E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	18	WINDSPEED	12.150	METERS/SEC	=	0.535E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	19	WINDSPEED	12.690	METERS/SEC	=	0.583E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	20	WINDSPEED	13.230	METERS/SEC	=	0.634E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	21	WINDSPEED	13.230	METERS/SEC	=	0.634E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	22	WINDSPEED	12.690	METERS/SEC	=	0.583E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	23	WINDSPEED	12.150	METERS/SEC	=	0.535E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	24	WINDSPEED	11.610	METERS/SEC	=	0.488E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	25	WINDSPEED	11.070	METERS/SEC	=	0.444E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	26	WINDSPEED	10.530	METERS/SEC	=	0.402E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	27	WINDSPEED	9.990	METERS/SEC	=	0.361E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	28	WINDSPEED	9.450	METERS/SEC	=	0.323E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	29	WINDSPEED	8.910	METERS/SEC	=	0.288E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	30	WINDSPEED	8.370	METERS/SEC	=	0.254E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	31	WINDSPEED	7.830	METERS/SEC	=	0.222E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	32	WINDSPEED	7.290	METERS/SEC	=	0.192E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	33	WINDSPEED	6.750	METERS/SEC	=	0.165E	04	MICRONS
THRESHOLD DIAMETER FOR HOUR	34	WINDSPEED	6.210	METERS/SEC	=	0.140E	04	MICRONS

THRESHOLD DIAMETER FOR HOUR 35 WINDSPEED 5.670 METERS/SEC = 0.116E 04 MICRONS
THRESHOLD DIAMETER FOR HOUR 36 WINDSPEED 5.130 METERS/SEC = 0.953E 03 MICRONS
THRESHOLD DIAMETER FOR HOUR 37 WINDSPEED 4.590 METERS/SEC = 0.763E 03 MICRONS
THRESHOLD DIAMETER FOR HOUR 38 WINDSPEED 4.050 METERS/SEC = 0.594E 03 MICRONS
THRESHOLD DIAMETER FOR HOUR 39 WINDSPEED 3.510 METERS/SEC = 0.446E 03 MICRONS
THRESHOLD DIAMETER FOR HOUR 40 WINDSPEED 2.970 METERS/SEC = 0.320E 03 MICRONS

AVERAGE GRAIN DIAMETERS FOR SALTATION

SALTATION DIAMETER FOR HOUR 1 = 0.200E 03 MICRONS
SALTATION DIAMETER FOR HOUR 2 = 0.263E 03 MICRONS
SALTATION DIAMETER FOR HOUR 3 = 0.337E 03 MICRONS
SALTATION DIAMETER FOR HOUR 4 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 5 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 6 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 7 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 8 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 9 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 10 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 11 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 12 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 13 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 14 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 15 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 16 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 17 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 18 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 19 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 20 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 21 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 22 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 23 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 24 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 25 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 26 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 27 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 28 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 29 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 30 = 0.340E 03 MICRONS
SALTATION DIAMETER FOR HOUR 31 = 0.340E 03 MICRONS

SALTATION DIAMETER FOR HOUR 32 = 0.340E 03 MICRONS

SALTATION DIAMETER FOR HOUR 33 = 0.340E 03 MICRONS

SALTATION DIAMETER FOR HOUR 34 = 0.340E 03 MICRONS

SALTATION DIAMETER FOR HOUR 35 = 0.340E 03 MICRONS

SALTATION DIAMETER FOR HOUR 36 = 0.340E 03 MICRONS

SALTATION DIAMETER FOR HOUR 37 = 0.340E 03 MICRONS

SALTATION DIAMETER FOR HOUR 38 = 0.337E 03 MICRONS

SALTATION DIAMETER FOR HOUR 39 = 0.263E 03 MICRONS

SALTATION DIAMETER FOR HOUR 40 = 0.200E 03 MICRONS

SALTATION RATES

SALTATION FOR HOUR 1 = 0.317E-01 GM/METER/SEC

SALTATION FOR HOUR 2 = 0.818E-01 GM/METER/SEC

SALTATION FOR HOUR 3 = 0.171E 00 GM/METER/SEC

SALTATION FOR HOUR 4 = 0.611E 00 GM/METER/SEC

SALTATION FOR HOUR 5 = 0.152E 01 GM/METER/SEC

SALTATION FOR HOUR 6 = 0.304E 01 GM/METER/SEC

SALTATION FOR HOUR 7 = 0.536E 01 GM/METER/SEC

SALTATION FOR HOUR 8 = 0.861E 01 GM/METER/SEC

SALTATION FOR HOUR 9 = 0.130E 02 GM/METER/SEC

SALTATION FOR HOUR 10 = 0.186E 02 GM/METER/SEC

SALTATION FOR HOUR 11 = 0.257E 02 GM/METER/SEC

SALTATION FOR HOUR 12 = 0.344E 02 GM/METER/SEC

SALTATION FOR HOUR 13 = 0.448E 02 GM/METER/SEC

SALTATION FOR HOUR 14 = 0.571E 02 GM/METER/SEC

SALTATION FOR HOUR 15 = 0.716E 02 GM/METER/SEC

SALTATION FOR HOUR 16 = 0.882E 02 GM/METER/SEC

SALTATION FOR HOUR 17 = 0.107E 03 GM/METER/SEC

SALTATION FOR HOUR 18 = 0.129E 03 GM/METER/SEC

SALTATION FOR HOUR 19 = 0.153E 03 GM/METER/SEC

SALTATION FOR HOUR 20 = 0.181E 03 GM/METER/SEC

SALTATION FOR HOUR 21 = 0.181E 03 GM/METER/SEC

SALTATION FOR HOUR 22 = 0.153E 03 GM/METER/SEC

SALTATION FOR HOUR 23 = 0.129E 03 GM/METER/SEC

SALTATION FOR HOUR 24 = 0.107E 03 GM/METER/SEC

SALTATION FOR HOUR 25 = 0.882E 02 GM/METER/SEC

SALTATION FOR HOUR 26 = 0.716E 02 GM/METER/SEC

SALTATION FOR HOUR 27 = 0.571E 02 GM/METER/SEC

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SALTATICN FCR HOUR  28  =   0.448E 02  GM/METER/SEC
SALTATICN FCR HOUR  29  =   0.344E 02  GM/METER/SEC
SALTATICN FOR HOUR  30  =   0.257E 02  GM/METER/SEC
SALTATICN FOR HOUR  31  =   0.186E 02  GM/METER/SEC
SALTATION FOR HOUR  32  =   0.130E 02  GM/METER/SEC
SALTATICN FCR HOUR  33  =   0.861E 01  GM/METER/SEC
SALTATION FOR HOUR  34  =   0.536E 01  GM/METER/SEC
SALTATICN FOR HOUR  35  =   0.304E 01  GM/METER/SEC
SALTATICN FOR HOUR  36  =   0.152E 01  GM/METER/SEC
SALTATICN FOR HOUR  37  =   0.611E 00  GM/METER/SEC
SALTATICN FOR HOUR  38  =   0.171E 00  GM/METER/SEC
SALTATICN FOR HOUR  39  =   0.818E-C1  GM/METER/SEC
SALTATICN FOR HOUR  40  =   0.317E-01  GM/METER/SEC

SUSPENSION FACTOR=     C.100E-04

STABILITY TYPE=    3


SIDE CF SOURCE SQUARE=  C.2000E 03  METERS
NUMBER OF SEGMENTS FOR INTEGRATION= 100
CROSSWIND DIST.=  0.0         METERS

SOURCE CONCENTRATION FRCM AERCSOL TYPE   1  =   1CC.000  PERCENT


VARIATION OF AREA SOURCE STRENGTHS WITH TIME FOR SIZE TYPE TYPE   1

AREA SOURCE STRENGTH FOR HOUR   1  =  0.3166E-06  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR   2  =  0.8181E-06  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR   3  =  0.1709E-05  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR   4  =  0.6113E-05  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR   5  =  C.1517E-04  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR   6  =  0.3044E-C4  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR   7  =  0.5355E-04  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR   8  =  0.8613E-04  GM/METER**2/SEC
AREA SCURCE STRENGTH FOR HOUR   9  =  0.1298E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  10  =  0.1862E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  11  =  0.256ESE-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  12  =  0.3436E-03  GM/METER**2/SEC
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AREA SOURCE STRENGTH FOR HOUR  13  =  0.4479E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  14  =  0.5713E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  15  =  0.7157E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  16  =  0.8824E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  17  =  0.1073E-02  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  18  =  0.1290E-02  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  19  =  0.1534E-02  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  20  =  0.1807E-02  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  21  =  0.1807E-02  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  22  =  0.1534E-02  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  23  =  0.1290E-02  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  24  =  0.1073E-02  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  25  =  0.8824E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  26  =  0.7157E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  27  =  0.5713E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  28  =  0.4479E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  29  =  0.3436E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  30  =  0.2569E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  31  =  0.1862E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  32  =  0.1298E-03  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  33  =  0.8613E-04  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  34  =  0.5355E-04  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  35  =  0.3044E-04  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  36  =  0.1517E-04  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  37  =  0.6113E-05  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  38  =  0.1709E-05  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  39  =  0.8181E-06  GM/METER**2/SEC
AREA SOURCE STRENGTH FOR HOUR  40  =  0.3166E-06  GM/METER**2/SEC

GROUND CONC. FOR AEROSOL TYPE  1  HOUR  1  DISTANCE  0.100E 03  =  0.159E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  1  DISTANCE  0.100E 04  =  0.137E-06  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  1  DISTANCE  0.100E 05  =  0.302E-08  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  2  DISTANCE  0.100E 03  =  0.349E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  2  DISTANCE  0.100E 04  =  0.305E-06  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  2  DISTANCE  0.100E 05  =  0.681E-08  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  3  DISTANCE  0.100E 03  =  0.634E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  3  DISTANCE  0.100E 04  =  0.558E-06  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  3  DISTANCE  0.100E 05  =  0.126E-07  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  4  DISTANCE  0.100E 03  =  0.200E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  4  DISTANCE  0.100E 04  =  0.177E-05  GM/METER**3
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GROUND CONC. FOR AEROSOL TYPE   1  HOUR   4  DISTANCE   0.100E 05  =   0.404E-07  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   5  DISTANCE   0.100E 03  =   0.446E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   5  DISTANCE   0.100E 04  =   0.397E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   5  DISTANCE   0.100E 05  =   0.910E-07  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   6  DISTANCE   0.100E 03  =   0.810E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   6  DISTANCE   0.100E 04  =   0.724E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   6  DISTANCE   0.100E 05  =   0.167E-06  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   7  DISTANCE   0.100E 03  =   0.130E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   7  DISTANCE   0.100E 04  =   0.117E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   7  DISTANCE   0.100E 05  =   0.270E-06  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   8  DISTANCE   0.100E 03  =   0.193E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   8  DISTANCE   0.100E 04  =   0.174E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   8  DISTANCE   0.100E 05  =   0.403E-06  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   9  DISTANCE   0.100E 03  =   0.269E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   9  DISTANCE   0.100E 04  =   0.243E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR   9  DISTANCE   0.100E 05  =   0.566E-06  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  10  DISTANCE   0.100E 03  =   0.360E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  10  DISTANCE   0.100E 04  =   0.325E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  10  DISTANCE   0.100E 05  =   0.760E-06  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  11  DISTANCE   0.100E 03  =   0.465E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  11  DISTANCE   0.100E 04  =   0.421E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  11  DISTANCE   0.100E 05  =   0.986E-06  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  12  DISTANCE   0.100E 03  =   0.585E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  12  DISTANCE   0.100E 04  =   0.530E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  12  DISTANCE   0.100E 05  =   0.124E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  13  DISTANCE   0.100E 03  =   0.719E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  13  DISTANCE   0.100E 04  =   0.653E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  13  DISTANCE   0.100E 05  =   0.153E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  14  DISTANCE   0.100E 03  =   0.868E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  14  DISTANCE   0.100E 04  =   0.789E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  14  DISTANCE   0.100E 05  =   0.186E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  15  DISTANCE   0.100E 03  =   0.103E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  15  DISTANCE   0.100E 04  =   0.939E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  15  DISTANCE   0.100E 05  =   0.221E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  16  DISTANCE   0.100E 03  =   0.121E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  16  DISTANCE   0.100E 04  =   0.110E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  16  DISTANCE   0.100E 05  =   0.260E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  17  DISTANCE   0.100E 03  =   0.140E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  17  DISTANCE   0.100E 04  =   0.128E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE   1  HOUR  17  DISTANCE   0.100E 05  =   0.303E-05  GM/METER**3
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GROUND CONC. FOR AEROSOL TYPE  1  HOUR  18  DISTANCE  0.100E 03  =  0.161E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  18  DISTANCE  0.100E 04  =  0.147E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  18  DISTANCE  0.100E 05  =  0.348E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  19  DISTANCE  0.100E 03  =  0.184E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  19  DISTANCE  0.100E 04  =  0.168E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  19  DISTANCE  0.100E 05  =  0.397E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  20  DISTANCE  0.100E 03  =  0.208E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  20  DISTANCE  0.100E 04  =  0.190E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  20  DISTANCE  0.100E 05  =  0.450E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  21  DISTANCE  0.100E 03  =  0.209E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  21  DISTANCE  0.100E 04  =  0.190E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  21  DISTANCE  0.100E 05  =  0.450E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  22  DISTANCE  0.100E 03  =  0.184E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  22  DISTANCE  0.100E 04  =  0.168E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  22  DISTANCE  0.100E 05  =  0.397E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  23  DISTANCE  0.100E 03  =  0.161E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  23  DISTANCE  0.100E 04  =  0.147E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  23  DISTANCE  0.100E 05  =  0.348E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  24  DISTANCE  0.100E 03  =  0.140E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  24  DISTANCE  0.100E 04  =  0.128E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  24  DISTANCE  0.100E 05  =  0.303E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  25  DISTANCE  0.100E 03  =  0.121E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  25  DISTANCE  0.100E 04  =  0.110E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  25  DISTANCE  0.100E 05  =  0.260E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  26  DISTANCE  0.100E 03  =  0.103E-02  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  26  DISTANCE  0.100E 04  =  0.939E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  26  DISTANCE  0.100E 05  =  0.221E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  27  DISTANCE  0.100E 03  =  0.868E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  27  DISTANCE  0.100E 04  =  0.789E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  27  DISTANCE  0.100E 05  =  0.186E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  28  DISTANCE  0.100E 03  =  0.719E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  28  DISTANCE  0.100E 04  =  0.653E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  28  DISTANCE  0.100E 05  =  0.153E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  29  DISTANCE  0.100E 03  =  0.585E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  29  DISTANCE  0.100E 04  =  0.530E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  29  DISTANCE  0.100E 05  =  0.124E-05  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  30  DISTANCE  0.100E 03  =  0.465E-03  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  30  DISTANCE  0.100E 04  =  0.421E-04  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  30  DISTANCE  0.100E 05  =  0.986E-06  GM/METER**3
GROUND CONC. FOR AEROSOL TYPE  1  HOUR  31  DISTANCE  0.100E 03  =  0.360E-03  GM/METER**3
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GROUND CONC. FOR AEROSOL TYPE 1 HOUR 31 DISTANCE 0.100E 04 = 0.325E-04 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 31 DISTANCE 0.100E 05 = 0.760E-06 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 32 DISTANCE 0.100E 03 = 0.269E-03 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 32 DISTANCE 0.100E 04 = 0.243E-04 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 32 DISTANCE 0.100E 05 = 0.566E-06 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 33 DISTANCE 0.100E 03 = 0.193E-03 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 33 DISTANCE 0.100E 04 = 0.174E-04 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 33 DISTANCE 0.100E 05 = 0.403E-06 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 34 DISTANCE 0.100E 03 = 0.130E-03 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 34 DISTANCE 0.100E 04 = 0.117E-04 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 34 DISTANCE 0.100E 05 = 0.270E-06 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 35 DISTANCE 0.100E 03 = 0.810E-04 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 35 DISTANCE 0.100E 04 = 0.724E-05 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 35 DISTANCE 0.100E 05 = 0.167E-06 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 36 DISTANCE 0.100E 03 = 0.446E-04 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 36 DISTANCE 0.100E 04 = 0.397E-05 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 36 DISTANCE 0.100E 05 = 0.910E-07 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 37 DISTANCE 0.100E 03 = 0.200E-04 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 37 DISTANCE 0.100E 04 = 0.177E-05 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 37 DISTANCE 0.100E 05 = 0.404E-07 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 38 DISTANCE 0.100E 03 = 0.634E-05 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 38 DISTANCE 0.100E 04 = 0.558E-06 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 38 DISTANCE 0.100E 05 = 0.126E-07 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 39 DISTANCE 0.100E 03 = 0.349E-05 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 39 DISTANCE 0.100E 04 = 0.305E-06 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 39 DISTANCE 0.100E 05 = 0.681E-08 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 40 DISTANCE 0.100E 03 = 0.159E-05 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 40 DISTANCE 0.100E 04 = 0.137E-06 GM/METER**3
GROUND CONC. FOR AEROSOL TYPE 1 HOUR 40 DISTANCE 0.100E 05 = 0.302E-08 GM/METER**3

DEPOSITION FOR AEROSOL TYPE 1 DURING HOUR 1 DISTANCE 0.100E 03 = 0.573E-04 GM/M** 2
DEPOSITION FOR AEROSOL TYPE 1 DURING HOUR 1 DISTANCE 0.100E 04 = 0.494E-05 GM/M** 2
DEPOSITION FOR AEROSOL TYPE 1 DURING HOUR 1 DISTANCE 0.100E 05 = 0.109E-06 GM/M** 2
DEPOSITION FOR AEROSOL TYPE 1 DURING HOUR 2 DISTANCE 0.100E 03 = 0.126E-03 GM/M** 2
DEPOSITION FOR AEROSOL TYPE 1 DURING HOUR 2 DISTANCE 0.100E 04 = 0.110E-04 GM/M** 2
DEPOSITION FOR AEROSOL TYPE 1 DURING HOUR 2 DISTANCE 0.100E 05 = 0.245E-06 GM/M** 2
DEPOSITION FOR AEROSOL TYPE 1 DURING HOUR 3 DISTANCE 0.100E 03 = 0.228E-03 GM/M** 2
DEPOSITION FOR AEROSOL TYPE 1 DURING HOUR 3 DISTANCE 0.100E 04 = 0.201E-04 GM/M** 2
DEPOSITION FOR AEROSOL TYPE 1 DURING HOUR 3 DISTANCE 0.100E 05 = 0.454E-06 GM/M** 2
DEPOSITION FOR AEROSOL TYPE 1 DURING HOUR 4 DISTANCE 0.100E 03 = 0.722E-03 GM/M** 2

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DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  4  DISTANCE  0.100E 04  =  0.639E-04  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  4  DISTANCE  0.100E 05  =  0.146E-05  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  5  DISTANCE  0.100E 03  =  0.160E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  5  DISTANCE  0.100E 04  =  0.143E-03  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  5  DISTANCE  0.100E 05  =  0.327E-05  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  6  DISTANCE  0.100E 03  =  0.292E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  6  DISTANCE  0.100E 04  =  0.261E-03  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  6  DISTANCE  0.100E 05  =  0.601E-05  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  7  DISTANCE  0.100E 03  =  0.469E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  7  DISTANCE  0.100E 04  =  0.421E-03  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  7  DISTANCE  0.100E 05  =  0.974E-05  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  8  DISTANCE  0.100E 03  =  0.695E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  8  DISTANCE  0.100E 04  =  0.625E-03  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  8  DISTANCE  0.100E 05  =  0.145E-04  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  9  DISTANCE  0.100E 03  =  0.970E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  9  DISTANCE  0.100E 04  =  0.875E-03  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  9  DISTANCE  0.100E 05  =  0.204E-04  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 10  DISTANCE  0.100E 03  =  0.130E-01  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 10  DISTANCE  0.100E 04  =  0.117E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 10  DISTANCE  0.100E 05  =  0.274E-04  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 11  DISTANCE  0.100E 03  =  0.167E-01  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 11  DISTANCE  0.100E 04  =  0.152E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 11  DISTANCE  0.100E 05  =  0.355E-04  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 12  DISTANCE  0.100E 03  =  0.210E-01  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 12  DISTANCE  0.100E 04  =  0.191E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 12  DISTANCE  0.100E 05  =  0.448E-04  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 13  DISTANCE  0.100E 03  =  0.259E-01  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 13  DISTANCE  0.100E 04  =  0.235E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 13  DISTANCE  0.100E 05  =  0.552E-04  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 14  DISTANCE  0.100E 03  =  0.312E-01  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 14  DISTANCE  0.100E 04  =  0.284E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 14  DISTANCE  0.100E 05  =  0.668E-04  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 15  DISTANCE  0.100E 03  =  0.371E-01  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 15  DISTANCE  0.100E 04  =  0.338E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 15  DISTANCE  0.100E 05  =  0.797E-04  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 16  DISTANCE  0.100E 03  =  0.436E-01  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 16  DISTANCE  0.100E 04  =  0.397E-02  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 16  DISTANCE  0.100E 05  =  0.937E-04  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 17  DISTANCE  0.100E 03  =  0.506E-01  GM/M** 2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR 17  DISTANCE  0.100E 04  =  0.461E-02  GM/M** 2
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DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  17  DISTANCE  0.100E 05  =  0.109E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  18  DISTANCE  0.100E 03  =  0.581E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  18  DISTANCE  0.100E 04  =  0.530E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  18  DISTANCE  0.100E 05  =  0.125E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  19  DISTANCE  0.100E 03  =  0.661E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  19  DISTANCE  0.100E 04  =  0.604E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  19  DISTANCE  0.100E 05  =  0.143E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  20  DISTANCE  0.100E 03  =  0.747E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  20  DISTANCE  0.100E 04  =  0.683E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  20  DISTANCE  0.100E 05  =  0.162E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  21  DISTANCE  0.100E 03  =  0.747E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  21  DISTANCE  0.100E 04  =  0.683E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  21  DISTANCE  0.100E 05  =  0.162E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  22  DISTANCE  0.100E 03  =  0.661E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  22  DISTANCE  0.100E 04  =  0.604E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  22  DISTANCE  0.100E 05  =  0.143E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  23  DISTANCE  0.100E 03  =  0.581E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  23  DISTANCE  0.100E 04  =  0.530E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  23  DISTANCE  0.100E 05  =  0.125E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  24  DISTANCE  0.100E 03  =  0.506E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  24  DISTANCE  0.100E 04  =  0.461E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  24  DISTANCE  0.100E 05  =  0.109E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  25  DISTANCE  0.100E 03  =  0.436E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  25  DISTANCE  0.100E 04  =  0.397E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  25  DISTANCE  0.100E 05  =  0.937E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  26  DISTANCE  0.100E 03  =  0.371E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  26  DISTANCE  0.100E 04  =  0.338E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  26  DISTANCE  0.100E 05  =  0.797E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  27  DISTANCE  0.100E 03  =  0.312E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  27  DISTANCE  0.100E 04  =  0.284E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  27  DISTANCE  0.100E 05  =  0.668E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  28  DISTANCE  0.100E 03  =  0.259E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  28  DISTANCE  0.100E 04  =  0.235E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  28  DISTANCE  0.100E 05  =  0.552E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  29  DISTANCE  0.100E 03  =  0.210E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  29  DISTANCE  0.100E 04  =  0.191E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  29  DISTANCE  0.100E 05  =  0.448E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  30  DISTANCE  0.100E 03  =  0.167E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  30  DISTANCE  0.100E 04  =  0.152E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE  1  DURING HOUR  30  DISTANCE  0.100E 05  =  0.355E-04  GM/M**2
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DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  31  DISTANCE   0.100E 03  =   0.130E-01  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  31  DISTANCE   0.100E 04  =   0.117E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  31  DISTANCE   0.100E 05  =   0.274E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  32  DISTANCE   0.100E 03  =   0.970E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  32  DISTANCE   0.100E 04  =   0.875E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  32  DISTANCE   0.100E 05  =   0.204E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  33  DISTANCE   0.100E 03  =   0.695E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  33  DISTANCE   0.100E 04  =   0.625E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  33  DISTANCE   0.100E 05  =   0.145E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  34  DISTANCE   0.100E 03  =   0.469E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  34  DISTANCE   0.100E 04  =   0.421E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  34  DISTANCE   0.100E 05  =   0.974E-05  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  35  DISTANCE   0.100E 03  =   0.292E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  35  DISTANCE   0.100E 04  =   0.261E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  35  DISTANCE   0.100E 05  =   0.601E-05  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  36  DISTANCE   0.100E 03  =   0.160E-02  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  36  DISTANCE   0.100E 04  =   0.143E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  36  DISTANCE   0.100E 05  =   0.327E-05  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  37  DISTANCE   0.100E 03  =   0.722E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  37  DISTANCE   0.100E 04  =   0.639E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  37  DISTANCE   0.100E 05  =   0.146E-05  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  38  DISTANCE   0.100E 03  =   0.228E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  38  DISTANCE   0.100E 04  =   0.201E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  38  DISTANCE   0.100E 05  =   0.454E-06  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  39  DISTANCE   0.100E 03  =   0.126E-03  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  39  DISTANCE   0.100E 04  =   0.110E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  39  DISTANCE   0.100E 05  =   0.245E-06  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  40  DISTANCE   0.100E 03  =   0.573E-04  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  40  DISTANCE   0.100E 04  =   0.494E-05  GM/M**2
DEPOSITION FOR AEROSOL TYPE   1  DURING HOUR  40  DISTANCE   0.100E 05  =   0.109E-06  GM/M**2


DEPOSITION OF AEROSOL TYPE   1  AT DISTANCE   0.100E 03  =   0.930E 00  GM/M**2
DEPOSITION OF AEROSOL TYPE   1  AT DISTANCE   0.100E 04  =   0.847E-01  GM/M**2
DEPOSITION OF AEROSOL TYPE   1  AT DISTANCE   0.100E 05  =   0.200E-02  GM/M**2


TOTAL AEROSOL DEPOSITION FOR DISTANCE   0.100E 03  =   0.930E 00  GM/METER**2
TOTAL AEROSOL DEPOSITION FOR DISTANCE   0.100E 04  =   0.847E-01  GM/METER**2
TOTAL AEROSOL DEPOSITION FOR DISTANCE   0.100E 05  =   0.200E-02  GM/METER**2
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TABLE 2-6 LISTING OF TERMOD SYMBOLS

A	soil surface area required to furnish food crops for one man (10^3 m^2)
A_g	pasture area per cow (10^4 m^2)
B	concentration of radioactivity in the beef (μCi/kg)
B_{eq}	equilibrium concentration of a stable isotope of the nuclide in wet beef (g/kg)
C	concentration of radioactivity in the milk (μCi/liter)
C_B	concentration of an element in man (ppm)
C_b	concentration of an element in meat (ppm)
C_p	concentration of an element in forage (ppm)
C_s	concentration of an element in soil (ppm)
D	radioactivity present in the soil below the root depth (μCi/m^2)
D_f	dry-weight areal density of man's above-surface food (0.1 kg/m^2)
D_g	dry-weight areal grass density (0.15 kg/m^2)
d	depth of the plow layer (20 cm)
d_1, d_2, d_3, d_4	dietary factors that correct the transfer coefficients to man from those for reference man to those for the population under study (dimensionless) (d_1 and d_2 = 0.25; d_3 and d_4 = 1.0)
δ	Kronecker delta function
E	radioactivity present on above-surface food per m^2 of surface on which the food crop is grown (μCi/m^2)
F	deposition source, which for this calculation was assumed to be present only at time $t = 0$ (μCi/m^2-day)
F_o	ground deposition source (μCi/m^2)
f_b	fraction of a steer's elemental uptake in forage that is converted into meat (dimensionless)
f_m	fraction of an isotope that is ingested daily by a cow and secreted per liter of milk (days/liter)
f_m'	fraction of the total uptake of a nuclide by a cow which is transferred to the milk (dimensionless)
G	radioactivity present in the grass compartment (μCi/m^2)
G_{eq}	equilibrium concentration of a stable isotope of the nuclide in wet grass (g/m^2)
h_k	time between harvest and consumption of food associated with the kth pathway (days)
I_{eq}	equilibrium stable elemental uptake by standard man
I	input source to man (μCi/day)
λ_e	turnover rate of the stable isotope of the nuclide in man ($days^{-1}$) except for Sr where λ_e was isotope dependent
λ_R	radioactive decay rate of the nuclide under study (day^{-1})
K_b	rate of increase in the wet weight muscle mass of a steer with respect to time (0.4 kg/day)

TABLE 2-6 (continued)

M	radioactivity present in man (μCi)
M_b	mass of muscle on a steer at the time of slaughter (200 kg/steer)
M_{eq}	equilibrium mass of a stable element in the whole body of standard man (g)
P	radioactivity present in the subsurface pool associated with one man's food supply (μCi)
P_{eq}	equilibrium mass of a stable element in soil from the ground surface to the depth of the plow layer (g)
ρ	density of the soil (1.4 g/cm^3)
R	radioactivity present in the soil from the ground surface to the root depth of the grass (μCi/m^2)
S	radioactivity present at the soil surface (μCi/m^2)
S_1, S_2, S_3	correction factor to account for different depositions to the above-surface food, S_1 (0.1), the soil below this food, S_2 (0.9), and the pasture, S_3 (0.25) (factors are dimensionless).
τ_{beef}	fraction of the beef herd slaughtered per day (0.00381 day^{-1})
τ_{exc}	excretion rate of a stable isotope of the nuclide from the muscle of a steer (days^{-1})
τ_{milk}	transfer rate of milk from the udder (2.0 days^{-1})
τ_{ij}	transfer coefficient from compartment i to compartment j
$\tau_{b,m}$	amount of meat eaten by a man each day (0.3 kg/day)
$\tau_{c,m}$	amount of milk consumed by a man each day (1.0 liter/day)
$\tau_{e,m}$	m^2/day
$\tau_{e,s}$	0.0495 day^{-1}
$\tau_{g,b}$	m^2/kg day
$\tau_{g,c}$	m^2/liter-day
$\tau_{g,r}$	0.0495 day^{-1}
$\tau_{p,d}$	1.096×10^{-4} day^{-1}
$\tau_{p,m}$	day^{-1}
$\tau_{r,d}$	1.096×10^{-4} day^{-1}
$\tau_{r,g}$	2.74×10^{-5} day^{-1}
$\tau_{s,p}$	0.0693, 0.00693, and 0.000693 day^{-1}; usually each problem was run three times, once for each value of $\tau_{s,p}$ listed
U	milk capacity of the udder (5.5 liters)
V	dry-weight amount of above-surface food consumed by a man each day (0.25 kg/day)
V_c	dry weight grass consumption per day by a cow (10 kg/day)
V_m	amount of milk produced by a cow per day (11 liters/day)
V_s	amount of soil available per man for food production (4×10^8 g)

TABLE 2-7 ELEMENT-DEPENDENT PARAMETERS FOR TERMOD

	C_s [a]	C_p [a]	C_b [a]	C_B [a]	λ_e		f_m [a]	M_{eq} [d]
Al	7.14 E+4	1.30 E+1	1.00 E 0	1.00 E 0	1.26 E-3		5.00 E-4	7.00 E-2
V	1.00 E+2	1.30 E-1	1.50 E-2	1.50 E-2	1.65 E-2		1.00 E-3	1.05 E-3
Mn	8.50 E+2	2.50 E+1	1.00 E 0	3.75 E-1	4.07 E-2		2.50 E-4	2.62 E-2
Sc	7.00 E 0	7.50 E-3	6.00 E-3	1.00 E-2	2.84 E-2		5.00 E-6	7.00 E-4
Fe	3.80 E+4	2.50 E+1	5.00 E+1	6.75 E+1	8.66 E-4		1.20 E-3	4.72 E 0
Co	8.00 E 0	7.50 E-2	5.00 E-2	2.45 E-2	7.29 E-2		1.00 E-3	1.71 E-3
Zn	5.00 E-3	2.00 E+1	3.00 E+1	3.15 E+1	7.44 E-4		3.90 E-2	2.30 E 0
Rb	1.00 E+2	1.30 E+1	2.00 E+1	4.75 E 0	1.54 E-2		3.00 E-2	3.32 E-1
Sr [c]	3.00 E+2	5.00 E 0	1.50 E-1	4.00 E 0	6.25 E-4	(^{89}Sr)	2.00 E-3	2.80 E-1
					1.74 E-4	(^{90}Sr)		
Y	5.00 E+1	1.30 E-1	3.00 E-2	5.00 E-1	4.95 E-5		1.00 E-5	3.50 E-2
Zr	3.00 E+2	5.00 E-2	8.60 E-2	8.60 E-2	1.54 E-3		5.00 E-6	6.02 E-3
Nb	5.30 E 0	5.00 E-2	7.00 E-1	7.00 E-1	9.11 E-4		2.50 E-3	4.90 E-2
Mo	2.00 E 0	2.50 E-1	1.00 E-1	1.75 E-1	1.39 E-1		7.50 E-3	5.00 E-3
Tc	1.00 E-13	2.50 E-14	1.25 E-15	1.25 E-15	6.93 E-1		2.50 E-2	8.75 E-17
Ru [c]	1.00 E-3	5.00 E-5	1.00 E-3	1.00 E-3	9.42 E-2	(^{103}Ru)	1.00 E-6	7.00 E-5
					5.33 E-3	(^{106}Ru)		
Ag	1.00 E-1	1.50 E-2	1.30 E-2	1.90 E-2	1.38 E-1		5.00 E-2	1.33 E-3

TABLE 2-7 (CONTINUED)

	C_s[a]	C_p[b]	C_b[a]	C_B[a]	λ_e		f_m[a]	M_{eq}[d]
Sb	2.30 E 0	2.50 E-2	5.00 E-3	5.00 E-2	1.82 E-2		1.50 E-3	3.50 E-3
Te	1.00 E-3	1.30 E-3	5.00 E-3	5.00 E-3	4.62 E-2		1.00 E-3	3.50 E-4
I	5.00 E 0	1.00 E-1	2.00 E-1	5.20 E-1	1.33 E-2		6.93 E-3[b]	3.64 E-2
Cs	5.00 E 0	5.00 E-2	1.00 E-2	1.45 E-2	6.30 E-3		1.40 E-2	1.01 E-3
Ba	5.00 E+2	2.50 E 0	4.00 E-1	7.20 E-1	1.00 E-2		6.00 E-4	5.00 E-2
La	4.00 E+1	1.00 E-1	1.00 E-3	7.00 E-1	1.38 E-3		5.00 E-6	5.00 E-2
Ce	5.30 E+1	1.30 E-1	8.00 E-3	5.00 E-2	1.23 E-3		2.00 E-5	3.50 E-3
Pm	1.00 E-18	2.50 E-21	6.00 E-22	5.00 E-22	1.05 E-3		5.00 E-6	3.50 E-23
Eu	1.00 E 0	2.50 E-3	6.00 E-4	5.00 E-4	1.09 E-3		5.00 E-6	3.50 E-5
W	1.00 E 0	1.80 E-2	1.20 E-3	1.00 E+2	6.92 E-1		5.00 E-4	7.00 E 0
Tl	1.00 E-1	2.50 E-2	5.00 E-2	8.60 E-2	1.40 E-1		2.25 E-2	6.00 E-3
Pb	1.00 E+1	6.80 E-1	1.00 E-2	1.10 E 0[b]	4.84 E-4		6.20 E-4	7.70 E-2
Bi	1.00 E-1	1.50 E-2	1.00 E-2	4.30 E-3[b]	1.39 E-1		5.00 E-4	3.01 E-4
Po	2.00 E-11	1.00 E-11	6.00 E-11	1.00 E-9	2.31 E-2		3.00 E-3	7.00 E-11
Rn	1.00 E-13	3.50 E-13	3.50 E-13	1.00 E-11	1.89 E-6		2.00 E-2	7.00 E-13
Ra	8.00 E-7	2.50 E-10	4.30 E-10	4.30 E-10	8.55 E-5		1.50 E+2	3.01 E-11
Th[c]	6.00 E 0	2.50 E-2	2.50 E-4[b]	5.25 E 0[b]	1.21 E-5	(^{228}Th)	5.00 E-6	3.70 E-1
					1.39 E-5	(^{230}Th)		
					1.39 E-5	(^{231}Th)		
					1.21 E-5	(^{232}Th)		
					1.39 E-5	(^{234}Th)		

TABLE 2-7 (CONTINUED)

	C_s [a]	C_p [b]	C_b [a]	C_B [a]	λ_e	f_m [a]	M_{eq} [d]
Pa	1.00 E-7	2.50 E-10	1.00 E-9	1.00 E-9	1.69 E-5	5.00 E-6	7.00 E-7
U	1.00 E 0	2.50 E-3	4.20 E-5[b]	3.00 E-4	6.93 E-3	5.00 E-4	2.10 E-5
Np	1.00 E-12	2.50 E-15	2.50 E-17[b]	5.25 E-15[b]	1.77 E-5	5.00 E-6	3.67 E-16
Pu	1.00 E-13	2.50 E-17	1.73 E-20[b]	5.25 E-15[b]	1.07 E-5	2.00 E-6	3.67 E-16
Am	1.00 E-30	2.50 E-34	2.50 E-36[b]	5.25 E-32[b]	3.46 E-5	5.00 E-6	3.67 E-33
Cm	1.00 E-30	2.50 E-33	2.50 E-35[b]	5.25 E-31[b]	2.89 E-5	5.00 E-6	3.67 E-32

[a] Y. C. Ng, C. A. Burton, S. E. Thompson, R. K. Tandy, H. K. Kretner, and M. W. Pratt, Prediction of the Maximum Dosage to Man from the Fallout of Nuclear Devices. IV. Handbook for Estimating the Maximum Internal Dose from Radionuclides Released to the Biosphere, UCRL-50163, part IV (1968).

[b] Data calculated.

[c] λ_e is isotope dependent for this element.

[d] $M_{eq} = 0.07 \times C_B$.

TABLE 2-8 RADIONUCLIDE INTAKE RATES (μCi/day) FOR STANDARD MAN CALCULATED WITH THE TERMOD COMPUTER CODE ASSUMING A CONTINUOUS UNIT DEPOSITION (1 μCi/m^2) ON THE LANDSCAPE PER DAY

	Intake (μCi/day)			
Radionuclide	Above Surface Food[a]	Milk[b]	Beef[c]	Total
^{26}Al	1.20	0.18	0.11	1.49
^{49}V	1.16	0.288	0.09	1.47
^{48}Sc	0.145	$< 10^{-3}$	0.001	0.146
^{54}Mn	1.15	0.033	0.028	1.21
^{55}Fe	1.19	0.16	2.05	3.4
^{58}Co	1.01	0.112	0.62	1.74
^{60}Co	1.19	0.113	0.743	2.05
^{65}Zn	1.14	4.88	0.97	6.99
^{88}Rb	0.004	0.002	$< 10^{-3}$	0.006
^{89}Rb	$< 10^{-3}$	$< 10^{-3}$	$< 10^{-3}$	$< 10^{-3}$
^{89}Sr	0.956	0.21	0.005	1.17
^{90}Sr	1.20	0.295	0.04	1.54
^{91}Sr	0.035	0.004	$< 10^{-3}$	0.039
^{90}Y	0.202	$< 10^{-3}$	$< 10^{-3}$	0.20
^{91}Y	0.975	$< 10^{-3}$	0.04	1.01
^{95}Zr	0.994	$< 10^{-3}$	0.355	1.35
^{95}Nb	0.868	0.24	1.31	2.42
^{99}Mo	0.209	0.163	0.001	0.37
^{99}Tc	1.20	9.0	0.07	10.27
^{103}Ru	0.900	$< 10^{-3}$	2.24	3.14
^{106}Ru	1.16	$< 10^{-3}$	14.92	16.08
^{110m}Ag	1.14	6.3	0.145	7.59
^{125}Sb	1.18	0.198	0.195	1.57
^{125m}Te	0.975	0.11	7.5	8.58
^{127}Te	0.034	0.002	0.003	0.039
^{127m}Te	1.07	0.12	14.5	15.69
^{129}Te	0.004	$< 10^{-3}$	$< 10^{-3}$	0.005

TABLE 2-8 (CONTINUED)

Radionuclide	Intake (μCi/day)			
	Above Surface Food[a]	Milk[b]	Beef[c]	Total
^{129m}Te	0.856	0.095	0.10	1.05
^{132}Te	0.239	0.025	0.02	0.28
$^{129}I^{d}$	1.20	3.6	2.83	7.63
$^{130}I^{d}$	0.045	0.023	$< 10^{-3}$	0.063
$^{131}I^{d}$	0.454	1.13	0.02	1.60
$^{132}I^{d}$	0.235	0.173	0.022	0.43
$^{133}I^{d}$	0.072	0.04	0.002	0.11
^{134}I	0.003	0.001	$< 10^{-3}$	0.004
^{135}I	0.025	0.01	$< 10^{-3}$	0.03
^{134}Cs	1.18	1.85	0.195	3.23
^{137}Cs	1.20	2.08	0.26	3.54
^{138}Cs	0.002	0.001	$< 10^{-3}$	0.003
^{140}Ba	0.589	0.04	0.006	0.63
^{140}La	0.135	$< 10^{-3}$	$< 10^{-3}$	0.135
^{141}Ce	0.850	$< 10^{-3}$	0.01	0.86
^{144}Ce	1.15	0.002	0.04	1.19
^{147}Pm	1.19	$< 10^{-3}$	0.24	1.43
^{154}Eu	1.20	$< 10^{-3}$	0.3	1.50
^{155}Eu	1.17	$< 10^{-3}$	0.218	1.39
^{187}W	0.084	0.003	$< 10^{-3}$	0.09
^{202}Tl	0.573	1.42	0.07	2.06
^{210}Pb	1.20	0.09	0.02	1.31
^{210}Bi	0.328	0.02	0.001	0.35
^{210}Po	1.09	0.36	2.53	3.98
^{222}Rn	0.267	0.57	0.006	0.84
^{226}Ra	1.20	2.37	2.44	6.01
^{228}Th	1.18	$< 10^{-3}$	0.01	1.19
^{230}Th	1.20	0.001	0.014	1.21
^{231}Th	0.089	$< 10^{-3}$	$< 10^{-3}$	0.09

TABLE 2-8 (CONTINUED)

Radionuclide	Intake (μCi/day)			
	Above Surface Food[a]	Milk[b]	Beef[c]	Total
^{232}Th	1.20	0.002	0.03	1.23
^{234}Th	0.775	$< 10^{-3}$	0.001	0.78
^{234}Pa	$< 10^{-3}$	$< 10^{-3}$	$< 10^{-3}$	$< 10^{-3}$
^{232}U	1.20	0.08	0.023	1.30
^{233}U	1.20	0.08	0.023	1.30
^{234}U	1.20	0.08	0.023	1.30
^{235}U	1.20	0.08	0.023	1.30
^{236}U	1.20	0.08	0.023	1.30
^{237}U	0.419	0.02	$< 10^{-3}$	0.44
^{238}U	1.20	0.08	0.023	1.30
^{237}Np	1.20	0.001	0.014	1.22
^{238}Np	0.163	$< 10^{-3}$	$< 10^{-3}$	0.16
^{236}Pu	1.19	0.001	0.003	1.19
^{238}Pu	1.20	0.001	0.004	1.21
^{239}Pu	1.20	0.001	0.004	1.21
^{240}Pu	1.20	0.001	0.004	1.21
^{241}Pu	1.20	0.001	0.004	1.21
^{242}Pu	1.20	0.001	0.004	1.21
^{241}Am	1.20	0.001	0.014	1.21
^{242}Am	1.20	0.001	0.014	1.21
^{243}Am	1.20	0.001	0.012	1.21
^{242}Cm	1.11	$< 10^{-3}$	0.05	1.16
^{243}Cm	1.20	0.001	0.013	1.21
^{244}Cm	1.20	0.001	0.012	1.21

[a] 0.25 kg/day intake.

[b] 1.0 liter/day.

[c] 0.3 kg/day.

[d] For calculation of dose to child's thyroid, the daily intake is assumed to be 10 times less than that of an adult for above-surface food and beef and equal to that of an adult for milk.

TABLE 2-9 TERMOD SAMPLE PROBLEM

```
THE TERRESTRIAL MODEL

PLEASE RESPOND TO QUESTIONS WITH A 'YES' OR 'NO'
DO YOU WANT A LIST OF THE  83  RADIONUCLIDES ?YES

MO-99        RU-103       I-131        I-133        TE-132
SC-48        ZN-65        W-187        TL-202       PB-210
U-238        U-234        TH-234       RA-226       TH-230
RN-222       BI-210       PO-210       I-129        PU-241
PU-238       KR-85        H-3          SR-89        SR-90
Y-90         Y-91         ZR-95        NB-95        RU-106
CS-134       CS-137       CE-141       CE-144       PM-147
PU-239       PU-240       PU-242       AM-241       AM-242
CM-243       CM-244       CM-242       U-235        NP-238
AG-110M      TE-127M      TE-129M      SB-125       EU-154
EU-155       TH-231       U-236        AM-243       PA-234
CR           PU-236       RB-88        RB-89        CO-58
MN-54        FE-55        C-14         BR-82        CO-60
KR-85M       TH-228       U-232        U-233        U-237
NP-237       SR-91        BR-84        BA-140       LA-140
AL-26        V-49         TC-99        TH-232       TH-229
RA-224       AC-225       PA-233

DO YOU WANT TO ADD ANY NUCLIDES ?NO
DO YOU WANT TO INSPECT THE DATA COMMON TO ALL NUCLIDES ?YES

RADIONUCLIDE INDEPENDENT PARAMETERS

A            1000
ASUBG        10000
DSUBF        0.1
DSUBG        0.15
SMALLD       20
D1           0.25
D2           0.25
D3           1
D4           1
KSUBB        0.4
MSUBB        200
RHO          1.4
S1           0.1
S2           0.9
S3           0.25
TAUBEF       3.81000E-3
TAUMLK       2
TAUBM        0.3
TAUCM        1
TAUES        0.0495
TAUGR        0.0495
TAUPD        1.09600E-4
TAURD        1.09600E-4
TAURG        2.74000E-5
TAUSP        0.000693
U            5.5
V            0.25
VSUBC        10
VSUBM        11
```

TABLE 2-9 (continued)

```
DO YOU WANT TO MAKE ANY CHANGES ?NO
WILL YOU WANT TO LOOK AT THE DATA SPECIFIC TO EACH NUCLIDE ?YES
DO YOU WANT TO CALCULATE INTAKES ?YES
HOW MANY TIME VALUES TO BE INVESTIGATED ?5
ENTER THE  5  TIMES IN DAYS
TIME 1  =  ?0
TIME 2  =  ?8
TIME 3  =  ?16
TIME 4  =  ?24
TIME 5  =  ?32
DO YOU WANT RATE BREAKDOWNS ?YES
DO YOU WANT TO CALCULATE EQUILIBRIUM VALUES ?YES

F IS THE INITIAL DEPOSITION OF THE NUCLIDE IN UCI/M**2

ENTER 'DONE' WHEN FINISHED

NUCLIDE =  ?I-131

PARAMETERS FOR I-131

LAMRR          8.57000E-2
CSUBB          0.2
CSUBP          0.1
CSUBS          5
FSUBM          0.01
LAME           6.93000E-3
CSUBBB         0.52
MSUBEQ         0.0364
TAUEXC         0

DO YOU WANT TO MAKE ANY CHANGES ?NO
F =  ?1.0
```

TIME (DAYS)	INTAKE (UCI)	PERCENT OF EQUILIBRIUM	INTAKE RATE (UCI/DAY)
0	0.00E+00	0.00	6.25E-02
8	1.05E+00	64.81	7.75E-02
16	1.43E+00	88.05	2.59E-02
24	1.55E+00	95.86	8.79E-03
32	1.60E+00	98.53	3.04E-03

TABLE 2-9 (continued)

INTAKE RATE FROM EACH PATHWAY (UCI/DAY) AND PERCENT OF TOTAL RATE

TIME		SOIL POOL	A.S. FOOD	BEEF	MILK
0	UCI/DAY	0.00E+00	6.25E-02	5.56E-11	2.29E-10
DAYS	PERCENT	0.00	100.00	0.00	0.00
8	UCI/DAY	1.15E-07	2.08E-02	1.60E-03	5.51E-02
DAYS	PERCENT	0.00	26.80	2.06	71.13
16	UCI/DAY	1.17E-07	6.90E-03	1.29E-03	1.77E-02
DAYS	PERCENT	0.00	26.63	4.99	68.38
24	UCI/DAY	8.93E-08	2.29E-03	7.97E-04	5.70E-03
DAYS	PERCENT	0.00	26.10	9.07	64.83
32	UCI/DAY	6.03E-08	7.62E-04	4.43E-04	1.83E-03
DAYS	PERCENT	0.00	25.09	14.57	60.33

EQUILIBRIUM VALUES FOR A CONSTANT SOURCE OF I-131

A.S.FOOD	7.26E-01	UCI/M**2
SOIL SURFACE	1.08E+01	UCI/M**2
SOIL POOL	8.75E+01	UCI
PASTURE GRASS	1.76E+00	UCI/M**2
PASTURE SOIL	1.02E+00	UCI/M**2
SOIL SINK	1.41E-03	UCI/M**2
MILK	1.13E+00	UCI/LITER
BEEF	1.31E-01	UCI/KG
INTAKE RATE	1.62E+00	UCI/DAY
MAN	1.75E+01	UCI

NUCLIDE = ?DONE

IS THERE ANYTHING ELSE TO DO ?NO

END OF TERRESTRIAL MODEL SESSION

CHAPTER 3
EXTERNAL DOSE

TABLES FOR CHAPTER 3

3 Estimation of External Radiation Dose

3.1 Dose to Man

The discussion of external dose to man in this section is developed with reference to three basic exposure modes: (1) submersion of an individual in contaminated water; (2) immersion in contaminated air; and (3) irradiation by exposure to a contaminated ground surface. The EXREM III computer code, which offers its user a number of options for simulating external exposure episodes involving one or more of these basic exposure modes, is described in Sec. 3.1.1., and a recent version of its data base is presented in Table 3-1, Sec. 3.1.1.2. For readers without access to EXREM III, dosimetric quantities for each of the three basic exposure modes have been computed and tabulated (Tables 3-2 through 3-9, Sec. 3.1.1.3), and some examples have been provided to suggest ways in which this information might be useful in making environmental radiological assessments.

EXREM III allows the user to supply factors to correct dose estimates for such effects as shielding and exposure for a fraction of the duration of the episode. The dosimetric information in Tables 3-2 through 3-9 was computed from dose-rate factors with the following built-in assumptions:

(i) Dose-reducing factors such as shielding provided by dwellings are not considered.

(ii) Exposure via swimming in contaminated water occurs 1 per cent of the year.

(iii) Immersion in contaminated air occurs 100 per cent of the year.

(iv) Exposure to contaminated ground surface occurs 100 per cent of the year; the receptor is a point 1 m above the surface.

Doses, dose rates, and dose-rate factors in Tables 3-2 through 3-9 may be adjusted to contain exposure factors other than those indicated in (i) - (iv), provided such factors apply uniformly to the exposure episode as a whole.

In general, the external dose to man associated with a radionuclide depends upon the distribution of the radionuclide in the environmental medium to which the reference individual is exposed, upon its decay and the build-up of radioactive progeny, and upon the dynamics of environmental removal and replacement of the nuclide and each daughter product. Dosimetric quantities discussed in the following subsections generally assume a homogeneous distribution of radioactivity throughout a large region of the medium. The calculation of the external dose to an exposed individual requires that the concentration of each nuclide in the medium be determined as a function of time. When radioactive progeny are produced, the concentrations of the various species in the chain are interrelated. Their kinetics in an environmental compartment are generally governed by a system of ordinary linear differential equations of the form

$$dC_1/dt = -(\lambda_1^R + \lambda_1^E)\, C_1 + I_1(t)$$

$$dC_i/dt = -(\lambda_i^R + \lambda_i^E)\, C_i + \lambda_i^R \sum_{j=1}^{i-1} f_{ij}\, C_j + I_i(t),\ i = 2, \ldots, n \qquad (3\text{-A})$$

where

n = number of species in the chain;

i = index whose value indicates the position of a species in the chain;

$C_i = C_i(t)$ = activity concentration of the i-th species in the medium at

time t (μCi per unit length, area, or volume, depending upon the nature of the medium);

λ_i^R = radioactive decay constant (hr^{-1}) of the i-th species = $\ln 2/T_i^R$, where T_i^R is the radioactive half-life (hr) of the i-th species;

λ_i^E = environmental removal rate constant (hr^{-1}) for all first-order environmental removal processes which apply to the i-th species;

f_{ij} = branching ratio of the j-th species to the i-th, where j is less than i;

$I_i(t)$ = rate of production at time t of the i-th species per linear unit of each dimension of the medium (μCi/hr per unit length, area, or volume);

t = time (hr).

(We have given specific units principally for illustration; any consistent system of units may be substituted.)

The quantities $I_i(t)$ might be explicit functions of time, representing, for example, direct source-term inputs into the medium; or they may stand for transfer rates of their respective species from other environmental compartments, in which case the dynamics of the external compartments must also be known before the system (3-A) can be solved for the concentrations $C_1(t), \ldots, C_n(t)$.

We remark that the system (3-A) is not sufficiently general to model all environmental media adequately: atmospheric transport of radionuclides, for example, usually requires a different approach.

It is appropriate to note that the system (3-14) of Sec. 3.1.1.1.2 is a special case of the system (3-A).

The i-th nuclide is in equilibrium in the environmental compartment governed by system (3-A) when its removal and replacement rates are equal (i.e., $dC_i/dt = 0$). When the equilibrium is sustained in time, the concentration of the nuclide in the medium is said to be in steady state. In particular, the solution of the system (3-A) approaches steady state when all inputs I_i are constant. In this event, the equilibrium values of the concentrations may be found by setting all dC_i/dt equal to zero in system (3-A) and solving the resulting linear equations for the C_i. The results of such calculations must be used with care, however: if the chain includes long-lived species, the time required for the system to progress from its initial conditions to an approximate steady state may be long in comparison with the time scale appropriate to a given radiological analysis. An inspection of the radioactive decay constants λ_i^R and the effective removal constants $\lambda_i^R + \lambda_i^E$ is necessary to determine the extent to which equilibrium concentrations might be useful. This point is illustrated in the examples of Sec. 3.1.1.3.

A frequently useful set of steady-state concentrations can be derived from system (3-A) subject to the following assumptions:

(i) $I_1(t) = P$ (a constant), and all other $I_i(t) = 0$. There is thus an input of the first species (the parent) at a constant rate. Resulting concentrations of daughter products will be attributable to buildup only.

(ii) $f_{2,1}, f_{3,2}, \ldots, f_{n,n-1}$ are the only non-zero branching ratios. Thus a non-branching pathway through the chain is being considered, where the term "pathway" is used in the sense of the first paragraph of Sec. 3.1.1.1.2. Complete analysis of any chain can be reduced to the consideration of one or more such pathways.

The steady-state concentrations are

$$C_1 = \frac{P}{\lambda_1^R + \lambda_1^E}$$

$$C_i = \frac{P}{\lambda_1^R + \lambda_1^E} \frac{\lambda_2^R f_{2,1}}{(\lambda_2^R + \lambda_2^E)} \cdots \frac{\lambda_i^R f_{i,i-1}}{(\lambda_i^R + \lambda_i^E)}, \quad i = 2, \ldots, n . \qquad (3\text{-B})$$

If other species have non-zero inputs, each may be considered the parent in its turn, and Eqs. (3-B) may be applied to compute the additional concentration of the species and its progeny relative to the nuclide pathway being considered.

3.1.1 The EXREM III Computer Code

EXREM III is a computer code[1] to estimate the dose rate and the total dose from beta, positron, electron, x-ray, and gamma radiation resulting from submersion in contaminated water, immersion in contaminated air, and exposure to a contaminated surface. There can be more than one environmental release, and exposure can begin at any time after the first release. EXREM III considers contributions from environmental releases and from nuclide decay chains. For a particular problem the user may choose to calculate either the dose rates at any selected time, or the total dose integrated over any selected time period, or both for any of the three modes of exposure. A separate solution array is printed for each mode of exposure. Nuclear data for over 200 radionuclides comprise the basic data base for this code.

EXREM III has been used in preparing radiation dose estimates for environmental impact statements for nuclear power plants and other nuclear facilities. The following sections (3.1.1.1 and 3.1.1.2) were excerpted

mainly from Trubey and Kaye ORNL-TM-4322,[1] who describe the code in full. EXREM III is written in FORTRAN IV and is designed to be run on the IBM 360 75/91 as a batch job. The code is available upon request from the Radiation Shielding Information Center, Oak Ridge National Laboratory, P. O. Box X, Oak Ridge, Tennessee 37830.

3.1.1.1 Model Equations

The derivation of the equations used for the computer solutions for external dose estimates are shown by Eqs. (3-1) through (3-24), which follow.

The dose equivalent rate at time t, including the contribution from radionuclide chains, is denoted by

$$DR_{ipq\ell}(t) = C_{ip\ell}(t)\ D_{iqp} \qquad (3\text{-}1)$$

where

i = radionuclide index,

q = radiation index (β for beta radiation, p for positrons, e for electrons, and γ for gamma radiation and x radiation),

p = exposure index (w for water, a for air, s for surface),

ℓ = location index,

$C_{ip\ell}(t)$= concentration ($\mu Ci/cm^3$ for p = w and p = a, $\mu Ci/cm^2$ for p = s) of the ith radionuclide for the pth mode of exposure at the ℓth location at time t,

D_{iqp} = dose-rate factor $[(\frac{mrem \cdot cm^3}{\mu Ci \cdot hr})]$ for p = w and p = a; $[(\frac{mrem \cdot cm^2}{\mu Ci \cdot hr})$ for p = s], and

t = time (hr).

The total dose equivalent from t_1 to t_2 is denoted by

$$TD_{ipq\ell}(t_1,t_2) = D_{iqp} \int_{t_1}^{t_2} C_{ip_\ell}(t)dt \qquad (3\text{-}2)$$

where t_1 and t_2 are in hours.

3.1.1.1.1 Dose-Rate Factors

3.1.1.1.1.1 Beta and Gamma Rays

Whole-Body Factors. The dose-rate factors (see Ref. 2) are denoted by

$$D_{i\beta w} = \frac{25.6}{24.0} \sum_{n=1}^{N_{\beta i}} (f_{\beta in}\overline{E}_{\beta in}) , \qquad (3\text{-}3)$$

$$D_{i\gamma w} = \frac{51.2}{24.0} \sum_{n=1}^{N_{\gamma i}} (f_{\gamma in}E_{\gamma in}) , \qquad (3\text{-}4)$$

$$D_{i\beta a} = \frac{29.2}{(24.0)(1.2\text{x}10^{-3})} \sum_{n=1}^{N_{\beta i}} (f_{\beta in}\overline{E}_{\beta in}) , \qquad (3\text{-}5)$$

$$D_{i\gamma a} = \frac{29.2}{(24.0)(1.2\text{x}10^{-3}} \sum_{n=1}^{N_{\gamma i}} (f_{\gamma in}E_{\gamma in}) , \qquad (3\text{-}6)$$

$$D_{i\beta s} = 1.07 \sum_{n=1}^{N_{\beta i}} \{\nu a(F[C,\nu,a(x)] + \exp[1-\nu a(x)])f_{\beta in}\overline{E}_{\beta in}\} , \qquad (3\text{-}7)$$

and

$$D_{i\gamma s} = 827\ Bs \sum_{n=1}^{N_{\gamma i}} [\sigma_{in}E_1(\sigma_{in}\ x)f_{\gamma in}E_{\gamma in}] , \qquad (3\text{-}8)$$

where

n = particle or photon index,

N_{qi} = number of beta particles ($q = \beta$) or photons ($q = \gamma$) emitted by the ith radionuclide,

f_{qin} = abundance (dimensionless) of the nth beta particle or photon emitted by the ith radionuclide,

$\overline{E}_{\beta in}$ = average energy (MeV) of the nth beta particle emitted by the ith radionuclide,

$E_{\gamma in}$ = energy (MeV) of the nth photon emitted by the ith radionuclide,

x = the distance (cm) from the exposed individual to the contaminated surface,

$$C = \begin{cases} 3.0, & E_{\beta in} < 0.17, \\ 2.0, & 0.17 \leq E_{\beta in} < 0.5, \\ 1.5, & 0.5 \leq E_{\beta in} < 1.5, \\ 1.0, & 1.5 \leq E_{\beta in} \end{cases}$$

$E_{\beta in}$ = maximum energy (MeV) of the nth beta particle emitted by the ith radionuclide,

$$\alpha = \begin{cases} 0.190, & E_{\beta in} < 0.17, \\ 0.260, & 0.17 \leq E_{\beta in} < 0.5, \\ 0.297, & 0.5 \leq E_{\beta in} < 1.5, \\ 0.333, & 1.5 \leq E_{\beta in} \end{cases}$$

$$\nu = \frac{(18.6)\Delta}{(E_{\beta in} - 0.036)^{1.37}}$$

Δ = 1 unless nuclide is not a "Fermi allowed" beta emitter,

$$F[C,\nu,a(x)] = \begin{cases} C\{1 + \ln[\frac{C}{\nu a(x)}] - \exp[1-(\frac{\nu a(x)}{C})]\} & \text{if } \nu a(x) < C, \\ 0 & \text{if } \nu a(x) \geq C, \end{cases}$$

$a(x)$ = distance from the contaminated surface multiplied by the density of air (g/cm^2),

$\overline{E}_{\beta in}$ = 0 if $E_{\beta in} \leq 0.036$ MeV,

= $1/3\ E_{\beta in}(1-0.02\ \sqrt{Z})(1+0.25\ \sqrt{E_{\beta in}})$ if $E_{\beta in} > 0.036$ MeV

Z = atomic number,

Bs = backscatter correction (dimensionless) for a body immersed in air,

σ_{in} = linear energy absorption coefficient (cm^{-1}) [$\sigma_{in} = \sigma(E_{\lambda in})$], and

$E_1(\sigma \cdot x)$= exponential integral (E-function) of the first order.

<u>Organ Factors</u>. Gamma ray dose rates are computed with EXREM III according to the genral rule

$$D_{ip}(t) = \sum_j H_{ij}(t)\ F_{jp}$$

where

$D_{ip}(t)$ = the dose rate for the p-th mode of exposure (air immersion, water submersion, or surface source) from the i-th radionuclide at time t,

F_{jp} = the amount of dose in the p-th mode of exposure that would be delivered from one unit of energy in the j-th energy group, and

$H_{ij}(t)$ = the expected rate of energy emission in the j-th group by the i-th radionuclide present at time t.

The terms F_{jp} and $H_{ij}(t)$ are not simple quantities, but are rather elaborately computed intermediate results in EXREM III.

Dose rates to organs are defined by

$$DORG_{ipr}(t) = \sum_j F_{jp}\ H_{ij}(t)\ G_{jpr}$$

where

$DORG_{ipr}(t)$ = the dose rate from the i-th radionuclide in the p-th exposure mode to the r-th organ at time t, and

G_{jpr} = the ratio of the dose rate to organ r to the dose rate to skin for a unit of energy in the j-th group and exposure in the p-th mode.

A new quantity $ORGMUL_{ipr}(t)$ is defined such that

$$ORGMUL_{ipr}(t) = \frac{DORG_{ipr}(t)}{D_{ip}(t)}$$

$$= \left[\sum_j F_{jp}\, H_{ij}(t)\, G_{jpr}\right] \Big/ \left[\sum_j F_{jp}\, H_{ij}(t)\right] .$$

As a practical matter, data are available for G only for air immersion, i.e., only for $G_{j,\ \text{air immersion},\ r}$. Therefore, ORGMUL is computed only for the air immersion mode and the same factor is used to determine organ dose rates for other exposure modes. The organ dose is finally calculated by

$$DORG_{ipr}(t) = D_{ip}(t)\ ORGMUL_{i,\ \text{air immersion},\ r}(t) .$$

Poston and Snyder,[3] using Monte Carlo calculations and additional extrapolation procedures, have evaluated various organ dose rates for a phantom immersed in air containing monoenergetic gamma ray emitters. The calculation was performed for a total of 12 different energies. An adult phantom having 85 geometrical subregions was used. Schematic drawings provided the location of each organ according to subregion in the phantom. For each photon energy, average dose in each subregion was calculated and depth dose profiles were constructed. By combining the depth dose profiles and the schematic drawings which give organ location

by subregion, an estimate of the absorbed dose to each organ or region was derived by Poston and Snyder. In this fashion they computed the matrix $\left[Q_{jr}\right]$, where Q_{jr} is defined as the dose rate to the r-th organ from immersion in air containing unit activity of gamma ray energy in the j-th group. The dose calculated for skin was the average dose over a skin depth of 0.2 centimeter. If skin is the organ for which r = 1, G is defined by

$$G_{j,\ \text{air immersion},\ r} = \frac{Q_{jr}}{Q_{j1}}$$

for other organs.

3.1.1.1.1.2 Positrons and Electrons

The dose rate factors for positrons and electrons are added to those for the beta rays. The average electron energy is taken to be the input energy; the average positron energy is calculated as follows:

$$\overline{E}_{pin} = 1/3\ E_{pin}\ (1+0.25\ \sqrt{E_{pin}})\ .$$

3.1.1.1.2 Calculation of the Concentration

In general, nuclide decay chains may be characterized by steps, each represented by a particular nuclide. A particular nuclide will decay by various modes (e.g., β decay), branching with certain probabilities (fractions or branching ratios) to other nuclides which may or may not be stable. Consider one possible sequence of decays from a starting nuclide to a stable one with a certain fraction, f, decaying to the next nuclide. This will be called a nuclide pathway. A decay chain may be resolved into one or more such pathways, each of which is

represented as follows where each nuclide is numbered from 1 to s:

$$1 \xrightarrow{f_1} 2 \xrightarrow{f_2} 3 \xrightarrow{f_3} \cdots \xrightarrow{f_{n-2}} n-1 \xrightarrow{f_{n-1}} n \xrightarrow{f_n} s \quad .$$

The following system of differential equations describes the decay process in the nuclide pathway (see Refs. 4 and 5):

$$\begin{cases} \dot{N}_1(t) = -\lambda_1 N_1(t) \\ \dot{N}_2(t) = -\lambda_2 N_2(t) + \lambda_1 f_1 N_1(t) \\ \dot{N}_3(t) = -\lambda_3 N_3(t) + \lambda_2 f_2 N_2(t) \\ \cdots \\ \dot{N}_n(t) = -\lambda_n N_n(t) + \lambda_{n-1} f_{n-1} N_{n-1}(t) \\ N_i(t_o) = N_i^o, \; i = 1, 2, \cdots, n, \end{cases} \tag{3-9}$$

where

$N_i(t)$ = number of nuclei of the i-th radionuclide present at time t (hr),

λ_i = decay constant (hr^{-1}) of the i-th radionuclide,

f_i = fraction of nuclei of the i-th radionuclide which decays to the (i+1)-th nuclide in the pathway,

t_o = initial time (hr), and

$\dot{N}_i(t) = \frac{dN_i(t)}{dt}$.

Now the activity is related to the number of disintegrations per hour by

$$A_i(t) = \frac{\lambda_i}{k} N_i(t) \tag{3-10}$$

where

$$k = 1.332 \times 10^8 \; \frac{dis}{hr \cdot \mu Ci} \; ,$$

$A_i(t)$ = activity (μCi) of the i-th radionuclide at time t.

For submersion in air (p = a) or water (p = w), let $C_{ip\ell}(t)$ = $A_i(t)$ per unit volume $\left(\frac{\text{dis}}{\text{hr}\cdot\mu\text{Ci}\cdot\text{cm}^3}\right)$, (3-11)

and for exposure to surface contamination (p = s), let

$$C_{ip\ell}(t) = A_i(t) \text{ per unit surface area } \left(\frac{\text{dis}}{\text{hr}\cdot\mu\text{Ci}\cdot\text{cm}^2}\right) . \tag{3-12}$$

Further, let

$$\begin{cases} q_i = \lambda_i , \\ S_i = \lambda_{i+1} f_i , \\ C_{ip\ell}(t_o) = A_i(t_o) g_{pi\ell} = C^o_{ip\ell} \end{cases} \tag{3-13}$$

where

$g_{pi\ell}$ = location correction factor for the <u>ith</u> radionuclide, the <u>pth</u> mode of exposure, and the <u>ℓth</u> location.

Substituting Eqs. (3-11), (3-12), and (3-13) into Eq. (3-9), one obtains

$$\begin{cases} \dot{C}_{1p\ell}(t) = -q_1 C_{1p\ell}(t) \\ \dot{C}_{2p\ell}(t) = -q_2 C_{2p\ell}(t) + S_1 C_{1p\ell}(t) \\ \dot{C}_{3p\ell}(t) = -q_3 C_{3p\ell}(t) + S_2 C_{2p\ell}(t) \\ \cdots \\ \dot{C}_{np\ell}(t) = -q_n C_{np\ell}(t) + S_{n-1} C_{(n-1)p\ell}(t) \\ C_{ip\ell}(t_o) = A_i(t_o) g_{pi\ell} = C^o_{ip\ell} , \quad i = 1, 2, \ldots, n. \end{cases} \tag{3-14}$$

The general solution to this system of equations is

$$C_{ipm}(t) = \begin{cases} C^{o}_{1pm} e^{-q_1 T} & , i = 1, \\ C^{o}_{ipm} e^{-q_i T} + T \left\{ \sum_{k=1}^{i-1} C^{o}_{kpm} \left[\sum_{j=k}^{i-1} Y_{ij}(T) S_j \prod_{\substack{\ell=k \\ \ell \neq j}}^{i-1} \left(\frac{S_\ell}{q_\ell - q_j} \right) \right] \right\} & , i > 1, \end{cases}$$

where (3-15)

$$T = t - t_o,$$

$$\prod_{\substack{\ell=k \\ \ell \neq j}}^{i-1} \left(\frac{S_\ell}{q_\ell - q_j} \right) = 1 \text{ if } k = i-1.$$

and

$$Y_{ij}(T) = \begin{cases} \left\{ \frac{1-\exp[-(q_i-q_j)T]}{(q_i-q_j)T} \right\} e^{-q_j T}, & \text{if } q_i > q_j, \\ \left\{ \frac{1-\exp[-(q_j-q_i)T]}{(q_j-q_i)T} \right\} e^{-q_i T}, & \text{if } q_i \leq q_j. \end{cases} \quad (3\text{-}16)$$

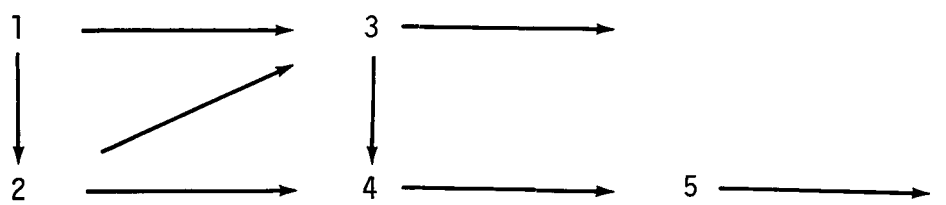
Thus for one environmental release, let t_o equal the time of the release and Y_i equal the quantity of the ith radionuclide released so that $C^{o}_{ip\ell} = Y_i \, g_{pi\ell}(t)$. Then $C_{ip\ell}(t)$ is given by Eq. (3-15). However, when p = a,

$$C_{ia\ell}(t) = 0 \text{ if } t > t_c \quad (3\text{-}17)$$

where t_c = time (hr) required for the radioactive cloud from the environmental release to pass the location.

The above procedure can be extended to estimate $C_{ip\ell}(t)$ when there exists more than one environmental release.

Next, consider a nuclide chain with branching and locate each pathway in the chain. The concentration for each radionuclide in each of the pathways of the chain can be solved by Eq. (3-15). For certain radionuclides, the contributions in some pathways must be added to the contributions from previous pathways. As an example, examine the following nuclide chain:



Radionuclides 3 and 5 decay into a stable nuclide. Each pathway in the nuclide chain is depicted below:

$$1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5$$

$$1 \rightarrow 2 \rightarrow 3 \rightarrow$$

$$1 \rightarrow 2 \rightarrow 504 \rightarrow 505 \rightarrow$$

$$1 \rightarrow 503 \rightarrow 504 \rightarrow 505 \rightarrow$$

$$1 \rightarrow 3 \rightarrow$$

For a particular pathway, 500 is added to the index of a radionuclide, as 503, 504, and 505, to indicate that the contribution for the nuclide in this pathway is added to the contribution from previous pathways. Note that the partial activity of nuclide 3 can be calculated from either pathway 1 or 2; thus 500 is not added. The rest of the activity for nuclides 3, 4, and 5 is determined from pathway 4. Pathway 5 does not add further activity to nuclide 3; thus 500 is not added.

3.1.1.1.3 Calculation of the Accumulated Concentration

To obtain an algorithm for approximating the integral in Eq. (3-2), consider the simpler case involving only one environmental release. Let

$$I_{ip\ell}(t_1,t_2) = \int_{t_1}^{t_2} C_{ip\ell}(t)dt \ . \tag{3-18}$$

When p = a, the upper limit of integration is actually the minimum of t_2 and t_c. By integrating the first equation in Eqs. (3-14), one obtains

$$I_{1p\ell}(t_1,t_2) = \frac{1}{q_1}[C_{1p\ell}(t_1) - C_{1p\ell}(t_2)] \ . \tag{3-19}$$

By integrating the second equation in Eqs. (3-14) and combining the results with Eq. (3-18), one obtains

$$I_{2p\ell}(t_1,t_2) = \frac{1}{q_2}[C_{2p\ell}(t_1) - C_{2p\ell}(t_2) + S_1 I_{1p\ell}(t_1,t_2)], \tag{3-20}$$

or in general

$$I_{ip\ell}(t_1,t_2) = \frac{1}{q_i}[C_{ip\ell}(t_1) - C_{ip\ell}(t_2) + S_{i-1}\ I_{(i-1)p\ell}(t_1,t_2)]. \tag{3-21}$$

Thus Eqs. (3-19) and (3-21) can be used to evaluate the integral in Eq. (3-2).

If there is more than one environmental release, then let τ_i denote the time of the i-th release. Define k and m so that $\tau_k \leq t_1 < \tau_{k+1}$ and $\tau_m < t_2 \leq \tau_{m+1}$. (If k is the number of the final release, then k+1 will not exist, and if m is the number of the final release, then m+1 will not exist.)

Then

$$I_{ip\ell}(t_1,t_2) = I_{ip\ell}(t_1,\tau_{k+1}) - \sum_{n=k+1}^{m-1} I_{ip\ell}(\tau_n,\tau_{n+1}) + I_{ip\ell}(\tau_m,t_2) \ . \qquad (3\text{-}22)$$

Let

$$C^o_{ip\ell n} = Y_{in}\ g_{pi\ell n} \ . \qquad (3\text{-}23)$$

For i = 1, combine Eq. (3-22) with Eq. (3-19) to obtain

$$I_{1p\ell}(t_1,t_2) = \frac{1}{q_1} C_{1p\ell}(t_1) + \sum_{n=k+1}^{m} C^o_{ip\ell n} - C_{1p\ell}(t_2) \ . \qquad (3\text{-}24)$$

For i > 1, combine Eq. (3-22) with Eq. (3-21) to obtain

$$I_{ip\ell}(t_1,t_2) = \frac{1}{q_i} C_{ip\ell}(t_1) + \sum_{n=k+1}^{m} C^o_{ip\ell n} - C_{ip\ell}(t_2) + S_{i-1}\ I_{(i-1)p\ell}(t_1,t_2) \ . \qquad (3\text{-}25)$$

3.1.1.2 The EXREM III Data Base

Table 3-1 contains the principal constituents of a recent version of the EXREM III data base. This tabulation, which contains data on 228 radionuclides, is organized into subtables 3-1A through 3-1G. Table 3-1A indicates the source in the literature of the nuclear data for each radionuclide in the data base. The atomic number, the radioactive decay constant λ^R (hr^{-1}), and the number of energies of each radiation type (beta, positron, photon, and conversion/Auger electron) are displayed in Table 3-1B for each radionuclide. Tables 3-1C through 3-1F contain the energy and intensity of each beta particle, positron, electron, and photon, respectively, for each nuclide. And Table 3-1G shows, for the chains

involving nuclides in the data base, those decay pathways (with branching fractions) that are judged to be of potential significance in their contribution to external dose. The term "pathway" is used here in the sense of the first paragraph of Sec. 3.1.1.1.2.

3.1.1.3 Use of the Tables

Environmental simulations involving external exposure to radionuclides are best carried out by one or more runs of the EXREM III code with data appropriate to the particular situation; output from a sample run is given in Table 3-10. For readers to whom this alternative is impractical, tables and examples of their use are provided to permit the calculation of approximations that might be useful in radiological assessments.

Tables 3-2 and 3-3 give dose rates and doses, respectively, to an individual submersed one per cent of the time in a large reservoir of contaminated water; sections A and B of this table correspond to electron and photon components, respectively. The reservoir is assumed to have received an inflow of a radionuclide at the constant rate of 1 μCi/ml/hr since time zero; the computed dose rates and doses, tabulated for various times, include the contribution of any radioactive daughters that will have built up in the water. Complete and instantaneous mixing of nuclides with the water is assumed, and no environmental removal of activity from the water is considered (i.e., the only removal process is radioactive decay). The doses in Table 3-3 are cumulative from time zero to the tabular times.

Table 3-4 contains dose rate factors for an individual immersed in air contaminated by a radionuclide at a concentration of 1 μCi/ml (=1 Ci/m^3). These factors pertain only to the indicated radionuclide and uniform unit concentration; they contain no adjustment for decay or for the buildup of daughter products. They are intended to be employed in conjunction with an atmospheric transport calculation which provides the air concentrations X(t) (μCi/ml) at times t throughout the release episode and at the point of location of the exposed individual. If DRF is the dose rate factor (mrem/yr

per μCi/ml) from Table 3-4 corresponding to the nuclide of interest, the dose to the exposed individual is

$$D = (DRF)\ \tilde{X}\ \ (\text{mrem}) \tag{3-26}$$

where

$$\tilde{X} = \int_{t_0}^{t_1} X(t)\ dt\ \ (\mu\text{Ci-yr/ml}) \tag{3-27}$$

and

t_0 = time (yr) release begins;

t_1 = time (yr) at which local concentration becomes negligible.

In general, the computation of X(t) involves the use of an atmospheric transport model and must be carried out with a computer. An important special case of the foregoing equations occurs when the release rate and atmospheric conditions may be assumed to produce a steady-state air concentration $X(\infty)$ of the radionuclide at the point of location of the exposed individual ($X(\infty)$ might represent a time average of measured or predicted concentrations corresponding to a long-term, constant-rate release of the radionuclide into the atmosphere, for example). In these circumstances the dose rate to the exposed individual is

$$\dot{D} = (DRF)\ X(\infty)\ \ (\text{mrem/yr}). \tag{3-28}$$

If the reference individual is exposed to the steady-state concentration for a period of duration T (yr), the dose is

$$D = \dot{D}\ T\ \ (\text{mrem}). \tag{3-29}$$

In the event that daughter products are present, their concentrations at the point of interest must also be predicted by an atmospheric transport calculation and combined with their respective dose rate factors from Table 3-4, as indicated above, for the computation of their contribution to the dose. The kinetics of decay and buildup must be modeled together with the dynamics of transport in the atmosphere, and the complexity of these processes prohibits further elaboration here. Atmospheric transport of radionuclides is discussed in Sec. 2.1.

It should be remarked that the dose rate factors of Table 3-4 apply in the strict sense to an individual (point receptor) immersed in a semi-infinite hemispherical cloud of air in which the distribution of activity is spatially uniform. The application of these factors to such nonuniform distributions of activity as may be expected to occur in the atmosphere must therefore be regarded as an approximation.

Tables 3-5 and 3-6 provide dose rates and doses, respectively, to an individual from exposure to contaminated ground; these tables are subdivided into A and B sections to correspond to electron and photon components, respectively. The contamination is assumed to result from the deposition of a radionuclide, beginning at time zero, at the constant rate of 1 $\mu Ci/cm^2/hr$. The ground is modeled as a plane surface with a uniform distribution of activity. The exposed individual is represented by a point receptor 1 m above the ground. The tabulated dose rates and doses take into account radioactive decay and the buildup of radioactive daughter products after deposition; no environmental removal processes are included.

Sample calculations are shown in the next subsection to illustrate the use of Tables 3-2 through 3-6.

Tables 3-7, 3-8, and 3-9 provide depth dose rate factors to several internal organs corresponding to submersion in contaminated water, immersion in contaminated air, and exposure to contaminated ground surface, respectively. These factors were computed as indicated in Sec. 3.1.1.1.1.1. Each dose-rate factor is normalized to unit concentration of the radionuclide in the source medium (μCi/ml for water and air and μCi/cm^2 for ground surface). These factors do not incorporate corrections for decay or buildup of radioactive daughter products. Illustrations of their use are given in the next subsection.

Section 3.1.1.2.1

Example 1. Assume that an individual is located near a nuclear facility which releases ^{90}Rb in particulate form to the atmosphere; assume further that source term information and atmospheric transport analysis predict steady-state ground-level air concentrations and total deposition rates for the ^{90}Rb → ^{90}Sr → ^{90}Y chain at the location of the exposed individual as follows:

Nuclide	Steady-State Air Concentration (μCi/ml)	Total Deposition Rate (μCi/cm^2-hr)
^{90}Rb	4.6×10^{-15}	2.1×10^{-11}
^{90}Sr	1.7×10^{-20}	7.7×10^{-17}
^{90}Y	3.6×10^{-23}	1.6×10^{-19}

The problem is to calculate the external dose to the exposed individual for 30 years of plant operation. Consider immersion in contaminated air and exposure to contaminated ground surface.

Solution of Example 1. The electron and photon dose rate factors shown below are taken from Table 3-4. The resulting doses are obtained by forming the product (dose rate factor)x(air concentration)x(30 years) (Eqs. (3-28) and (3-29)):

Immersion in Contaminated Air

Nuclide	From Table 3-4: Dose-Rate Factor $\left(\frac{\text{mrem/yr}}{\mu\text{Ci/ml}}\right)$ Electron	Photon	30-Year Dose (mrem) Electron	Photon
^{90}Rb	1.61×10^{10}	2.29×10^{10}	2.2×10^{-3}	3.2×10^{-3}
^{90}Sr	1.68×10^{9}	0	8.6×10^{-10}	0
^{90}Y	8.11×10^{9}	0	8.8×10^{-12}	0
Total			2.2×10^{-3}	3.2×10^{-3}

From Table 3-6 we obtain contaminated ground doses (mrem) which result from 30 years' deposition at the rate of 1 $\mu Ci/cm^2/hr$. These doses must be multiplied by the total deposition rates tabulated earlier to obtain the doses shown:

Exposure to Contaminated Ground Surface

Nuclide	From Table 3-6: 30-Year Dose per Unit Deposition Rate $\left(\frac{\text{mrem}}{\mu\text{Ci/cm}^2\text{-hr}}\right)$ Electron	Photon	30-Year Dose (mrem) Electron	Photon
^{90}Rb	7.05×10^{7}	6.35×10^{6}	1.5×10^{-3}	1.3×10^{-4}
^{90}Sr	7.37×10^{13}	0	5.7×10^{-3}	0
^{90}Y	6.34×10^{10}	0	1.0×10^{-8}	0
Total			7.2×10^{-3}	1.3×10^{-4}

We remark that the tabulated electron dose for ^{90}Rb contains contributions from the ^{90}Sr - ^{90}Y daughters that have been formed after deposition on the ground, and a similar remark applies to ^{90}Sr.

Example 2. Assume that a nuclear facility is releasing ^{99}Mo as a liquid effluent into a nearby creek which empties into a lake. Analysis shows that ^{99}Mo and daughter ^{99m}Tc reach the lake at the rate of 10^{-3} Ci/day for each nuclide. The mean volume of the lake is $2x10^7$ ℓ. Assume that an individual swims in the lake one per cent of the time during 30 years of plant operation. Estimate the resulting external surface dose and photon depth doses to the organs given in Table 3-7, and investigate the infinite-time contribution of the residual ^{99}Tc to population dose. Assume 100 users of the lake per year.

Solution of Example 2. The radioactive half-lives of ^{99}Mo and its radioactive daughters (calculated from decay constants in Table 3-1B) are shown below:

Nuclide	Radioactive Half-Life (hr)
^{99}Mo	66.2
^{99m}Tc	6.02
^{99}Tc	$1.26x10^9$

If we first consider only the inflow of ^{99}Mo, these half-lives indicate that ^{99}Mo and ^{99m}Tc will come into equilibrium rather quickly and that very little ^{99}Tc will be formed. The ^{99m}Tc input to the lake also produces relatively little ^{99}Tc during the 30-year period. We will calculate the maximum concentration later, but we shall neglect the contribution of ^{99}Tc to the 30-year dose. We remark that a confirmation of this assumption is provided by an inspection of dose rates for ^{99}Mo and ^{99m}Tc in Table

3-2A. The former rates show an unperturbed steady state after one month, and the latter remain steady except for an increase of one unit in the least significant digit between 100 and 500 years.

Our given total inflow rate and lake volume give a rate per unit volume of 2.08×10^{-9} μCi/ml-hr for ^{99}Mo and ^{99m}Tc. Entries from Table 3-3 and the resultant surface dose estimates are shown below.

Submersion in Contaminated Water

Nuclide	From Table 3-3: 30-Year Dose per Unit Inflow Rate $\left(\frac{\text{mrem}}{\mu\text{Ci/ml-hr}}\right)$ Electron	Photon	30-Year Dose (mrem) Electron	Photon
^{9}Mo	1.16×10^{8}	1.45×10^{8}	0.241	0.302
^{9m}Tc	4.17×10^{5}	6.12×10^{6}	8.67×10^{-4}	1.27×10^{-2}
Total			0.242	0.315

We have noted that ^{99}Mo and the ^{99m}Tc formed in the lake promptly establish equilibrium. The steady-state concentration of ^{99}Mo in the lake is given by

$$C_1 = \frac{2.08 \times 10^{-9}\ \mu\text{Ci/ml-hr}}{0.693/66.2\ \text{hr}} = 1.99 \times 10^{-7}\ \mu\text{Ci/ml}$$

and that of ^{99m}Tc produced in the lake is the same. The ^{99m}Tc flowing into the lake reaches the steady-state concentration

$$C_2 = \frac{2.08 \times 10^{-9}\ \mu\text{Ci/ml-hr}}{0.693/6.02\ \text{hr}} = 1.81 \times 10^{-8}\ \mu\text{Ci/ml}$$

and thus the total steady-state concentration of ^{99m}Tc is the sum of the two:

$$C_1 + C_2 = 2.17 \times 10^{-7}\ \mu\text{Ci/ml}.$$

The following table lists, for various organs, the photon depth dose rate factors from Table 3-7 and the resulting 30-year doses corresponding to these contributions:

Submersion in Contaminated Water

Organ	From Table 3-7: Photon Depth Dose Rate Factor $\left(\frac{mrem/yr}{\mu Ci/ml}\right)$ ^{99}Mo	^{99m}Tc	30-Year Photon Depth Dose (mrem) ^{99}Mo $(1.99\times10^{-7}\mu Ci/ml)$	^{99m}Tc $(2.17\times10^{-9}\mu Ci/ml)$	Total
Bladder	1.92×10^{4}	1.38×10^{4}	0.115	8.98×10^{-2}	0.205
Stomach	2.26×10^{4}	1.30×10^{4}	0.135	8.46×10^{-2}	0.220
Small Int.	1.77×10^{4}	1.30×10^{4}	0.106	8.46×10^{-2}	0.191
U. Large Int.	1.94×10^{4}	1.27×10^{4}	0.116	8.27×10^{-2}	0.199
L. Large Int.	1.67×10^{4}	1.05×10^{4}	9.97×10^{-2}	6.84×10^{-2}	0.168
Kidneys	2.14×10^{4}	1.46×10^{4}	0.128	9.50×10^{-2}	0.223
Liver	2.00×10^{4}	1.49×10^{4}	0.119	9.70×10^{-2}	0.216
Lungs	2.27×10^{4}	1.68×10^{4}	0.136	0.109	0.245
Marrow	2.95×10^{4}	3.60×10^{4}	0.176	0.234	0.410
Y. Marrow	3.11×10^{4}	3.88×10^{4}	0.186	0.253	0.439
R. Marrow	2.78×10^{4}	3.32×10^{4}	0.166	0.216	0.382
Muscle	2.41×10^{4}	1.74×10^{4}	0.144	0.113	0.257
Ovaries	1.06×10^{4}	8.56×10^{3}	6.33×10^{-2}	5.57×10^{-2}	0.119
Pancreas	1.69×10^{4}	1.05×10^{4}	0.101	6.84×10^{-2}	0.169
Skeleton	2.95×10^{4}	3.60×10^{4}	0.176	0.234	0.410
Skin	3.03×10^{4}	2.35×10^{4}	0.181	0.153	0.334
Spleen	2.47×10^{4}	1.22×10^{4}	0.147	7.94×10^{-2}	0.226
Testes	2.61×10^{4}	1.88×10^{4}	0.156	0.122	0.278
Thymue	1.55×10^{4}	1.05×10^{4}	9.25×10^{-2}	6.84×10^{-2}	0.161
Thyroid	2.35×10^{4}	2.46×10^{3}	0.140	0.160	0.300
Uterus	1.62×10^{4}	8.28×10^{3}	9.67×10^{-2}	5.39×10^{-2}	0.151
Total Body	2.42×10^{4}	2.02×10^{4}	0.144	0.132	0.276

An estimate of the total 30-year buildup of ^{99}Tc may be obtained as follows. If $C_M(t)$ is the concentration of ^{99m}Tc in the lake at time t, and if C(t) is the resultant concentration of ^{99}Tc, then C satisfies

$$dC/dt = -\lambda^R C + \lambda^R C_M \ , \ C(0)=0,$$

where

$$\lambda^R = 0.693/(1.26\text{x}10^9 \text{ hr}) = 5.50\text{x}10^{-10} \text{ hr}^{-1} = 4.82\text{x}10^{-6} \text{ yr}^{-1}.$$

During most of the first 30 years, C_M has the steady-state value $2.17\text{x}10^{-7}$ μCi/ml, and hence

$$C(t) = 2.17\text{x}10^{-7} \left[1 - e^{-(4.82\text{x}10^{-6})t}\right] \text{ (μCi/ml)}, \quad 0 \leq t \leq 30 \text{ yr}.$$

The maximum concentration occurs at t = 30 yr:

$$C(30) = 3.14\text{x}10^{-11} \text{ μCi/ml}.$$

If one neglects the slight increment that would build up within the several days after shut-down during the decay of the residual ^{99}Mo and ^{99m}Tc in the lake, we may express the concentration of ^{99m}Tc in the lake at times subsequent to 30 years as

$$C(t) = 3.14\text{x}10^{-11} \, e^{-(4.82\text{x}10^{-6})\,(t-30)} \text{ (μCi/ml)}, \quad t > 30 \text{ yr}.$$

If it is assumed that 100 people use the lake each year, that each spends one per cent of the time swimming in the lake, and that this pattern of usage will persist for the indefinite future, the contribution to the infinite-time population dose (to total body) of the residual ^{99}Tc in the lake is

$$D(\infty) = (100 \text{ man})\text{x}\left(8.97\text{x}10^3 \frac{\text{mrem/yr}}{\text{μCi/ml}} \text{ x } 10^{-3} \text{ rem/mrem}\right) \text{x}\left(\int_{30 \text{ yr}}^{+\infty} C(t)\, dt \, \frac{\text{μCi-yr}}{\text{ml}}\right) = 5.84\text{x}10^{-3} \text{ man-rem}.$$

The dose-rate factor $8.97\text{x}10^3 \frac{\text{mrem/yr}}{\text{μCi/ml}}$ was taken from Table 3-2A as the dose rate after a one-hour inflow of ^{99}Tc at the rate of 1 μCi/ml/hr.

Note: If the rate of turnover of water in the lake is known, this estimate can be reduced. Suppose, for example, the rate is one replacement per 3.5 yr. Then

$$C(t) = 3.14\times10^{-11}\ e^{-(4.82\times10^{-6} + 1/3.5)(t-30)}\ (\mu Ci/ml),\ t > 30\ yr.$$

Substitution of this expression into the formula for $D(\infty)$ gives

$$D(\infty) = 9.86\times10^{-8}\ \text{man-rem}.$$

Example 3. Assume that a nuclear facility releases ^{127}Sb into a river at the constant rate of 2 Ci/yr. The flow of the river is 3.0×10^{15} ml/yr, and an average velocity in the vicinity of the plant is 3 ft/sec. The problem is to estimate the total body photon depth dose rate to a swimmer 8 miles downstream.

Solution of Example 3. The radioactive half-lives and branching ratios (from Table 3-1G) of ^{127}Sb and its daughters are indicated in the following table:

Nuclide	Half-Life (hr)	Decay Constant (hr^{-1})	Branching Ratios = From ^{127}Sb	^{127M}Te
^{127}Sb	91.2	7.60×10^{-3}		
^{127m}Te	2.62×10^{3}	2.65×10^{-4}	0.166	
^{127}Te	9.35	7.41×10^{-2}	0.834	0.976

During a brief time increment Δt (yr), the concentration of ^{127}Sb introduced into the element of water flowing past the facility site is

$$\frac{(2\ Ci/yr)\ \Delta t\ yr}{(3\times10^{15}\ ml/yr)\ \Delta t\ yr} \times 10^{6}\ \mu Ci/Ci = 6.67\times10^{-10}\ \mu Ci/ml.$$

As the element of water moves downstream, ^{127}Sb decays to form ^{127m}Te and ^{127}Te. Let $C_1(t)$, $C_2(t)$, and $C_3(t)$ denote the concentrations (μCi/ml) in the element of water of ^{127}Sb, ^{127m}Te, and ^{127}Te, respectively. Let t = 0 correspond to the element's passing the facility, and let t be measured in hours. With these assumptions, C_1, C_2, and C_3 satisfy the following equations (system (3-A) of Sec. 3.1):

$$C_1(t) = 6.67\text{x}10^{-10}\ e^{-(7.60\text{x}10^{-3})t}$$
$$dC_2/dt = -(2.65\text{x}10^{-4})\ C_2 + (2.65\text{x}10^{-4})(0.166)\ C_1$$
$$dC_3/dt = -(7.41\text{x}10^{-2})\ C_3 + (7.41\text{x}10^{-2})\ \ [0.834\ C_1 + 0.976\ C_2]\ ,$$
$$C_2(0) = C_3(0) = 0.$$

These differential equations for C_2 and C_3 may be solved (by the method of Laplace transforms, for example) to give

$$C_2(t) = (4.00\text{x}10^{-12})\ e^{-(2.65\text{x}10^{-4})t} - e^{-(7.60\text{x}10^{-3})t}$$
$$C_3(t) = (6.15\text{x}10^{-10})\ e^{-(7.60\text{x}10^{-3})t} + (3.91\text{x}10^{-12})\ e^{-(2.65\text{x}10^{-4})t} - (6.19\text{x}10^{-10})\ e^{-(7.41\text{x}10^{-2})t}.$$

Since 3 ft/sec = 2.05 mi/hr, the element of water will arrive 8 miles downstream in 3.91 hr. Substituting this value for t in the equations for C_1, C_2, and C_3 gives

$C_1 = 6.47\text{x}10^{-10}$ μCi/ml (^{127}Sb)
$C_2 = 1.13\text{x}10^{-13}$ μCi/ml (^{127m}Te)
$C_3 = 1.38\text{x}10^{-10}$ μCi/ml (^{127}Te).

The depth dose rate factors for total body and the resulting dose rates are given below.

Submersion in Contaminated Water

Nuclide	From Table 3-7: Total Body Depth Dose Rate Factors $\frac{mrem/yr}{\mu Ci/ml}$	Total Body Depth Dose Rate (mrem/yr)
^{127}Sb	1.01×10^{5}	6.54×10^{-5}
^{127m}Te	7.28×10^{2}	8.23×10^{-11}
^{127}Te	6.20×10^{12}	8.56×10^{-8}
Total		6.55×10^{-5}

Example 4.

Assume an instantaneous release of ^{91}Sr to the environment. Use the EXREM III computer code to calculate electron and photon dose-rate and integrated dose factors for the resulting contamination of water, air, and ground surface by the ^{91}Sr and daughters ^{91m}Y and ^{91}Y. The dose integration interval extends from the time of release to one hour afterward.

Solution of Example 4.

Table 3-10 displays an edited version of the EXREM III printout. The first two pages of the table summarize input information. Subsequent pages show, for each medium, factors for dose rates at times 0.0 and 1.0 hr, and accumulated doses for the interval 0.0 to 1.0 hr. These factors must be interpreted as dose rates or doses per unit concentration in the respective media and must be multiplied by appropriate concentrations. For example, if an atmospheric dispersion calculation predicts an average air concentration of ^{91}Sr at ground level of 1×10^{-12} $\mu Ci/ml$ during the first hour following the release, then we may estimate a total air immersion dose of

$$1 \times 10^{-12}\ \mu Ci/ml \times 0.144 \times 10^{7}\ \frac{mrem}{\mu Ci/ml} = 1.44 \times 10^{-6}\ mrem.$$

3.2 External Dose to Biota

The external dose rates from electron and photon radiation to an organism submersed continuously in a body of radionuclide-contaminated water have been calculated and tabulated for 104 radionuclides from dose rates computed with the EXREM III computer code (Sec. 3.1.1). The contamination is assumed to be the result of the release of a radionuclide from a nuclear facility into the body of water at a constant rate; no environmental removal from the water is assumed (i.e., the nuclide is subject only to radioactive decay). The dose-rate factors include the contributions of radioactive daughter products if any are formed.

For most nuclides and chains, the parent and daughters will establish steady-state concentrations within a relatively short time after the beginning of the release, but exceptions occur when long-lived species are present; in the latter case, equilibrium may not be attained within the life of the nuclear facility, and dose rates based on the assumption of equilibrium may be unduly conservative. For such cases, the buildup has been allowed to proceed for 30 years, with inflow of the parent at that constant rate which produces a concentration of 1 μCi/ml of the parent at the end of the 30-th year. The dose rate corresponding to this concentration of the parent and the resulting concentrations of any radioactive daughters has been computed; this dose rate is the maximum rate for the 30-year period.

The estimated dose rates to submersed biota from many of the radionuclides potentially released from nuclear fuel cycle facilities are shown for a concentration of 1 μCi/ml in Table 3-11.

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TABLE 3-1A EXREM III DATA BASE: SOURCES OF INFORMATION

Radio-nuclide	Reference	Radio-nuclide	Reference	Radio-nuclide	Reference
H-3	1	Mn-52m	4	Kr-79	1
Be-7	1	Mn-52	1	Kr-83m	8
C-11	1	Mn-54	1	Kr-85m	4
C-14	1	Fe-52	4	Kr-85	1
N-13	1	Fe-55	1	Kr-87	8
O-15	1	Fe-59	1	Kr-88	8
F-18	1	Co-56	1	Rb-84	4
Na-22	1	Co-57	1	Rb-86	1
Na-24	1	Co-58	1	Rb-88	8
Mg-28	1	Co-60	6	Rb-89	5
Al-28	1	Ni-56	1	Rb-90	9
P-32	1	Ni-63	1	Sr-85	8
P-33	2	Cu-64	1	Sr-87m	1
S-35	1	Zn-65	1	Sr-89	5
Cl-36	1	Zn-69m	5	Sr-90	1
Cl-38	1	Zn-69	5	Sr-91	5
A-37	3	Ga-67	4	Sr-92	2
A-39	2	Ga-68	4	Sr-93	10
K-40	1	Ge-77	7	Y-87	1
K-42	1	As-76	1	Y-88	1
K-43	4	As-77	7	Y-90	1
Ca-45	4	Se-75	1	Y-91m	5
Ca-47	1	Se-77m	7	Y-91	1
Ca-49	1	Br-80m	5	Y-92	2
Sc-46	5	Br-80	5	Y-93	5
Sc-47	1	Br-82	1	Zr-95	1
Sc-49	1	Br-83	5	Zr-97	5
Cr-51	1	Br-84	4	Nb-95m	1

TABLE 3-1A (continued)

Radio-nuclide	Reference	Radio-nuclide	Reference	Radio-nuclide	Reference
Nb-95	1	Sb-127	5	Xe-138	16
Nb-97m	5	Te-123m	1	Cs-134	5
Nb-97	5	Te-125m	1	Cs-135	5
Mo-99	1	Te-127m	5	Cs-136	5
Tc-99m	6	Te-127	5	Cs-137	8
Tc-99	5	Te-129m	5	Cs-138	5
Ru-103	1	Te-129	5	Cs-139	17
Ru-106	1	Te-131m	5	Ba-133	4
Rh-103m	1	Te-131	5	Ba-137m	6
Rh-105	5	Te-132	1	Ba-139	2
Rh-106	1	I-123	1	Ba-140	1
Pd-103	6	I-124	1	La-140	1
Ag-110m	5	I-125	6	Ce-141	1
Ag-111	1	I-126	4	Ce-143	5
Cd-111m	2	I-129	5	Ce-144	1
Cd-113m	2	I-130	4	Pr-143	5
Cd-115m	11	I-131	1	Pr-144	1
In-113m	1	I-132	1	Nd-147	5
In-114m	12	I-133	5	Pm-147	1
In-114	12	I-134	5	Pm-148m	5
In-115m	13	I-135	5	Pm-148	5
Sn-113	1	I-136	15	Sm-151	5
Sn-119m	5	Xe-131m	8	Eu-154	5
Sn-123	5	Xe-133m	8	Eu-155	5
Sn-125	14	Xe-133	8	Eu-156	16
Sb-122	5	Xe-135m	8	Gd-162	5
Sb-124	1	Xe-135	8	Tb-160	5
Sb-125	1	Xe-137	8	Ta-182	5

TABLE 3-1A (continued)

Radio-nuclide	Reference	Radio-nuclide	Reference	Radio-nuclide	Reference
W-185	5	Rn-220	2	U-238	5
W-187	5	Rn-222	2	U-240	5
Au-195m	4	Ra-224	5	Np-237	5
Au-195	4	Ra-226	5	Np-238	21
Au-198	1	Ra-228	20	Np-239	5
Au-199	4	Ac-228	20	Np-240m	5
Hg-197	1	Th-228	5	Pu-236	5
Hg-203	1	Th-230	5	Pu-238	5
Tl-204	1	Th-231	5	Pu-239	5
Tl-208	5	Th-232	5	Pu-240	5
Tl-210	2	Th-234	5	Pu-241	5
Pb-204m	18	Pa-233	5	Pu-242	5
Pb-210	5	Pa-234m	5	Pu-244	2
Pb-212	5	Pa-234	5	Am-241	1
Pb-214	2	U-232	5	Am-242	5
Bi-210	5	U-233	5	Am-243	5
Bi-212	5	U-234	5	Cm-242	5
Bi-214	19	U-235	5	Cm-243	5
Po-214	2	U-236	5	Cm-244	5
Po-218	2	U-237	5	Cf-252	22

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TABLE 3-1A (continued)

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TABLE 3-1A (continued)

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TABLE 3-1B

EXREM III DATA BASE

ATOMIC NUMBERS, RADIOACTIVE DECAY RATE CONSTANTS, AND RADIATION TYPES WITH NUMBERS OF ENERGIES

INDEX	ATOMIC NUMBER	NAME	DECAY CONSTANT (1/HRS)	NO. BETA-PARTICLES	POSITRON PARTICLES	NUMBER PHOTONS	CONVERSION/AUGER ELECTRONS
303	1	H3	6.41200E-06	1	0	0	0
302	4	BE7	5.41800E-04	0	0	1	1
360	6	C11	2.03900E 00	0	1	1	1
314	6	C14	1.37900E-08	1	0	0	0
361	7	N13	4.17100E 00	0	1	1	1
362	8	O15	2.04500E 01	0	1	1	1
363	9	F18	3.78700E-01	0	1	1	1
312	11	NA22	3.04100E-05	0	2	3	1
309	11	NA24	4.62100E-02	2	0	3	1
376	12	MG28	3.28500E-02	1	0	5	2
377	13	AL28	1.85700E 01	1	0	1	0
310	15	P32	2.02100E-03	1	0	0	0
509	15	P33	1.14100E-03	1	0	0	0
318	16	S35	3.31100E-04	1	0	0	0
317	17	CL36	2.62700E-10	1	0	1	2
378	17	CL38	1.11700E 00	3	0	2	0
510	18	A37	8.29740E-04	0	0	1	3
506	18	A39	2.93800E-07	1	0	0	0
379	19	K40	6.17700E-14	1	0	2	2
315	19	K42	5.60800E-02	5	0	3	0
387	19	K43	3.12200E-02	4	0	7	0
311	20	CA45	1.77100E-04	1	0	0	0
380	20	CA47	6.36000E-03	3	0	5	0
382	20	CA49	4.76800E 00	5	0	5	0
316	21	SC46	3.44600E-04	1	0	2	3
381	21	SC47	8.46700E-03	2	0	2	3
383	21	SC49	7.25700E-01	1	0	0	0
304	24	CR51	1.04200E-03	0	0	2	2
364	25	MN52M	1.94300E 00	0	2	7	5
365	25	MN52	5.12900E-03	0	1	13	2
305	25	MN54	9.24000E-05	0	0	2	2
371	26	FE52	8.34900E-02	0	1	5	5
307	26	FE55	2.92900E-05	0	0	1	2
308	26	FE59	6.47500E-04	5	0	6	0
366	27	CO56	3.67800E-04	0	3	27	2
342	27	CO57	1.06500E-04	0	0	5	9
343	27	CO58	4.05000E-04	0	1	5	2
323	27	CO60	1.50300E-05	2	0	2	0
390	28	NI56	4.73400E-03	0	0	7	6
384	28	NI63	7.90500E-07	1	0	0	0
324	29	CU64	5.44000E-02	1	1	3	2
325	30	ZN65	1.18500E-04	0	1	3	2
350	30	ZN69M	4.99000E-02	0	0	4	8
351	30	ZN69	7.29500E-01	1	0	0	0
401	31	GA67	8.85500E-03	0	0	14	11
372	31	GA68	6.09700E-01	0	2	8	5
3	32	GE77	6.13300E-02	15	0	26	0
385	33	AS76	2.63500E-02	9	0	22	2
4	33	AS77	1.78600E-02	5	0	8	0
391	34	SE75	2.40700E-04	0	0	11	16
505	34	SE77M	1.42560E 02	0	0	4	7
504	35	BR80M	1.56800E-01	0	0	7	11
495	35	BR80	2.38970E 00	4	1	11	8
14	35	BR82	1.95800E-02	2	0	21	7
16	35	BR83	2.87610E-01	2	0	8	8
21	35	BR84	1.29960E 00	8	0	22	4
367	36	KR79	1.98600E-02	0	2	25	4
17	36	KR83M	3.72600E-01	0	0	4	9
25	36	KR85M	1.54700E-01	1	0	6	10
26	36	KR85	7.36900E-06	2	0	1	0
31	36	KR87	5.47100E-01	11	0	28	3
33	36	KR88	2.47500E-01	10	0	30	7
373	37	RB84	8.49300E-04	1	2	9	5
386	37	RB86	1.54800E-03	2	0	1	0
34	37	RB88	2.34900E 00	10	0	12	0
37	37	RB89	2.73600E 00	7	0	8	0
41	37	RB90	1.54000E 01	15	0	30	7

TABLE 3-1B (continued)

INDEX	ATOMIC NUMBER	NAME	DECAY CONSTANT (1/HRS)	NO. BETA-PARTICLES	POSITRON PARTICLES	NUMBER PHOTONS	CONVERSION/AUGER ELECTRONS
346	38	SR85	4.42900E-04	0	0	3	4
392	38	SR87M	2.46700E-01	0	0	1	3
38	38	SR89	5.71700E-04	1	0	0	0
42	38	SR90	2.72600E-06	1	0	0	0
46	38	SR91	7.31000E-02	5	0	5	0
51	38	SR92	2.55700E-01	4	0	3	0
55	38	SR93	5.54400E 00	7	0	22	0
368	39	Y87	8.63000E-03	0	2	5	5
369	39	Y88	2.70900E-04	0	1	6	2
43	39	Y90	1.08300E-02	1	0	0	0
47	39	Y91M	8.36700E-01	0	0	6	8
48	39	Y91	5.10200E-04	2	0	1	0
52	39	Y92	1.96320E-01	7	0	11	3
56	39	Y93	6.79400E-02	6	0	9	5
65	40	ZR95	4.40900E-04	4	0	4	4
69	40	ZR97	4.12500E-02	10	0	30	7
66	41	NB95M	8.00000E-03	0	0	1	3
67	41	NB95	8.22800E-04	1	0	2	2
70	41	NB97M	4.62000E 01	0	0	6	8
71	41	NB97	5.64900E-01	8	0	14	6
77	42	MO99	1.04700E-02	6	0	10	13
78	43	TC99M	1.15140E-01	0	0	6	12
79	43	TC99	3.73000E-10	1	0	0	0
88	44	RU103	7.29300E-04	4	0	8	4
97	44	RU106	7.82600E-05	1	0	0	0
89	45	RH103M	7.42500E-01	0	0	5	7
96	45	RH105	1.95200E-02	4	0	10	11
98	45	RH106	8.34400E 01	7	0	11	2
398	46	PD103	1.65000E-03	0	0	3	11
333	47	AG110M	1.15300E-04	3	0	27	25
114	47	AG111	3.87600E-03	3	0	4	5
507	48	CD111M	8.53800E-01	0	0	2	0
511	48	CD113M	5.41500E-06	1	0	5	7
125	48	CD115M	6.47400E-04	5	0	14	2
394	49	IN113M	4.18000E-01	0	0	1	3
427	49	IN114M	5.77500E-04	0	0	13	14
514	49	IN114	3.46500E 01	2	0	6	5
127	49	IN115M	1.54000E-01	2	0	7	8
393	50	SN113	2.51100E-04	0	0	3	3
405	50	SN119M	1.17900E-04	0	0	7	10
154	50	SN123	2.23800E-04	1	0	0	0
161	50	SN125	2.99500E-03	14	0	23	0
428	51	SB122	1.06160E-02	3	1	14	15
159	51	SB124	4.79700E-04	10	0	24	2
162	51	SB125	2.85600E-05	7	0	23	14
168	51	SB127	7.59900E-03	15	0	30	23
396	52	TE123M	2.41200E-04	0	0	4	9
163	52	TE125M	4.97900E-04	0	0	4	8
169	52	TE127M	2.65000E-04	2	0	6	8
170	52	TE127	7.41300E-02	2	0	10	5
176	52	TE129M	8.64500E-04	7	0	22	12
177	52	TE129	5.94000E-01	8	0	29	11
185	52	TE131M	2.31000E-02	15	0	30	30
186	52	TE131	1.66300E 00	9	0	26	13
191	52	TE132	8.88600E-03	1	0	4	0
395	53	I123	5.29000E-02	0	0	11	5
374	53	I124	6.92500E-03	0	3	30	3
399	53	I125	4.83700E-04	0	0	6	8
375	53	I126	2.22100E-03	3	2	16	11
178	53	I129	4.97200E-12	1	0	6	8
388	53	I130	5.59000E-02	3	0	9	11

TABLE 3-1B (continued)

INDEX	ATOMIC NUMBER	NAME	DECAY CONSTANT (1/HRS)	NO. BETA-PARTICLES	POSITRON PARTICLES	NUMBER PHOTONS	CONVERSION/AUGER ELECTRONS
187	53	I131	3.59100E-03	5	0	14	12
192	53	I132	3.04000E-01	9	0	30	14
196	53	I133	3.30100E-02	5	0	7	0
200	53	I134	7.90500E-01	9	0	24	8
202	53	I135	1.05200E-01	3	0	8	0
206	53	I136	2.93500E 01	8	0	20	9
188	54	XE131M	2.40800E-03	0	0	3	6
197	54	XE133M	1.29500E-02	0	0	3	6
198	54	XE133	5.45900E-03	2	0	5	6
203	54	XE135M	2.71800E 00	0	0	3	5
204	54	XE135	7.55700E-02	5	0	8	5
209	54	XE137	1.08300E 01	9	0	13	2
213	54	XE138	2.77200E 00	5	0	12	1
327	55	CS134	3.83800E-05	3	0	14	15
205	55	CS135	3.43700E-11	1	0	0	0
207	55	CS136	2.22100E-03	3	0	15	30
210	55	CS137	2.62600E-06	2	0	0	0
214	55	CS138	1.29150E 00	7	0	14	3
217	55	CS139	4.47100E 00	7	0	12	0
400	56	BA133	7.60100E-06	0	0	14	22
211	56	BA137M	1.63100E 01	0	0	3	5
218	56	BA139	4.99200E-01	3	0	6	8
221	56	BA140	2.25600E-03	5	0	17	13
222	57	LA140	1.72100E-02	10	0	24	8
227	58	CE141	6.91900E-04	2	0	3	5
236	58	CE143	2.06000E-02	10	0	30	20
238	58	CE144	1.01700E-04	4	0	7	18
237	59	PR143	2.12670E-03	1	0	0	0
239	59	PR144	2.40700E 00	3	0	3	0
246	60	ND147	2.61130E-03	7	0	21	30
247	61	PM147	3.01400E-05	1	0	0	0
406	61	PM148M	6.99200E-04	4	0	25	30
407	61	PM148	5.37700E-03	4	0	9	13
255	62	SM151	9.08900E-07	2	0	2	4
260	63	EU154	9.30300E-06	15	0	30	30
262	63	EU155	1.59420E-05	6	0	16	30
264	63	EU156	1.89970E-03	4	0	23	0
332	64	GD162	4.15800E 00	1	0	8	13
272	65	TB160	4.05600E-04	11	0	30	30
341	73	TA182	2.51100E-04	9	0	30	30
290	74	W185	3.85000E-04	1	0	0	0
291	74	W187	2.90000E-02	8	0	11	23
370	79	AU195M	8.18000E 01	0	0	10	17
279	79	AU195	1.56100E-04	0	0	10	13
288	79	AU198	1.07100E-02	2	0	5	5
389	79	AU199	9.19600E-03	3	0	10	12
397	80	HG197	1.08100E-02	0	0	5	6
301	80	HG203	6.19900E-04	1	0	3	5
300	81	TL204	2.09200E-05	1	0	2	2
476	81	TL208	1.36150E 01	4	0	19	20
518	81	TL210	3.19800E 01	0	0	1	0
296	82	PB204M	6.21520E-01	0	0	5	0

TABLE 3-1B (continued)

INDEX	ATOMIC NUMBER	NAME	DECAY CONSTANT (1/HRS)	NO. BETA-PARTICLES	POSITRON PARTICLES	NUMBER PHOTONS	CONVERSION/AUGER ELECTRONS
299	82	PB210	3.54500E-06	2	0	4	4
455	82	PB212	6.51500E-02	3	0	11	16
515	82	PB214	1.55000E 00	7	0	15	22
321	83	BI210	5.76300E-03	1	0	0	0
457	83	BI212	6.86300E-01	6	0	19	11
516	83	BI214	2.10000E 00	15	0	30	30
517	84	PO214	1.52000E 07	0	0	1	0
513	84	PO218	1.36300E 01	0	0	1	0
508	86	RN220	4.48700E 01	0	0	1	0
519	86	RN222	7.55000E-03	0	0	1	0
460	88	RA224	7.93400E-03	0	0	6	5
348	88	RA226	4.94000E-08	0	0	8	6
461	88	RA228	1.37500E-05	1	0	1	1
463	90	AC228	1.13000E-01	9	0	12	5
352	90	TH228	4.13300E-05	0	0	8	5
355	90	TH230	1.02670E-09	0	0	7	6
465	90	TH231	2.71800E-02	3	0	24	20
349	90	TH232	5.64600E-15	0	0	4	4
356	90	TH234	1.19800E-03	3	0	7	12
358	91	PA233	1.07000E-03	5	0	20	29
354	91	PA234M	3.53900E 01	4	0	15	13
409	91	PA234	1.03900E-01	4	0	30	30
359	92	U232	1.09800E-06	0	0	5	6
353	92	U233	5.00400E-10	0	0	19	12
338	92	U234	3.24000E-10	0	0	5	7
339	92	U235	1.12290E-13	0	0	19	30
468	92	U236	3.37600E-12	0	0	4	4
313	92	U237	4.27900E-03	4	0	20	25
340	92	U238	1.76900E-14	0	0	5	6
496	92	U240	4.91600E-02	1	0	4	4
345	93	NP237	3.69500E-11	0	0	15	8
512	93	NP238	1.36200E-02	4	0	7	0
330	93	NP239	1.22900E-02	6	0	25	30
497	93	NP240M	5.54400E 00	9	0	19	13
494	94	PU236	2.77390E-05	0	0	5	6
280	94	PU238	9.00400E-07	0	0	5	6
281	94	PU239	3.24100E-09	0	0	8	11
282	94	PU240	1.20170E-08	0	0	5	6
283	94	PU241	5.27000E-06	1	0	0	0
284	94	PU242	2.04300E-10	0	0	4	4
286	94	PU244	9.52470E-13	0	0	0	0
334	95	AM241	1.82600E-07	0	0	6	18
404	95	AM242	4.32600E-02	0	0	12	11
335	95	AM243	1.07000E-08	0	0	6	8
336	96	CM242	1.77200E-04	0	0	5	6
403	96	CM243	2.82300E-06	0	0	29	30
337	96	CM244	4.41700E-06	0	0	5	5
474	98	CF252	2.98000E-05	0	0	13	0

TABLE 3-1C

EXREM III DATA BASE

ENERGY AND INTENSITY FOR EACH BETA PARTICLE

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
303	H3	1	0.0185	1.00000
314	C14	1	0.1561	1.00000
309	NA24	1	0.2840	0.00100
		2	1.3920	0.99900
376	MG28	1	0.4590	1.00000
377	AL28	1	2.8550	1.00000
310	P32	1	1.7089	1.00000
509	P33	1	0.0766	1.00000
318	S35	1	0.1673	1.00000
317	CL36	1	0.7089	0.98100
378	CL38	1	1.1030	0.32800
		2	2.7450	0.11200
		3	4.9130	0.56000
506	A39	1	0.5650	1.00000
379	K40	1	1.3140	0.89300
315	K42	1	0.0700	0.00100
		2	1.0900	0.00100
		3	1.6830	0.00200
		4	1.9950	0.17600
		5	3.5200	0.82100
387	K43	1	0.4600	0.08000
		2	0.8200	0.87000
		3	1.2400	0.03700
		4	1.8100	0.01300
311	CA45	1	0.2570	1.00000
380	CA47	1	0.6870	0.82000
		2	1.2170	0.00100
		3	1.9840	0.18000
382	CA49	1	0.5290	0.00300
		2	1.1920	0.07900
		3	2.1800	0.90900
		4	2.9000	0.00500
		5	3.0400	0.00400
316	SC46	1	0.3570	1.00000
381	SC47	1	0.4410	0.70000
		2	0.6000	0.30000
383	SC49	1	2.0080	1.00000
308	FE59	1	0.0840	0.00100
		2	0.1320	0.00100
		3	0.2740	0.46000
		4	0.4670	0.53000
		5	1.5660	0.00300
323	CO60	1	0.3179	0.99900
		2	1.4911	0.00100
384	NI63	1	0.0659	1.00000
324	CU64	1	0.5736	0.38000

TABLE 3-1C (continued)

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
351	ZN69	1	0.9010	1.00000
3	GE77	1	0.3900	0.05400
		2	0.5300	0.01200
		3	0.6200	0.02700
		4	0.7400	0.07800
		5	0.8800	0.00600
		6	1.1800	0.09400
		7	1.2100	0.03100
		8	1.2800	0.03500
		9	1.3800	0.02500
		10	1.5500	0.21300
		11	1.6500	0.01500
		12	1.9400	0.02000
		13	2.1100	0.18000
		14	2.2650	0.15100
		15	2.5100	0.04500
385	AS76	1	0.3030	0.00300
		2	0.3170	0.01200
		3	0.5420	0.02000
		4	1.0890	0.00300
		5	1.1840	0.01900
		6	1.7560	0.08000
		7	1.8540	0.04000
		8	2.4130	0.29000
		9	2.9720	0.54000
4	AS77	1	0.6840	0.97300
		2	0.4450	0.01500
		3	0.4340	0.00700
		4	0.3820	0.00010
		5	0.1630	0.00490
495	BR80	1	0.7000	0.00200
		2	0.7600	0.00300
		3	1.3800	0.06800
		4	2.0500	0.83600
14	BR82	1	0.2630	0.01700
		2	0.4440	0.98300
16	BR83	1	0.9300	0.01400
		2	0.4000	0.98600
21	BR84	1	0.5000	0.03000
		2	0.7700	0.19000
		3	0.9800	0.02000
		4	1.3300	0.14000
		5	1.7700	0.01000
		6	2.7800	0.15000
		7	3.8000	0.14000
		8	4.6800	0.32000
25	KR85M	1	0.8400	0.78700
26	KR85	1	0.1730	0.00400
		2	0.6870	0.99600
31	KR87	1	0.5840	0.00500
		2	0.8370	0.00100
		3	0.9320	0.04800
		4	1.0810	0.00600
		5	1.3370	0.08900
		6	1.4780	0.05500
		7	1.5140	0.00400
		8	2.1520	0.00700
		9	3.0460	0.06900
		10	3.4890	0.39000
		11	3.8920	0.33000
33	KR88	1	0.3500	0.00800
		2	0.5100	0.70700
		3	0.6700	0.08400
		4	1.6600	0.00400
		5	1.6900	0.00300
		6	1.7200	0.01600
		7	1.7600	0.00400
		8	2.0400	0.02700
		9	2.5400	0.05000
		10	2.7000	0.09900
373	RB84	1	0.8860	0.02800
386	RB86	1	0.6900	0.08800
		2	1.7670	0.91200

TABLE 3-1C (continued)

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
34	RB88	1	0.4490	0.00500
		2	0.4580	0.00400
		3	0.5580	0.00200
		4	0.7900	0.02500
		5	0.8920	0.00200
		6	1.8150	0.00100
		7	2.0850	0.01200
		8	2.5700	0.14000
		9	3.4680	0.04800
		10	5.3040	0.76200
37	RB89	1	0.4200	0.02000
		2	0.6700	0.28000
		3	1.1700	0.03000
		4	1.3300	0.02000
		5	1.6100	0.53000
		6	2.8700	0.05000
		7	3.9200	0.07000
41	RB90	1	1.3300	0.03100
		2	1.4120	0.04100
		3	1.6200	0.01600
		4	1.9500	0.03800
		5	2.2300	0.16600
		6	2.4600	0.09900
		7	2.6000	0.01800
		8	3.1500	0.01300
		9	3.2200	0.08100
		10	3.5600	0.01600
		11	4.0700	0.01000
		12	4.7100	0.06800
		13	4.9500	0.01000
		14	5.7700	0.24300
		15	6.6000	0.15000
38	SR89	1	1.4630	1.00000
42	SR90	1	0.5460	1.00000
46	SR91	1	0.6100	0.07000
		2	1.0900	0.33000
		3	1.3700	0.29000
		4	2.0300	0.04000
		5	2.6700	0.27000
51	SR92	1	0.5300	0.90000
		2	1.4600	0.04100
		3	1.6700	0.03500
		4	1.9000	0.02400
55	SR93	1	2.6000	0.25000
		2	2.2000	0.10000
		3	4.2000	0.10000
		4	3.9000	0.14000
		5	3.8000	0.08000
		6	3.5000	0.16000
		7	3.3000	0.13000
43	Y90	1	2.2740	1.00000
48	Y91	1	0.3400	0.00200
		2	1.5450	0.99800
52	Y92	1	1.3000	0.06000
		2	1.5800	0.00300
		3	1.8000	0.00800
		4	2.1400	0.01500
		5	2.2500	0.02300
		6	2.7000	0.03100
		7	3.6300	0.86000
56	Y93	1	0.4300	0.00150
		2	0.7100	0.01380
		3	1.4400	0.00250
		4	1.9400	0.02380
		5	2.6200	0.05840
		6	2.8900	0.90000
65	ZR95	1	0.3640	0.54300
		2	0.3970	0.43500
		3	0.8860	0.01800
		4	1.1210	0.00400
69	ZR97	1	0.4200	0.00300
		2	0.5600	0.05200
		3	0.8200	0.00400
		4	0.9100	0.02000
		5	0.9200	0.00700
		6	1.0200	0.00200
		7	1.1200	0.01300
		8	1.3900	0.00200
		9	1.4200	0.03400
		10	1.9300	0.86300
67	NB95	1	0.1597	1.00000

TABLE 3-1C (continued)

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
71	NB97	1	0.3020	0.00060
		2	0.4140	0.00170
		3	0.6610	0.00180
		4	0.7830	0.00040
		5	0.8130	0.00070
		6	0.9060	0.01100
		7	1.2100	0.00090
		8	1.2710	0.98290
77	MO99	1	0.2330	0.00100
		2	0.3710	0.00100
		3	0.4540	0.18600
		4	0.7040	0.00100
		5	0.8650	0.01400
		6	1.2320	0.80000
79	TC99	1	0.2920	1.00000
88	RU103	1	0.1020	0.06200
		2	0.2160	0.89000
		3	0.4570	0.00200
		4	0.7120	0.04000
97	RU106	1	0.0394	1.00000
96	RH105	1	0.1240	0.00040
		2	0.2480	0.19500
		3	0.2610	0.05400
		4	0.5670	0.75060
98	RH106	1	0.9200	0.00100
		2	1.5400	0.00400
		3	1.8300	0.00100
		4	1.9800	0.01700
		5	2.4100	0.10500
		6	3.0300	0.08400
		7	3.5400	0.78800
333	AG110M	1	0.0840	0.67800
		2	0.5310	0.30900
		3	1.4680	0.00200
114	AG111	1	0.6870	0.08000
		2	0.7840	0.00900
		3	1.0310	0.91000
511	CD113M	1	0.5800	0.99400
125	CD115M	1	0.0521	0.00300
		2	0.0927	0.00930
		3	0.1462	0.00070
		4	0.2383	0.01700
		5	0.6117	0.97000
514	IN114	1	0.2230	0.00150
		2	0.7802	0.97780
127	IN115M	1	0.0952	0.00060
		2	0.2772	0.05500
154	SN123	1	1.4200	1.00000
161	SN125	1	0.0800	0.00430
		2	0.1200	0.00675
		3	0.1610	0.00065
		4	0.3600	0.02300
		5	3.8000	0.04100
		6	0.4720	0.06000
		7	0.5560	0.00130
		8	0.7710	0.00020
		9	0.9430	0.00110
		10	1.0130	0.00320
		11	1.2730	0.02780
		12	1.2950	0.00480
		13	2.0300	0.00090
		14	2.3600	0.82500
428	SB122	1	0.7200	0.04060
		2	1.4060	0.62900
		3	1.9720	0.29940
159	SB124	1	0.1320	0.00400
		2	0.2130	0.09100
		3	0.4240	0.00500
		4	0.6130	0.51700
		5	0.8150	0.00600
		6	0.8680	0.04000
		7	0.9490	0.00200
		8	1.5810	0.05200
		9	1.6580	0.02800
		10	2.3040	0.23400
162	SB125	1	0.0940	0.13300
		2	0.1240	0.06000
		3	0.1300	0.18800
		4	0.2410	0.02000
		5	0.3030	0.39600
		6	0.4550	0.06500
		7	0.6210	0.13600

TABLE 3-1C (continued)

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
168	SB127	1	0.2031	0.00070
		2	0.2576	0.00200
		3	0.2907	0.00750
		4	0.4260	0.00910
		5	0.4394	0.01580
		6	0.5040	0.05230
		7	0.6566	0.01260
		8	0.7951	0.07850
		9	0.7973	0.17250
		10	0.8173	0.00070
		11	0.8953	0.34530
		12	0.9495	0.04380
		13	1.1080	0.22220
		14	1.2403	0.01740
		15	1.4927	0.01960
169	TE127M	1	0.0600	0.01300
		2	0.7200	1.50000
170	TE127	1	0.2700	0.01000
		2	0.6900	0.99000
176	TE129M	1	0.1900	0.00150
		2	0.5500	0.00038
		3	0.7500	0.00016
		4	0.8300	0.00032
		5	0.8700	0.00740
		6	0.9000	0.03100
		7	1.6000	0.32500
177	TE129	1	0.2000	0.00010
		2	0.2300	0.00040
		3	0.3800	0.01030
		4	0.6600	0.00240
		5	0.9300	0.00260
		6	1.0000	0.09300
		7	1.2100	0.61000
		8	1.4600	0.88500

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
185	TE131M	1	0.1800	0.00800
		2	0.2200	0.01500
		3	0.2800	0.02000
		4	0.3450	0.01700
		5	0.4700	0.34000
		6	0.5500	0.18000
		7	0.8050	0.03300
		8	0.8540	0.00500
		9	0.8950	0.01200
		10	1.1350	0.01200
		11	1.3900	0.02700
		12	1.6000	0.00800
		13	1.6800	0.02800
		14	2.4500	0.06600
		15	0.4500	0.04900
186	TE131	1	0.7100	0.01210
		2	0.7650	0.01490
		3	0.7840	0.01490
		4	1.0220	0.00340
		5	1.0600	0.10500
		6	1.1100	0.02400
		7	1.3300	0.00800
		8	1.6100	0.19770
		9	2.0600	0.62000
191	TE132	1	0.2150	1.00000
375	I126	1	0.3850	0.05000
		2	0.8650	0.29900
		3	1.2500	0.09000
178	I129	1	0.1500	1.00000
388	I130	1	0.6200	0.47800
		2	1.0400	0.51800
		3	1.7000	0.00400
187	I131	1	0.2479	0.01900
		2	0.3039	0.00600
		3	0.3339	0.07000
		4	0.6063	0.90200
		5	0.8068	0.00700

TABLE 3-1C (continued)

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
192	I132	1	0.7400	0.17000
		2	0.8300	0.00300
		3	0.9100	0.03600
		4	1.0000	0.14000
		5	1.1900	0.22000
		6	1.4700	0.09000
		7	1.6200	0.12000
		8	1.7800	0.02000
		9	2.1400	0.21000
196	I133	1	0.2200	0.01000
		2	0.4200	0.01000
		3	0.5700	0.02000
		4	0.9300	0.08000
		5	1.2700	0.88000
200	I134	1	0.8000	0.04000
		2	0.9000	0.02500
		3	1.0500	0.01000
		4	1.2500	0.23000
		5	1.4900	0.15000
		6	1.6800	0.07500
		7	1.8100	0.09500
		8	2.2100	0.12000
		9	2.4100	0.25500
202	I135	1	0.4700	0.35000
		2	1.0000	0.40000
		3	1.4000	0.25000
206	I136	1	2.7300	0.06000
		2	3.2600	0.15000
		3	3.4300	0.07000
		4	3.7700	0.22000
		5	4.1600	0.05000
		6	4.3700	0.24000
		7	5.6000	0.15000
		8	7.0000	0.06000
198	XE133	1	0.2660	0.00600
		2	0.3460	0.99400
204	XE135	1	0.0940	0.00100
		2	0.1750	0.00100
		3	0.5480	0.02600
		4	0.7490	0.00500
		5	0.9070	0.96700
209	XE137	1	1.5000	0.00600
		2	2.2800	0.00200
		3	2.4300	0.00100
		4	2.5600	0.00500
		5	2.7700	0.00100
		6	3.3700	0.00200
		7	3.5000	0.00800
		8	3.8900	0.30000
		9	4.3500	0.70000
213	XE138	1	0.4000	0.04800
		2	0.7700	0.24000
		3	2.4000	0.19700
		4	2.5000	0.14700
		5	2.8000	0.27000
327	CS134	1	0.0920	0.24700
		2	0.4190	0.01600
		3	0.6620	0.73700
205	CS135	1	0.2100	1.00000
207	CS136	1	0.3420	0.91600
		2	0.4950	0.01900
		3	0.6820	0.06500
210	CS137	1	0.5120	0.94100
		2	1.1740	0.05900
214	CS138	1	1.4900	0.00500
		2	2.2000	0.10000
		3	2.3900	0.36000
		4	2.5300	0.05000
		5	2.6200	0.16000
		6	2.9400	0.12000
		7	3.4000	0.20500
217	CS139	1	0.4700	0.00800
		2	0.7900	0.01200
		3	1.1900	0.01700
		4	1.6100	0.00300
		5	2.2400	0.01800
		6	2.8700	0.04200
		7	4.1500	0.90000
218	BA139	1	0.9100	0.00500
		2	2.1700	0.27000
		3	2.3400	0.72500

TABLE 3-1C (continued)

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
221	BA140	1	0.4680	0.24000
		2	0.5820	0.10100
		3	0.8860	0.02600
		4	1.0050	0.46000
		5	1.0190	0.17000
222	LA140	1	0.8690	0.00100
		2	1.2220	0.00800
		3	1.2470	0.10800
		4	1.2530	0.05800
		5	1.2880	0.01300
		6	1.3050	0.05500
		7	1.3570	0.45000
		8	1.4210	0.05100
		9	1.6850	0.18000
		10	2.1720	0.07000
227	CE141	1	0.4380	0.70600
		2	0.5800	0.29400
236	CE143	1	0.0410	0.00020
		2	0.0580	0.00050
		3	0.2790	0.00600
		4	0.3780	0.00100
		5	0.5020	0.01700
		6	0.7100	0.16000
		7	0.8750	0.00100
		8	0.9840	0.00030
		9	1.0930	0.52600
		10	1.3870	0.28800
238	CE144	1	0.1821	0.19400
		2	0.2156	0.00300
		3	0.2355	0.04200
		4	0.3156	0.76300
237	PR143	1	0.9310	1.00000
239	PR144	1	0.8100	0.01000
		2	2.3000	0.01200
		3	2.9960	0.97800
246	ND147	1	0.2086	0.02310
		2	0.2141	0.00050
		3	0.3635	0.15530
		4	0.4052	0.00880
		5	0.4840	0.00410
		6	0.8034	0.80520
		7	0.8945	0.00300
247	PM147	1	0.2246	1.00000
406	PM148M	1	0.2710	0.56000
		2	0.3700	0.17000
		3	0.5590	0.21700
		4	0.8710	0.00700
407	PM148	1	1.0000	0.38000
		2	1.3040	0.01250
		3	2.4650	0.49750
		4	1.9150	0.11000
255	SM151	1	0.0544	0.01700
		2	0.0760	0.98300
260	EU154	1	0.2580	0.27960
		2	0.3180	0.00690
		3	0.3320	0.00130
		4	0.3610	0.01350
		5	0.4180	0.00080
		6	0.4470	0.00230
		7	0.5800	0.36600
		8	0.7140	0.00680
		9	0.7270	0.00250
		10	0.8500	0.16850
		11	0.9300	0.00110
		12	0.9820	0.02180
		13	1.1620	0.00360
		14	1.6070	0.00590
		15	1.8550	0.12210
262	EU155	1	0.1020	0.00640
		2	0.1300	0.02000
		3	0.1430	0.51770
		4	0.1615	0.23580
		5	0.1880	0.08610
		6	0.2480	0.13000
264	EU156	1	0.3000	0.23000
		2	0.4800	0.34000
		3	1.2100	0.11000
		4	2.4470	0.32000
332	GD162	1	0.9580	1.00000

TABLE 3-1C (continued)

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
272	TB160	1	0.3050	0.00350
		2	0.4410	0.04430
		3	0.4540	0.00940
		4	0.4810	0.09640
		5	0.5530	0.03330
		6	0.5750	0.44640
		7	0.6840	0.00180
		8	0.7910	0.06160
		9	0.8740	0.25980
		10	1.5560	0.00430
		11	1.7530	0.03920
341	TA182	1	0.2540	0.28600
		2	0.3200	0.02100
		3	0.3640	0.00200
		4	0.4330	0.19900
		5	0.4760	0.03000
		6	0.5180	0.40100
		7	0.5490	0.03100
		8	0.5650	0.00900
		9	1.4800	0.00240
290	W185	1	0.4290	1.00000
291	W187	1	0.4300	0.00500
		2	0.4400	0.00900
		3	0.5400	0.05000
		4	0.6200	0.70000
		5	0.6800	0.01300
		6	0.6900	0.07000
		7	0.8000	0.00300
		8	1.3100	0.15000
288	AU198	1	0.2651	0.01200
		2	0.9610	0.98800
389	AU199	1	0.2510	0.23000
		2	0.3020	0.70000
		3	0.4600	0.07000
301	HG203	1	0.2110	1.00000
300	TL204	1	0.7634	0.97500
476	TL208	1	1.0320	0.03800
		2	1.2840	0.25000
		3	1.5180	0.21000
		4	1.7950	0.50000
299	PB210	1	0.0145	0.81000
		2	0.0610	0.19000
455	PB212	1	0.1600	0.00500
		2	0.3400	0.81000
		3	0.5800	0.14000
515	PB214	1	0.2100	0.00500
		2	0.5100	0.00700
		3	0.6900	0.47000
		4	0.7500	0.44000
		5	0.7800	0.00800
		6	0.9900	0.01000
		7	1.0400	0.06000
321	BI210	1	1.1600	1.00000
457	BI212	1	0.4500	0.00800
		2	0.6300	0.02100
		3	0.7400	0.01300
		4	0.9300	0.00100
		5	1.5500	0.05000
		6	2.2500	0.54700
516	BI214	1	0.1200	0.00600
		2	0.2240	0.03100
		3	0.3090	0.01900
		4	0.5290	0.01900
		5	0.7560	0.03800
		6	0.8650	0.00300
		7	0.9800	0.05900
		8	1.0570	0.08500
		9	1.1510	0.04700
		10	1.2530	0.02500
		11	1.5050	0.18000
		12	1.5400	0.15000
		13	1.8990	0.09000
		14	2.6610	0.04000
		15	3.2700	0.20000
461	RA228	1	0.0480	1.00000
463	AC228	1	0.4500	0.04900
		2	0.4900	0.05600
		3	0.6200	0.05500
		4	0.9900	0.07300
		5	1.0200	0.04000
		6	1.1200	0.06500
		7	1.1700	0.03300
		8	1.7600	0.02000
		9	2.1000	0.01300

TABLE 3-1C (continued)

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
465	TH231	1	0.1340	0.01400
		2	0.2180	0.27700
		3	0.2990	0.70900
356	TH234	1	0.1000	0.07000
		2	0.1000	0.12000
		3	0.1930	0.81000
358	PA233	1	0.1550	0.26800
		2	0.1720	0.13400
		3	0.2300	0.26800
		4	0.2590	0.27800
		5	0.5710	0.05200
354	PA234M	1	1.2500	0.00740
		2	1.5300	0.00720
		3	2.2500	0.00540
		4	2.2900	0.98000
409	PA234	1	0.2300	0.14000
		2	0.5100	0.66000
		3	0.7300	0.11000
		4	1.0200	0.07000
313	U237	1	0.1460	0.00500
		2	0.1850	0.03500
		3	0.2360	0.53000
		4	0.2490	0.43000
496	U240	1	0.3600	1.00000
512	NP238	1	0.2000	0.08000
		2	0.2500	0.31000
		3	0.2800	0.20000
		4	1.2500	0.45000
330	NP239	1	0.2080	0.01000
		2	0.3280	0.32000
		3	0.3900	0.07000
		4	0.4370	0.48000
		5	0.6540	0.05000
		6	0.7130	0.07000
497	NP240M	1	0.5600	0.00700
		2	0.6500	0.04000
		3	0.7600	0.00300
		4	1.2300	0.03000
		5	1.2800	0.02300
		6	1.3200	0.04000
		7	1.6000	0.32000
		8	2.1400	0.12000
		9	2.1800	0.41700
283	PU241	1	0.0208	1.00000

TABLE 3-1D

EXREM III DATA BASE

ENERGY AND INTENSITY FOR EACH POSITRON

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
360	C11	1	0.9590	0.99800
361	N13	1	1.1986	0.99800
362	O15	1	1.7376	0.99900
363	F18	1	0.6329	0.96700
312	NA22	1	0.5459	0.90500
		2	1.8204	0.00100
364	MN52M	1	1.1000	0.01500
		2	2.6300	0.92000
365	MN52	1	0.5740	0.27600
371	FE52	1	0.8040	0.56500
366	CO56	1	0.4210	0.01000
		2	0.5840	0.00100
		3	1.4590	0.23000
343	CO58	1	0.4740	0.15000
324	CU64	1	0.6540	0.18400
325	ZN65	1	0.3310	0.01400
372	GA68	1	0.8200	0.01500
		2	1.8980	0.86700
495	BR80	1	0.8660	0.02800
367	KR79	1	0.3450	0.00200
		2	0.6060	0.07200
373	RB84	1	0.7800	0.11000
		2	1.6600	0.10000
368	Y87	1	0.3000	0.00600
		2	0.7800	0.01300
369	Y88	1	0.7630	0.00200
428	SB122	1	0.5980	0.00006
374	I124	1	0.8120	0.00300
		2	1.5350	0.11400
		3	2.1380	0.11000
375	I126	1	0.4630	0.00300
		2	1.1300	0.01000

TABLE 3-1E

EXREM III DATA BASE

ENERGY AND INTENSITY FOR EACH ELECTRON

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
302	BE7	1	0.0001	0.88000
360	C11	1	0.0002	0.00200
361	N13	1	0.0003	0.00200
362	O15	1	0.0004	0.00100
363	F18	1	0.0005	0.03100
312	NA22	1	0.0008	0.08500
309	NA24	1	1.7321	0.00100
376	MG28	1	0.0014	0.05000
		2	0.0291	0.05000
317	CL36	1	0.0002	0.00300
		2	0.0021	0.00200
510	A37	1	0.0024	0.68650
		2	0.0026	0.11740
		3	0.0001	1.68370
379	K40	1	0.0002	0.16000
		2	0.0027	0.07000
316	SC46	1	0.8944	0.00015
		2	0.0040	0.00015
		3	0.0004	0.00039
381	SC47	1	0.0004	0.00300
		2	0.0040	0.00200
		3	0.1544	0.00200
304	CR51	1	0.0005	1.52000
		2	0.0044	0.68000
364	MN52M	1	0.0048	0.02400
		2	0.0054	0.00600
		3	0.0005	0.06800
		4	0.0001	0.14300
		5	0.3765	0.00100
365	MN52	1	0.0006	1.04000
		2	0.0048	0.46000
305	MN54	1	0.0006	1.49000
		2	0.0048	0.65600
371	FE52	1	0.1585	0.05800
		2	0.0052	0.25800
		3	0.0058	0.06100
		4	0.0006	0.73400
		5	0.0001	0.15500
307	FE55	1	0.0006	1.46400
		2	0.0052	0.63000
366	CO56	1	0.0007	1.12000
		2	0.0056	0.47400
342	CO57	1	0.0007	2.57000
		2	0.0056	1.05000
		3	0.0073	0.69700
		4	0.0136	0.07700
		5	0.0143	0.00900
		6	0.1150	0.01800
		7	0.1213	0.00200
		8	0.1293	0.01400
		9	0.1357	0.00200
343	CO58	1	0.0007	1.22000
		2	0.0056	0.50000
390	NI56	1	0.0008	1.43000
		2	0.0061	0.58900
		3	0.1506	0.01200
		4	0.1574	0.00200
		5	0.2619	0.00100
		6	0.4730	0.00100
324	CU64	1	0.0008	0.59000
		2	0.0065	0.24000
325	ZN65	1	0.0009	1.34000
		2	0.0070	0.51600
350	ZN69M	1	0.4293	0.04584
		2	0.4379	0.00469
		3	0.4389	0.00156
		4	0.0075	0.02008
		5	0.0085	0.00546
		6	0.0095	0.00026
		7	0.0009	0.06817
		8	0.0001	0.14603

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
401	GA67	1	0.0815	0.00200
		2	0.0836	0.25000
		3	0.0922	0.02700
		4	0.0932	0.00900
		5	0.1748	0.00300
		6	0.2863	0.00100
		7	0.0075	0.51400
		8	0.0085	0.14000
		9	0.0095	0.00700
		10	0.0009	1.73000
		11	0.0001	3.68000
372	GA68	1	0.0075	0.04700
		2	0.0085	0.01300
		3	0.0095	0.00100
		4	0.0009	0.15900
		5	0.0001	0.33800
385	AS76	1	0.0013	0.00100
		2	0.5466	0.00100
391	SE75	1	0.0012	1.37000
		2	0.0091	0.44800
		3	0.0126	0.04900
		4	0.0229	0.01000
		5	0.0243	0.00200
		6	0.0542	0.00300
		7	0.0849	0.03000
		8	0.0952	0.00400
		9	0.0965	0.00100
		10	0.1092	0.00700
		11	0.1196	0.00100
		12	0.1241	0.01600
		13	0.1344	0.00200
		14	0.2528	0.00400
		15	0.2677	0.00200
		16	0.2921	0.00100
505	SE77M	1	0.1492	0.40130
		2	0.1604	0.06080
		3	0.1617	0.02260
		4	0.0096	0.12410
		5	0.0110	0.03720
		6	0.0011	0.55100
		7	0.0001	1.20580

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
504	BR80M	1	0.0235	0.52709
		2	0.0354	0.06109
		3	0.0368	0.02036
		4	0.0345	0.67332
		5	0.0464	0.24290
		6	0.0478	0.08096
		7	0.0103	0.33689
		8	0.0117	0.10376
		9	0.0131	0.00950
		10	0.0012	1.69280
		11	0.0002	3.74150
495	BR80	1	0.0097	0.01737
		2	0.0110	0.00520
		3	0.0123	0.00044
		4	0.0012	0.07370
		5	0.0002	0.15948
		6	0.6017	0.00011
		7	0.0013	0.00014
		8	0.0002	0.00031
14	BR82	1	0.0015	0.00700
		2	0.0108	0.00200
		3	0.0778	0.00500
		4	0.2070	0.00100
		5	0.5400	0.00100
		6	0.6048	0.00100
		7	0.7624	0.00100
16	BR83	1	0.0182	0.25912
		2	0.0308	0.55526
		3	0.0323	0.18507
		4	0.0109	0.07599
		5	0.0124	0.02401
		6	0.0139	0.00236
		7	0.0013	0.83487
		8	0.0002	1.93480
21	BR84	1	0.8657	0.00023
		2	0.8783	0.00020
		3	0.0013	0.00046
		4	0.0002	0.00104
367	KR79	1	0.0014	1.04000
		2	0.0102	0.30700
		3	0.0131	0.00100
		4	0.2478	0.00100

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
17	KR83M	1	0.0015	1.62000
		2	0.0074	0.77200
		3	0.0091	0.12700
		4	0.0093	0.04200
		5	0.0108	0.08200
		6	0.0177	0.24100
		7	0.0303	0.61900
		8	0.0318	0.10500
		9	0.0320	0.03500
25	KR85M	1	0.0015	0.07800
		2	0.0017	0.03800
		3	0.0108	0.02000
		4	0.0114	0.01000
		5	0.1358	0.03200
		6	0.1489	0.00400
		7	0.1507	0.00100
		8	0.2902	0.06100
		9	0.3026	0.00900
		10	0.3042	0.00100
31	KR87	1	0.0017	0.00200
		2	0.0114	0.00100
		3	0.3875	0.00200
33	KR88	1	0.0017	0.13500
		2	0.0114	0.03500
		3	0.0128	0.10300
		4	0.0259	0.11800
		5	0.0277	0.00200
		6	0.1508	0.00200
		7	0.1809	0.00800
373	RB84	1	0.0109	0.17400
		2	0.0124	0.05500
		3	0.0139	0.00500
		4	0.0013	0.83600
		5	0.0002	1.83000
41	RB90	1	0.8154	0.00039
		2	0.8295	0.00004
		3	0.8312	0.00001
		4	0.0121	0.00009
		5	0.0138	0.00003
		6	0.0015	0.00046
		7	0.0003	0.00102
346	SR85	1	0.0017	1.06000
		2	0.0114	0.28100
		3	0.4988	0.00600
		4	0.5119	0.00100
392	SR87M	1	0.3723	0.15500
		2	0.3862	0.02300
		3	0.3880	0.00400
368	Y87	1	0.0017	0.00700
		2	0.0018	1.20000
		3	0.0114	0.00200
		4	0.0121	0.30300
		5	0.4674	0.00200
369	Y88	1	0.0018	1.03000
		2	0.0121	0.25800
47	Y91M	1	0.5340	0.04483
		2	0.5488	0.00615
		3	1.5507	0.00205
		4	0.0127	0.00908
		5	0.0146	0.00308
		6	0.0154	0.00035
		7	0.0016	0.05243
		8	0.0003	0.11740
52	Y92	1	0.4300	0.00013
		2	0.0017	0.00034
		3	0.0003	0.00076
56	Y93	1	0.2490	0.00100
		2	0.2647	0.00012
		3	0.0134	0.00019
		4	0.0017	0.00115
		5	0.0003	0.00259
65	ZR95	1	0.0021	0.01400
		2	0.0140	0.00300
		3	0.0752	0.00100
		4	0.7379	0.00100
69	ZR97	1	0.2353	0.00019
		2	0.3365	0.00015
		3	0.0141	0.00247
		4	0.0162	0.00089
		5	0.0183	0.00011
		6	0.0017	0.01615
		7	0.0004	0.03570
66	NB95M	1	0.2164	0.58000
		2	0.2327	0.11600
		3	0.2349	0.03100
67	NB95	1	0.0023	0.00200
		2	0.7458	0.00200

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
70	NB97M	1	0.7240	0.01473
		2	0.7405	0.00240
		3	0.7426	0.00080
		4	0.0140	0.00257
		5	0.0151	0.00091
		6	0.0183	0.00011
		7	0.0017	0.01684
		8	0.0004	0.03813
71	NB97	1	0.6379	0.00176
		2	0.6553	0.00020
		3	0.0147	0.00029
		4	0.0170	0.00010
		5	0.0018	0.00191
		6	0.0004	0.00433
77	MO99	1	0.0016	0.94000
		2	0.0022	0.15800
		3	0.0155	0.03200
		4	0.0195	0.04400
		5	0.0375	0.00500
		6	0.0400	0.00200
		7	0.1195	0.09300
		8	0.1216	0.00600
		9	0.1375	0.01200
		10	0.1396	0.00200
		11	0.1400	0.00200
		12	0.1600	0.00800
		13	0.1780	0.00100
78	TC99M	1	0.0017	0.98600
		2	0.1195	0.08800
		3	0.1377	0.01100
		4	0.1401	0.00400
		5	0.1217	0.01000
		6	0.1399	0.00300
		7	0.1423	0.00100
		8	0.0155	0.01500
		9	0.0178	0.00600
		10	0.0202	0.00100
		11	0.0019	0.10600
		12	0.0004	1.23000
88	RU103	1	0.0024	0.77900
		2	0.0497	0.00100
		3	0.0170	0.02000
		4	0.0299	0.00700
89	RH103M	1	0.0165	0.09670
		2	0.0366	0.67690
		3	0.0392	0.22560
		4	0.0169	0.01280
		5	0.0195	0.00480
		6	0.0021	0.70890
		7	0.0004	1.72460
96	RH105	1	0.0144	0.00129
		2	0.0355	0.00014
		3	0.2819	0.00085
		4	0.3030	0.00011
		5	0.2949	0.00248
		6	0.3160	0.00034
		7	0.3188	0.00011
		8	0.0177	0.00058
		9	0.0205	0.00022
		10	0.0023	0.00471
		11	0.0005	0.01089
98	RH106	1	0.0025	0.00100
		2	0.4875	0.00100
398	PD103	1	0.0168	0.08400
		2	0.0359	0.68600
		3	0.0395	0.22900
		4	0.0298	0.05900
		5	0.0499	0.00800
		6	0.0525	0.00300
		7	0.0159	0.13400
		8	0.0916	0.05100
		9	0.0222	0.00700
		10	0.0021	1.66000
		11	0.0005	3.90000

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
333	AG110M	1	0.0002	0.00825
		2	0.0031	0.00275
		3	0.0908	0.00661
		4	0.1128	0.00324
		5	0.1158	0.00108
		6	0.0185	0.00077
		7	0.0214	0.00030
		8	0.0024	0.01618
		9	0.0006	0.03907
		10	0.4201	0.00025
		11	0.6310	0.00245
		12	0.6540	0.00033
		13	0.6571	0.00011
		14	0.6508	0.00034
		15	0.6602	0.00016
		16	0.6799	0.00032
		17	0.7372	0.00040
		18	0.7912	0.00010
		19	0.8578	0.00093
		20	0.9106	0.00034
		21	1.3573	0.00016
		22	0.0193	0.00063
		23	0.0224	0.00025
		24	0.0025	0.00553
		25	0.0006	0.01289
114	AG111	1	0.0027	0.00300
		2	0.0193	0.00100
		3	0.0696	0.00200
		4	0.2192	0.00100
		5	0.3153	0.00100
511	CD113M	1	0.2433	0.00241
		2	0.2663	0.00176
		3	0.2694	0.00059
		4	0.0193	0.00030
		5	0.0224	0.00012
		6	0.0025	0.00366
		7	0.0006	0.00880
125	CD115M	1	0.0026	0.00018
		2	0.0007	0.00041
394	IN113M	1	0.3638	0.28900
		2	0.3875	0.05600
		3	0.3909	0.01100
427	IN114M	1	0.5313	0.00015
		2	0.0193	0.00332
		3	0.0224	0.00133
		4	0.0255	0.00020
		5	0.0025	0.02991
		6	0.0006	0.06931
		7	0.1637	0.38756
		8	0.1877	0.33410
		9	0.1909	0.08716
		10	0.0201	0.03989
		11	0.0234	0.01612
		12	0.0266	0.00251
		13	0.0026	0.62733
		14	0.0007	1.48520
514	IN114	1	0.0193	0.00198
		2	0.0224	0.00079
		3	0.0255	0.00012
		4	0.0025	0.01759
		5	0.0006	0.04076
127	IN115M	1	0.3077	0.43570
		2	0.3317	0.08714
		3	0.3350	0.02904
		4	0.0201	0.04485
		5	0.0234	0.01812
		6	0.0266	0.00283
		7	0.0026	0.44766
		8	0.0007	1.05470
393	SN113	1	0.0028	1.12400
		2	0.0201	0.17000
		3	0.2271	0.00100
405	SN119M	1	0.0197	0.63607
		2	0.0231	0.21181
		3	0.0358	0.30617
		4	0.0609	0.52037
		5	0.0643	0.17328
		6	0.0210	0.03364
		7	0.0244	0.01379
		8	0.0278	0.00217
		9	0.0027	1.27260
		10	0.0007	3.16230

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
428	SB122	1	0.5342	0.00327
		2	0.5614	0.00045
		3	0.5652	0.00015
		4	0.6542	0.00010
		5	0.6814	0.00001
		6	0.0227	0.00023
		7	0.0264	0.00013
		8	0.0302	0.00002
		9	0.0029	0.00315
		10	0.0008	0.00752
		11	0.0209	0.00261
		12	0.0244	0.00107
		13	0.0278	0.00017
		14	0.0027	0.02547
		15	0.0007	0.05958
159	SB124	1	0.0032	0.00300
		2	0.5709	0.00400
162	SB125	1	0.0032	0.84000
		2	0.0036	0.72000
		3	0.0227	0.11100
		4	0.0305	0.09100
		5	0.0344	0.01700
		6	0.0775	0.12100
		7	0.1033	0.09100
		8	0.1826	0.02500
		9	0.1445	0.00900
		10	0.1713	0.00200
		11	0.1753	0.00100
		12	0.3961	0.00300
		13	0.4317	0.00100
		14	0.5690	0.00100

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
168	SB127	1	0.0292	0.03573
		2	0.0564	0.00526
		3	0.0602	0.00175
		4	0.1212	0.00004
		5	0.1225	0.00029
		6	0.1497	0.00007
		7	0.1535	0.00002
		8	0.2206	0.00362
		9	0.2478	0.00047
		10	0.2516	0.00016
		11	0.2486	0.00023
		12	0.2758	0.00004
		13	0.2796	0.00001
		14	0.2590	0.00061
		15	0.2862	0.00008
		16	0.2930	0.00003
		17	0.2615	0.00009
		18	0.2887	0.00002
		19	0.0227	0.00392
		20	0.0264	0.00165
		21	0.0302	0.00027
		22	0.0029	0.04136
		23	0.0008	0.09855
396	TE123M	1	0.0032	0.86500
		2	0.0227	0.07500
		3	0.0556	0.43000
		4	0.0835	0.44500
		5	0.0874	0.10200
		6	0.0883	0.02200
		7	0.1272	0.14200
		8	0.1541	0.01900
		9	0.1581	0.00400
163	TE125M	1	0.0032	1.50000
		2	0.0036	0.81000
		3	0.0027	0.17400
		4	0.0305	0.10400
		5	0.0344	0.01800
		6	0.0775	0.50800
		7	0.1043	0.38200
		8	0.1083	0.10800
169	TE127M	1	0.0569	0.35433
		2	0.0841	0.47245
		3	0.0879	0.15747
		4	0.0227	0.03115
		5	0.0264	0.01315
		6	0.0302	0.00212
		7	0.0029	0.70027
		8	0.0008	1.72160

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
170	TE127	1	0.0244	0.00083
		2	0.0528	0.00010
		3	0.3848	0.00011
		4	0.0031	0.00096
		5	0.0009	0.00230
176	TE129M	1	0.0737	0.31177
		2	0.1009	0.24060
		3	0.1047	0.08019
		4	0.0227	0.02741
		5	0.0264	0.01157
		6	0.0302	0.00187
		7	0.0029	0.46312
		8	0.0008	1.12830
		9	0.0230	0.00099
		10	0.0269	0.00033
		11	0.0031	0.00099
		12	0.0009	0.00249
177	TE129	1	0.0230	0.60612
		2	0.0269	0.20202
		3	0.1758	0.00017
		4	0.2175	0.00021
		5	0.2453	0.00023
		6	0.4264	0.00083
		7	0.4548	0.00011
		8	0.4542	0.00014
		9	0.0236	0.00014
		10	0.0031	0.52825
		11	0.0009	1.33850

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
185	TE131M	1	0.0477	0.05669
		2	0.0761	0.00597
		3	0.0800	0.00199
		4	0.0691	0.05871
		5	0.0975	0.00605
		6	0.1014	0.00202
		7	0.1165	0.00725
		8	0.1449	0.00092
		9	0.1489	0.00031
		10	0.1675	0.00224
		11	0.1959	0.00028
		12	0.2074	0.00018
		13	0.2358	0.00020
		14	0.3013	0.00250
		15	0.3297	0.00030
		16	0.3336	0.00010
		17	0.4195	0.00011
		18	0.7405	0.00073
		19	0.7689	0.00014
		20	0.8189	0.00047
		21	0.0236	0.01076
		22	0.0275	0.00461
		23	0.0314	0.00075
		24	0.0031	0.11529
		25	0.0009	0.27540
		26	0.1499	0.10991
		27	0.1800	0.06300
		28	0.0230	0.01510
		29	0.0029	0.13090
		30	0.0010	0.31600
186	TE131	1	0.1158	0.14231
		2	0.1452	0.01801
		3	0.1491	0.00600
		4	0.3098	0.00016
		5	0.3508	0.00012
		6	0.4198	0.00223
		7	0.4482	0.00023
		8	0.4598	0.00035
		9	0.0236	0.01212
		10	0.0275	0.00520
		11	0.0314	0.00085
		12	0.0031	0.13230
		13	0.0009	0.31639
395	I123	1	0.0032	0.92800
		2	0.0227	0.13200
		3	0.1272	0.14100
		4	0.1541	0.01900
		5	0.1581	0.00400

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
374	I124	1	0.0032	0.61000
		2	0.0227	0.08700
		3	0.5709	0.00300
399	I125	1	0.0037	0.74600
		2	0.0309	0.10700
		3	0.0347	0.08000
		4	0.0227	0.13700
		5	0.0264	0.05800
		6	0.0302	0.00900
		7	0.0029	1.49000
		8	0.0008	3.59000
375	I126	1	0.6352	0.00100
		2	0.0227	0.04200
		3	0.0264	0.01800
		4	0.0302	0.00300
		5	0.0029	0.44000
		6	0.0008	1.04000
		7	0.3514	0.00600
		8	0.3809	0.00100
		9	0.0245	0.00100
		10	0.0032	0.00500
		11	0.0009	0.01200
178	I129	1	0.0050	0.84833
		2	0.0345	0.08483
		3	0.0386	0.02827
		4	0.0245	0.06761
		5	0.0286	0.02934
		6	0.0327	0.00485
		7	0.0032	0.74231
		8	0.0009	1.78210
388	I130	1	0.3844	0.00500
		2	0.4130	0.00100
		3	0.5035	0.00600
		4	0.5330	0.00100
		5	0.6344	0.00300
		6	0.6639	0.00100
		7	0.7085	0.00200
		8	0.0245	0.00100
		9	0.0286	0.00100
		10	0.0032	0.01500
		11	0.0009	0.03500
187	I131	1	0.0034	0.05300
		2	0.0246	0.00700
		3	0.0456	0.03000
		4	0.0747	0.00400
		5	0.0790	0.00100
		6	0.1294	0.00800
		7	0.1585	0.00400
		8	0.1628	0.00200
		9	0.2497	0.00200
		10	0.3299	0.01500
		11	0.3590	0.00200
		12	0.3633	0.00100
192	I132	1	0.0033	0.75000
		2	0.0165	0.73000
		3	0.0236	0.10000
		4	0.0445	0.10100
		5	0.0486	0.03000
		6	0.0786	0.00900
		7	0.0831	0.00900
		8	0.1651	0.00200
		9	0.1111	0.00200
		10	0.1950	0.06400
		11	0.2230	0.01200
		12	0.2271	0.00400
		13	0.6331	0.00400
		14	0.7380	0.00200
200	I134	1	0.8134	0.00192
		2	0.8429	0.00026
		3	0.8554	0.00119
		4	0.8849	0.00016
		5	0.0245	0.00025
		6	0.0286	0.00011
		7	0.0032	0.00283
		8	0.0009	0.00681
206	I136	1	0.1655	0.01102
		2	0.1949	0.00146
		3	0.1991	0.00048
		4	1.2854	0.00055
		5	1.2854	0.00025
		6	0.0244	0.00103
		7	0.0286	0.00045
		8	0.0032	0.01068
		9	0.0009	0.02588

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
188	XE131M	1	0.0034	0.72200
		2	0.0246	0.07300
		3	0.1294	0.60900
		4	0.1589	0.28500
		5	0.1629	0.06500
		6	0.1640	0.02100
197	XE133M	1	0.0034	0.67400
		2	0.0246	0.07600
		3	0.1982	0.63400
		4	0.2274	0.20700
		5	0.2317	0.04600
		6	0.2326	0.01500
198	XE133	1	0.0036	0.49200
		2	0.0255	0.06400
		3	0.0436	0.00300
		4	0.0450	0.53200
		5	0.0753	0.08800
		6	0.0798	0.02400
203	XE135M	1	0.0034	0.14700
		2	0.0246	0.01900
		3	0.4928	0.15500
		4	0.5220	0.03000
		5	0.5263	0.01000
204	XE135	1	0.0036	0.05200
		2	0.0255	0.00700
		3	0.2152	0.05700
		4	0.2444	0.00900
		5	0.2487	0.00300
209	XE137	1	0.0036	0.00300
		2	0.4200	0.00300
213	XE138	1	0.0300	0.04300
327	CS134	1	0.4381	0.00014
		2	0.5256	0.00051
		3	0.5319	0.00105
		4	0.5637	0.00014
		5	0.5674	0.00465
		6	0.5993	0.00072
		7	0.6038	0.00024
		8	0.7586	0.00217
		9	0.7905	0.00031
		10	0.7950	0.00010
		11	0.7645	0.00020
		12	0.0263	0.00064
		13	0.0308	0.00028
		14	0.0034	0.00787
		15	0.0011	0.01912
207	CS136	1	0.0296	0.05212
		2	0.0614	0.04738
		3	0.0659	0.01579
		4	0.0486	0.00908
		5	0.0804	0.00249
		6	0.1156	0.01704
		7	0.1474	0.00284
		8	0.1519	0.00095
		9	0.1266	0.03845
		10	0.1584	0.03496
		11	0.1629	0.01165
		12	0.1386	0.00232
		13	0.1704	0.00075
		14	0.1749	0.00025
		15	0.2356	0.00135
		16	0.2674	0.00020
		17	0.3026	0.01090
		18	0.3344	0.00218
		19	0.3389	0.00073
		20	0.7806	0.00249
		21	0.8124	0.00083
		22	0.8159	0.00028
		23	1.0156	0.00127
		24	1.0474	0.00015
		25	1.2026	0.00016
		26	0.0263	0.00978
		27	0.0308	0.00435
		28	0.0353	0.00073
		29	0.0034	0.18131
		30	0.0011	0.44907
214	CS138	1	1.3890	0.00060
		2	0.0034	0.00050
		3	0.0011	0.00120

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
400	BA133	1	0.0180	0.08100
		2	0.0487	0.01100
		3	0.0530	0.00400
		4	0.0435	0.09200
		5	0.0742	0.01200
		6	0.0785	0.00400
		7	0.0450	0.47200
		8	0.0757	0.07400
		9	0.0800	0.02500
		10	0.1250	0.00500
		11	0.1557	0.00100
		12	0.2400	0.00200
		13	0.2660	0.00600
		14	0.2967	0.00100
		15	0.3200	0.01200
		16	0.3507	0.00100
		17	0.3460	0.00100
		18	0.0254	0.09500
		19	0.0297	0.04200
		20	0.0340	0.00700
		21	0.0033	1.35000
		22	0.0010	0.32600
211	BA137M	1	0.0037	0.07100
		2	0.0254	0.00900
		3	0.6242	0.07800
		4	0.6557	0.01400
		5	0.6604	0.00300
218	BA139	1	0.1269	0.04750
		2	0.1600	0.00485
		3	0.1647	0.00162
		4	0.0273	0.00345
		5	0.0320	0.00156
		6	0.0367	0.00026
		7	0.0036	0.03990
		8	0.0011	0.09774
221	BA140	1	0.0038	0.98000
		2	0.0076	0.55000
		3	0.0125	0.11200
		4	0.0136	0.06000
		5	0.0237	0.60200
		6	0.0274	0.00100
		7	0.0286	0.12600
		8	0.0297	0.06300
		9	0.0938	0.00300
		10	0.1240	0.00600
		11	0.1566	0.00100
		12	0.2659	0.00300
		13	0.4985	0.00300

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
222	LA140	1	0.0039	0.01500
		2	0.0180	0.00300
		3	0.0284	0.00200
		4	0.0285	0.00200
		5	0.0690	0.00200
		6	0.0907	0.00200
		7	0.2683	0.00700
		8	0.4466	0.00400
227	CE141	1	0.0041	0.15700
		2	0.0294	0.01800
		3	0.1035	0.18400
		4	0.1386	0.02500
		5	0.1439	0.00700
236	CE143	1	0.0154	0.64588
		2	0.0511	0.08749
		3	0.0562	0.02916
		4	0.0980	0.00040
		5	0.1897	0.00274
		6	0.2254	0.00034
		7	0.2305	0.00011
		8	0.2513	0.03193
		9	0.2870	0.00523
		10	0.2921	0.00174
		11	0.3087	0.00093
		12	0.3444	0.00017
		13	0.4485	0.00027
		14	0.6220	0.00037
		15	0.7300	0.00021
		16	0.0293	0.04255
		17	0.0344	0.01962
		18	0.0395	0.00339
		19	0.0039	0.58168
		20	0.0012	1.43390

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
238	CE144	1	0.0041	0.10300
		2	0.0294	0.01000
		3	0.0114	0.00900
		4	0.0170	0.00400
		5	0.0267	0.00900
		6	0.0303	0.00200
		7	0.0341	0.00800
		8	0.0381	0.03300
		9	0.0394	0.00200
		10	0.0466	0.00100
		11	0.0522	0.00600
		12	0.0575	0.00200
		13	0.0580	0.00100
		14	0.0733	0.00500
		15	0.0786	0.00100
		16	0.0915	0.05300
		17	0.1270	0.00700
		18	0.1320	0.00200
246	ND147	1	0.0336	0.00027
		2	0.0719	0.00031
		3	0.0711	0.00019
		4	0.0459	0.47912
		5	0.0842	0.07030
		6	0.0897	0.02690
		7	0.1140	0.00069
		8	0.1097	0.00008
		9	0.1480	0.00001
		10	0.1514	0.00037
		11	0.1900	0.00007
		12	0.2302	0.00072
		13	0.2690	0.00013
		14	0.2742	0.00101
		15	0.3130	0.00020
		16	0.3530	0.00026
		17	0.3920	0.00005
		18	0.3653	0.00003
		19	0.3947	0.00024
		20	0.4340	0.00005
		21	0.4441	0.00002
		22	0.4858	0.00170
		23	0.5250	0.00033
		24	0.5496	0.00002
		25	0.6407	0.00006
		26	0.0314	0.02759
		27	0.0369	0.01023
		28	0.0425	0.00228
		29	0.0042	0.40937
		30	0.0014	1.02010
406	PM148M	1	0.0517	0.05435
		2	0.0920	0.01049
		3	0.1500	0.00330
		4	0.2500	0.00110
		5	0.2649	0.00053
		6	0.3673	0.00125
		7	0.3859	0.00084
		8	0.4255	0.00021
		9	0.4543	0.00025
		10	0.4939	0.00004
		11	0.5033	0.00782
		12	0.5429	0.00176
		13	0.5527	0.00036
		14	0.5643	0.00015
		15	0.5900	0.00645
		16	0.6900	0.00166
		17	0.8700	0.00057
		18	0.9800	0.00049
		19	0.0325	0.00456
		20	0.0390	0.00257
		21	0.0043	0.07036
		22	0.0014	0.17635
		23	0.0163	0.00012
		24	0.0560	0.04587
		25	0.0305	0.03007
		26	0.0700	0.00574
		27	0.0320	0.00261
		28	0.0425	0.00014
		29	0.0042	0.05344
		30	0.0014	0.13694
407	PM148	1	0.5033	0.00215
		2	0.5429	0.00036
		3	0.5487	0.00012
		4	0.5643	0.00003
		5	0.8681	0.00015
		6	0.9077	0.00002
		7	1.4183	0.00011
		8	1.4579	0.00001
		9	0.0325	0.00013
		10	0.0382	0.00006
		11	0.0440	0.00001
		12	0.0043	0.00205
		13	0.0014	0.00515
255	SM151	1	0.0141	0.01229
		2	0.0201	0.00410
		3	0.0045	0.00993
		4	0.0015	0.02631

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
260	EU154	1	0.0729	0.26147
		2	0.1150	0.23010
		3	0.0958	0.00014
		4	0.1183	0.00002
		5	0.1380	0.00012
		6	1.2242	0.00026
		7	0.1978	0.00588
		8	0.2403	0.00150
		9	0.2465	0.00050
		10	0.2718	0.00003
		11	0.9545	0.00042
		12	0.3942	0.00008
		13	0.4366	0.00002
		14	0.4280	0.00005
		15	0.5073	0.00002
		16	0.5318	0.00002
		17	0.5415	0.00032
		18	0.5750	0.00003
		19	0.6500	0.00070
		20	0.6422	0.00010
		21	0.6721	0.00038
		22	0.7066	0.00022
		23	0.7951	0.00005
		24	0.8229	0.00043
		25	0.9461	0.00025
		26	0.0347	0.01340
		27	0.0409	0.00657
		28	0.0471	0.00657
		29	0.0047	0.32664
		30	0.0015	0.84056

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
262	EU155	1	0.0026	0.00980
		2	0.0089	0.00326
		3	0.0110	0.16654
		4	0.0172	0.05551
		5	0.0133	0.00982
		6	0.0195	0.00327
		7	0.0187	0.00510
		8	0.0250	0.00170
		9	0.0236	0.00392
		10	0.0299	0.00131
		11	0.0375	0.00471
		12	0.0438	0.00157
		13	0.0077	0.00074
		14	0.0502	0.00016
		15	0.0100	0.08637
		16	0.0530	0.02523
		17	0.0358	0.00349
		18	0.8000	0.00068
		19	0.0363	0.11821
		20	0.0768	0.01849
		21	0.0850	0.00616
		22	0.0551	0.04690
		23	0.0975	0.00713
		24	0.1038	0.00238
		25	0.0958	0.00022
		26	0.1383	0.00015
		27	0.0347	0.01267
		28	0.0420	0.00730
		29	0.0047	0.37378
		30	0.0015	0.96765
332	GD162	1	0.0307	0.29831
		2	0.0372	0.09943
		3	0.3508	0.00319
		4	0.3947	0.00044
		5	0.4012	0.00015
		6	0.3896	0.00297
		7	0.4335	0.00041
		8	0.4400	0.00014
		9	0.0358	0.00029
		10	0.0423	0.00014
		11	0.0488	0.00003
		12	0.0049	0.24235
		13	0.0016	0.64764

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
272	TB160	1	0.0330	0.20507
		2	0.0800	0.42050
		3	0.0008	0.04013
		4	0.0860	0.00016
		5	0.1432	0.00812
		6	0.1900	0.00426
		7	0.1619	0.00125
		8	0.2100	0.00024
		9	0.1768	0.00002
		10	0.2448	0.00379
		11	0.2910	0.00072
		12	0.2558	0.00011
		13	0.3012	0.00002
		14	0.2900	0.00005
		15	0.3390	0.00011
		16	0.3841	0.00001
		17	0.6285	0.00005
		18	0.7200	0.00013
		19	0.8250	0.00097
		20	0.8710	0.00020
		21	0.9100	0.00092
		22	0.9600	0.00020
		23	1.0613	0.00001
		24	1.1300	0.00016
		25	1.2200	0.00007
		26	0.0370	0.01005
		27	0.0437	0.00503
		28	0.0504	0.00088
		29	0.0051	0.40248
		30	0.0017	1.05860

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
341	TA182	1	0.0320	0.00173
		2	0.0550	0.08700
		3	0.0570	0.07050
		4	0.0152	0.01570
		5	0.0740	0.05500
		6	0.0306	0.11970
		7	0.0900	0.43000
		8	0.0440	0.04900
		9	0.1020	0.01400
		10	0.0469	0.00100
		11	0.1052	0.00017
		12	0.0829	0.00717
		13	0.1400	0.00160
		14	0.0869	0.00271
		15	0.1500	0.00060
		16	0.1099	0.01911
		17	0.1700	0.00650
		18	0.1289	0.00265
		19	0.1900	0.00231
		20	0.1526	0.00293
		21	0.2100	0.00063
		22	0.1598	0.00392
		23	0.2200	0.00283
		24	0.1946	0.00256
		25	0.2529	0.00141
		26	1.0600	0.00190
		27	1.1500	0.00081
		28	1.1800	0.00044
		29	0.0500	0.02080
		30	0.0030	2.60500

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
291	W187	1	0.0003	0.10682
		2	0.0604	0.01602
		3	0.0696	0.00534
		4	0.0349	0.00688
		5	0.0950	0.00140
		6	0.1042	0.00047
		7	0.0420	0.00284
		8	0.1021	0.00035
		9	0.1114	0.00012
		10	0.0625	0.15273
		11	0.1226	0.03182
		12	0.1319	0.01061
		13	0.1345	0.00148
		14	0.1946	0.00043
		15	0.2039	0.00014
		16	0.1674	0.00068
		17	0.2275	0.00011
		18	0.1749	0.00033
		19	0.4081	0.00373
		20	0.4682	0.00089
		21	0.4774	0.00030
		22	0.4408	0.00024
		23	0.4800	0.00028
370	AU195M	1	0.0433	0.74700
		2	0.0539	0.24700
		3	0.0482	0.01400
		4	0.0588	0.00500
		5	0.1193	0.00300
		6	0.1867	0.00200
		7	0.1973	0.00800
		8	0.1503	0.24000
		9	0.2477	0.04500
		10	0.2586	0.01500
		11	0.2373	0.00200
		12	0.3047	0.00100
		13	0.0540	0.00600
		14	0.0646	0.00400
		15	0.0752	0.00100
		16	0.0079	0.63600
		17	0.0027	0.19600

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
279	AU195	1	0.0180	0.20200
		2	0.0283	0.06700
		3	0.0204	0.89900
		4	0.0859	0.12100
		5	0.0962	0.04000
		6	0.0513	0.00400
		7	0.1198	0.00700
		8	0.1271	0.00300
		9	0.0526	0.02900
		10	0.0628	0.01900
		11	0.0731	0.00300
		12	0.0076	1.16000
		13	0.0026	3.25000
288	AU198	1	0.0076	0.02100
		2	0.0538	0.00100
		3	0.3287	0.02900
		4	0.3970	0.01100
		5	0.4082	0.00300
389	AU199	1	0.0350	0.02700
		2	0.0478	0.01000
		3	0.0753	0.09900
		4	0.1446	0.18300
		5	0.1555	0.06100
		6	0.1251	0.07500
		7	0.1944	0.01400
		8	0.2034	0.00400
		9	0.0535	0.00400
		10	0.0665	0.00300
		11	0.0081	0.22800
		12	0.0028	0.70000
397	HG197	1	0.0074	0.90100
		2	0.0524	0.03200
		3	0.0630	0.61800
		4	0.0739	0.19000
		5	0.1108	0.00500
		6	0.1771	0.00100
301	HG203	1	0.0078	0.09000
		2	0.0552	0.00500
		3	0.1936	0.13300
		4	0.2638	0.04000
		5	0.2755	0.01200
300	TL204	1	0.0076	0.01300
		2	0.0538	0.00100

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
476	TL208	1	0.1450	0.00100
		2	0.1650	0.00200
		3	0.1891	0.02400
		4	0.2623	0.00500
		5	0.2739	0.00200
		6	0.4228	0.01700
		7	0.4963	0.00300
		8	0.5079	0.00100
		9	0.4950	0.01300
		10	0.5683	0.00400
		11	0.5799	0.00100
		12	0.6751	0.00100
		13	0.7710	0.00300
		14	0.8482	0.00100
		15	2.5418	0.00200
		16	0.0585	0.00200
		17	0.0717	0.00100
		18	0.0086	0.03800
		19	0.0031	0.11900
		20	0.2343	0.00100
299	PB210	1	0.0313	0.57724
		2	0.0433	0.19239
		3	0.0089	0.34346
		4	0.0032	1.11310
455	PB212	1	0.0245	0.03100
		2	0.0998	0.00600
		3	0.1118	0.00200
		4	0.0865	0.00400
		5	0.1648	0.00100
		6	0.1481	0.29400
		7	0.2234	0.05000
		8	0.2354	0.01700
		9	0.2095	0.01300
		10	0.2848	0.00300
		11	0.2968	0.00100
		12	0.0601	0.00900
		13	0.0721	0.00500
		14	0.0842	0.00100
		15	0.0089	0.19800
		16	0.0032	0.61600
515	PB214	1	0.0380	0.11131
		2	0.0500	0.03710
		3	0.1155	0.00067
		4	0.1514	0.04932
		5	0.2267	0.00930
		6	0.2387	0.00310
		7	0.1684	0.00224
		8	0.2437	0.00040
		9	0.2557	0.00013
		10	0.2047	0.07995
		11	0.2800	0.01438
		12	0.2920	0.00479
		13	0.2613	0.08866
		14	0.3368	0.01569
		15	0.3488	0.00523
		16	0.3905	0.00066
		17	0.4658	0.00012
		18	0.0601	0.00566
		19	0.0721	0.00333
		20	0.0842	0.00053
		21	0.0089	0.19490
		22	0.0032	0.61650
457	BI212	1	0.0257	0.18800
		2	0.0370	0.06300
		3	0.2015	0.00100
		4	0.0084	0.11600
		5	0.0030	0.36900
		6	0.6338	0.00100
		7	1.7068	0.00100
		8	0.0092	0.00100
		9	0.0033	0.00400
		10	0.2993	0.00100
		11	0.7547	0.00100

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
516	BI214	1	0.1801	0.00197
		2	0.2574	0.00156
		3	0.2699	0.00052
		4	0.5163	0.00615
		5	0.5936	0.00182
		6	0.6061	0.00061
		7	0.6101	0.00057
		8	0.6874	0.00032
		9	0.6999	0.00011
		10	0.6278	0.00015
		11	0.6756	0.00061
		12	0.7529	0.00015
		13	0.6940	0.00010
		14	0.7132	0.00012
		15	0.8417	0.00053
		16	1.0273	0.00187
		17	1.1076	0.00041
		18	1.0623	0.00025
		19	1.1452	0.00059
		20	1.2851	0.00015
		21	1.3149	0.00017
		22	1.3228	0.00320
		23	1.4029	0.00081
		24	1.4162	0.00022
		25	1.5679	0.00021
		26	1.7213	0.00173
		27	2.1111	0.00015
		28	0.0662	0.00068
		29	0.0091	0.01217
		30	0.0033	0.03833
460	RA224	1	0.1407	0.00500
		2	0.2242	0.00600
		3	0.2375	0.00200
		4	0.0097	0.00500
		5	0.0035	0.01700
348	RA226	1	0.0873	0.00731
		2	0.1689	0.00962
		3	0.1822	0.00385
		4	0.0648	0.00016
		5	0.0097	0.00883
		6	0.0035	2.94800
461	RA228	1	0.0354	1.00000
463	AC228	1	0.0017	0.07150
		2	0.0010	0.08653
		3	0.0016	0.01016
		4	0.0403	0.00110
		5	0.0137	0.00040

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
352	TH228	1	0.0656	0.20800
		2	0.0807	0.06900
		3	0.1480	0.00200
		4	0.0103	0.11800
		5	0.0038	0.09800
355	TH230	1	0.0499	0.17713
		2	0.0640	0.05899
		3	0.1231	0.00055
		4	0.1372	0.00018
		5	0.0103	0.10045
		6	0.0038	0.33742
465	TH231	1	0.0060	0.44900
		2	0.0215	0.14965
		3	0.0389	0.53736
		4	0.0544	0.17910
		5	0.0615	0.06738
		6	0.0770	0.02246
		7	0.0624	0.03391
		8	0.0779	0.01130
		9	0.0645	0.15270
		10	0.0800	0.05089
		11	0.0796	0.06759
		12	0.0951	0.02253
		13	0.0505	0.00726
		14	0.1434	0.00242
		15	0.1589	0.00081
		16	0.0733	0.00015
		17	0.0888	0.00010
		18	0.1042	0.00001
		19	0.0113	0.72513
		20	0.0042	2.47930
349	TH232	1	0.0411	0.17100
		2	0.0552	0.05700
		3	0.0103	0.09700
		4	0.0038	0.32500
356	TH234	1	0.0102	0.01500
		2	0.0257	0.00500
		3	0.0435	0.00467
		4	0.0590	0.00156
		5	0.0439	0.00282
		6	0.0594	0.00094
		7	0.0734	0.07162
		8	0.0889	0.02385
		9	0.0738	0.00544
		10	0.0893	0.00181
		11	0.0113	0.05555
		12	0.0042	0.18824

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
358	PA233	1	1.0130	0.01120
		2	0.0083	0.14580
		3	0.0242	0.04860
		4	0.0201	0.10190
		5	0.0366	0.04370
		6	0.0540	0.10680
		7	0.0710	0.03450
		8	0.0663	0.10200
		9	0.0830	0.06860
		10	0.0996	0.01150
		11	0.1566	0.00040
		12	0.2600	0.00140
		13	0.1852	0.05020
		14	0.2930	0.06200
		15	0.1959	0.26860
		16	0.3300	0.01090
		17	0.3076	0.01660
		18	0.2255	0.03340
		19	0.3551	0.00060
		20	0.3750	0.00090
		21	0.2836	0.00070
		22	0.3943	0.00090
		23	0.3009	0.00160
		24	0.4116	0.00020
		25	0.0745	0.00760
		26	0.0905	0.00480
		27	0.1064	0.00070
		28	0.0117	0.48900
		29	0.0043	1.63600
354	PA234M	1	0.0501	0.00098
		2	0.0656	0.00032
		3	0.0113	0.00054
		4	0.0042	0.00184
		5	0.0232	0.00704
		6	0.0392	0.00235
		7	0.1210	0.00071
		8	0.2157	0.00014
		9	0.6950	0.00357
		10	0.7907	0.00070
		11	0.8067	0.00023
		12	0.0117	0.00632
		13	0.0043	0.02116

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
409	PA234	1	0.0250	1.10960
		2	0.0820	0.59190
		3	0.1300	0.16620
		4	0.1800	0.06270
		5	0.1100	0.24170
		6	0.2300	0.05840
		7	0.3500	0.00701
		8	0.4500	0.02100
		9	0.5500	0.69800
		10	0.6760	0.00273
		11	0.7750	0.00075
		12	0.7070	0.00435
		13	0.8100	0.00118
		14	0.7580	0.00374
		15	0.8600	0.00101
		16	0.7600	0.00372
		17	0.8600	0.00101
		18	0.7630	0.00369
		19	0.8600	0.00101
		20	0.8050	0.00328
		21	0.9000	0.00089
		22	0.8070	0.00084
		23	0.9017	0.00022
		24	0.8260	0.00310
		25	0.9300	0.00083
		26	0.0745	0.00832
		27	0.0905	0.00525
		28	0.1064	0.00079
		29	0.0117	1.00600
		30	0.0043	3.18350
359	U232	1	0.0384	0.23900
		2	0.0535	0.07900
		3	0.1099	0.00200
		4	0.1250	0.00100
		5	0.0110	0.13500
		6	0.0040	0.45500
353	U233	1	0.0099	0.00380
		2	0.0250	0.00127
		3	0.0233	0.11761
		4	0.0384	0.03920
		5	0.0355	0.00918
		6	0.0506	0.00306
		7	0.0527	0.00205
		8	0.0678	0.00068
		9	0.0780	0.00174
		10	0.0931	0.00058
		11	0.0110	0.07519
		12	0.0040	0.25453

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
338	U234	1	0.0342	0.20880
		2	0.0493	0.06959
		3	0.0111	0.00014
		4	0.1018	0.00209
		5	0.1169	0.00070
		6	0.0110	0.11795
		7	0.0040	0.39926
339	U235	1	0.0027	0.34511
		2	0.0150	0.11502
		3	0.0109	0.15934
		4	0.0260	0.05311
		5	0.0229	0.16106
		6	0.0380	0.05368
		7	0.0259	0.02490
		8	0.0410	0.00630
		9	0.0779	0.02722
		10	0.0930	0.00907
		11	0.0003	0.00671
		12	0.0909	0.00131
		13	0.1060	0.00044
		14	0.0333	0.01794
		15	0.1250	0.00490
		16	0.0533	0.00631
		17	0.1440	0.00173
		18	0.0703	0.01509
		19	0.1610	0.00389
		20	0.0753	0.04775
		21	0.1700	0.01271
		22	0.0913	0.01916
		23	0.1900	0.00476
		24	0.0943	0.00365
		25	0.1850	0.00099
		26	0.0715	0.00245
		27	0.0855	0.00152
		28	0.1016	0.00023
		29	0.0110	0.46002
		30	0.0040	1.56120
468	U236	1	0.0307	0.19440
		2	0.0457	0.06479
		3	0.0110	0.10751
		4	0.0040	0.36670
313	U237	1	0.0054	0.12600
		2	0.0219	0.04200
		3	0.0123	0.16400
		4	0.0268	0.05600
		5	0.0225	0.03700
		6	0.0604	0.00100
		7	0.0386	0.31400
		8	0.0551	0.10000
		9	0.1437	0.02300
		10	0.1602	0.00800
		11	0.0698	0.53000
		12	0.1871	0.11200
		13	0.2042	0.03900
		14	0.0764	0.01100
		15	0.0929	0.00700
		16	0.1093	0.00100
		17	0.0120	0.66500
		18	0.0044	2.22600
		19	0.2492	0.00300
		20	0.1493	0.00600
		21	0.1162	0.00200
		22	0.0464	0.00400
		23	0.0439	0.00400
		24	0.0176	0.00300
		25	0.3155	0.00100
340	U238	1	0.0289	0.17210
		2	0.0440	0.05731
		3	0.0929	0.00146
		4	0.1080	0.00049
		5	0.0110	0.09705
		6	0.0040	0.32848
496	U240	1	0.0231	0.73800
		2	0.0396	0.24600
		3	0.0120	0.41000
		4	0.0044	1.39400
345	NP237	1	0.0100	0.14187
		2	0.0255	0.04724
		3	0.0371	0.19697
		4	0.0526	0.06559
		5	0.0673	0.01939
		6	0.0828	0.00646
		7	0.0113	0.19990
		8	0.0042	0.67742

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
330	NP239	1	0.0033	0.63600
		2	0.0280	0.15100
		3	0.0450	0.05000
		4	0.0357	0.24200
		5	0.0527	0.08000
		6	0.0500	0.12400
		7	0.0850	0.21400
		8	0.0605	0.00231
		9	0.1650	0.00059
		10	0.0886	0.06973
		11	0.1900	0.01960
		12	0.1052	0.00371
		13	0.2100	0.00101
		14	0.1070	0.18289
		15	0.2100	0.04080
		16	0.1332	0.00154
		17	0.2400	0.00043
		18	0.1517	0.00095
		19	0.2514	0.00020
		20	0.1564	0.15104
		21	0.2600	0.04100
		22	0.1643	0.00055
		23	0.2700	0.00096
		24	0.1947	0.00038
		25	0.2131	0.00045
		26	0.0781	0.00857
		27	0.0951	0.00549
		28	0.1121	0.00082
		29	0.0124	0.58686
		30	0.0046	2.60670
497	NP240M	1	0.0213	0.29200
		2	0.0384	0.09800
		3	0.1382	0.00100
		4	0.4322	0.00200
		5	0.4752	0.00100
		6	0.7382	0.00100
		7	0.7412	0.00100
		8	0.0124	0.16400
		9	0.0046	0.56100
		10	0.1992	0.00100
		11	0.5477	0.00100
		12	0.6673	0.00100
		13	0.8096	0.00100
494	PU236	1	0.0273	0.23337
		2	0.0433	0.07778
		3	0.0887	0.00122
		4	0.1047	0.00041
		5	0.0117	0.12902
		6	0.0043	0.44179
280	PU238	1	0.0232	0.21040
		2	0.0392	0.07013
		3	0.0795	0.00063
		4	0.0955	0.00021
		5	0.0117	0.11607
		6	0.0043	0.39743
281	PU239	1	0.0007	0.99000
		2	0.0087	0.18700
		3	0.0183	0.01997
		4	0.0343	0.00666
		5	0.0259	0.00022
		6	0.0313	0.05907
		7	0.0473	0.01969
		8	0.0365	0.00022
		9	0.0485	0.00015
		10	0.0117	0.04383
		11	0.0043	0.33712
282	PU240	1	0.0250	0.18038
		2	0.0410	0.06012
		3	0.0833	0.00062
		4	0.0993	0.00021
		5	0.0117	0.09955
		6	0.0043	0.34089
284	PU242	1	0.0244	0.17973
		2	0.0404	0.05990
		3	0.0117	0.09885
		4	0.0043	0.33848
334	AM241	1	0.0047	0.08700
		2	0.0066	0.00100
		3	0.0101	0.36000
		4	0.0116	0.11400
		5	0.0206	0.04000
		6	0.0218	0.10200
		7	0.0249	0.01100
		8	0.0275	0.03700
		9	0.0317	0.01400
		10	0.0339	0.00900
		11	0.0377	0.02700
		12	0.0379	0.34000
		13	0.0419	0.00700
		14	0.0498	0.00200
		15	0.0538	0.10300
		16	0.0580	0.03700
		17	0.0774	0.00300
		18	0.0932	0.00100

TABLE 3-1E (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
404	AM242	1	0.0230	0.07490
		2	0.0339	0.02497
		3	0.0767	0.00245
		4	0.0957	0.00157
		5	0.1127	0.00023
		6	0.0124	0.10891
		7	0.0046	0.36512
		8	0.0193	0.37469
		9	0.0374	0.12489
		10	0.0133	0.20496
		11	0.0048	0.70454
335	AM243	1	0.0102	0.05591
		2	0.0267	0.01863
		3	0.0226	0.02989
		4	0.0391	0.00996
		5	0.0538	0.13274
		6	0.0702	0.04424
		7	0.0102	0.11998
		8	0.0044	0.41136
336	CM242	1	0.0225	0.19499
		2	0.0395	0.06499
		3	0.0804	0.00028
		4	0.0974	0.00009
		5	0.0124	0.10701
		6	0.0046	0.36736

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
403	CM243	1	0.0033	0.69400
		2	0.0076	0.00373
		3	0.0230	0.07426
		4	0.0420	0.05334
		5	0.0300	0.32720
		6	0.0500	0.27420
		7	0.0820	0.00116
		8	0.1000	0.00282
		9	0.0850	0.01055
		10	0.1000	0.00796
		11	0.0445	0.00135
		12	0.1500	0.00037
		13	0.0732	0.00251
		14	0.1900	0.01652
		15	0.0880	0.07689
		16	0.2000	0.05231
		17	0.1060	0.21050
		18	0.2230	0.01463
		19	0.1326	0.00206
		20	0.2400	0.00059
		21	0.1550	0.15910
		22	0.2560	0.03315
		23	0.1637	0.00061
		24	0.2730	0.01210
		25	0.2950	0.00048
		26	0.0787	0.00940
		27	0.0957	0.00602
		28	0.1127	0.00090
		29	0.0124	0.53673
		30	0.0046	2.50820
337	CM244	1	0.0213	0.09688
		2	0.0383	0.03229
		3	0.0773	0.00002
		4	0.0124	0.05310
		5	0.0046	0.18229

TABLE 3-1F

EXREM III DATA BASE

ENERGY AND INTENSITY FOR EACH PHOTON

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
302	BE7	1	0.4776	0.10300
360	C11	1	0.5110	1.99500
361	N13	1	0.5110	1.99600
362	O15	1	0.5110	1.99800
363	F18	1	0.5110	1.93400
312	NA22	1	0.0008	0.00200
		2	0.5110	1.81100
		3	1.2745	1.00000
309	NA24	1	1.3686	1.00000
		2	2.7541	0.99900
		3	3.8610	0.00100
376	MG28	1	0.0015	0.00200
		2	0.0306	0.95000
		3	0.3998	0.31000
		4	0.9415	0.28000
		5	1.3420	0.69000
377	AL28	1	1.7787	1.00000
317	CL36	1	0.0023	0.00200
378	CL38	1	1.6424	0.32800
		2	2.1675	0.44000
510	A37	1	0.0026	0.10440
379	K40	1	0.0030	0.01100
		2	1.4608	0.10700
315	K42	1	0.3124	0.00200
		2	1.5247	0.17900
		3	1.9200	0.00100
387	K43	1	0.2200	0.03000
		2	0.3710	0.85000
		3	0.3880	0.07000
		4	0.3940	0.11000
		5	0.5900	0.13000
		6	0.6100	0.81000
		7	1.0030	0.02000
380	CA47	1	0.4892	0.06800
		2	0.5303	0.00100
		3	0.7671	0.00200
		4	0.8079	0.06800
		5	1.2971	0.75000
382	CA49	1	2.2200	0.00400
		2	2.3600	0.00500
		3	3.0810	0.90900
		4	4.0690	0.07900
		5	4.7320	0.00300
316	SC46	1	0.8894	0.99585
		2	1.1205	0.99991
381	SC47	1	0.0045	0.00100
		2	0.1594	0.70000
304	CR51	1	0.0050	0.21500
		2	0.3201	0.09900
364	MN52M	1	0.0054	0.00600
		2	1.4336	0.98000
		3	1.5310	0.05000
		4	0.5110	1.87000
		5	0.0054	0.00300
		6	0.0059	0.00100
		7	0.3830	0.01900
365	MN52	1	0.0055	0.16600
		2	0.3458	0.00900
		3	0.3985	0.00300
		4	0.5028	0.00900
		5	0.5110	0.55000
		6	0.6006	0.00500
		7	0.6470	0.00500
		8	0.7442	0.85000
		9	0.8484	0.03200
		10	0.9356	0.94000
		11	1.2470	0.04700
		12	1.3338	0.05100
		13	1.4344	1.00000
305	MN54	1	0.0055	0.23600
		2	0.8348	1.00000
371	FE52	1	0.5110	1.13000
		2	0.1650	0.94200
		3	0.0059	0.07800
		4	0.0059	0.03900
		5	0.0065	0.01300

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
307	FE55	1	0.0059	0.25700
308	FE59	1	0.1425	0.00800
		2	0.1923	0.02800
		3	0.3348	0.00300
		4	1.0993	0.56000
		5	1.2916	0.44000
		6	1.4818	0.00100
366	CO56	1	0.0065	0.21900
		2	0.5110	0.48000
		3	0.7337	0.00100
		4	0.7880	0.00400
		5	0.8468	1.00000
		6	0.9775	0.01400
		7	1.0379	0.12900
		8	1.1412	0.00200
		9	1.1751	0.02000
		10	1.2383	0.70000
		11	1.3603	0.04300
		12	1.7714	0.15600
		13	1.8110	0.00600
		14	1.9642	0.00700
		15	2.0154	0.02900
		16	2.0349	0.07400
		17	2.1128	0.00400
		18	2.2131	0.00300
		19	2.2740	0.00100
		20	2.3740	0.00200
		21	2.5986	0.16800
		22	3.0100	0.00900
		23	3.2022	0.03100
		24	3.2536	0.07600
		25	3.2732	0.01500
		26	3.4514	0.00800
		27	3.5482	0.00200
342	CO57	1	0.0065	0.54000
		2	0.0144	0.09500
		3	0.1221	0.85600
		4	0.1364	0.10600
		5	0.6921	0.00200
343	CO58	1	0.0065	0.25700
		2	0.5110	0.30000
		3	0.8106	0.99400
		4	0.8636	0.00700
		5	1.6748	0.00500
323	CO60	1	1.1732	0.99900
		2	1.3325	1.00000
390	NI56	1	0.0070	0.30800
		2	0.1583	0.98700
		3	0.2696	0.39000
		4	0.4807	0.38000
		5	0.7506	0.48000
		6	0.8122	0.87000
		7	1.5625	0.15000
324	CU64	1	0.0076	0.14000
		2	0.5100	0.37000
		3	1.3470	0.00600
325	ZN65	1	0.0081	0.35200
		2	0.5100	0.02800
		3	1.1155	0.50600
350	ZN69M	1	0.4390	0.94791
		2	0.0086	0.01910
		3	0.0086	0.00594
		4	0.0096	0.00214
401	GA67	1	0.0912	0.02300
		2	0.0933	0.39600
		3	0.1845	0.22900
		4	0.2060	0.01500
		5	0.2960	0.20500
		6	0.3880	0.08000
		7	0.4900	0.00200
		8	0.6900	0.00100
		9	0.7800	0.00100
		10	0.8700	0.00200
		11	0.0086	0.29100
		12	0.0086	0.14500
		13	0.0096	0.05200
		14	0.0097	0.00100
372	GA68	1	0.5110	1.76000
		2	0.8000	0.00500
		3	1.0780	0.03500
		4	1.2400	0.00100
		5	1.8700	0.00200
		6	0.0086	0.02700
		7	0.0086	0.01300
		8	0.0096	0.00500

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
3	GE77	1	0.1564	0.00800
		2	0.1949	0.01500
		3	0.2108	0.30600
		4	0.2156	0.28000
		5	0.2645	0.53300
		6	0.3382	0.00900
		7	0.3674	0.13000
		8	0.4165	0.23400
		9	0.4712	0.02600
		10	0.5579	0.16700
		11	0.5930	0.01900
		12	0.6325	0.10500
		13	0.7139	0.08900
		14	0.7470	0.02300
		15	0.7750	0.03600
		16	0.8101	0.02400
		17	0.9067	0.01100
		18	0.9260	0.03000
		19	1.0851	0.07000
		20	1.1933	0.03000
		21	1.3691	0.02100
		22	1.5746	0.00600
		23	1.7170	0.00700
		24	1.4786	0.00900
		25	2.0004	0.00700
		26	2.0900	0.00900
385	AS76	1	0.5590	0.04000
		2	0.5593	0.42000
		3	0.5720	0.00200
		4	0.6240	0.00400
		5	0.6574	0.06400
		6	0.6661	0.00300
		7	0.7080	0.00200
		8	0.7399	0.00200
		9	0.7722	0.00200
		10	0.8580	0.00100
		11	0.8694	0.00100
		12	0.9720	0.00100
		13	1.1300	0.00100
		14	1.2130	0.02000
		15	1.2160	0.04000
		16	1.2286	0.01500
		17	1.4376	0.00300
		18	1.4527	0.00100
		19	1.7884	0.00300
		20	1.8830	0.00100
		21	2.0967	0.00600
		22	2.1120	0.00200

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
4	AS77	1	0.5208	0.00430
		2	0.2616	0.00050
		3	0.2708	0.00008
		4	0.1392	0.00010
		5	0.2500	0.00410
		6	0.0880	0.00300
		7	0.2391	0.01590
		8	0.1620	0.00310
391	SE75	1	0.0013	0.01400
		2	0.0107	0.54400
		3	0.0660	0.01000
		4	0.0967	0.03200
		5	1.2111	0.16200
		6	0.1360	0.55600
		7	0.1986	0.01400
		8	0.2647	0.59100
		9	0.2796	0.25000
		10	0.3040	0.01400
		11	0.4007	0.12400
505	SE77M	1	0.0111	0.06880
		2	0.0112	0.13820
		3	0.0124	0.02790
		4	0.1619	0.50790
504	BR80M	1	0.0370	0.39150
		2	0.0480	0.00280
		3	0.0119	0.43569
		4	0.0119	0.21719
		5	0.0133	0.09019
		6	0.0135	0.00719
		7	0.0014	0.04163
495	BR80	1	0.6660	0.01099
		2	0.0112	0.01934
		3	0.0112	0.00963
		4	0.0125	0.00391
		5	0.0127	0.00025
		6	0.0013	0.00127
		7	0.5110	0.05600
		8	0.6150	0.07187
		9	0.6390	0.00230
		10	0.7040	0.00200
		11	1.2570	0.00080

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
14	BR82	1	0.0128	0.00400
		2	0.0921	0.00400
		3	0.1370	0.00200
		4	0.2213	0.02300
		5	0.2734	0.00800
		6	0.5543	0.72000
		7	0.6065	0.01000
		8	0.6191	0.43000
		9	0.6984	0.27000
		10	0.7767	0.83000
		11	0.8278	0.24000
		12	0.9510	0.00400
		13	1.0080	0.01700
		14	1.0440	0.29000
		15	1.0820	0.00400
		16	1.3174	0.28000
		17	1.4749	0.17000
		18	1.6512	0.00900
		19	1.7820	0.00100
		20	1.8740	0.00100
		21	1.9590	0.00100
16	BR83	1	0.0093	1.00000
		2	0.0325	0.00055
		3	0.5300	0.01390
		4	0.0126	0.09050
		5	0.0126	0.04510
		6	0.0141	0.01919
		7	0.0143	0.00190
		8	0.0015	0.03208

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
21	BR84	1	0.2700	0.00500
		2	0.3500	0.01000
		3	0.4300	0.02100
		4	0.4700	0.00900
		5	0.5200	0.02400
		6	0.6100	0.02300
		7	0.7400	0.02900
		8	0.8100	0.06300
		9	0.8800	0.41650
		10	1.0100	0.08800
		11	1.2100	0.03200
		12	1.4700	0.01700
		13	1.5700	0.01000
		14	1.7400	0.02000
		15	1.9000	0.15000
		16	2.0500	0.01600
		17	2.1700	0.01600
		18	2.4700	0.07500
		19	2.8200	0.01900
		20	3.0300	0.03000
		21	3.2800	0.02400
		22	3.9300	0.10400
367	KR79	1	0.0015	0.03000
		2	0.0121	0.51100
		3	0.0445	0.00100
		4	0.1360	0.00600
		5	0.1805	0.00100
		6	0.2086	0.00700
		7	0.2173	0.01800
		8	0.2613	0.11000
		9	0.2997	0.01300
		10	0.3068	0.02200
		11	0.3453	0.00100
		12	0.3891	0.01400
		13	0.3976	0.08000
		14	0.5110	0.15000
		15	0.5228	0.00200
		16	0.5252	0.00300
		17	0.6066	0.08000
		18	0.6150	0.00100
		19	0.8090	0.00100
		20	0.8322	0.01200
		21	0.9352	0.00100
		22	1.0257	0.00100
		23	1.0703	0.00100
		24	1.1151	0.00300
		25	1.3323	0.00300

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
17	KR83M	1	0.0016	0.04800
		2	0.0094	0.05900
		3	0.0128	0.16000
		4	0.0320	0.00100
25	KR85M	1	0.0016	0.00200
		2	0.0017	0.00100
		3	0.0128	0.04100
		4	0.0136	0.02200
		5	0.1510	0.75100
		6	0.3045	0.14100
26	KR85	1	0.5140	0.00400
31	KR87	1	0.0136	0.00100
		2	0.1294	0.00100
		3	0.4027	0.48000
		4	0.5095	0.00100
		5	0.6737	0.01800
		6	0.8144	0.00200
		7	0.8365	0.00800
		8	0.8456	0.07200
		9	0.9470	0.00100
		10	0.9767	0.00100
		11	1.1755	0.01100
		12	1.3382	0.00600
		13	1.3827	0.00300
		14	1.3898	0.00100
		15	1.4612	0.00100
		16	1.5312	0.00400
		17	1.5783	0.00100
		18	1.6113	0.00100
		19	1.7404	0.02000
		20	2.0119	0.02900
		21	2.3786	0.00100
		22	2.4084	0.00200
		23	2.5545	0.08600
		24	2.5577	0.04300
		25	2.8112	0.00300
		26	2.9602	0.00100
		27	3.0551	0.00100
		28	3.3082	0.00500
33	KR88	1	0.1660	0.06800
		2	0.1961	0.37500
		3	0.3904	0.00600
		4	0.4732	0.00600
		5	0.7890	0.00400
		6	0.8347	0.12900
		7	0.8624	0.00500
		8	0.9452	0.00300
		9	0.9867	0.01600
		10	1.0396	0.00400
		11	1.0495	0.00100
		12	1.1417	0.01700
		13	1.1795	0.00800
		14	1.1851	0.00600
		15	1.2130	0.00200
		16	1.2456	0.00300
		17	1.2500	0.01100
		18	1.3525	0.00200
		19	1.4069	0.00200
		20	1.5185	0.01500
		21	1.5298	0.11300
		22	1.6038	0.00200
		23	2.0295	0.04800
		24	2.0353	0.04800
		25	2.1868	0.00200
		26	2.1959	0.14800
		27	2.2316	0.03600
		28	2.3524	0.00200
		29	2.3920	0.37500
		30	2.5490	0.00300
373	RB84	1	0.5110	0.42000
		2	0.8800	0.73400
		3	1.0100	0.00400
		4	1.9000	0.00800
		5	0.0127	0.25700
		6	0.0126	0.12800
		7	0.0141	0.05400
		8	0.0143	0.00500
		9	0.0015	0.02500
386	RB86	1	1.0770	0.08800

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
34	RB88	1	0.8980	0.14800
		2	1.3832	0.00800
		3	1.7794	0.00200
		4	1.8361	0.23200
		5	2.1122	0.00100
		6	2.1191	0.00500
		7	2.5758	0.00200
		8	2.6766	0.02300
		9	3.0094	0.00300
		10	3.2187	0.00200
		11	3.4882	0.00100
		12	4.7452	0.00200
37	RB89	1	0.6000	0.15000
		2	1.0500	0.75000
		3	1.2600	0.53000
		4	1.5500	0.04000
		5	2.2000	0.13000
		6	2.5900	0.13000
		7	2.7500	0.03000
		8	3.5000	0.02000

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
41	RB90	1	0.5340	0.00188
		2	0.8278	0.02075
		3	0.8315	0.48945
		4	0.9775	0.01020
		5	1.0600	0.10820
		6	1.2156	0.00920
		7	1.3569	0.01060
		8	0.9999	0.01830
		9	1.8343	0.01540
		10	2.1741	0.01760
		11	2.2435	0.00420
		12	2.5009	0.01520
		13	2.7540	0.00130
		14	3.0385	0.01910
		15	3.3022	0.02080
		16	3.3603	0.01570
		17	3.3833	0.08370
		18	3.5342	0.05470
		19	3.8150	0.00790
		20	4.0807	0.00700
		21	4.1360	0.09240
		22	4.2600	0.00300
		23	4.3456	0.00690
		24	4.3660	0.09880
		25	4.4540	0.00400
		26	4.6466	0.02880
		27	5.0149	0.00470
		28	5.1878	0.01380
		29	5.2545	0.00330
		30	5.3336	0.00600
346	SR85	1	0.0017	0.03800
		2	0.0136	0.59800
		3	0.5140	0.99300
392	SR87M	1	0.3884	0.84800
46	SR91	1	0.6450	0.14000
		2	0.7480	0.29000
		3	0.9300	0.03000
		4	1.0250	0.30000
		5	1.4130	0.07000
51	SR92	1	0.2300	0.03500
		2	0.4400	0.04100
		3	1.3700	0.90000

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
55	SR93	1	0.1684	0.20860
		2	0.2600	0.08630
		3	0.3464	0.03600
		4	0.3773	0.02200
		5	0.4327	0.01440
		6	0.4461	0.02160
		7	0.4830	0.02900
		8	0.5900	0.71940
		9	0.6633	0.02900
		10	0.7100	0.22300
		11	0.7178	0.01440
		12	0.7709	0.01440
		13	0.8346	0.01800
		14	0.8758	0.25180
		15	0.8883	0.22300
		16	1.0410	0.05000
		17	1.0938	0.01900
		18	1.1223	0.03600
		19	1.2149	0.02900
		20	1.2688	0.10100
		21	1.3210	0.02900
		22	1.5548	0.01440
368	Y87	1	0.0018	0.05100
		2	0.0136	0.00400
		3	0.0144	0.71400
		4	0.4835	0.92000
		5	0.5110	0.03800
369	Y88	1	0.0018	0.04000
		2	0.0144	0.61200
		3	0.5110	0.00400
		4	0.8980	0.93400
		5	1.8361	0.99400
		6	2.7350	0.00600
47	Y91M	1	0.5510	0.94696
		2	0.0150	0.01842
		3	0.0149	0.00921
		4	0.0157	0.00413
		5	0.0170	0.00057
		6	0.0019	0.00259
48	Y91	1	1.2100	0.00200
52	Y92	1	0.4480	0.02490
		2	0.4900	0.00300
		3	0.5600	0.02490
		4	0.8400	0.01000
		5	0.9000	0.00700
		6	0.9340	0.13790
		7	1.1200	0.00250
		8	1.4000	0.04700
		9	1.8300	0.00400
		10	2.0600	0.00050
		11	0.0158	0.00013
56	Y93	1	0.2670	0.07684
		2	0.6794	0.00579
		3	0.9465	0.01799
		4	1.4508	0.00250
		5	1.9179	0.01240
		6	2.1843	0.00140
		7	2.1907	0.00150
		8	0.0158	0.00043
		9	0.0157	0.00022
65	ZR95	1	0.0022	0.00100
		2	0.0169	0.00900
		3	0.7569	0.54300
		4	0.7242	0.43500

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
69	ZR97	1	0.1117	0.00070
		2	0.1820	0.00080
		3	0.2192	0.00240
		4	0.2543	0.01178
		5	0.2724	0.00250
		6	0.2960	0.00084
		7	0.3310	0.00090
		8	0.3555	0.02182
		9	0.4010	0.00250
		10	0.5078	0.04900
		11	0.5130	0.00920
		12	0.6024	0.01397
		13	0.6903	0.00250
		14	0.7036	0.01098
		15	0.8048	0.00710
		16	0.8299	0.00290
		17	0.8545	0.00390
		18	0.9711	0.00300
		19	1.0210	0.00920
		20	1.1090	0.00050
		21	1.1478	0.02749
		22	1.2758	0.01000
		23	1.3626	0.01100
		24	1.7499	0.01499
		25	1.8513	0.00460
		26	0.0156	0.00605
		27	0.0165	0.00303
		28	0.0186	0.00141
		29	0.0190	0.00230
		30	0.0021	0.00101
66	NB95M	1	0.2354	0.24200
67	NB95	1	0.0178	0.00100
		2	0.7658	0.99800
70	NB97M	1	0.7430	0.98210
		2	0.0166	0.00629
		3	0.0165	0.00315
		4	0.0186	0.00146
		5	0.0190	0.00023
		6	0.0021	0.00106

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
71	NB97	1	0.6579	0.98196
		2	0.7200	0.00130
		3	0.8581	0.00040
		4	0.9080	0.00040
		5	1.0241	0.01099
		6	1.1174	0.00070
		7	1.1467	0.00040
		8	1.2687	0.00180
		9	1.5160	0.00130
		10	1.6280	0.00020
		11	0.0175	0.00077
		12	0.0174	0.00039
		13	0.0196	0.00018
		14	0.0022	0.00013
77	MO99	1	0.0024	0.01200
		2	0.0187	0.11600
		3	0.0406	0.01300
		4	0.9610	0.00100
		5	0.1811	0.06700
		6	0.3664	0.01500
		7	0.5289	0.00100
		8	0.7397	0.13800
		9	0.7782	0.04800
		10	0.8231	0.00100
78	TC99M	1	0.1405	0.88300
		2	0.0184	0.04300
		3	0.0183	0.02200
		4	0.0206	0.01000
		5	0.0210	0.00200
		6	0.0024	0.00800
88	RU103	1	0.0027	0.07100
		2	0.0206	0.08300
		3	0.6102	0.05400
		4	0.0531	0.00300
		5	0.2949	0.00200
		6	0.4438	0.00400
		7	0.4969	0.89000
		8	0.5569	0.00800
89	RH103M	1	0.0397	0.00060
		2	0.0202	0.04360
		3	0.0200	0.02190
		4	0.0227	0.01070
		5	0.0026	0.06410

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
96	RH105	1	0.0388	0.00022
		2	0.2805	0.00166
		3	0.3063	0.05301
		4	0.3193	0.19106
		5	0.4427	0.00040
		6	0.0212	0.00212
		7	0.0210	0.00107
		8	0.0238	0.00053
		9	0.0244	0.00010
		10	0.0028	0.00046
98	RH106	1	0.0216	0.00100
		2	0.4279	0.00100
		3	0.4350	0.00100
		4	0.5118	0.20600
		5	0.6162	0.00700
		6	0.6221	0.09900
		7	0.8735	0.00400
		8	0.1050	0.01500
		9	1.1275	0.00400
		10	1.1940	0.00100
		11	1.5620	0.00200
398	PD103	1	0.0400	0.00100
		2	0.0530	0.03200
		3	0.3600	0.00100

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
333	AG110M	1	0.0037	0.00001
		2	0.1153	0.00006
		3	0.0222	0.00304
		4	0.0220	0.00154
		5	0.0249	0.00077
		6	0.0255	0.00015
		7	0.0029	0.00172
		8	0.4468	0.03270
		9	0.6202	0.02789
		10	0.6577	0.94410
		11	0.6775	0.11661
		12	0.6869	0.07081
		13	0.7066	0.16061
		14	0.7441	0.04189
		15	0.7639	0.22454
		16	0.8130	0.07188
		17	0.8846	0.71407
		18	0.9374	0.30860
		19	1.3840	0.25882
		20	1.4757	0.04098
		21	1.5047	0.14192
		22	1.5621	0.01279
		23	0.0232	0.00266
		24	0.0230	0.00135
		25	0.0261	0.00068
		26	0.0257	0.00014
		27	0.0031	0.00062
114	AG111	1	0.0236	0.00300
		2	0.0963	0.00200
		3	0.2459	0.01200
		4	0.3420	0.08000
507	CD111M	1	0.1500	1.00000
		2	0.2470	1.00000
511	CD113M	1	0.2700	0.00125
		2	0.0232	0.00109
		3	0.0230	0.00055
		4	0.0261	0.00028
		5	0.0031	0.00045

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
125	CD115M	1	0.1050	0.00010
		2	0.1300	0.00001
		3	0.1570	0.00013
		4	0.1980	0.00003
		5	0.2320	0.00002
		6	0.2610	0.00002
		7	0.3170	0.00002
		8	0.4650	0.00278
		9	0.4920	0.00021
		10	0.9350	0.01957
		11	1.1330	0.00079
		12	1.2900	0.00909
		13	1.4200	0.00002
		14	1.4500	0.00018
394	IN113M	1	0.3917	0.64400
427	IN114M	1	0.0232	0.01400
		2	0.0230	0.00711
		3	0.0261	0.00360
		4	0.0257	0.00072
		5	0.0031	0.00336
		6	0.1916	0.15620
		7	0.0242	0.18060
		8	0.0240	0.09190
		9	0.0273	0.04710
		10	0.0279	0.00948
		11	0.0033	0.07517
		12	0.5580	0.03483
		13	0.7252	0.03491
514	IN114	1	1.2999	0.00150
		2	0.5580	0.00070
		3	0.0232	0.01258
		4	0.0261	0.00215
		5	0.0257	0.00043
		6	0.0031	0.00198
127	IN115M	1	0.3356	0.39250
		2	0.0242	0.20310
		3	0.0240	0.10330
		4	0.0273	0.05290
		5	0.0279	0.01070
		6	0.0033	0.05364
		7	0.4973	0.00060
393	SN113	1	0.0033	0.13500
		2	0.0247	0.96600
		3	0.2550	0.01900

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
405	SN119M	1	0.0238	0.15212
		2	0.0650	0.00019
		3	0.0253	0.14035
		4	0.0250	0.07158
		5	0.0285	0.03705
		6	0.0292	0.00758
		7	0.0034	0.17683
161	SN125	1	0.2650	0.00150
		2	0.3320	0.01330
		3	0.3510	0.00230
		4	0.4700	0.01350
		5	0.6500	0.00050
		6	0.8170	0.04870
		7	0.8940	0.00240
		8	0.9150	0.03500
		9	0.9300	0.00240
		10	1.0170	0.00270
		11	1.0670	0.08860
		12	1.0880	0.05140
		13	1.1500	0.00120
		14	1.1700	0.00240
		15	1.2600	0.00240
		16	1.3490	0.00060
		17	1.4200	0.00480
		18	1.8060	0.00150
		19	1.8900	0.00070
		20	2.0020	0.02130
		21	2.2010	0.00040
		22	2.2270	0.00002
		23	2.2750	0.00190
428	SB122	1	0.5660	0.66012
		2	0.0860	0.03388
		3	1.1252	0.00659
		4	0.0275	0.00160
		5	0.0272	0.00082
		6	0.0310	0.00043
		7	0.0318	0.00009
		8	0.0038	0.00046
		9	1.1400	0.00739
		10	0.0253	0.01260
		11	0.0250	0.00643
		12	0.0285	0.00333
		13	0.0292	0.00068
		14	0.0034	0.00325

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
159	SB124	1	0.0280	0.00400
		2	0.4000	0.00400
		3	0.4440	0.00300
		4	0.5255	0.00300
		5	0.6027	0.98200
		6	0.6324	0.00100
		7	0.6458	0.07300
		8	0.7093	0.01400
		9	0.7138	0.02500
		10	0.7228	0.11100
		11	0.7357	0.00100
		12	0.7908	0.00700
		13	0.9682	0.01900
		14	1.0451	0.01900
		15	1.3255	0.01400
		16	1.3522	0.01000
		17	1.3682	0.02400
		18	1.3673	0.00400
		19	1.4366	0.01100
		20	1.4453	0.00200
		21	1.4891	0.00600
		22	1.5264	0.00400
		23	1.6910	0.48300
		24	2.0910	0.05700
162	SB125	1	0.0038	0.12000
		2	0.0280	0.73000
		3	0.0355	0.05900
		4	0.0818	0.01000
		5	0.1093	0.00100
		6	0.1110	0.00100
		7	0.1170	0.00300
		8	0.1726	0.00200
		9	0.1763	0.06300
		10	0.2041	0.00300
		11	0.2081	0.00200
		12	0.2279	0.00100
		13	0.3211	0.00400
		14	0.3850	0.01400
		15	0.4081	0.00200
		16	0.4279	0.29600
		17	0.4436	0.00300
		18	0.4635	0.10000
		19	0.4898	0.00300
		20	0.6006	0.18400
		21	0.6068	0.05200
		22	0.6361	0.11200
		23	0.6717	0.01800
168	SB127	1	0.0610	0.01626
		2	0.1540	0.00106
		3	0.2500	0.08400
		4	0.2910	0.02100
		5	0.3900	0.01170
		6	0.4100	0.04400
		7	0.4500	0.04000
		8	0.4730	0.25000
		9	0.5400	0.03600
		10	0.6000	0.04600
		11	0.6240	0.00060
		12	0.6378	0.00400
		13	0.6523	0.00330
		14	0.6675	0.00710
		15	0.6823	0.00540
		16	0.6857	0.35500
		17	0.6985	0.03520
		18	0.7222	0.01810
		19	0.7637	0.00070
		20	0.7837	0.14590
		21	0.8170	0.00390
		22	0.8206	0.00200
		23	0.9244	0.00500
		24	1.1416	0.00360
		25	1.1552	0.00040
		26	1.2903	0.00360
		27	1.3779	0.00070
		28	0.0274	0.03190
		29	0.0310	0.00690
		30	0.0038	0.00600
396	TE123M	1	0.0038	0.12400
		2	0.0280	0.49300
		3	0.0885	0.00100
		4	0.1590	0.83500
163	TE125M	1	0.0038	0.21400
		2	0.0280	1.14000
		3	0.0355	0.06800
		4	0.1093	0.00300
169	TE127M	1	0.0887	0.00075
		2	0.0275	0.16744
		3	0.0272	0.08590
		4	0.0310	0.04521
		5	0.0318	0.00938
		6	0.0038	0.10095

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
170	TE127	1	0.0576	0.00028
		2	0.1452	0.00003
		3	0.2028	0.00051
		4	0.2150	0.00055
		5	0.3600	0.00117
		6	0.4180	0.00807
		7	0.0286	0.00050
		8	0.0283	0.00026
		9	0.0323	0.00014
		10	0.0039	0.00015
176	TE129M	1	0.1055	0.00144
		2	0.0278	0.00027
		3	0.5566	0.00109
		4	0.6720	0.00025
		5	0.6960	0.03099
		6	0.7018	0.00019
		7	0.7056	0.00005
		8	0.7296	0.00747
		9	0.7411	0.00029
		10	0.7689	0.00003
		11	0.8172	0.00091
		12	0.8449	0.00035
		13	1.0226	0.00020
		14	1.0504	0.00018
		15	1.3738	0.00001
		16	1.4016	0.00004
		17	0.0039	0.00015
		18	0.0275	0.14733
		19	0.0272	0.07558
		20	0.0310	0.03978
		21	0.0318	0.00825
		22	0.0038	0.06677
177	TE129	1	0.0278	0.16787
		2	0.2090	0.00200
		3	0.2507	0.00415
		4	0.2703	0.00004
		5	0.2784	0.00583
		6	0.2812	0.00153
		7	0.3426	0.00007
		8	0.3428	0.00039
		9	0.4596	0.07622
		10	0.4874	0.01454
		11	0.5318	0.00088
		12	0.5515	0.00011
		13	0.5597	0.00007
		14	0.6244	0.00092
		15	0.7411	0.00360
		16	0.7639	0.00004
		17	0.8022	0.00209
		18	0.8299	0.00008
		19	0.8334	0.00046
		20	0.9824	0.00018
		21	1.0840	0.00609
		22	1.1117	0.00240
		23	1.2330	0.00009
		24	1.2608	0.00013
		25	1.2644	0.00009
		26	0.0286	0.00080
		27	0.0283	0.00041
		28	0.0323	0.00022
		29	0.0039	0.07963

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
185	TE131M	1	0.1020	0.14600
		2	0.1350	0.01400
		3	0.1800	0.11500
		4	0.2000	0.08900
		5	0.2300	0.01100
		6	0.2500	0.11000
		7	0.2790	0.02800
		8	0.3300	0.09900
		9	0.3500	0.00760
		10	0.4300	0.01200
		11	0.4600	0.03800
		12	0.6000	0.01670
		13	0.7100	0.04700
		14	0.7700	0.42100
		15	0.7900	0.23600
		16	0.8500	0.27700
		17	0.9100	0.03190
		18	0.9220	0.00480
		19	1.0597	0.00988
		20	1.1255	0.11300
		21	1.1485	0.03300
		22	1.2065	0.09130
		23	1.2380	0.00340
		24	1.3150	0.01199
		25	1.6460	0.01400
		26	1.8880	0.01900
		27	2.0010	0.02000
		28	2.1680	0.00300
		29	2.2700	0.00300
		30	0.0300	0.20800

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
186	TE131	1	0.1500	0.67767
		2	0.2790	0.00680
		3	0.3430	0.00721
		4	0.3840	0.00725
		5	0.4530	0.15946
		6	0.4930	0.04658
		7	0.5440	0.00268
		8	0.6030	0.04000
		9	0.6540	0.01203
		10	0.6750	0.00340
		11	0.7270	0.00269
		12	0.8420	0.00140
		13	0.8980	0.00200
		14	0.9330	0.00810
		15	0.9480	0.01995
		16	0.9520	0.00400
		17	0.9970	0.03433
		18	1.0070	0.01010
		19	1.0980	0.00539
		20	1.1470	0.06350
		21	1.2950	0.00950
		22	0.0286	0.06896
		23	0.0283	0.03548
		24	0.0323	0.01883
		25	0.0332	0.00393
		26	0.0039	0.01994
191	TE132	1	0.0497	0.13900
		2	0.1118	0.01800
		3	0.1163	0.01900
		4	0.2282	0.85000
395	I123	1	0.0038	0.13300
		2	0.0280	0.86700
		3	0.1590	0.82900
		4	0.2483	0.00100
		5	0.2810	0.00100
		6	0.3466	0.00100
		7	0.4404	0.00400
		8	0.5056	0.00300
		9	0.5290	0.01100
		10	0.5385	0.00300
		11	0.6249	0.00100

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
374	I124	1	0.0280	0.57000
		2	0.5110	0.46000
		3	0.5412	0.00200
		4	0.5924	0.00200
		5	0.6027	0.62000
		6	0.6458	0.01000
		7	0.7228	0.10200
		8	0.9682	0.00400
		9	1.0451	0.00400
		10	1.0540	0.00100
		11	1.3255	0.01500
		12	1.3682	0.00300
		13	1.3763	0.01700
		14	1.4891	0.00200
		15	1.5095	0.03100
		16	1.5598	0.00200
		17	1.6377	0.00200
		18	1.6758	0.00100
		19	1.6910	0.10700
		20	1.7203	0.00200
		21	1.8514	0.00200
		22	1.9187	0.00200
		23	2.0383	0.00400
		24	2.0789	0.00400
		25	2.0910	0.00600
		26	2.0991	0.00100
		27	2.1443	0.00100
		28	2.2323	0.00600
		29	2.2833	0.00700
		30	2.7459	0.00500
399	I125	1	0.0355	0.06800
		2	0.0275	0.73800
		3	0.0272	0.37800
		4	0.0310	0.19900
		5	0.0318	0.04100
		6	0.0038	0.21500

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
375	I126	1	0.5110	0.02600
		2	0.6670	0.32800
		3	0.7500	0.03600
		4	1.4200	0.00400
		5	0.0275	0.22500
		6	0.0272	0.11500
		7	0.0310	0.06100
		8	0.0318	0.01300
		9	0.0038	0.06300
		10	0.3860	0.33500
		11	0.4800	0.04200
		12	0.8600	0.00800
		13	0.0298	0.00300
		14	0.0295	0.00100
		15	0.0336	0.00100
		16	0.0041	0.00100
178	I129	1	0.0396	0.03856
		2	0.0298	0.40353
		3	0.0295	0.20822
		4	0.0336	0.11137
		5	0.0346	0.02340
		6	0.0041	0.11884
388	I130	1	0.1439	0.34600
		2	0.5380	0.99300
		3	0.6690	0.99600
		4	0.7430	0.86700
		5	1.1500	0.12000
		6	0.0298	0.00800
		7	0.0295	0.00400
		8	0.0336	0.00200
		9	0.0041	0.00200
187	I131	1	0.0041	0.00900
		2	0.0304	0.04900
		3	0.0816	0.02500
		4	0.1772	0.00300
		5	0.2723	0.00100
		6	0.2843	0.05000
		7	0.3180	0.00100
		8	0.3257	0.00300
		9	0.3645	0.82400
		10	0.4050	0.00100
		11	0.5029	0.00300
		12	0.6369	0.06900
		13	0.6430	0.00200
		14	0.7229	0.01600

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
192	I132	1	0.0292	0.71000
		2	0.5059	0.05200
		3	0.5226	0.16500
		4	0.5471	0.01300
		5	0.6210	0.02000
		6	0.6302	0.14100
		7	0.6506	0.02700
		8	0.6677	1.01300
		9	0.6698	0.05100
		10	0.6716	0.05400
		11	0.7271	0.06700
		12	0.7726	0.78000
		13	0.7802	0.01300
		14	0.8098	0.02900
		15	0.8122	0.05800
		16	0.8768	0.01100
		17	0.9103	0.00900
		18	0.9545	0.18500
		19	1.1360	0.03000
		20	1.1434	0.01400
		21	1.1732	0.01100
		22	1.2907	0.01200
		23	1.2953	0.02000
		24	1.2982	0.00900
		25	1.3721	0.02500
		26	1.3986	0.07300
		27	1.4426	0.01500
		28	1.7575	0.00400
		29	1.9211	0.01200
		30	2.0023	0.01100
196	I133	1	0.5300	0.92000
		2	0.7100	0.02000
		3	0.8700	0.08000
		4	0.8700	0.01000
		5	1.0500	0.01000
		6	1.2400	0.02000
		7	1.3000	0.04000
200	I134	1	0.1400	0.03000
		2	0.3900	0.07000
		3	0.4100	0.00500
		4	0.4300	0.03000
		5	0.5100	0.01000
		6	0.5400	0.08000
		7	0.6100	0.18000
		8	0.6900	0.07000
		9	0.7500	0.01000
		10	0.7700	0.06000
		11	0.8480	0.94770
		12	0.8600	0.04500
		13	0.8900	0.70860
		14	0.0041	0.00045
		15	0.9600	0.02000
		16	1.0000	0.04500
		17	1.0700	0.18000
		18	0.0296	0.00226
		19	1.1500	0.09500
		20	1.4600	0.03500
		21	1.4900	0.01000
		22	1.6200	0.04990
		23	1.7900	0.05000
		24	0.0336	0.00041
202	I135	1	0.4200	0.06900
		2	1.2800	0.34000
		3	1.6900	0.19000
		4	0.8600	0.11000
		5	1.0400	0.09000
		6	1.1400	0.37000
		7	1.4600	0.12000
		8	1.4600	0.11000

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
206	I136	1	0.2000	0.10704
		2	0.3900	0.19000
		3	0.5300	0.04000
		4	0.7100	0.03000
		5	1.0000	0.06000
		6	1.3200	0.69936
		7	1.3200	0.24970
		8	1.5500	0.03997
		9	1.7200	0.02000
		10	1.9100	0.05000
		11	2.2500	0.07000
		12	2.4000	0.12000
		13	2.6300	0.10997
		14	2.8400	0.07998
		15	3.2000	0.05000
		16	0.0298	0.05590
		17	0.0294	0.02880
		18	0.0336	0.00154
		19	0.0346	0.00032
		20	0.0041	0.00186
188	XE131M	1	0.0041	0.11700
		2	0.0304	0.53600
		3	0.1640	0.01900
197	XE133M	1	0.0041	0.11000
		2	0.0304	0.55800
		3	0.2328	0.09900
198	XE133	1	0.0043	0.08000
		2	0.0316	0.47000
		3	0.0796	0.00200
		4	0.0810	0.36100
		5	0.1606	0.00100
203	XE135M	1	0.0041	0.02400
		2	0.0304	0.13600
		3	0.5274	0.80500
204	XE135	1	0.0043	0.00900
		2	0.0316	0.05000
		3	0.1585	0.00200
		4	0.2498	0.90400
		5	0.3586	0.00200
		6	0.4082	0.00300
		7	0.6086	0.02400
		8	0.8126	0.00100
209	XE137	1	0.0316	0.00300
		2	0.3940	0.00200
		3	0.4560	0.30000
		4	0.8490	0.00700
		5	0.9820	0.00200
		6	1.1170	0.00200
		7	1.2750	0.00300
		8	1.5760	0.00200
		9	1.6150	0.00200
		10	1.7840	0.00500
		11	1.9180	0.00100
		12	2.3960	0.00100
		13	2.8520	0.00300
213	XE138	1	0.0154	0.45800
		2	0.0330	0.05700
		3	0.1172	0.05880
		4	0.1532	0.12000
		5	0.2222	0.02480
		6	0.2428	0.03300
		7	0.2582	0.37000
		8	0.3965	0.05500
		9	0.4346	0.17000
		10	1.7700	0.14000
		11	2.0130	0.14800
		12	0.4017	0.03100
327	CS134	1	0.4756	0.01583
		2	0.5631	0.08539
		3	0.5693	0.13175
		4	0.6048	0.96939
		5	0.7960	0.86742
		6	0.8019	0.07876
		7	1.0382	0.00998
		8	1.1634	0.01998
		9	1.3654	0.03497
		10	0.0322	0.00421
		11	0.0318	0.00218
		12	0.0364	0.00119
		13	0.0374	0.00025
		14	0.0045	0.00139

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
207	CS136	1	0.0670	0.08971
		2	0.0860	0.04542
		3	0.1530	0.08518
		4	0.1640	0.05494
		5	0.1760	0.13668
		6	0.2730	0.12239
		7	0.3400	0.45419
		8	0.8180	0.99640
		9	1.0530	0.79553
		10	1.2400	0.18181
		11	0.0322	0.06465
		12	0.0318	0.03355
		13	0.0364	0.01823
		14	0.0374	0.00388
		15	0.0045	0.03200
214	CS138	1	0.1389	0.01900
		2	0.1939	0.00800
		3	0.2289	0.01600
		4	0.4106	0.03000
		5	0.4626	0.23000
		6	0.5500	0.08000
		7	0.8700	0.04000
		8	1.0100	0.25000
		9	1.4260	0.72940
		10	2.2100	0.18000
		11	2.6300	0.09000
		12	3.3400	0.00500
		13	0.0322	0.00030
		14	0.0318	0.00010
217	CS139	1	0.6400	0.01800
		2	1.2800	0.08000
		3	1.6800	0.01300
		4	1.9100	0.00600
		5	2.0900	0.00600
		6	2.3000	0.00200
		7	2.4000	0.00600
		8	2.5400	0.00300
		9	2.6800	0.00400
		10	2.9600	0.00200
		11	3.3700	0.00200
		12	3.6800	0.00200

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
400	BA133	1	0.0540	0.01500
		2	0.0795	0.05200
		3	0.0810	0.35000
		4	0.1610	0.01300
		5	0.2200	0.00100
		6	0.2760	0.04700
		7	0.3020	0.16300
		8	0.3560	0.58600
		9	0.3820	0.05900
		10	0.0310	0.54900
		11	0.0306	0.28400
		12	0.0350	0.15300
		13	0.0360	0.03200
		14	0.0043	0.24100
211	BA137M	1	0.0045	0.01300
		2	0.0329	0.06900
		3	0.6616	0.84600
218	BA139	1	0.1658	0.27000
		2	1.2700	0.00070
		3	1.4300	0.00430
		4	0.0333	0.03450
		5	0.0380	0.00780
		6	0.0047	0.00790
221	BA140	1	0.0046	0.18000
		2	0.0138	0.01300
		3	0.0300	0.14000
		4	0.0341	0.01200
		5	0.1327	0.00200
		6	0.1629	0.06200
		7	0.1770	0.00200
		8	0.3048	0.04500
		9	0.4237	0.03200
		10	0.4375	0.02100
		11	0.4660	0.00200
		12	0.4980	0.00400
		13	0.5120	0.00300
		14	0.5374	0.23800
		15	0.6020	0.00600
		16	0.6370	0.00300
		17	0.6610	0.00700

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
222	LA140	1	0.0048	0.00300
		2	0.0355	0.01500
		3	0.0689	0.00100
		4	0.1094	0.00200
		5	0.1311	0.00800
		6	0.1735	0.00100
		7	0.2420	0.00600
		8	0.2665	0.00700
		9	0.3069	0.00100
		10	0.3288	0.21000
		11	0.3978	0.00100
		12	0.4325	0.03300
		13	0.4870	0.45000
		14	0.7518	0.04400
		15	0.8158	0.23100
		16	0.8678	0.05500
		17	0.9196	0.02500
		18	0.9252	0.06900
		19	0.9505	0.00600
		20	1.5966	0.95600
		21	2.3484	0.00900
		22	2.5220	0.03000
		23	2.5479	0.00100
		24	2.8997	0.00100
227	CE141	1	0.0050	0.03200
		2	0.0367	0.16600
		3	0.1454	0.49000

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
236	CE143	1	0.0574	0.10947
		2	0.1400	0.00093
		3	0.2317	0.02281
		4	0.2933	0.45610
		5	0.3507	0.03584
		6	0.3720	0.00029
		7	0.3900	0.00030
		8	0.4340	0.00185
		9	0.4460	0.00098
		10	0.4905	0.02168
		11	0.4990	0.00070
		12	0.5570	0.00050
		13	0.5870	0.00326
		14	0.6640	0.06456
		15	0.7720	0.06475
		16	0.8090	0.00050
		17	0.8810	0.01195
		18	0.9370	0.00040
		19	1.0030	0.00003
		20	1.0310	0.00030
		21	1.0460	0.00020
		22	1.0610	0.00050
		23	1.1030	0.00520
		24	1.3240	0.00020
		25	1.3400	0.00003
		26	0.0360	0.32905
		27	0.0356	0.17193
		28	0.0407	0.09559
		29	0.0420	0.02073
		30	0.0051	0.11745
238	CE144	1	0.0050	0.02100
		2	0.0336	0.00200
		3	0.0367	0.09000
		4	0.0409	0.00400
		5	0.0534	0.00100
		6	0.0801	0.01500
		7	0.1335	0.10800
239	PR144	1	0.6965	0.01500
		2	1.4891	0.00300
		3	2.1857	0.00700

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
246	ND147	1	0.0788	0.00012
		2	0.0911	0.27815
		3	0.1205	0.00451
		4	0.1549	0.00021
		5	0.1966	0.00186
		6	0.2754	0.00905
		7	0.3194	0.02038
		8	0.3982	0.00869
		9	0.4105	0.00186
		10	0.4399	0.01192
		11	0.4893	0.00127
		12	0.5310	0.13267
		13	0.5893	0.00029
		14	0.5948	0.00268
		15	0.6804	0.00020
		16	0.6859	0.00783
		17	0.0387	0.23556
		18	0.0382	0.12367
		19	0.0438	0.06996
		20	0.0452	0.01531
		21	0.0055	0.08986
406	PM148M	1	0.0985	0.03623
		2	0.1895	0.01168
		3	0.2886	0.12190
		4	0.3117	0.03947
		5	0.4141	0.18475
		6	0.4327	0.05396
		7	0.5011	0.06870
		8	0.5501	0.94443
		9	0.5995	0.12464
		10	0.6111	0.05485
		11	0.6299	0.89256
		12	0.7256	0.32334
		13	0.9149	0.18643
		14	1.0137	0.20051
		15	0.0401	0.04110
		16	0.0395	0.02162
		17	0.0454	0.01233
		18	0.0468	0.00271
		19	0.0058	0.01618
		20	0.0757	0.01021
		21	0.0387	0.01459
		22	0.0382	0.00766
		23	0.0438	0.00433
		24	0.0452	0.00095
		25	0.0055	0.01173
407	PM148	1	0.5501	0.25987
		2	0.6111	0.01246
		3	0.9149	0.13583
		4	1.4651	0.23987
		5	0.0401	0.00118
		6	0.0395	0.00062
		7	0.0454	0.00035
		8	0.0468	0.00008
		9	0.0058	0.00047
255	SM151	1	0.0216	0.00061
		2	0.0060	0.00236
260	EU154	1	0.1231	0.40102
		2	0.1450	0.00024
		3	0.1882	0.00228
		4	0.2480	0.06532
		5	0.3220	0.00067
		6	0.4300	0.00711
		7	0.4780	0.00281
		8	0.5500	0.00297
		9	0.5900	0.05668
		10	0.6200	0.00399
		11	0.6700	0.00217
		12	0.6924	0.01699
		13	0.7223	0.19876
		14	0.7569	0.04338
		15	0.8300	0.01006
		16	0.8732	0.11771
		17	0.8927	0.00538
		18	0.9040	0.00819
		19	0.9963	0.10301
		20	1.0048	0.17352
		21	1.0473	0.00050
		22	1.1300	0.05910
		23	1.1700	0.00121
		24	1.2470	0.00829
		25	1.2744	0.35504
		26	1.4936	0.00650
		27	1.5965	0.01719
		28	0.0430	0.19960
		29	0.0490	0.04894
		30	0.0062	0.08064

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
262	EU155	1	0.0104	0.00004
		2	0.0188	0.00046
		3	0.0265	0.00330
		4	0.0314	0.00007
		5	0.0453	0.01352
		6	0.0580	0.00070
		7	0.0602	0.01196
		8	0.0860	0.00132
		9	0.0865	0.32774
		10	0.1053	0.21899
		11	0.1460	0.00054
		12	0.0430	0.12406
		13	0.0423	0.06563
		14	0.0487	0.03784
		15	0.0502	0.00844
		16	0.0062	0.09228
264	EU156	1	0.0890	0.10800
		2	0.1992	0.01800
		3	0.4300	0.00540
		4	0.5000	0.01000
		5	0.5995	0.01800
		6	0.6462	0.06500
		7	0.7200	0.06100
		8	0.8116	0.09500
		9	0.8700	0.01600
		10	0.9610	0.03200
		11	1.0600	0.10600
		12	1.1300	0.13500
		13	1.1500	0.15300
		14	1.2400	0.18000
		15	1.3660	0.01600
		16	1.6700	0.00540
		17	1.8770	0.02000
		18	1.9370	0.02900
		19	1.9656	0.04500
		20	2.0260	0.03200
		21	2.0975	0.04100
		22	2.1810	0.03600
		23	2.1865	0.02300
332	GD162	1	0.0388	0.06726
		2	0.4028	0.46122
		3	0.4416	0.53149
		4	0.0445	0.00298
		5	0.0437	0.00158
		6	0.0504	0.00092
		7	0.0520	0.00021
		8	0.0065	0.06211

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
272	TB160	1	0.0868	0.13241
		2	0.0939	0.00033
		3	0.1970	0.04882
		4	0.2156	0.03700
		5	0.2306	0.00068
		6	0.2465	0.00019
		7	0.2986	0.25589
		8	0.3096	0.00777
		9	0.3374	0.00326
		10	0.3499	0.00128
		11	0.3794	0.00129
		12	0.3925	0.01288
		13	0.4328	0.00010
		14	0.4862	0.00099
		15	0.6823	0.00514
		16	0.7652	0.01826
		17	0.8720	0.00268
		18	0.8793	0.28464
		19	0.9661	0.33600
		20	1.0030	0.00979
		21	0.0091	0.00110
		22	1.1150	0.01980
		23	1.1779	0.14856
		24	1.1990	0.02358
		25	1.2720	0.07510
		26	1.3120	0.02860
		27	0.0460	0.10757
		28	0.0452	0.05723
		29	0.0522	0.04088
		30	0.0067	0.10699

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
341	TA182	1	0.0650	0.02900
		2	0.0677	0.42952
		3	0.1000	0.17000
		4	0.1140	0.05400
		5	0.1524	0.06824
		6	0.1564	0.02769
		7	0.1794	0.03330
		8	0.1984	0.01504
		9	0.2221	0.07244
		10	0.2293	0.03325
		11	0.2641	0.03194
		12	0.8930	0.00100
		13	0.9280	0.00696
		14	0.9600	0.00296
		15	1.0020	0.02091
		16	1.0450	0.00399
		17	1.1220	0.34869
		18	1.1580	0.01393
		19	1.1890	0.15922
		20	1.2220	0.27915
		21	1.2310	0.11969
		22	1.2580	0.01595
		23	1.2740	0.00798
		24	1.2890	0.01384
		25	1.3430	0.00199
		26	1.3740	0.00299
		27	1.4530	0.00099
		28	0.0590	0.19600
		29	0.0670	0.07400
		30	0.0100	0.24000
291	W187	1	0.0720	0.10682
		2	0.1066	0.00275
		3	0.1137	0.00109
		4	0.1342	0.08584
		5	0.2062	0.00064
		6	0.2391	0.00097
		7	0.2466	0.00110
		8	0.2522	0.00200
		9	0.4798	0.23309
		10	0.5125	0.01858
		11	0.5517	0.04966

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
370	AU195M	1	0.0615	0.00200
		2	0.2000	0.01500
		3	0.2610	0.67900
		4	0.0688	0.11600
		5	0.0670	0.06400
		6	0.0780	0.04000
		7	0.0807	0.01100
		8	0.0097	0.17700
		9	0.0115	0.16700
		10	0.0134	0.02200
279	AU195	1	0.0309	0.00100
		2	0.0988	0.11900
		3	0.1297	0.01000
		4	0.0668	0.56100
		5	0.0651	0.29800
		6	0.0757	0.18300
		7	0.0784	0.04800
		8	0.0094	0.29200
		9	0.0111	0.27500
		10	0.0129	0.03700
288	AU198	1	0.0100	0.01300
		2	0.0725	0.02800
		3	0.4118	0.95500
		4	0.6759	0.01000
		5	1.0877	0.00200
389	AU199	1	0.0498	0.00300
		2	0.1584	0.39600
		3	0.2082	0.09800
		4	0.0708	0.08400
		5	0.0689	0.04600
		6	0.0803	0.02900
		7	0.0831	0.00800
		8	0.0100	0.06700
		9	0.0118	0.06300
		10	0.0138	0.00800
397	HG197	1	0.0097	0.51800
		2	0.0704	0.71800
		3	0.0773	0.19500
		4	0.1915	0.00600
		5	0.2680	0.00100
301	HG203	1	0.0103	0.05600
		2	0.0746	0.12800
		3	0.2792	0.81500
300	TL204	1	0.0100	0.00800
		2	0.0725	0.01500

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
476	TL208	1	0.0410	0.00300
		2	0.2110	0.00300
		3	0.2330	0.00200
		4	0.2530	0.00800
		5	0.2770	0.06900
		6	0.4860	0.00500
		7	0.5110	0.22900
		8	0.5830	0.85200
		9	0.7630	0.01900
		10	0.8600	0.11700
		11	1.0940	0.00600
		12	2.6150	0.99800
		13	0.0749	0.03000
		14	0.0727	0.01700
		15	0.0849	0.01100
		16	0.0879	0.00300
		17	0.0105	0.01200
		18	0.0126	0.01200
		19	0.0148	0.00200
518	TL210	1	0.0650	0.00011
296	PB204M	1	0.2892	0.00200
		2	0.3747	0.89500
		3	0.6222	0.00220
		4	0.8991	0.99000
		5	0.9117	0.94000
299	PB210	1	0.0465	0.04037
		2	0.0108	0.11332
		3	0.0130	0.10617
		4	0.0152	0.01429
455	PB212	1	0.1150	0.00600
		2	0.1770	0.00200
		3	0.2386	0.45900
		4	0.3006	0.02900
		5	0.0771	0.16200
		6	0.0748	0.09000
		7	0.0874	0.05800
		8	0.0905	0.01700
		9	0.0108	0.06600
		10	0.0130	0.06200
		11	0.0152	0.00800

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
515	PB214	1	0.0532	0.01159
		2	0.2060	0.00062
		3	0.2419	0.07828
		4	0.2589	0.00392
		5	0.2952	0.20088
		6	0.3520	0.36042
		7	0.4810	0.00618
		8	0.7770	0.00500
		9	0.0771	0.10512
		10	0.0748	0.05823
		11	0.0874	0.03758
		12	0.0905	0.01104
		13	0.0108	0.06511
		14	0.0130	0.06100
		15	0.0152	0.00821
457	BI212	1	0.0400	0.00900
		2	0.2870	0.00300
		3	0.3270	0.00100
		4	0.4533	0.00400
		5	0.0722	0.00100
		6	0.0103	0.03600
		7	0.0122	0.03500
		8	0.0143	0.00500
		9	0.7270	0.07100
		10	0.7850	0.01000
		11	0.8930	0.00400
		12	0.9530	0.00100
		13	1.0740	0.00700
		14	1.3400	0.00100
		15	1.5130	0.00300
		16	1.6200	0.01700
		17	0.0799	0.00200
		18	0.0759	0.00100
		19	0.0907	0.00100

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
516	BI214	1	0.2732	0.04795
		2	0.3868	0.02500
		3	0.4899	0.02300
		4	0.6094	0.41143
		5	0.6598	0.04400
		6	0.7103	0.01674
		7	0.7720	0.06706
		8	0.8063	0.01584
		9	0.9348	0.02634
		10	1.1349	0.02569
		11	1.1204	0.14372
		12	1.2383	0.04925
		13	1.2925	0.01898
		14	1.3782	0.04679
		15	1.4080	0.02379
		16	1.5359	0.05367
		17	1.7029	0.03649
		18	1.7644	0.16411
		19	1.8562	0.02508
		20	2.0927	0.02081
		21	2.1600	0.01100
		22	2.2042	0.05282
		23	2.2535	0.01197
		24	2.4050	0.00300
		25	2.4400	0.01700
		26	0.0784	0.01404
		27	0.0898	0.00325
		28	0.0931	0.00098
		29	0.0111	0.00413
		30	0.0137	0.00439
517	PO214	1	0.7950	0.00014
513	PO218	1	0.8370	0.00011
508	RN220	1	0.5500	0.00065
519	RN222	1	0.5120	0.00076
460	RA224	1	0.2410	0.04000
		2	0.0838	0.00200
		3	0.0811	0.00100
		4	0.0957	0.00100
		5	0.0117	0.00200
		6	0.0145	0.00200

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
348	RA226	1	0.1857	0.03323
		2	0.0838	0.00345
		3	0.0811	0.00193
		4	0.0095	0.00126
		5	0.0984	0.00040
		6	0.0117	0.00319
		7	0.0142	0.00299
		8	0.0158	0.00040
461	RA228	1	0.0316	1.00000
463	AC228	1	0.0500	0.25000
		2	0.1150	0.16200
		3	0.2000	0.08210
		4	0.3000	0.11500
		5	0.4000	0.07260
		6	0.7000	0.05420
		7	0.8500	0.03220
		8	0.9500	0.42200
		9	1.4640	0.01100
		10	1.5030	0.02500
		11	1.5930	0.04500
		12	1.6420	0.02400
352	TH228	1	0.0845	0.01300
		2	0.1320	0.00200
		3	0.1670	0.00100
		4	0.2149	0.00300
		5	0.0123	0.04400
		6	0.0151	0.04100
		7	0.0178	0.00600
		8	0.0899	0.00100
355	TH230	1	0.0678	0.00388
		2	0.1410	0.00036
		3	0.1840	0.00013
		4	0.2530	0.00016
		5	0.0123	0.03749
		6	0.0151	0.03512
		7	0.0178	0.00473

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
465	TH231	1	0.0172	0.16500
		2	0.0181	0.10100
		3	0.0256	0.12135
		4	0.0428	0.00050
		5	0.0585	0.00454
		6	0.0727	0.00240
		7	0.0812	0.01116
		8	0.0821	0.00579
		9	0.0842	0.06941
		10	0.0899	0.01100
		11	0.0993	0.01988
		12	0.1022	0.00490
		13	0.1249	0.00070
		14	0.1459	0.00130
		15	0.1631	0.00181
		16	0.1741	0.00020
		17	0.1834	0.00040
		18	0.0959	0.00337
		19	0.0923	0.00190
		20	0.1084	0.00128
		21	0.1126	0.00045
		22	0.0133	0.28642
		23	0.0165	0.26835
		24	0.0196	0.03612
349	TH232	1	0.0590	0.00200
		2	0.0123	0.03600
		3	0.0151	0.03400
		4	0.0178	0.00500
356	TH234	1	0.0632	0.00037
		2	0.0636	0.00925
		3	0.0931	0.01753
		4	0.0935	0.04875
		5	0.0133	0.02133
		6	0.0165	0.01998
		7	0.0196	0.00269

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
358	PA233	1	0.0285	0.00060
		2	0.0434	0.00020
		3	0.0579	0.00010
		4	0.0753	0.00800
		5	0.0866	0.01700
		6	0.1039	0.00690
		7	0.2716	0.00250
		8	0.3002	0.06270
		9	0.3119	0.34000
		10	0.3405	0.05570
		11	0.3754	0.00560
		12	0.3986	0.01100
		13	0.4159	0.01490
		14	0.0979	0.16410
		15	0.0941	0.09270
		16	0.1107	0.06270
		17	0.1150	0.02270
		18	0.0136	0.18850
		19	0.0170	0.17660
		20	0.0202	0.02380
354	PA234M	1	0.0133	0.00021
		2	0.0165	0.00020
		3	0.0196	0.00010
		4	0.2550	0.00047
		5	0.7460	0.00020
		6	0.7650	0.00354
		7	0.7900	0.00030
		8	1.0010	0.00592
		9	0.0979	0.00203
		10	0.0941	0.00115
		11	0.1107	0.00078
		12	0.1150	0.00028
		13	0.0136	0.00244
		14	0.0170	0.00228
		15	0.0202	0.00031

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
409	PA234	1	0.0435	0.00134
		2	0.1000	0.04242
		3	0.1260	0.28829
		4	0.1530	0.07291
		5	0.1860	0.05000
		6	0.1970	0.00722
		7	0.2240	0.02400
		8	0.2200	0.11891
		9	0.2870	0.11000
		10	0.3690	0.05217
		11	0.5650	0.15000
		12	0.7910	0.04653
		13	0.8220	0.08197
		14	0.8730	0.08274
		15	0.8750	0.08277
		16	0.8780	0.08281
		17	0.9200	0.16990
		18	0.9410	0.08356
		19	0.9750	0.08750
		20	1.0200	0.08000
		21	0.2080	0.16000
		22	0.3400	0.09110
		23	1.1300	0.03000
		24	1.3400	0.02000
		25	1.4100	0.06000
		26	1.6200	0.03000
		27	1.8500	1.00000
		28	0.0960	0.28200
		29	0.1110	0.09390
		30	0.0150	0.77960
359	U232	1	0.0575	0.00200
		2	0.1290	0.00100
		3	0.0130	0.05100
		4	0.0160	0.04800
		5	0.0190	0.00600
353	U233	1	0.0290	0.00010
		2	0.0424	0.00119
		3	0.0546	0.00026
		4	0.0718	0.00026
		5	0.0971	0.00017
		6	0.1207	0.00010
		7	0.1240	0.00080
		8	0.1353	0.00012
		9	0.1645	0.00030
		10	0.2454	0.00010
		11	0.2484	0.00010
		12	0.2745	0.00010
		13	0.2779	0.00010
		14	0.2912	0.00010
		15	0.3168	0.00100
		16	0.3202	0.00010
		17	0.0130	0.02875
		18	0.0160	0.02694
		19	0.0190	0.00363
338	U234	1	0.0533	0.00161
		2	0.1209	0.00058
		3	0.0130	0.04510
		4	0.0160	0.04226
		5	0.0190	0.00569
339	U235	1	0.0190	0.20387
		2	0.0300	0.00156
		3	0.0420	0.00426
		4	0.0450	0.00080
		5	0.0970	0.00271
		6	0.1100	0.01854
		7	0.1430	0.10126
		8	0.1630	0.05000
		9	0.1800	0.00512
		10	0.1850	0.51952
		11	0.2010	0.00897
		12	0.2040	0.05038
		13	0.0934	0.05430
		14	0.0900	0.03057
		15	0.1056	0.02047
		16	0.1097	0.00706
		17	0.0130	0.18024
		18	0.0160	0.16887
		19	0.0190	0.02273
468	U236	1	0.0498	0.00080
		2	0.0129	0.04212
		3	0.0160	0.03946
		4	0.0190	0.00531

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
313	U237	1	0.0138	0.53400
		2	0.0264	0.03200
		3	0.0332	0.00100
		4	0.0510	0.00200
		5	0.0595	0.35900
		6	0.0648	0.01300
		7	0.1646	0.02000
		8	0.2080	0.23000
		9	0.2675	0.00800
		10	0.3324	0.01100
		11	0.3354	0.00100
		12	0.3686	0.00100
		13	0.3709	0.00100
		14	0.1006	0.25000
		15	0.0966	0.14200
		16	0.1138	0.09600
		17	0.1182	0.03600
		18	0.0139	0.25800
		19	0.0174	0.24100
		20	0.0208	0.03200
340	U238	1	0.0480	0.00059
		2	0.1120	0.00028
		3	0.0130	0.03711
		4	0.0160	0.03477
		5	0.0190	0.00468
496	U240	1	0.0440	0.01600
		2	0.0139	0.15900
		3	0.0174	0.14900
		4	0.0208	0.02000
345	NP237	1	0.0297	0.06089
		2	0.0568	0.00144
		3	0.0870	0.14415
		4	0.1050	0.28000
		5	0.1084	0.05000
		6	0.1335	0.02700
		7	0.1450	0.00800
		8	0.1600	0.02200
		9	0.1750	0.01600
		10	0.2000	0.00500
		11	0.2070	0.02800
		12	0.2400	0.06000
		13	0.0133	0.07675
		14	0.0165	0.07191
		15	0.0196	0.00968

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
512	NP238	1	0.9842	0.23000
		2	0.9237	0.02400
		3	0.8824	0.00770
		4	0.9182	0.05500
		5	0.9362	0.00300
		6	1.0260	0.07900
		7	1.0280	0.16500
330	NP239	1	0.0446	0.00081
		2	0.0494	0.00108
		3	0.0573	0.00140
		4	0.0615	0.02097
		5	0.0679	0.00125
		6	0.1061	0.03578
		7	0.1817	0.00060
		8	0.2098	0.03670
		9	0.2264	0.00178
		10	0.2282	0.11431
		11	0.2544	0.00103
		12	0.2729	0.00079
		13	0.2776	0.12586
		14	0.2855	0.00549
		15	0.3159	0.01353
		16	0.3343	0.01795
		17	0.4542	0.00005
		18	0.5042	0.00005
		19	0.1031	0.18975
		20	0.0989	0.10759
		21	0.1166	0.07362
		22	0.1212	0.02770
		23	0.0143	0.22808
		24	0.0179	0.21370
		25	0.0214	0.02877

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
497	NP240M	1	0.2600	0.02200
		2	0.3040	0.01400
		3	0.5540	0.21000
		4	0.5970	0.13000
		5	0.7580	0.01400
		6	0.8160	0.01600
		7	0.8200	0.00300
		8	0.8980	0.01200
		9	0.9400	0.00300
		10	0.9420	0.01900
		11	1.4900	0.01500
		12	1.5300	0.01900
		13	1.6200	0.00700
		14	0.1038	0.00300
		15	0.0996	0.00200
		16	0.1185	0.00200
		17	0.0143	0.06500
		18	0.0179	0.06100
		19	0.0224	0.00900
494	PU236	1	0.0476	0.00065
		2	0.1090	0.00018
		3	0.0136	0.05117
		4	0.0170	0.04794
		5	0.0202	0.00945
280	PU238	1	0.0435	0.00038
		2	0.0998	0.00006
		3	0.0136	0.04603
		4	0.0170	0.04313
		5	0.0202	0.00581
281	PU239	1	0.0386	0.00037
		2	0.0462	0.00001
		3	0.0516	0.00025
		4	0.0568	0.00001
		5	0.0988	0.00001
		6	0.0136	0.01739
		7	0.0170	0.01629
		8	0.0202	0.00219
282	PU240	1	0.0453	0.00039
		2	0.1036	0.00007
		3	0.0136	0.03948
		4	0.0170	0.03699
		5	0.0202	0.00498
284	PU242	1	0.0447	0.00037
		2	0.0136	0.03920
		3	0.0170	0.03673
		4	0.0202	0.00494
334	AM241	1	0.0139	0.29000
		2	0.0263	0.02500
		3	0.0332	0.00100
		4	0.0434	0.00100
		5	0.0595	0.35300
		6	0.1035	0.00100
404	AM242	1	0.0445	0.00013
		2	0.1038	0.05414
		3	0.0996	0.03070
		4	0.1173	0.02100
		5	0.1218	0.00790
		6	0.0143	0.04354
		7	0.0179	0.04080
		8	0.0214	0.00549
		9	0.0422	0.00042
		10	0.0149	0.08227
		11	0.0193	0.07709
		12	0.0238	0.01038
335	AM243	1	0.0311	0.00046
		2	0.0435	0.03415
		3	0.0747	0.62901
		4	0.0139	0.04777
		5	0.0174	0.04476
		6	0.0208	0.00603
336	CM242	1	0.0441	0.00032
		2	0.1019	0.00002
		3	0.0143	0.04278
		4	0.0179	0.04008
		5	0.0214	0.00540

TABLE 3-1F (continued)

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
403	CM243	1	0.0292	0.00002
		2	0.0446	0.00578
		3	0.0495	0.00101
		4	0.0573	0.00125
		5	0.0678	0.00200
		6	0.0881	0.00015
		7	0.1025	0.00006
		8	0.1061	0.00179
		9	0.1065	0.00114
		10	0.1173	0.00057
		11	0.1663	0.02720
		12	0.1950	0.00079
		13	0.2098	0.02976
		14	0.2242	0.00160
		15	0.2282	0.10112
		16	0.2544	0.00137
		17	0.2702	0.00285
		18	0.2728	0.00077
		19	0.2776	0.13295
		20	0.2855	0.00723
		21	0.3123	0.00191
		22	0.3307	0.00086
		23	0.1038	0.20780
		24	0.0995	0.11793
		25	0.1173	0.08070
		26	0.1218	0.03037
		27	0.0143	0.21459
		28	0.0179	0.20105
		29	0.0214	0.02707
337	CM244	1	0.0429	0.10399
		2	0.0988	0.02020
		3	0.0143	0.02123
		4	0.0179	0.01989
		5	0.0214	0.00268
474	CF252	1	0.3500	0.23200
		2	0.7500	0.28800
		3	1.2500	0.08590
		4	1.7500	0.03890
		5	2.2500	0.01110
		6	2.7500	0.00560
		7	3.2500	0.00283
		8	3.7500	0.00152
		9	4.2500	0.00086
		10	4.7500	0.00041
		11	5.2500	0.00025
		12	5.7500	0.00009
		13	6.2500	0.00005

TABLE 3-1G

EXREM III DATA BASE

DECAY SCHEME PATHWAYS AND BRANCHING FRACTIONS FOR THE RADIONUCLIDE CHAINS

From	To	Fraction
Mg-28	Al-28	1.00
Ca-47	Sc-47	1.00
Ca-49	Sc-49	1.00
Mn-52M	Mn-52	2.00E-2
Fe-52	Mn-52M	1.00
Mn-52M	Mn-52	2.00E-2
Ni-56	Co-56	1.00
Zn-69M	Zn-69	1.00
Ge-77	As-77	1.00
As-77	Se-77M	2.00E-2
As-77	Se-77M	2.00E-2
Br-80M	Br-80	1.00
Br-83	Kr-83M	2.00E-1
Kr-85M	Kr-85	2.30E-1
Kr-88	Rb-88	1.00
Rb-89	Sr-89	1.00
Rb-90	Sr-90	1.00
Sr-90	Y-90	1.00
Sr-90	Y-90	1.00
Sr-91	Y-91M	5.90E-1
Sr-91	Y-91	4.10E-1
Y-91M	Y-91	1.00
Sr-92	Y-92	1.00
Sr-93	Y-93	1.00
Y-87	Sr-87M	1.00
Y-91M	Y-91	1.00
Zr-95	Nb-95M	1.80E-2
Zr-95	Nb-95	9.82E-1
Nb-95M	Nb-95	1.00
Zr-97	Nb-97M	9.42E-1
Zr-97	Nb-97	5.80E-2
Nb-97M	Nb-97	1.00
Nb-95M	Nb-95	1.00
Nb-97M	Nb-97	1.00
Mo-99	Tc-99M	8.63E-1
Mo-99	Tc-99	1.37E-1
Tc-99M	Tc-99	1.00
Tc-99M	Tc-99	1.00
Ru-103	Rh-103M	1.00
Ru-106	Rh-106	1.00
Ag-111	Cd-111M	9.00E-2
Cd-115M	In-115M	5.00E-2
In-114M	In-114	1.00
Sn-113	In-113M	1.00
Sn-125	Sb-125	1.00
Sb-125	Te-125M	2.39E-1
Sb-125	Te-125M	2.39E-1
Sb-127	Te-127M	1.66E-1
Sb-127	Te-127	8.34E-1
Te-127M	Te-127	9.76E-1
Te-127M	Te-127	9.76E-1
Te-129M	Te-129	6.34E-1
Te-129M	I-129	3.66E-1
Te-129	I-129	1.00
Te-129	I-129	1.00
Te-131M	Te-131	1.80E-1
Te-131M	I-131	8.20E-1
Te-131	I-131	1.00
I-131	Xe-131M	1.35E-2
Te-131	I-131	1.00
I-131	Xe-131M	1.35E-2
Te-132	I-132	1.00
I-123	Te-123M	1.00E-3
I-131	Xe-131M	1.35E-2
I-133	Xe-133M	2.40E-2
I-133	Xe-133	9.76E-1
Xe-133M	Xe-133	1.00
I-135	Xe-135M	3.00E-1
I-135	Xe-135	7.00E-1
Xe-135M	Xe-135	1.00
Xe-135	Cs-135	1.00
Xe-133M	Xe-133	1.00
Xe-135M	Xe-135	1.00
Xe-135	Cs-135	1.00
Xe-137	Cs-137	1.00
Cs-137	Ba-137M	9.41E-1
Xe-138	Cs-138	1.00
Cs-137	Ba-137M	9.41E-1
Cs-139	Ba-139	1.00
Ba-140	La-140	1.00
Ce-143	Pr-143	1.00
Ce-144	Pr-144	1.00
Nd-147	Pm-147	1.00
Pm-148M	Pm-148	4.60E-2
Au-195M	Au-195	1.00
Tl-204	Pb-204M	1.00
Tl-210	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00
Bi-210M	Po-210	1.00

TABLE 3-1G (continued)

From	To	Fraction
Bi-212	Tl-208	3.37E-1
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
Ra-226	Rn-222	1.00
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00

From	To	Fraction
Ra-228	Ac-228	1.00
Ac-228	Th-228	1.00
Th-228	Ra-224	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
Ac-228	Th-228	1.00
Th-228	Ra-224	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
Th-228	Ra-224	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
Th-230	Ra-226	1.00
Ra-226	Rn-222	1.00
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Th-232	Ra-228	1.00
Ra-228	Ac-228	1.00
Ac-228	Th-228	1.00
Th-228	Ra-224	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1

From	To	Fraction
Th-234	Pa-234M	1.00
Pa-234M	U-234	1.00
U-234	Th-230	1.00
Th-230	Ra-226	1.00
Ra-226	Rn-222	1.00
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00
Pa-233	U-233	1.00
Pa-234M	U-234	1.00
U-234	Th-230	1.00
Th-230	Ra-226	1.00
Ra-226	Rn-222	1.00
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00
Pa-234	U-234	1.00
U-234	Th-230	1.00
Th-230	Ra-226	1.00
Ra-226	Rn-222	1.00
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00

From	To	Fraction
U-232	Th-228	1.00
Th-228	Ra-224	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
U-234	Th-230	1.00
Th-230	Ra-226	1.00
Ra-226	Rn-222	1.00
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00
U-240	Np-240M	1.00
Np-240M	Pu-240	1.00
Pu-240	U-236	1.00
U-236	Th-232	1.00
Th-232	Ra-228	1.00
Ra-228	Ac-228	1.00
Ac-228	Th-228	1.00
Th-228	Ra-224	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
Np-238	Pu-238	1.00
Pu-238	U-234	1.00
U-234	Th-230	1.00
Th-230	Ra-226	1.00
Ra-226	Rn-222	1.00
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00

TABLE 3-1G (continued)

From	To	Fraction
Np-239	Pu-239	1.00
Pu-239	U-235	1.00
U-235	Th-231	1.00
Np-240M	Pu-240	1.00
Pu-240	U-236	1.00
U-236	Th-232	1.00
Th-232	Ra-228	1.00
Ra-228	Ac-228	1.00
Ac-228	Th-228	1.00
Th-228	Ra-224	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
Pu-236	U-232	1.00
U-232	Th-228	1.00
Th-228	Ra-224	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
Pu-238	U-234	1.00
U-234	Th-230	1.00
Th-230	Ra-226	1.00
Ra-226	Rn-222	1.00
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00

From	To	Fraction
Pu-239	U-235	1.00
U-235	Th-231	1.00
Pu-240	U-236	1.00
U-236	Th-232	1.00
Th-232	Ra-228	1.00
Ra-228	Ac-228	1.00
Ac-228	Th-228	1.00
Th-228	Ra-224	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
Pu-241	Am-241	1.00
Am-241	Np-237	1.00
Np-237	Pa-233	1.00
Pa-233	U-233	1.00
Pu-242	U-238	1.00
U-238	Th-234	1.00
Th-234	Pa-234M	1.00
Pa-234M	U-234	1.00
U-234	Th-230	1.00
Th-230	Ra-226	1.00
Ra-226	Rn-222	1.00
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00

From	To	Fraction
Pu-244	U-240	1.00
U-240	Np-240M	1.00
Np-240M	Pu-240	1.00
Pu-240	U-236	1.00
U-236	Th-232	1.00
Th-232	Ra-228	1.00
Ra-228	Ac-228	1.00
Ac-228	Th-228	1.00
Th-228	Ra-224	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1
Am-241	Np-237	1.00
Np-237	Pa-233	1.00
Pa-233	U-233	1.00
Am-242	Cm-242	8.40E-1
Am-242	Pu-242	1.60E-1
Cm-242	Pu-238	1.00
Pu-242	U-238	1.00
Pu-238	U-234	1.00
U-238	Th-234	1.00
Th-234	Pa-234M	1.00
Pa-234M	U-234	1.00
U-234	Th-230	1.00
Th-230	Ra-226	1.00
Ra-226	Rn-222	1.00
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00

From	To	Fraction
Am-243	Np-239	1.00
Np-239	Pu-239	1.00
Pu-239	U-235	1.00
U-235	Th-231	1.00
Cm-242	Pu-238	1.00
Pu-238	U-234	1.00
U-234	Th-230	1.00
Th-230	Ra-226	1.00
Ra-226	Rn-222	1.00
Rn-222	Po-218	1.00
Po-218	Pb-214	1.00
Pb-214	Bi-214	1.00
Bi-214	Po-214	1.00
Po-214	Pb-210	1.00
Pb-210	Bi-210M	1.00
Bi-210M	Po-210	1.00
Cm-243	Pu-239	1.00
Pu-239	U-235	1.00
U-235	Th-231	1.00
Cm-244	Pu-240	1.00
Pu-240	U-236	1.00
U-236	Th-232	1.00
Th-232	Ra-228	1.00
Ra-228	Ac-228	1.00
Ac-228	Th-228	1.00
Th-228	Ra-224	1.00
Ra-224	Rn-220	1.00
Rn-220	Pb-212	1.00
Pb-212	Bi-212	1.00
Bi-212	Tl-208	3.37E-1

TABLE 3-2A

DOSE RATE (MREM/YR) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
H-3	0.00E+00	5.84E+02	1.40E+04	9.81E+04	4.20E+05	4.97E+06	2.23E+07	3.91E+07	6.15E+07	7.42E+07	8.56E+07	9.07E+07	9.11E+07
BE-7	0.00E+00	8.22E+00	1.96E+02	1.32E+03	4.90E+03	1.50E+04	1.52E+04	1.52E+04	1.52E+04	1.52E+04	1.52E+04	1.52E+04	1.52E+04
C-11	0.00E+00	1.58E+04	1.82E+04	1.82E+04	1.82E+04	1.82E+04	1.82E+04	1.82E+04	1.82E+04	1.82E+04	1.82E+04	1.82E+04	1.82E+04
C-14	0.00E+00	5.08E+03	1.22E+05	8.53E+05	3.66E+06	4.45E+07	2.22E+08	4.45E+08	8.89E+08	1.33E+09	2.22E+09	4.42E+09	2.16E+10
N-13	0.00E+00	1.12E+04	1.14E+04	1.14E+04	1.14E+04	1.14E+04	1.14E+04	1.14E+04	1.14E+04	1.14E+04	1.14E+04	1.14E+04	1.14E+04
O-15	0.00E+00	3.52E+03	3.52E+03	3.52E+03	3.52E+03	3.52E+03	3.52E+03	3.52E+03	3.52E+03	3.52E+03	3.52E+03	3.52E+03	3.52E+03
F-18	0.00E+00	1.91E+04	6.05E+04	6.05E+04	6.05E+04	6.05E+04	6.05E+04	6.05E+04	6.05E+04	6.05E+04	6.05E+04	6.05E+04	6.05E+04
NA-22	0.00E+00	1.83E+04	4.39E+05	3.07E+06	1.30E+07	1.41E+08	4.43E+08	5.60E+08	5.99E+08	6.02E+08	6.02E+08	6.02E+08	6.02E+08
NA-24	0.00E+00	5.13E+04	7.61E+05	1.14E+06	1.14E+06	1.14E+06	1.14E+06	1.14E+06	1.14E+06	1.14E+06	1.14E+06	1.14E+06	1.14E+06
MG-28	0.00E+00	1.24E+05	2.20E+06	4.02E+06	4.04E+06	4.04E+06	4.04E+06	4.04E+06	4.04E+06	4.04E+06	4.04E+06	4.04E+06	4.04E+06
AL-28	0.00E+00	6.30E+03	6.30E+03	6.30E+03	6.30E+03	6.30E+03	6.30E+03	6.30E+03	6.30E+03	6.30E+03	6.30E+03	6.30E+03	6.30E+03
P-32	0.00E+00	6.51E+04	1.53E+06	9.29E+06	2.47E+07	3.23E+07	3.23E+07	3.23E+07	3.23E+07	3.23E+07	3.23E+07	3.23E+07	3.23E+07
P-33	0.00E+00	2.35E+03	5.55E+04	3.51E+05	1.06E+06	1.67E+06	1.67E+06	1.67E+06	1.67E+06	1.67E+06	1.67E+06	1.67E+06	1.67E+06
S-35	0.00E+00	5.28E+03	1.26E+05	8.63E+05	3.38E+06	1.51E+07	1.59E+07	1.59E+07	1.59E+07	1.59E+07	1.59E+07	1.59E+07	1.59E+07
CL-36	0.00E+00	2.41E+04	5.78E+05	4.05E+06	1.74E+07	2.11E+08	1.06E+09	2.11E+09	4.22E+09	6.33E+09	1.06E+10	2.11E+10	1.05E+11
CL-38	0.00E+00	8.91E+04	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05	1.32E+05
A-37	0.00E+00	1.98E+02	4.70E+03	3.10E+04	1.07E+05	2.38E+05	2.39E+05	2.39E+05	2.39E+05	2.39E+05	2.39E+05	2.39E+05	2.39E+05
A-39	0.00E+00	1.91E+04	4.58E+05	3.21E+06	1.38E+07	1.67E+08	8.31E+08	1.65E+09	3.26E+09	4.83E+09	7.85E+09	1.48E+10	4.71E+10
K-40	0.00E+00	4.29E+04	1.03E+06	7.21E+06	3.09E+07	3.76E+08	1.88E+09	3.76E+09	7.52E+09	1.13E+10	1.88E+10	3.76E+10	1.88E+11
K-42	0.00E+00	1.30E+05	1.77E+06	2.39E+06	2.39E+06	2.39E+06	2.39E+06	2.39E+06	2.39E+06	2.39E+06	2.39E+06	2.39E+06	2.39E+06
K-43	0.00E+00	2.83E+04	4.85E+05	9.14E+05	9.19E+05	9.19E+05	9.19E+05	9.19E+05	9.19E+05	9.19E+05	9.19E+05	9.19E+05	9.19E+05
CA-45	0.00E+00	8.21E+03	1.97E+05	1.36E+06	5.55E+06	3.65E+07	4.63E+07	4.64E+07	4.64E+07	4.64E+07	4.64E+07	4.64E+07	4.64E+07
CA-47	0.00E+00	3.30E+04	7.70E+05	4.30E+06	7.61E+06	7.75E+06	7.75E+06	7.75E+06	7.75E+06	7.75E+06	7.75E+06	7.75E+06	7.75E+06
CA-49	0.00E+00	2.39E+04	3.32E+04	3.32E+04	3.32E+04	3.32E+04	3.32E+04	3.32E+04	3.32E+04	3.32E+04	3.32E+04	3.32E+04	3.32E+04
SC-46	0.00E+00	1.16E+04	2.77E+05	1.89E+06	7.40E+06	3.20E+07	3.37E+07	3.37E+07	3.37E+07	3.37E+07	3.37E+07	3.37E+07	3.37E+07
SC-47	0.00E+00	1.62E+04	3.54E+05	1.46E+06	1.92E+06	1.93E+06	1.93E+06	1.93E+06	1.93E+06	1.93E+06	1.93E+06	1.93E+06	1.93E+06
SC-49	0.00E+00	5.47E+04	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05
CR-51	0.00E+00	3.51E+02	8.32E+03	5.41E+04	1.78E+05	3.37E+05	3.37E+05	3.37E+05	3.37E+05	3.37E+05	3.37E+05	3.37E+05	3.37E+05
MN-52M	0.00E+00	4.72E+04	5.51E+04	5.51E+04	5.51E+04	5.51E+04	5.51E+04	5.51E+04	5.51E+04	5.51E+04	5.51E+04	5.51E+04	5.51E+04
MN-52	0.00E+00	6.11E+03	1.38E+05	6.90E+05	1.17E+06	1.20E+06	1.20E+06	1.20E+06	1.20E+06	1.20E+06	1.20E+06	1.20E+06	1.20E+06
MN-54	0.00E+00	3.72E+02	8.92E+03	6.20E+04	2.59E+05	2.23E+06	3.96E+06	4.02E+06	4.03E+06	4.03E+06	4.03E+06	4.03E+06	4.03E+06
FE-52	0.00E+00	7.56E+04	1.29E+06	1.50E+06	1.50E+06	1.50E+06	1.50E+06	1.50E+06	1.50E+06	1.50E+06	1.50E+06	1.50E+06	1.50E+06
FE-55	0.00E+00	3.92E+02	9.40E+03	6.57E+04	2.79E+05	3.03E+06	9.67E+06	1.24E+07	1.33E+07	1.34E+07	1.34E+07	1.34E+07	1.34E+07
FE-59	0.00E+00	1.23E+04	2.93E+05	1.96E+06	7.08E+06	1.89E+07	1.90E+07	1.90E+07	1.90E+07	1.90E+07	1.90E+07	1.90E+07	1.90E+07
CO-56	0.00E+00	1.41E+04	3.37E+05	2.30E+06	8.92E+06	3.68E+07	3.83E+07	3.83E+07	3.83E+07	3.83E+07	3.83E+07	3.83E+07	3.83E+07
CO-57	0.00E+00	1.72E+03	4.12E+04	2.86E+05	1.19E+06	9.80E+06	1.60E+07	1.61E+07	1.62E+07	1.62E+07	1.62E+07	1.62E+07	1.62E+07
CO-58	0.00E+00	2.94E+03	7.02E+04	4.77E+05	1.84E+06	7.05E+06	7.26E+06	7.26E+06	7.26E+06	7.26E+06	7.26E+06	7.26E+06	7.26E+06
CO-60	0.00E+00	1.02E+04	2.45E+05	1.71E+06	7.30E+06	8.37E+07	3.27E+08	4.97E+08	6.30E+08	6.66E+08	6.78E+08	6.79E+08	6.79E+08
NI-56	0.00E+00	7.05E+02	1.74E+04	1.37E+05	6.53E+05	3.00E+06	3.13E+06	3.13E+06	3.13E+06	3.13E+06	3.13E+06	3.13E+06	3.13E+06
NI-63	0.00E+00	1.95E+03	4.68E+04	3.28E+05	1.40E+06	1.70E+07	8.39E+07	1.65E+08	3.19E+08	4.63E+08	7.22E+08	1.23E+09	2.39E+09
CU-64	0.00E+00	1.16E+04	1.59E+05	2.19E+05	2.19E+05	2.19E+05	2.19E+05	2.19E+05	2.19E+05	2.19E+05	2.19E+05	2.19E+05	2.19E+05
ZN-65	0.00E+00	6.20E+02	1.49E+04	1.03E+05	4.28E+05	3.38E+06	5.20E+06	5.23E+06	5.23E+06	5.23E+06	5.23E+06	5.23E+06	5.23E+06
ZN-69M	0.00E+00	1.09E+04	4.48E+05	6.62E+05	6.62E+05	6.62E+05	6.62E+05	6.62E+05	6.62E+05	6.62E+05	6.62E+05	6.62E+05	6.62E+05
ZN-69	0.00E+00	2.19E+04	4.24E+04	4.24E+04	4.24E+04	4.24E+04	4.24E+04	4.24E+04	4.24E+04	4.24E+04	4.24E+04	4.24E+04	4.24E+04
GA-67	0.00E+00	3.00E+03	6.51E+04	2.63E+05	3.39E+05	3.40E+05	3.40E+05	3.40E+05	3.40E+05	3.40E+05	3.40E+05	3.40E+05	3.40E+05
GA-68	0.00E+00	5.20E+04	1.14E+05	1.14E+05	1.14E+05	1.14E+05	1.14E+05	1.14E+05	1.14E+05	1.14E+05	1.14E+05	1.14E+05	1.14E+05

TABLE 3-2A (continued)

DOSE RATE (MREM/YR) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
GE-77	0.00E+00	5.61E+04	7.88E+05	1.28E+06	1.31E+06	1.31E+06	1.31E+06	1.31E+06	1.31E+06	1.31E+06	1.31E+06	1.31E+06	1.31E+06
AS-76	0.00E+00	9.81E+04	1.77E+06	3.73E+06	3.77E+06	3.77E+06	3.77E+06	3.77E+06	3.77E+06	3.77E+06	3.77E+06	3.77E+06	3.77E+06
AS-77	0.00E+00	2.24E+04	4.42E+05	1.20E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06
SE-75	0.00E+00	1.39E+03	3.33E+04	2.29E+05	9.19E+05	5.07E+06	5.77E+06	5.77E+06	5.77E+06	5.77E+06	5.77E+06	5.77E+06	5.77E+06
SE-77M	0.00E+00	4.83E+01	4.83E+01	4.83E+01	4.83E+01	4.83E+01	4.83E+01	4.83E+01	4.83E+01	4.83E+01	4.83E+01	4.83E+01	4.83E+01
BR-80M	0.00E+00	4.52E+04	4.60E+05	4.72E+05	4.72E+05	4.72E+05	4.72E+05	4.72E+05	4.72E+05	4.72E+05	4.72E+05	4.72E+05	4.72E+05
BR-80	0.00E+00	2.60E+04	2.86E+04	2.86E+04	2.86E+04	2.86E+04	2.86E+04	2.86E+04	2.86E+04	2.86E+04	2.86E+04	2.86E+04	2.86E+04
BR-82	0.00E+00	1.43E+04	2.76E+05	7.08E+05	7.35E+05	7.35E+05	7.35E+05	7.35E+05	7.35E+05	7.35E+05	7.35E+05	7.35E+05	7.35E+05
BR-83	0.00E+00	1.38E+04	5.73E+04	5.74E+04	5.74E+04	5.74E+04	5.74E+04	5.74E+04	5.74E+04	5.74E+04	5.74E+04	5.74E+04	5.74E+04
BR-84	0.00E+00	6.44E+04	8.85E+04	8.85E+04	8.85E+04	8.85E+04	8.85E+04	8.85E+04	8.85E+04	8.85E+04	8.85E+04	8.85E+04	8.85E+04
KR-79	0.00E+00	2.08E+03	4.01E+04	1.02E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05
KR-83M	0.00E+00	2.97E+03	9.55E+03	9.55E+03	9.55E+03	9.55E+03	9.55E+03	9.55E+03	9.55E+03	9.55E+03	9.55E+03	9.55E+03	9.55E+03
KR-85M	0.00E+00	2.29E+04	1.56E+05	1.60E+05	1.60E+05	1.62E+05	1.69E+05	1.76E+05	1.84E+05	1.89E+05	1.92E+05	1.93E+05	1.93E+05
KR-85	0.00E+00	2.27E+04	5.45E+05	3.81E+06	1.63E+07	1.93E+08	8.50E+08	1.47E+09	2.23E+09	2.64E+09	2.96E+09	3.08E+09	3.08E+09
KR-87	0.00E+00	9.63E+04	2.28E+05	2.28E+05	2.28E+05	2.28E+05	2.28E+05	2.28E+05	2.28E+05	2.28E+05	2.28E+05	2.28E+05	2.28E+05
KR-88	0.00E+00	1.40E+05	9.27E+05	9.30E+05	9.30E+05	9.30E+05	9.30E+05	9.30E+05	9.30E+05	9.30E+05	9.30E+05	9.30E+05	9.30E+05
RB-84	0.00E+00	1.13E+04	2.68E+05	1.77E+06	6.09E+06	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07
RB-86	0.00E+00	6.07E+04	1.43E+06	8.98E+06	2.63E+07	3.92E+07	3.92E+07	3.92E+07	3.92E+07	3.92E+07	3.92E+07	3.92E+07	3.92E+07
RB-88	0.00E+00	7.59E+04	8.39E+04	8.39E+04	8.39E+04	8.39E+04	8.39E+04	8.39E+04	8.39E+04	8.39E+04	8.39E+04	8.39E+04	8.39E+04
RB-89	0.00E+00	1.92E+04	2.08E+04	2.23E+04	2.70E+04	3.94E+04	3.95E+04	3.95E+04	3.95E+04	3.95E+04	3.95E+04	3.95E+04	3.95E+04
RB-90	0.00E+00	1.10E+04	1.10E+04	1.10E+04	1.11E+04	1.12E+04	1.18E+04	1.25E+04	1.36E+04	1.45E+04	1.57E+04	1.71E+04	1.77E+04
SR-85	0.00E+00	7.94E+02	1.90E+04	1.29E+05	4.89E+05	1.76E+06	1.79E+06	1.79E+06	1.79E+06	1.79E+06	1.79E+06	1.79E+06	1.79E+06
SR-87M	0.00E+00	5.65E+03	2.58E+04	2.58E+04	2.58E+04	2.58E+04	2.58E+04	2.58E+04	2.58E+04	2.58E+04	2.58E+04	2.58E+04	2.58E+04
SR-89	0.00E+00	5.20E+04	1.24E+06	8.33E+06	3.07E+07	9.03E+07	9.10E+07	9.10E+07	9.10E+07	9.10E+07	9.10E+07	9.10E+07	9.10E+07
SR-90	0.00E+00	1.82E+04	6.69E+05	1.07E+07	6.62E+07	8.84E+08	4.25E+09	8.02E+09	1.43E+10	1.93E+10	2.63E+10	3.43E+10	3.78E+10
SR-91	0.00E+00	5.70E+04	6.85E+05	8.80E+05	1.05E+06	1.57E+06	1.58E+06	1.58E+06	1.58E+06	1.58E+06	1.58E+06	1.58E+06	1.58E+06
SR-92	0.00E+00	3.02E+04	5.94E+05	6.11E+05	6.11E+05	6.11E+05	6.11E+05	6.11E+05	6.11E+05	6.11E+05	6.11E+05	6.11E+05	6.11E+05
SR-93	0.00E+00	2.35E+04	3.83E+04	4.22E+04	4.22E+04	4.22E+04	4.22E+04	4.22E+04	4.22E+04	4.22E+04	4.22E+04	4.22E+04	4.22E+04
Y-87	0.00E+00	1.80E+03	1.40E+05	6.54E+05	8.61E+05	8.63E+05	8.63E+05	8.63E+05	8.63E+05	8.63E+05	8.63E+05	8.63E+05	8.63E+05
Y-88	0.00E+00	5.21E+02	1.25E+04	8.56E+04	3.41E+05	1.74E+06	1.92E+06	1.92E+06	1.92E+06	1.92E+06	1.92E+06	1.92E+06	1.92E+06
Y-90	0.00E+00	8.48E+04	1.80E+06	6.60E+06	7.87E+06	7.88E+06	7.88E+06	7.88E+06	7.88E+06	7.88E+06	7.88E+06	7.88E+06	7.88E+06
Y-91M	0.00E+00	1.96E+03	4.20E+03	8.81E+03	2.37E+04	6.85E+04	6.93E+04	6.93E+04	6.93E+04	6.93E+04	6.93E+04	6.93E+04	6.93E+04
Y-91	0.00E+00	5.51E+04	1.31E+06	8.87E+06	3.32E+07	1.07E+08	1.08E+08	1.08E+08	1.08E+08	1.08E+08	1.08E+08	1.08E+08	1.08E+08
Y-92	0.00E+00	1.23E+05	6.82E+05	6.88E+05	6.88E+05	6.88E+05	6.88E+05	6.88E+05	6.88E+05	6.88E+05	6.88E+05	6.88E+05	6.88E+05
Y-93	0.00E+00	1.05E+05	1.29E+06	1.60E+06	1.60E+06	1.60E+06	1.60E+06	1.60E+06	1.60E+06	1.60E+06	1.60E+06	1.60E+06	1.60E+06
ZR-95	0.00E+00	1.24E+04	2.98E+05	2.08E+06	8.56E+06	3.88E+07	3.99E+07	3.99E+07	3.99E+07	3.99E+07	3.99E+07	3.99E+07	3.99E+07
ZR-97	0.00E+00	7.51E+04	1.65E+06	2.68E+06	2.68E+06	2.68E+06	2.68E+06	2.68E+06	2.68E+06	2.68E+06	2.68E+06	2.68E+06	2.68E+06
NB-95M	0.00E+00	1.48E+04	3.26E+05	1.41E+06	2.09E+06	2.48E+06	2.48E+06	2.48E+06	2.48E+06	2.48E+06	2.48E+06	2.48E+06	2.48E+06
NB-95	0.00E+00	4.91E+03	1.17E+05	7.70E+05	2.67E+06	5.96E+06	5.97E+06	5.97E+06	5.97E+06	5.97E+06	5.97E+06	5.97E+06	5.97E+06
NB-97M	0.00E+00	4.32E+02	9.81E+02	9.81E+02	9.81E+02	9.81E+02	9.81E+02	9.81E+02	9.81E+02	9.81E+02	9.81E+02	9.81E+02	9.81E+02
NB-97	0.00E+00	3.37E+04	7.81E+04	7.81E+04	7.81E+04	7.81E+04	7.81E+04	7.81E+04	7.81E+04	7.81E+04	7.81E+04	7.81E+04	7.81E+04
MO-99	0.00E+00	3.89E+04	8.48E+05	3.19E+06	3.85E+06	3.86E+06	3.86E+06	3.86E+06	3.86E+06	3.86E+06	3.86E+06	3.86E+06	3.86E+06
TC-99M	0.00E+00	1.51E+03	1.30E+04	1.39E+04	1.39E+04	1.39E+04	1.39E+04	1.39E+04	1.39E+04	1.39E+04	1.39E+04	1.39E+04	1.40E+04
TC-99	0.00E+00	8.97E+03	2.15E+05	1.51E+06	6.46E+06	7.86E+07	3.93E+08	7.86E+08	1.57E+09	2.36E+09	3.93E+09	7.86E+09	3.93E+10
RU-103	0.00E+00	8.20E+03	2.50E+05	1.69E+06	5.98E+06	1.46E+07	1.47E+07	1.47E+07	1.47E+07	1.47E+07	1.47E+07	1.47E+07	1.47E+07
RU-106	0.00E+00	1.32E+05	3.19E+06	2.22E+07	9.32E+07	8.44E+08	1.65E+09	1.70E+09	1.70E+09	1.70E+09	1.70E+09	1.70E+09	1.70E+09
RH-103M	0.00E+00	2.48E+03	4.74E+03	4.74E+03	4.74E+03	4.74E+03	4.74E+03	4.74E+03	4.74E+03	4.74E+03	4.74E+03	4.74E+03	4.74E+03

TABLE 3-2A (continued)

DOSE RATE (MREM/YR) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
RH-105	0.00E+00	1.54E+04	2.99E+05	7.69E+05	7.99E+05	7.99E+05	7.99E+05	7.99E+05	7.99E+05	7.99E+05	7.99E+05	7.99E+05	7.99E+05
RH-106	0.00E+00	1.58E+03	1.58E+03	1.58E+03	1.58E+03	1.58E+03	1.58E+03	1.58E+03	1.58E+03	1.58E+03	1.58E+03	1.58E+03	1.58E+03
PD-103	0.00E+00	4.73E+03	1.11E+05	6.94E+05	1.99E+06	2.87E+06	2.87E+06	2.87E+06	2.87E+06	2.87E+06	2.87E+06	2.87E+06	2.87E+06
AG-110M	0.00E+00	7.46E+03	1.79E+05	1.24E+06	5.15E+06	4.11E+07	6.43E+07	6.47E+07	6.47E+07	6.47E+07	6.47E+07	6.47E+07	6.47E+07
AG-111	0.00E+00	3.36E+04	7.72E+05	4.16E+06	8.16E+06	8.69E+06	8.69E+06	8.69E+06	8.69E+06	8.69E+06	8.69E+06	8.69E+06	8.69E+06
CD-111M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD-113M	0.00E+00	3.42E-01	3.42E-01	3.42E-01	3.42E-01	3.42E-01	3.42E-01	3.42E-01	3.42E-01	3.42E-01	3.42E-01	3.42E-01	3.42E-01
CD-115M	0.00E+00	1.93E+04	4.72E+05	3.19E+06	1.15E+07	3.09E+07	3.10E+07	3.10E+07	3.10E+07	3.10E+07	3.10E+07	3.10E+07	3.10E+07
IN-113M	0.00E+00	1.01E+04	2.94E+04	2.94E+04	2.94E+04	2.94E+04	2.94E+04	2.94E+04	2.94E+04	2.94E+04	2.94E+04	2.94E+04	2.94E+04
IN-114M	0.00E+00	3.80E+04	9.22E+05	6.20E+06	2.28E+07	6.66E+07	6.70E+07	6.70E+07	6.70E+07	6.70E+07	6.70E+07	6.70E+07	6.70E+07
IN-114	0.00E+00	7.22E+02	7.22E+02	7.22E+02	7.22E+02	7.22E+02	7.22E+02	7.22E+02	7.22E+02	7.22E+02	7.22E+02	7.22E+02	7.22E+02
IN-115M	0.00E+00	1.57E+04	1.07E+05	1.10E+05	1.10E+05	1.10E+05	1.10E+05	1.10E+05	1.10E+05	1.10E+05	1.10E+05	1.10E+05	1.10E+05
SN-113	0.00E+00	2.89E+03	2.80E+05	2.10E+06	8.50E+06	4.58E+07	5.15E+07	5.15E+07	5.15E+07	5.15E+07	5.15E+07	5.15E+07	5.15E+07
SN-119M	0.00E+00	7.29E+03	1.75E+05	1.21E+06	5.03E+06	3.98E+07	6.15E+07	6.18E+07	6.18E+07	6.18E+07	6.18E+07	6.18E+07	6.18E+07
SN-123	0.00E+00	4.93E+04	1.18E+06	8.13E+06	3.28E+07	1.89E+08	2.20E+08	2.20E+08	2.20E+08	2.20E+08	2.20E+08	2.20E+08	2.20E+08
SN-125	0.00E+00	8.10E+04	1.88E+06	1.07E+07	2.40E+07	2.81E+07	3.06E+07	3.16E+07	3.19E+07	3.20E+07	3.20E+07	3.20E+07	3.20E+07
SB-122	0.00E+00	5.28E+04	1.12E+06	4.16E+06	5.00E+06	5.00E+06	5.00E+06	5.00E+06	5.00E+06	5.00E+06	5.00E+06	5.00E+06	5.00E+06
SB-124	0.00E+00	3.67E+04	8.76E+05	5.92E+06	2.23E+07	7.54E+07	7.65E+07	7.65E+07	7.65E+07	7.65E+07	7.65E+07	7.65E+07	7.65E+07
SB-125	0.00E+00	1.23E+04	2.95E+05	2.08E+06	9.03E+06	1.09E+08	3.61E+08	4.64E+08	5.01E+08	5.04E+08	5.04E+08	5.04E+08	5.04E+08
SB-127	0.00E+00	3.06E+04	8.79E+05	4.54E+06	6.54E+06	7.62E+06	7.77E+06	7.77E+06	7.77E+06	7.77E+06	7.77E+06	7.77E+06	7.77E+06
TE-123M	0.00E+00	9.20E+03	2.20E+05	1.51E+06	6.08E+06	3.35E+07	3.81E+07	3.81E+07	3.81E+07	3.81E+07	3.81E+07	3.81E+07	3.81E+07
TE-125M	0.00E+00	9.62E+03	2.30E+05	1.55E+06	5.82E+06	1.91E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07
TE-127M	0.00E+00	4.30E+04	1.28E+06	1.02E+07	4.16E+07	2.17E+08	2.41E+08	2.41E+08	2.41E+08	2.41E+08	2.41E+08	2.41E+08	2.41E+08
TE-127	0.00E+00	2.13E+04	2.48E+05	2.98E+05	2.98E+05	2.98E+05	2.98E+05	2.98E+05	2.98E+05	2.98E+05	2.98E+05	2.98E+05	2.98E+05
TE-129M	0.00E+00	3.66E+04	1.65E+06	1.13E+07	3.89E+07	8.41E+07	8.41E+07	8.41E+07	8.41E+07	8.41E+07	8.41E+07	8.41E+07	8.41E+07
TE-129	0.00E+00	5.69E+04	1.27E+05	1.27E+05	1.27E+05	1.27E+05	1.27E+05	1.27E+05	1.27E+05	1.27E+05	1.27E+05	1.27E+05	1.27E+05
TE-131M	0.00E+00	3.02E+04	6.80E+05	1.84E+06	2.34E+06	2.42E+06	2.42E+06	2.42E+06	2.42E+06	2.42E+06	2.42E+06	2.42E+06	2.42E+06
TE-131	0.00E+00	3.20E+04	4.05E+04	4.48E+04	5.04E+04	5.13E+04	5.13E+04	5.13E+04	5.13E+04	5.13E+04	5.13E+04	5.13E+04	5.13E+04
TE-132	0.00E+00	1.35E+04	1.12E+06	5.06E+06	6.56E+06	6.57E+06	6.57E+06	6.57E+06	6.57E+06	6.57E+06	6.57E+06	6.57E+06	6.57E+06
I-123	0.00E+00	2.50E+03	3.49E+04	4.86E+04	4.86E+04	4.87E+04	4.88E+04	4.88E+04	4.88E+04	4.88E+04	4.88E+04	4.88E+04	4.88E+04
I-124	0.00E+00	1.77E+04	3.94E+05	1.77E+06	2.55E+06	2.57E+06	2.57E+06	2.57E+06	2.57E+06	2.57E+06	2.57E+06	2.57E+06	2.57E+06
I-125	0.00E+00	1.96E+03	4.68E+04	3.16E+05	1.19E+06	3.99E+06	4.05E+06	4.05E+06	4.05E+06	4.05E+06	4.05E+06	4.05E+06	4.05E+06
I-126	0.00E+00	1.40E+04	3.27E+05	1.96E+06	5.03E+06	6.30E+06	6.30E+06	6.30E+06	6.30E+06	6.30E+06	6.30E+06	6.30E+06	6.30E+06
I-129	0.00E+00	5.77E+03	1.38E+05	9.69E+05	4.15E+06	5.05E+07	2.53E+08	5.05E+08	1.01E+09	1.52E+09	2.53E+09	5.05E+09	2.53E+10
I-130	0.00E+00	2.78E+04	3.78E+05	5.12E+05	5.12E+05	5.12E+05	5.12E+05	5.12E+05	5.12E+05	5.12E+05	5.12E+05	5.12E+05	5.12E+05
I-131	0.00E+00	1.95E+04	4.49E+05	2.46E+06	5.05E+06	5.48E+06	5.48E+06	5.48E+06	5.48E+06	5.48E+06	5.48E+06	5.48E+06	5.48E+06
I-132	0.00E+00	4.48E+04	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05
I-133	0.00E+00	4.05E+04	6.98E+05	1.47E+06	1.67E+06	1.68E+06	1.68E+06	1.68E+06	1.68E+06	1.68E+06	1.68E+06	1.68E+06	1.68E+06
I-134	0.00E+00	4.35E+04	7.96E+04	7.96E+04	7.96E+04	7.96E+04	7.96E+04	7.96E+04	7.96E+04	7.96E+04	7.96E+04	7.96E+04	7.96E+04
I-135	0.00E+00	3.16E+04	4.74E+05	6.10E+05	6.10E+05	6.10E+05	6.10E+05	6.10E+05	6.10E+05	6.10E+05	6.10E+05	6.10E+05	6.10E+05
I-136	0.00E+00	5.86E+03	5.86E+03	5.86E+03	5.86E+03	5.86E+03	5.86E+03	5.86E+03	5.86E+03	5.86E+03	5.86E+03	5.86E+03	5.86E+03
XE-131M	0.00E+00	1.33E+04	3.10E+05	1.84E+06	4.55E+06	5.52E+06	5.52E+06	5.52E+06	5.52E+06	5.52E+06	5.52E+06	5.52E+06	5.52E+06
XE-133M	0.00E+00	1.78E+04	3.88E+05	1.65E+06	2.42E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06
XE-133	0.00E+00	1.39E+04	3.13E+05	1.53E+06	2.50E+06	2.55E+06	2.55E+06	2.55E+06	2.55E+06	2.55E+06	2.55E+06	2.55E+06	2.55E+06
XE-135M	0.00E+00	3.70E+03	1.28E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04	1.47E+04
XE-135	0.00E+00	2.98E+04	3.42E+05	4.09E+05	4.09E+05	4.09E+05	4.09E+05	4.09E+05	4.09E+05	4.09E+05	4.09E+05	4.09E+05	4.09E+05
XE-137	0.00E+00	1.59E+04	1.59E+04	1.59E+04	1.59E+04	1.59E+04	1.61E+04	1.63E+04	1.67E+04	1.69E+04	1.73E+04	1.78E+04	1.80E+04

TABLE 3-2A (continued)

DOSE RATE (MREM/YR) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
XE-138	0.00E+00	4.21E+04	6.03E+04	6.03E+04	6.03E+04	6.03E+04	6.03E+04	6.03E+04	6.03E+04	6.03E+04	6.03E+04	6.03E+04	6.03E+04
CS-134	0.00E+00	1.70E+04	4.08E+05	2.85E+06	1.21E+07	1.26E+08	3.60E+08	4.28E+08	4.42E+08	4.43E+08	4.43E+08	4.43E+08	4.43E+08
CS-135	0.00E+00	6.21E+03	1.49E+05	1.04E+06	4.47E+06	5.44E+07	2.72E+08	5.44E+08	1.09E+09	1.63E+09	2.72E+09	5.44E+09	2.72E+10
CS-136	0.00E+00	1.42E+04	3.32E+05	1.99E+06	5.10E+06	6.39E+06	6.39E+06	6.39E+06	6.39E+06	6.39E+06	6.39E+06	6.39E+06	6.39E+06
CS-137	0.00E+00	2.24E+04	5.45E+05	3.81E+06	1.63E+07	1.97E+08	9.40E+08	1.78E+09	3.19E+09	4.31E+09	5.91E+09	7.78E+09	8.65E+09
CS-138	0.00E+00	5.67E+04	7.82E+04	7.82E+04	7.82E+04	7.82E+04	7.82E+04	7.82E+04	7.82E+04	7.82E+04	7.82E+04	7.82E+04	7.82E+04
CS-139	0.00E+00	4.07E+04	5.39E+04	5.39E+04	5.39E+04	5.39E+04	5.39E+04	5.39E+04	5.39E+04	5.39E+04	5.39E+04	5.39E+04	5.39E+04
BA-133	0.00E+00	4.92E+03	1.18E+05	8.26E+05	3.53E+06	4.17E+07	1.83E+08	3.15E+08	4.76E+08	5.59E+08	6.24E+08	6.46E+08	6.47E+08
BA-137M	0.00E+00	3.46E+02	3.46E+02	3.46E+02	3.46E+02	3.46E+02	3.46E+02	3.46E+02	3.46E+02	3.46E+02	3.46E+02	3.46E+02	3.46E+02
BA-139	0.00E+00	6.63E+04	1.69E+05	1.69E+05	1.69E+05	1.69E+05	1.69E+05	1.69E+05	1.69E+05	1.69E+05	1.69E+05	1.69E+05	1.69E+05
BA-140	0.00E+00	3.07E+04	9.22E+05	9.15E+06	2.80E+07	3.57E+07	3.57E+07	3.57E+07	3.57E+07	3.57E+07	3.57E+07	3.57E+07	3.57E+07
LA-140	0.00E+00	4.99E+04	9.89E+05	2.76E+06	2.92E+06	2.92E+06	2.92E+06	2.92E+06	2.92E+06	2.92E+06	2.92E+06	2.92E+06	2.92E+06
CE-141	0.00E+00	1.72E+04	4.08E+05	2.68E+06	9.14E+06	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07
CE-143	0.00E+00	3.95E+04	7.71E+05	2.21E+06	3.06E+06	3.42E+06	3.42E+06	3.42E+06	3.42E+06	3.42E+06	3.42E+06	3.42E+06	3.42E+06
CE-144	0.00E+00	7.92E+04	2.87E+06	2.02E+07	8.43E+07	7.05E+08	1.18E+09	1.19E+09	1.19E+09	1.19E+09	1.19E+09	1.19E+09	1.19E+09
PR-143	0.00E+00	3.05E+04	7.14E+05	4.31E+06	1.12E+07	1.43E+07	1.43E+07	1.43E+07	1.43E+07	1.43E+07	1.43E+07	1.43E+07	1.43E+07
PR-144	0.00E+00	4.23E+04	4.65E+04	4.65E+04	4.65E+04	4.65E+04	4.65E+04	4.65E+04	4.65E+04	4.65E+04	4.65E+04	4.65E+04	4.65E+04
ND-147	0.00E+00	2.64E+04	6.14E+05	3.59E+06	8.60E+06	1.07E+07	1.20E+07	1.25E+07	1.26E+07	1.26E+07	1.26E+07	1.26E+07	1.26E+07
PM-147	0.00E+00	6.60E+03	1.58E+05	1.11E+06	4.70E+06	5.08E+07	1.60E+08	2.03E+08	2.18E+08	2.19E+08	2.19E+08	2.19E+08	2.19E+08
PM-148M	0.00E+00	1.24E+04	3.00E+05	2.13E+06	8.34E+06	2.20E+07	2.20E+07	2.20E+07	2.20E+07	2.20E+07	2.20E+07	2.20E+07	2.20E+07
PM-148	0.00E+00	6.53E+04	1.47E+06	7.25E+06	1.19E+07	1.22E+07	1.22E+07	1.22E+07	1.22E+07	1.22E+07	1.22E+07	1.22E+07	1.22E+07
SM-151	0.00E+00	2.15E+03	5.16E+04	3.61E+05	1.55E+06	1.88E+07	9.23E+07	1.81E+08	3.48E+08	5.03E+08	7.77E+08	1.30E+09	2.32E+09
EU-154	0.00E+00	2.80E+04	6.72E+05	4.70E+06	2.01E+07	2.36E+08	1.01E+09	1.68E+09	2.42E+09	2.75E+09	2.96E+09	3.01E+09	3.01E+09
EU-155	0.00E+00	6.65E+03	1.60E+05	1.12E+06	4.76E+06	5.44E+07	2.10E+08	3.14E+08	3.92E+08	4.11E+08	4.17E+08	4.17E+08	4.17E+08
EU-156	0.00E+00	4.01E+04	9.41E+05	5.77E+06	1.57E+07	2.11E+07	2.11E+07	2.11E+07	2.11E+07	2.11E+07	2.11E+07	2.11E+07	2.11E+07
GD-162	0.00E+00	7.79E+03	7.91E+03	7.91E+03	7.91E+03	7.91E+03	7.91E+03	7.91E+03	7.91E+03	7.91E+03	7.91E+03	7.91E+03	7.91E+03
TB-160	0.00E+00	2.70E+04	6.45E+05	4.38E+06	1.69E+07	6.47E+07	6.66E+07	6.66E+07	6.66E+07	6.66E+07	6.66E+07	6.66E+07	6.66E+07
TA-182	0.00E+00	1.99E+04	4.76E+05	3.27E+06	1.31E+07	7.05E+07	7.92E+07	7.93E+07	7.93E+07	7.93E+07	7.93E+07	7.93E+07	7.93E+07
W-185	0.00E+00	1.29E+04	3.08E+05	2.10E+06	8.11E+06	3.24E+07	3.35E+07	3.35E+07	3.35E+07	3.35E+07	3.35E+07	3.35E+07	3.35E+07
W-187	0.00E+00	2.42E+04	4.25E+05	8.42E+05	8.48E+05	8.48E+05	8.48E+05	8.48E+05	8.48E+05	8.48E+05	8.48E+05	8.48E+05	8.48E+05
AU-195M	0.00E+00	1.22E+02	1.23E+02	1.24E+02	1.30E+02	1.73E+02	1.90E+02	1.90E+02	1.90E+02	1.90E+02	1.90E+02	1.90E+02	1.90E+02
AU-195	0.00E+00	5.58E+03	1.34E+05	9.25E+05	3.80E+06	2.66E+07	3.57E+07	3.57E+07	3.57E+07	3.57E+07	3.57E+07	3.57E+07	3.57E+07
AU-198	0.00E+00	3.16E+04	6.73E+05	2.48E+06	2.97E+06	2.97E+06	2.97E+06	2.97E+06	2.97E+06	2.97E+06	2.97E+06	2.97E+06	2.97E+06
AU-199	0.00E+00	1.45E+04	3.14E+05	1.25E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06
HG-197	0.00E+00	5.77E+03	1.23E+05	4.49E+05	5.36E+05	5.37E+05	5.37E+05	5.37E+05	5.37E+05	5.37E+05	5.37E+05	5.37E+05	5.37E+05
HG-203	0.00E+00	9.81E+03	2.34E+05	1.57E+06	5.70E+06	1.58E+07	1.58E+07	1.58E+07	1.58E+07	1.58E+07	1.58E+07	1.58E+07	1.58E+07
TL-204	0.00E+00	2.32E+04	5.57E+05	3.89E+06	1.66E+07	1.86E+08	6.65E+08	9.32E+08	1.08E+09	1.10E+09	1.11E+09	1.11E+09	1.11E+09
TL-208	0.00E+00	4.13E+03	4.13E+03	4.13E+03	4.13E+03	4.13E+03	4.13E+03	4.13E+03	4.13E+03	4.13E+03	4.13E+03	4.13E+03	4.13E+03
TL-210	0.00E+00	4.10E-04	1.64E-02	3.20E-01	2.58E+00	3.87E+01	1.85E+02	3.43E+02	5.96E+02	7.81E+02	1.02E+03	1.23E+03	1.29E+03
PB-204M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PB-210	0.00E+00	3.82E+03	1.49E+05	2.89E+06	2.32E+07	3.49E+08	1.67E+09	3.10E+09	5.37E+09	7.04E+09	9.16E+09	1.11E+10	1.16E+10
PB-212	0.00E+00	3.38E+04	9.93E+05	1.28E+06	1.28E+06	1.28E+06	1.28E+06	1.28E+06	1.28E+06	1.28E+06	1.28E+06	1.28E+06	1.28E+06
PB-214	0.00E+00	3.64E+04	5.90E+04	5.90E+04	5.91E+04	5.98E+04	6.28E+04	6.61E+04	7.13E+04	7.51E+04	8.00E+04	8.44E+04	8.56E+04
BI-210M	0.00E+00	3.74E+04	8.41E+05	4.04E+06	6.40E+06	6.51E+06	6.51E+06	6.51E+06	6.51E+06	6.51E+06	6.51E+06	6.51E+06	6.51E+06
BI-212	0.00E+00	4.75E+04	9.73E+04	9.73E+04	9.73E+04	9.73E+04	9.73E+04	9.73E+04	9.73E+04	9.73E+04	9.73E+04	9.73E+04	9.73E+04
BI-214	0.00E+00	2.58E+04	2.94E+04	2.94E+04	2.94E+04	3.00E+04	3.22E+04	3.46E+04	3.85E+04	4.13E+04	4.48E+04	4.81E+04	4.90E+04

TABLE 3-2A (continued)

DOSE RATE (MREM/YR) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
PO-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PO-214	0.00E+00	8.90E-10	3.46E-08	6.73E-07	5.42E-06	8.14E-05	3.89E-04	7.23E-04	1.25E-03	1.64E-03	2.14E-03	2.59E-03	2.71E-03
PO-218	0.00E+00	3.90E+03	6.71E+03	6.71E+03	6.72E+03	6.80E+03	7.15E+03	7.52E+03	8.11E+03	8.54E+03	9.10E+03	9.60E+03	9.74E+03
RN-220	0.00E+00	4.76E+01	1.44E+03	1.86E+03	1.86E+03	1.86E+03	1.86E+03	1.86E+03	1.86E+03	1.86E+03	1.86E+03	1.86E+03	1.86E+03
RN-222	0.00E+00	2.53E+04	1.93E+06	8.68E+06	1.21E+07	1.23E+07	1.29E+07	1.36E+07	1.46E+07	1.54E+07	1.64E+07	1.73E+07	1.76E+07
RA-224	0.00E+00	1.13E+03	8.62E+05	7.37E+06	1.05E+07	1.06E+07	1.06E+07	1.06E+07	1.06E+07	1.06E+07	1.06E+07	1.06E+07	1.06E+07
RA-226	0.00E+00	1.31E+03	2.02E+05	6.80E+06	5.46E+07	8.05E+08	4.18E+09	8.60E+09	1.80E+10	2.80E+10	4.90E+10	1.04E+11	5.18E+11
RA-228	0.00E+00	5.23E+03	2.96E+05	2.66E+06	1.22E+07	2.48E+08	2.16E+09	4.35E+09	6.49E+09	7.15E+09	7.41E+09	7.44E+09	7.44E+09
AC-228	0.00E+00	1.12E+04	9.75E+04	1.06E+05	1.22E+05	3.32E+05	7.40E+05	8.44E+05	8.64E+05	8.65E+05	8.65E+05	8.65E+05	8.65E+05
TH-228	0.00E+00	1.99E+03	1.07E+05	5.66E+06	4.93E+07	6.23E+08	1.74E+09	2.02E+09	2.08E+09	2.08E+09	2.08E+09	2.08E+09	2.08E+09
TH-230	0.00E+00	1.40E+03	3.36E+04	2.35E+05	1.01E+06	1.24E+07	6.58E+07	1.41E+08	3.21E+08	5.43E+08	1.12E+09	3.38E+09	6.30E+10
TH-231	0.00E+00	1.57E+04	2.80E+05	5.79E+05	5.85E+05	5.85E+05	5.85E+05	5.85E+05	5.85E+05	5.85E+05	5.85E+05	5.85E+05	5.85E+05
TH-232	0.00E+00	1.55E+03	3.12E+04	2.01E+05	8.97E+05	2.31E+07	6.20E+08	2.67E+09	9.54E+09	1.79E+10	3.58E+10	8.11E+10	4.44E+11
TH-234	0.00E+00	1.35E+05	3.26E+06	2.10E+07	6.65E+07	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08
PA-233	0.00E+00	2.06E+04	4.88E+05	3.17E+06	1.03E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07
PA-234M	0.00E+00	2.24E+03	2.24E+03	2.24E+03	2.24E+03	2.24E+03	2.24E+03	2.24E+03	2.24E+03	2.24E+03	2.24E+03	2.24E+03	2.24E+03
PA-234	0.00E+00	6.78E+04	6.30E+05	6.87E+05	6.87E+05	6.87E+05	6.87E+05	6.87E+05	6.87E+05	6.87E+05	6.87E+05	6.87E+05	6.87E+05
U-232	0.00E+00	1.59E+03	3.82E+04	2.81E+05	1.77E+06	1.31E+08	2.05E+09	5.41E+09	1.22E+10	1.84E+10	2.91E+10	4.84E+10	7.90E+10
U-233	0.00E+00	6.53E+02	1.57E+04	1.10E+05	4.70E+05	5.72E+06	2.86E+07	5.72E+07	1.14E+08	1.72E+08	2.86E+08	5.72E+08	2.86E+09
U-234	0.00E+00	1.29E+03	3.10E+04	2.17E+05	9.29E+05	1.13E+07	5.65E+07	1.13E+08	2.26E+08	3.39E+08	5.65E+08	1.13E+09	5.75E+09
U-235	0.00E+00	3.92E+03	1.90E+05	2.71E+06	1.35E+07	1.71E+08	8.58E+08	1.72E+09	3.43E+09	5.15E+09	8.58E+09	1.72E+10	8.58E+10
U-236	0.00E+00	1.08E+03	2.59E+04	1.81E+05	7.78E+05	9.46E+06	4.73E+07	9.46E+07	1.89E+08	2.84E+08	4.73E+08	9.46E+08	4.73E+09
U-237	0.00E+00	1.86E+04	4.24E+05	2.23E+06	4.15E+06	4.35E+06	4.35E+06	4.35E+06	4.35E+06	4.35E+06	4.35E+06	4.35E+06	4.35E+06
U-238	0.00E+00	3.36E+03	7.21E+04	2.34E+06	3.34E+07	1.10E+09	5.96E+09	1.20E+10	2.42E+10	3.63E+10	6.07E+10	1.21E+11	6.08E+11
U-240	0.00E+00	6.48E+04	1.09E+06	1.58E+06	1.58E+06	1.58E+06	1.58E+06	1.58E+06	1.58E+06	1.58E+06	1.58E+06	1.58E+06	1.58E+06
NP-237	0.00E+00	1.91E+03	5.19E+04	6.12E+05	5.86E+06	1.78E+08	9.66E+08	1.95E+09	3.92E+09	5.89E+09	9.84E+09	1.97E+10	9.85E+10
NP-238	0.00E+00	2.21E+04	4.57E+05	1.47E+06	1.64E+06	1.64E+06	1.64E+06	1.64E+06	1.65E+06	1.65E+06	1.66E+06	1.68E+06	1.71E+06
NP-239	0.00E+00	2.55E+04	5.34E+05	1.83E+06	2.09E+06	2.09E+06	2.09E+06	2.09E+06	2.09E+06	2.09E+06	2.09E+06	2.09E+06	2.09E+06
NP-240M	0.00E+00	1.14E+04	1.15E+04	1.15E+04	1.15E+04	1.15E+04	1.15E+04	1.15E+04	1.15E+04	1.15E+04	1.15E+04	1.15E+04	1.15E+04
PU-236	0.00E+00	1.24E+03	2.98E+04	2.08E+05	8.85E+05	1.01E+07	5.92E+07	1.61E+08	4.19E+08	6.72E+08	1.11E+09	1.91E+09	3.17E+09
PU-238	0.00E+00	1.01E+03	2.42E+04	1.70E+05	7.27E+05	8.81E+06	4.34E+07	8.51E+07	1.64E+09	2.36E+08	3.66E+08	6.12E+08	1.10E+09
PU-239	0.00E+00	7.17E+02	1.72E+04	1.20E+05	5.16E+05	6.28E+06	3.14E+07	6.28E+07	1.26E+08	1.88E+08	3.14E+08	6.27E+08	3.12E+09
PU-240	0.00E+00	9.04E+02	2.17E+04	1.52E+05	6.51E+05	7.92E+06	3.96E+07	7.91E+07	1.58E+08	2.37E+08	3.95E+08	7.88E+08	3.86E+09
PU-241	0.00E+00	5.41E+02	1.30E+04	9.09E+04	3.89E+05	4.65E+06	2.17E+07	3.98E+07	6.83E+07	8.95E+07	1.20E+08	1.70E+08	4.13E+08
PU-242	0.00E+00	8.80E+02	2.11E+04	1.48E+05	6.34E+05	7.71E+06	3.85E+07	7.71E+07	1.54E+08	2.31E+08	3.85E+08	7.71E+08	3.85E+09
PU-244	0.00E+00	1.44E+03	7.62E+05	1.15E+07	5.44E+07	6.79E+08	3.40E+09	6.80E+09	1.36E+10	2.04E+10	3.40E+10	6.81E+10	3.40E+11
AM-241	0.00E+00	3.06E+03	7.34E+04	5.14E+05	2.20E+06	2.68E+07	1.33E+08	2.66E+08	5.28E+08	7.85E+08	1.29E+09	2.48E+09	9.23E+09
AM-242	0.00E+00	2.19E+03	3.35E+04	5.22E+04	5.39E+04	6.61E+04	7.06E+04	7.13E+04	7.27E+04	7.40E+04	7.62E+04	8.06E+04	8.92E+04
AM-243	0.00E+00	1.60E+03	1.17E+05	2.73E+06	1.74E+07	2.36E+08	1.19E+09	2.37E+09	4.75E+09	7.12E+09	1.19E+10	2.37E+10	1.16E+11
CM-242	0.00E+00	9.34E+02	2.24E+04	1.55E+05	6.32E+05	4.18E+06	5.46E+06	5.68E+06	6.08E+06	6.45E+06	7.11E+06	8.37E+06	1.09E+07
CM-243	0.00E+00	1.26E+04	3.02E+05	2.12E+06	9.06E+06	1.09E+08	5.19E+08	9.78E+08	1.74E+09	2.34E+09	3.17E+09	4.09E+09	4.47E+09
CM-244	0.00E+00	4.48E+02	1.08E+04	7.52E+04	3.22E+05	3.85E+06	1.79E+07	3.26E+07	5.48E+07	6.99E+07	8.74E+07	1.01E+08	1.11E+08
CF-252	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 3-2B

DOSE RATE (MREM/YR) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
H-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BE-7	0.00E+00	9.19E+03	2.19E+05	1.48E+06	5.48E+06	1.68E+07	1.70E+07	1.70E+07	1.70E+07	1.70E+07	1.70E+07	1.70E+07	1.70E+07
C-11	0.00E+00	8.15E+04	9.37E+04	9.37E+04	9.37E+04	9.37E+04	9.37E+04	9.37E+04	9.37E+04	9.37E+04	9.37E+04	9.37E+04	9.37E+04
C-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-13	0.00E+00	4.51E+04	4.58E+04	4.58E+04	4.58E+04	4.58E+04	4.58E+04	4.58E+04	4.58E+04	4.58E+04	4.58E+04	4.58E+04	4.58E+04
O-15	0.00E+00	9.34E+03	9.34E+03	9.34E+03	9.34E+03	9.34E+03	9.34E+03	9.34E+03	9.34E+03	9.34E+03	9.34E+03	9.34E+03	9.34E+03
F-18	0.00E+00	1.54E+05	4.88E+05	4.89E+05	4.89E+05	4.89E+05	4.89E+05	4.89E+05	4.89E+05	4.89E+05	4.89E+05	4.89E+05	4.89E+05
NA-22	0.00E+00	4.11E+05	9.86E+06	6.89E+07	2.93E+08	3.16E+09	9.95E+09	1.26E+10	1.34E+10	1.35E+10	1.35E+10	1.35E+10	1.35E+10
NA-24	0.00E+00	7.53E+05	1.12E+07	1.67E+07	1.67E+07	1.67E+07	1.67E+07	1.67E+07	1.67E+07	1.67E+07	1.67E+07	1.67E+07	1.67E+07
MG-28	0.00E+00	5.56E+05	9.67E+06	1.77E+07	1.77E+07	1.77E+07	1.77E+07	1.77E+07	1.77E+07	1.77E+07	1.77E+07	1.77E+07	1.77E+07
AL-28	0.00E+00	1.79E+04	1.79E+04	1.79E+04	1.79E+04	1.79E+04	1.79E+04	1.79E+04	1.79E+04	1.79E+04	1.79E+04	1.79E+04	1.79E+04
P-32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
P-33	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
S-35	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CL-36	0.00E+00	8.60E-01	2.06E+01	1.44E+02	6.19E+02	7.53E+03	3.77E+04	7.53E+04	1.51E+05	2.26E+05	3.77E+05	7.53E+05	3.76E+06
CL-38	0.00E+00	1.68E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05
A-37	0.00E+00	5.07E+01	1.20E+03	7.95E+03	2.75E+04	6.11E+04	6.11E+04	6.11E+04	6.11E+04	6.11E+04	6.11E+04	6.11E+04	6.11E+04
A-39	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
K-40	0.00E+00	2.92E+04	7.01E+05	4.91E+06	2.10E+07	2.56E+08	1.28E+09	2.56E+09	5.12E+09	7.67E+09	1.28E+10	2.56E+10	1.28E+11
K-42	0.00E+00	5.01E+04	6.79E+05	9.18E+05	9.18E+05	9.18E+05	9.18E+05	9.18E+05	9.18E+05	9.18E+05	9.18E+05	9.18E+05	9.18E+05
K-43	0.00E+00	1.81E+05	3.11E+06	5.86E+06	5.89E+06	5.89E+06	5.89E+06	5.89E+06	5.89E+06	5.89E+06	5.89E+06	5.89E+06	5.89E+06
CA-45	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CA-47	0.00E+00	1.98E+05	4.47E+06	2.17E+07	3.41E+07	3.46E+07	3.46E+07	3.46E+07	3.46E+07	3.46E+07	3.46E+07	3.46E+07	3.46E+07
CA-49	0.00E+00	1.23E+05	1.24E+05	1.24E+05	1.24E+05	1.24E+05	1.24E+05	1.24E+05	1.24E+05	1.24E+05	1.24E+05	1.24E+05	1.24E+05
SC-46	0.00E+00	3.76E+05	8.99E+06	6.14E+07	2.40E+08	1.04E+09	1.09E+09	1.09E+09	1.09E+09	1.09E+09	1.09E+09	1.09E+09	1.09E+09
SC-47	0.00E+00	2.08E+04	4.54E+05	1.87E+06	2.46E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06
SC-49	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CR-51	0.00E+00	6.12E+03	1.45E+05	9.43E+05	3.10E+06	5.87E+06	5.87E+06	5.87E+06	5.87E+06	5.87E+06	5.87E+06	5.87E+06	5.87E+06
MN-52M	0.00E+00	2.02E+05	2.36E+05	2.39E+05	2.42E+05	2.42E+05	2.42E+05	2.42E+05	2.42E+05	2.42E+05	2.42E+05	2.42E+05	2.42E+05
MN-52	0.00E+00	6.33E+05	1.43E+07	7.15E+07	1.21E+08	1.24E+08	1.24E+08	1.24E+08	1.24E+08	1.24E+08	1.24E+08	1.24E+08	1.24E+08
MN-54	0.00E+00	1.56E+05	3.74E+06	2.60E+07	1.09E+08	9.37E+08	1.66E+09	1.69E+09	1.69E+09	1.69E+09	1.69E+09	1.69E+09	1.69E+09
FE-52	0.00E+00	3.79E+05	6.13E+06	7.20E+06	7.26E+06	7.27E+06	7.27E+06	7.27E+06	7.27E+06	7.27E+06	7.27E+06	7.27E+06	7.27E+06
FE-55	0.00E+00	2.86E+02	6.86E+03	4.79E+04	2.04E+05	2.21E+06	7.06E+06	9.01E+06	9.71E+06	9.76E+06	9.76E+06	9.76E+06	9.76E+06
FE-59	0.00E+00	2.23E+05	5.31E+06	3.55E+07	1.28E+08	3.43E+08	3.44E+08	3.44E+08	3.44E+08	3.44E+08	3.44E+08	3.44E+08	3.44E+08
CO-56	0.00E+00	6.77E+05	1.62E+07	1.10E+08	4.28E+08	1.77E+09	1.84E+09	1.84E+09	1.84E+09	1.84E+09	1.84E+09	1.84E+09	1.84E+09
CO-57	0.00E+00	2.34E+04	5.61E+05	3.90E+06	1.62E+07	1.33E+08	2.18E+08	2.20E+08	2.20E+08	2.20E+08	2.20E+08	2.20E+08	2.20E+08
CO-58	0.00E+00	1.82E+05	4.35E+06	2.96E+07	1.14E+08	4.36E+08	4.49E+08	4.49E+08	4.49E+08	4.49E+08	4.49E+08	4.49E+08	4.49E+08
CO-60	0.00E+00	4.68E+05	1.12E+07	7.85E+07	3.35E+08	3.84E+09	1.50E+10	2.28E+10	2.89E+10	3.05E+10	3.11E+10	3.11E+10	3.11E+10
NI-56	0.00E+00	3.26E+05	7.49E+06	4.06E+07	9.12E+07	2.06E+08	2.12E+08	2.12E+08	2.12E+08	2.12E+08	2.12E+08	2.12E+08	2.12E+08
NI-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CU-64	0.00E+00	3.60E+04	4.96E+05	6.80E+05	6.80E+05	6.80E+05	6.80E+05	6.80E+05	6.80E+05	6.80E+05	6.80E+05	6.80E+05	6.80E+05
ZN-65	0.00E+00	1.09E+05	2.61E+06	1.81E+07	7.52E+07	5.94E+08	9.15E+08	9.20E+08	9.20E+08	9.20E+08	9.20E+08	9.20E+08	9.20E+08
ZN-69M	0.00E+00	7.59E+04	1.09E+06	1.56E+06	1.56E+06	1.56E+06	1.56E+06	1.56E+06	1.56E+06	1.56E+06	1.56E+06	1.56E+06	1.56E+06
ZN-69	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GA-67	0.00E+00	3.43E+04	7.46E+05	3.02E+06	3.89E+06	3.90E+06	3.90E+06	3.90E+06	3.90E+06	3.90E+06	3.90E+06	3.90E+06	3.90E+06
GA-68	0.00E+00	1.33E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05	2.90E+05

TABLE 3-2B (continued)

DOSE RATE (MREM/YR) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
GE-77	0.00E+00	1.77E+05	2.29E+06	2.99E+06	3.00E+06	3.00E+06	3.00E+06	3.00E+06	3.00E+06	3.00E+06	3.00E+06	3.00E+06	3.00E+06
AS-76	0.00E+00	8.01E+04	1.44E+06	3.04E+06	3.08E+06	3.08E+06	3.08E+06	3.08E+06	3.08E+06	3.08E+06	3.08E+06	3.08E+06	3.08E+06
AS-77	0.00E+00	1.79E+03	3.53E+04	9.62E+04	1.01E+05	1.01E+05	1.01E+05	1.01E+05	1.01E+05	1.01E+05	1.01E+05	1.01E+05	1.01E+05
SE-75	0.00E+00	1.05E+05	2.51E+06	1.73E+07	6.94E+07	3.83E+08	4.36E+08	4.36E+08	4.36E+08	4.36E+08	4.36E+08	4.36E+08	4.36E+08
SE-77M	0.00E+00	1.09E+02	1.09E+02	1.09E+02	1.09E+02	1.09E+02	1.09E+02	1.09E+02	1.09E+02	1.09E+02	1.09E+02	1.09E+02	1.09E+02
BR-80M	0.00E+00	1.33E+04	1.26E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05
BR-80	0.00E+00	6.01E+03	6.61E+03	6.61E+03	6.61E+03	6.61E+03	6.61E+03	6.61E+03	6.61E+03	6.61E+03	6.61E+03	6.61E+03	6.61E+03
BR-82	0.00E+00	4.96E+05	9.59E+06	2.46E+07	2.56E+07	2.56E+07	2.56E+07	2.56E+07	2.56E+07	2.56E+07	2.56E+07	2.56E+07	2.56E+07
BR-83	0.00E+00	3.06E+03	1.25E+04	1.25E+04	1.25E+04	1.25E+04	1.25E+04	1.25E+04	1.25E+04	1.25E+04	1.25E+04	1.25E+04	1.25E+04
BR-84	0.00E+00	1.94E+05	2.67E+05	2.67E+05	2.67E+05	2.67E+05	2.67E+05	2.67E+05	2.67E+05	2.67E+05	2.67E+05	2.67E+05	2.67E+05
KR-79	0.00E+00	4.43E+04	8.53E+05	2.17E+06	2.25E+06	2.25E+06	2.25E+06	2.25E+06	2.25E+06	2.25E+06	2.25E+06	2.25E+06	2.25E+06
KR-83M	0.00E+00	4.23E+02	1.36E+03	1.36E+03	1.36E+03	1.36E+03	1.36E+03	1.36E+03	1.36E+03	1.36E+03	1.36E+03	1.36E+03	1.36E+03
KR-85M	0.00E+00	2.72E+04	1.85E+05	1.90E+05	1.90E+05	1.90E+05	1.90E+05	1.90E+05	1.90E+05	1.91E+05	1.91E+05	1.91E+05	1.91E+05
KR-85	0.00E+00	3.84E+02	9.22E+03	6.45E+04	2.76E+05	3.26E+06	1.44E+07	2.48E+07	3.78E+07	4.46E+07	5.00E+07	5.20E+07	5.21E+07
KR-87	0.00E+00	1.12E+05	2.65E+05	2.65E+05	2.65E+05	2.65E+05	2.65E+05	2.65E+05	2.65E+05	2.65E+05	2.65E+05	2.65E+05	2.65E+05
KR-88	0.00E+00	4.02E+05	2.02E+06	2.02E+06	2.02E+06	2.02E+06	2.02E+06	2.02E+06	2.02E+06	2.02E+06	2.02E+06	2.02E+06	2.02E+06
RB-84	0.00E+00	1.65E+05	3.92E+06	2.58E+07	8.89E+07	1.94E+08	1.94E+08	1.94E+08	1.94E+08	1.94E+08	1.94E+08	1.94E+08	1.94E+08
RB-86	0.00E+00	1.77E+04	4.17E+05	2.62E+06	7.68E+06	1.14E+07	1.14E+07	1.14E+07	1.14E+07	1.14E+07	1.14E+07	1.14E+07	1.14E+07
RB-88	0.00E+00	4.89E+04	5.41E+04	5.41E+04	5.41E+04	5.41E+04	5.41E+04	5.41E+04	5.41E+04	5.41E+04	5.41E+04	5.41E+04	5.41E+04
RB-89	0.00E+00	1.52E+05	1.63E+05	1.63E+05	1.63E+05	1.63E+05	1.63E+05	1.63E+05	1.63E+05	1.63E+05	1.63E+05	1.63E+05	1.63E+05
RB-90	0.00E+00	3.13E+04	3.13E+04	3.13E+04	3.13E+04	3.13E+04	3.13E+04	3.13E+04	3.13E+04	3.13E+04	3.13E+04	3.13E+04	3.13E+04
SR-85	0.00E+00	9.69E+04	2.31E+06	1.57E+07	5.97E+07	2.14E+08	2.19E+08	2.19E+08	2.19E+08	2.19E+08	2.19E+08	2.19E+08	2.19E+08
SR-87M	0.00E+00	5.46E+04	2.49E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05	2.50E+05
SR-89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR-91	0.00E+00	1.52E+05	2.21E+06	2.69E+06	2.69E+06	2.70E+06	2.70E+06	2.70E+06	2.70E+06	2.70E+06	2.70E+06	2.70E+06	2.70E+06
SR-92	0.00E+00	2.11E+05	1.09E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06
SR-93	0.00E+00	5.06E+04	5.27E+04	5.32E+04	5.32E+04	5.32E+04	5.32E+04	5.32E+04	5.32E+04	5.32E+04	5.32E+04	5.32E+04	5.32E+04
Y-87	0.00E+00	9.53E+04	3.05E+06	1.33E+07	1.74E+07	1.74E+07	1.74E+07	1.74E+07	1.74E+07	1.74E+07	1.74E+07	1.74E+07	1.74E+07
Y-88	0.00E+00	5.03E+05	1.20E+07	8.26E+07	3.29E+08	1.68E+09	1.86E+09	1.86E+09	1.86E+09	1.86E+09	1.86E+09	1.86E+09	1.86E+09
Y-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y-91M	0.00E+00	6.61E+04	1.17E+05	1.17E+05	1.17E+05	1.17E+05	1.17E+05	1.17E+05	1.17E+05	1.17E+05	1.17E+05	1.17E+05	1.17E+05
Y-91	0.00E+00	4.52E+02	1.08E+04	7.28E+04	2.72E+05	8.76E+05	8.86E+05	8.86E+05	8.86E+05	8.86E+05	8.86E+05	8.86E+05	8.86E+05
Y-92	0.00E+00	4.19E+04	2.33E+05	2.35E+05	2.35E+05	2.35E+05	2.35E+05	2.35E+05	2.35E+05	2.35E+05	2.35E+05	2.35E+05	2.35E+05
Y-93	0.00E+00	1.36E+04	1.67E+05	2.08E+05	2.08E+05	2.08E+05	2.08E+05	2.08E+05	2.08E+05	2.08E+05	2.08E+05	2.08E+05	2.08E+05
ZR-95	0.00E+00	1.36E+05	3.28E+06	2.36E+07	1.07E+08	6.12E+08	6.33E+08	6.33E+08	6.33E+08	6.33E+08	6.33E+08	6.33E+08	6.33E+08
ZR-97	0.00E+00	1.84E+05	4.26E+06	6.92E+06	6.93E+06	6.93E+06	6.93E+06	6.93E+06	6.93E+06	6.93E+06	6.93E+06	6.93E+06	6.93E+06
NB-95M	0.00E+00	1.06E+04	2.63E+05	2.04E+06	8.18E+06	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07
NB-95	0.00E+00	1.43E+05	3.40E+06	2.24E+07	7.77E+07	1.74E+08	1.74E+08	1.74E+08	1.74E+08	1.74E+08	1.74E+08	1.74E+08	1.74E+08
NB-97M	0.00E+00	4.08E+03	5.63E+03	5.63E+03	5.63E+03	5.63E+03	5.63E+03	5.63E+03	5.63E+03	5.63E+03	5.63E+03	5.63E+03	5.63E+03
NB-97	0.00E+00	9.47E+04	2.20E+05	2.20E+05	2.20E+05	2.20E+05	2.20E+05	2.20E+05	2.20E+05	2.20E+05	2.20E+05	2.20E+05	2.20E+05
MO-99	0.00E+00	3.13E+04	9.35E+05	3.97E+06	4.83E+06	4.83E+06	4.83E+06	4.83E+06	4.83E+06	4.83E+06	4.83E+06	4.83E+06	4.83E+06
TC-99M	0.00E+00	2.22E+04	1.91E+05	2.04E+05	2.04E+05	2.04E+05	2.04E+05	2.04E+05	2.04E+05	2.04E+05	2.04E+05	2.04E+05	2.04E+05
TC-99	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU-103	0.00E+00	9.06E+04	2.16E+06	1.44E+07	5.09E+07	1.24E+08	1.25E+08	1.25E+08	1.25E+08	1.25E+08	1.25E+08	1.25E+08	1.25E+08
RU-106	0.00E+00	3.44E+04	8.34E+05	5.81E+06	2.44E+07	2.21E+08	4.30E+08	4.44E+08	4.45E+08	4.45E+08	4.45E+08	4.45E+08	4.45E+08
RH-103M	0.00E+00	2.31E+02	4.40E+02	4.40E+02	4.40E+02	4.40E+02	4.40E+02	4.40E+02	4.40E+02	4.40E+02	4.40E+02	4.40E+02	4.40E+02

TABLE 3-2B (continued)

DOSE RATE (MREM/YR) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
RH-105	0.00E+00	1.45E+04	2.80E+05	7.20E+05	7.48E+05	7.48E+05	7.48E+05	7.48E+05	7.48E+05	7.48E+05	7.48E+05	7.48E+05	7.48E+05
RH-106	0.00E+00	4.17E+02	4.17E+02	4.17E+02	4.17E+02	4.17E+02	4.17E+02	4.17E+02	4.17E+02	4.17E+02	4.17E+02	4.17E+02	4.17E+02
PD-103	0.00E+00	3.92E+02	9.22E+03	5.75E+04	1.65E+05	2.38E+05	2.38E+05	2.38E+05	2.38E+05	2.38E+05	2.38E+05	2.38E+05	2.38E+05
AG-110M	0.00E+00	5.10E+05	1.22E+07	8.49E+07	3.52E+08	2.81E+09	4.39E+09	4.42E+09	4.42E+09	4.42E+09	4.42E+09	4.42E+09	4.42E+09
AG-111	0.00E+00	7.89E+03	2.77E+05	1.53E+06	3.00E+06	3.20E+06	3.20E+06	3.20E+06	3.20E+06	3.20E+06	3.20E+06	3.20E+06	3.20E+06
CD-111M	0.00E+00	4.99E+04	8.69E+04	8.69E+04	8.69E+04	8.69E+04	8.69E+04	8.69E+04	8.69E+04	8.69E+04	8.69E+04	8.69E+04	8.69E+04
CD-113M	0.00E+00	1.33E-03	1.33E-03	1.33E-03	1.33E-03	1.33E-03	1.33E-03	1.33E-03	1.33E-03	1.33E-03	1.33E-03	1.33E-03	1.33E-03
CD-115M	0.00E+00	6.20E+03	1.69E+05	1.18E+06	4.27E+06	1.14E+07	1.15E+07	1.15E+07	1.15E+07	1.15E+07	1.15E+07	1.15E+07	1.15E+07
IN-113M	0.00E+00	3.85E+04	1.13E+05	1.13E+05	1.13E+05	1.13E+05	1.13E+05	1.13E+05	1.13E+05	1.13E+05	1.13E+05	1.13E+05	1.13E+05
IN-114M	0.00E+00	1.61E+04	3.84E+05	2.58E+06	9.49E+06	2.77E+07	2.79E+07	2.79E+07	2.79E+07	2.79E+07	2.79E+07	2.79E+07	2.79E+07
IN-114	0.00E+00	1.46E+01	1.46E+01	1.46E+01	1.46E+01	1.46E+01	1.46E+01	1.46E+01	1.46E+01	1.46E+01	1.46E+01	1.46E+01	1.46E+01
IN-115M	0.00E+00	2.45E+04	1.67E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05	1.71E+05
SN-113	0.00E+00	1.41E+04	1.15E+06	8.54E+06	3.45E+07	1.86E+08	2.09E+08	2.09E+08	2.09E+08	2.09E+08	2.09E+08	2.09E+08	2.09E+08
SN-119M	0.00E+00	2.03E+03	4.87E+04	3.38E+05	1.40E+06	1.11E+07	1.71E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07
SN-123	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SN-125	0.00E+00	5.82E+04	1.35E+06	7.73E+06	1.76E+07	2.56E+07	3.97E+07	4.55E+07	4.76E+07	4.78E+07	4.78E+07	4.78E+07	4.78E+07
SB-122	0.00E+00	7.69E+04	1.64E+06	6.06E+06	7.28E+06	7.28E+06	7.28E+06	7.28E+06	7.28E+06	7.28E+06	7.28E+06	7.28E+06	7.28E+06
SB-124	0.00E+00	3.43E+05	8.18E+06	5.54E+07	2.09E+08	7.04E+08	7.15E+08	7.15E+08	7.15E+08	7.15E+08	7.15E+08	7.15E+08	7.15E+08
SB-125	0.00E+00	8.33E+04	2.00E+06	1.40E+07	5.95E+07	6.54E+08	2.11E+09	2.70E+09	2.91E+09	2.93E+09	2.93E+09	2.93E+09	2.93E+09
SB-127	0.00E+00	1.24E+05	2.73E+06	1.18E+07	1.63E+07	1.64E+07	1.65E+07	1.65E+07	1.65E+07	1.65E+07	1.65E+07	1.65E+07	1.65E+07
TE-123M	0.00E+00	2.75E+04	6.58E+05	4.53E+06	1.82E+07	1.00E+08	1.14E+08	1.14E+08	1.14E+08	1.14E+08	1.14E+08	1.14E+08	1.14E+08
TE-125M	0.00E+00	6.63E+03	1.58E+05	1.07E+06	4.01E+06	1.31E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07
TE-127M	0.00E+00	1.73E+03	5.01E+04	3.91E+05	1.59E+06	8.31E+06	9.21E+06	9.21E+06	9.21E+06	9.21E+06	9.21E+06	9.21E+06	9.21E+06
TE-127	0.00E+00	7.32E+02	8.51E+03	1.02E+04	1.02E+04	1.02E+04	1.02E+04	1.02E+04	1.02E+04	1.02E+04	1.02E+04	1.02E+04	1.02E+04
TE-129M	0.00E+00	8.98E+03	3.41E+05	2.32E+06	7.99E+06	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07
TE-129	0.00E+00	9.35E+03	2.09E+04	2.09E+04	2.09E+04	2.09E+04	2.09E+04	2.09E+04	2.09E+04	2.09E+04	2.09E+04	2.09E+04	2.09E+04
TE-131M	0.00E+00	2.65E+05	5.12E+06	1.27E+07	1.47E+07	1.50E+07	1.50E+07	1.50E+07	1.50E+07	1.50E+07	1.50E+07	1.50E+07	1.50E+07
TE-131	0.00E+00	3.78E+04	5.00E+04	6.58E+04	8.59E+04	8.91E+04	8.91E+04	8.91E+04	8.91E+04	8.91E+04	8.91E+04	8.91E+04	8.91E+04
TE-132	0.00E+00	9.61E+04	8.79E+06	3.98E+07	5.17E+07	5.18E+07	5.18E+07	5.18E+07	5.18E+07	5.18E+07	5.18E+07	5.18E+07	5.18E+07
I-123	0.00E+00	3.08E+04	4.30E+05	5.97E+05	5.97E+05	5.98E+05	5.98E+05	5.98E+05	5.98E+05	5.98E+05	5.98E+05	5.98E+05	5.98E+05
I-124	0.00E+00	2.03E+05	4.51E+06	2.03E+07	2.93E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07
I-125	0.00E+00	7.71E+03	1.84E+05	1.24E+06	4.69E+06	1.57E+07	1.59E+07	1.59E+07	1.59E+07	1.59E+07	1.59E+07	1.59E+07	1.59E+07
I-126	0.00E+00	8.08E+04	1.89E+06	1.13E+07	2.91E+07	3.64E+07	3.64E+07	3.64E+07	3.64E+07	3.64E+07	3.64E+07	3.64E+07	3.64E+07
I-129	0.00E+00	4.62E+03	1.11E+05	7.76E+05	3.33E+06	4.05E+07	2.02E+08	4.05E+08	8.09E+08	1.21E+09	2.02E+09	4.05E+09	2.02E+10
I-130	0.00E+00	3.70E+05	5.02E+06	6.80E+06	6.80E+06	6.80E+06	6.80E+06	6.80E+06	6.80E+06	6.80E+06	6.80E+06	6.80E+06	6.80E+06
I-131	0.00E+00	7.07E+04	1.63E+06	8.93E+06	1.82E+07	1.97E+07	1.97E+07	1.97E+07	1.97E+07	1.97E+07	1.97E+07	1.97E+07	1.97E+07
I-132	0.00E+00	3.64E+05	1.39E+06	1.39E+06	1.39E+06	1.39E+06	1.39E+06	1.39E+06	1.39E+06	1.39E+06	1.39E+06	1.39E+06	1.39E+06
I-133	0.00E+00	1.23E+05	2.08E+06	3.91E+06	4.04E+06	4.05E+06	4.05E+06	4.05E+06	4.05E+06	4.05E+06	4.05E+06	4.05E+06	4.05E+06
I-134	0.00E+00	3.08E+05	5.63E+05	5.63E+05	5.63E+05	5.63E+05	5.63E+05	5.63E+05	5.63E+05	5.63E+05	5.63E+05	5.63E+05	5.63E+05
I-135	0.00E+00	3.24E+05	3.31E+06	3.74E+06	3.74E+06	3.74E+06	3.74E+06	3.74E+06	3.74E+06	3.74E+06	3.74E+06	3.74E+06	3.74E+06
I-136	0.00E+00	1.76E+04	1.76E+04	1.76E+04	1.76E+04	1.76E+04	1.76E+04	1.76E+04	1.76E+04	1.76E+04	1.76E+04	1.76E+04	1.76E+04
XE-131M	0.00E+00	3.72E+03	8.67E+04	5.14E+05	1.27E+06	1.54E+06	1.54E+06	1.54E+06	1.54E+06	1.54E+06	1.54E+06	1.54E+06	1.54E+06
XE-133M	0.00E+00	7.53E+03	1.67E+05	7.70E+05	1.21E+06	1.23E+06	1.23E+06	1.23E+06	1.23E+06	1.23E+06	1.23E+06	1.23E+06	1.23E+06
XE-133	0.00E+00	8.34E+03	1.88E+05	9.19E+05	1.50E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06
XE-135M	0.00E+00	2.83E+04	4.35E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04
XE-135	0.00E+00	4.41E+04	5.07E+05	6.06E+05	6.06E+05	6.06E+05	6.06E+05	6.06E+05	6.06E+05	6.06E+05	6.06E+05	6.06E+05	6.06E+05
XE-137	0.00E+00	3.10E+03	3.10E+03	3.11E+03	3.12E+03	3.31E+03	4.09E+03	4.98E+03	6.47E+03	7.65E+03	9.34E+03	1.13E+04	1.22E+04

TABLE 3-2B (continued)

DOSE RATE (MREM/YR) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
XE-138	0.00E+00	1.29E+05	1.99E+05	1.99E+05	1.99E+05	1.99E+05	1.99E+05	1.99E+05	1.99E+05	1.99E+05	1.99E+05	1.99E+05	1.99E+05
CS-134	0.00E+00	2.90E+05	6.96E+06	4.86E+07	2.06E+08	2.16E+09	6.15E+09	7.29E+09	7.55E+09	7.56E+09	7.56E+09	7.56E+09	7.56E+09
CS-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CS-136	0.00E+00	3.97E+05	9.28E+06	5.57E+07	1.43E+08	1.79E+08	1.79E+08	1.79E+08	1.79E+08	1.79E+08	1.79E+08	1.79E+08	1.79E+08
CS-137	0.00E+00	9.27E+04	2.37E+06	1.66E+07	7.11E+07	8.56E+08	4.09E+09	7.73E+09	1.39E+10	1.88E+10	2.57E+10	3.39E+10	3.76E+10
CS-138	0.00E+00	2.26E+05	3.11E+05	3.11E+05	3.11E+05	3.11E+05	3.11E+05	3.11E+05	3.11E+05	3.11E+05	3.11E+05	3.11E+05	3.11E+05
CS-139	0.00E+00	9.69E+03	1.13E+04	1.13E+04	1.13E+04	1.13E+04	1.13E+04	1.13E+04	1.13E+04	1.13E+04	1.13E+04	1.13E+04	1.13E+04
BA-133	0.00E+00	6.77E+04	1.62E+06	1.14E+07	4.86E+07	5.74E+08	2.52E+09	4.33E+09	6.56E+09	7.70E+09	8.59E+09	8.90E+09	8.91E+09
BA-137M	0.00E+00	6.44E+03	6.44E+03	6.44E+03	6.44E+03	6.44E+03	6.44E+03	6.44E+03	6.44E+03	6.44E+03	6.44E+03	6.44E+03	6.44E+03
BA-139	0.00E+00	7.84E+03	2.00E+04	2.00E+04	2.00E+04	2.00E+04	2.00E+04	2.00E+04	2.00E+04	2.00E+04	2.00E+04	2.00E+04	2.00E+04
BA-140	0.00E+00	4.01E+04	2.68E+06	4.71E+07	1.60E+08	2.07E+08	2.07E+08	2.07E+08	2.07E+08	2.07E+08	2.07E+08	2.07E+08	2.07E+08
LA-140	0.00E+00	4.26E+05	8.45E+06	2.36E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07
CE-141	0.00E+00	1.45E+04	3.44E+05	2.26E+06	7.70E+06	1.63E+07	1.63E+07	1.63E+07	1.63E+07	1.63E+07	1.63E+07	1.63E+07	1.63E+07
CE-143	0.00E+00	5.68E+04	1.09E+06	2.70E+06	2.79E+06	2.79E+06	2.79E+06	2.79E+06	2.79E+06	2.79E+06	2.79E+06	2.79E+06	2.79E+06
CE-144	0.00E+00	7.12E+03	2.20E+05	1.54E+06	6.43E+06	5.37E+07	9.00E+07	9.10E+07	9.11E+07	9.11E+07	9.11E+07	9.11E+07	9.11E+07
PR-143	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR-144	0.00E+00	2.14E+03	2.35E+03	2.35E+03	2.35E+03	2.35E+03	2.35E+03	2.35E+03	2.35E+03	2.35E+03	2.35E+03	2.35E+03	2.35E+03
ND-147	0.00E+00	2.64E+04	6.14E+05	3.59E+06	8.57E+06	1.01E+07	1.01E+07	1.01E+07	1.01E+07	1.01E+07	1.01E+07	1.01E+07	1.01E+07
PM-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM-148M	0.00E+00	3.72E+05	8.86E+06	5.93E+07	2.13E+08	5.39E+08	5.40E+08	5.40E+08	5.40E+08	5.40E+08	5.40E+08	5.40E+08	5.40E+08
PM-148	0.00E+00	1.18E+05	2.66E+06	1.31E+07	2.15E+07	2.19E+07	2.19E+07	2.19E+07	2.19E+07	2.19E+07	2.19E+07	2.19E+07	2.19E+07
SM-151	0.00E+00	5.11E+00	1.23E+02	8.58E+02	3.68E+03	4.46E+04	2.19E+05	4.30E+05	8.28E+05	1.19E+06	1.85E+06	3.09E+06	5.52E+06
EU-154	0.00E+00	2.39E+05	5.74E+06	4.01E+07	1.72E+08	2.01E+09	8.60E+09	1.43E+10	2.07E+10	2.35E+10	2.53E+10	2.57E+10	2.57E+10
EU-155	0.00E+00	1.20E+04	2.88E+05	2.01E+06	8.59E+06	9.81E+07	3.78E+08	5.66E+08	7.07E+08	7.41E+08	7.52E+08	7.53E+08	7.53E+08
EU-156	0.00E+00	2.61E+05	6.12E+06	3.75E+07	1.02E+08	1.37E+08	1.37E+08	1.37E+08	1.37E+08	1.37E+08	1.37E+08	1.37E+08	1.37E+08
GD-162	0.00E+00	1.87E+04	1.90E+04	1.90E+04	1.90E+04	1.90E+04	1.90E+04	1.90E+04	1.90E+04	1.90E+04	1.90E+04	1.90E+04	1.90E+04
TB-160	0.00E+00	2.04E+05	4.87E+06	3.31E+07	1.27E+08	4.89E+08	5.03E+08	5.03E+08	5.03E+08	5.03E+08	5.03E+08	5.03E+08	5.03E+08
TA-182	0.00E+00	2.44E+05	5.84E+06	4.01E+07	1.61E+08	8.64E+08	9.72E+08	9.72E+08	9.72E+08	9.72E+08	9.72E+08	9.72E+08	9.72E+08
W-185	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
W-187	0.00E+00	3.13E+04	5.50E+05	1.09E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06	1.10E+06
AU-195M	0.00E+00	4.58E+02	4.59E+02	4.64E+02	4.81E+02	6.18E+02	6.72E+02	6.72E+02	6.72E+02	6.72E+02	6.72E+02	6.72E+02	6.72E+02
AU-195	0.00E+00	1.75E+04	4.19E+05	2.90E+06	1.19E+07	8.35E+07	1.12E+08	1.12E+08	1.12E+08	1.12E+08	1.12E+08	1.12E+08	1.12E+08
AU-198	0.00E+00	7.52E+04	1.60E+06	5.89E+06	7.06E+06	7.06E+06	7.06E+06	7.06E+06	7.06E+06	7.06E+06	7.06E+06	7.06E+06	7.06E+06
AU-199	0.00E+00	1.80E+04	3.90E+05	1.55E+06	1.97E+06	1.97E+06	1.97E+06	1.97E+06	1.97E+06	1.97E+06	1.97E+06	1.97E+06	1.97E+06
HG-197	0.00E+00	1.34E+04	2.85E+05	1.05E+06	1.25E+06	1.25E+06	1.25E+06	1.25E+06	1.25E+06	1.25E+06	1.25E+06	1.25E+06	1.25E+06
HG-203	0.00E+00	4.44E+04	1.06E+06	7.08E+06	2.58E+07	7.13E+07	7.16E+07	7.16E+07	7.16E+07	7.16E+07	7.16E+07	7.16E+07	7.16E+07
TL-204	0.00E+00	9.98E+04	8.74E+06	6.48E+07	2.78E+08	3.12E+09	1.12E+10	1.57E+10	1.82E+10	1.86E+10	1.87E+10	1.87E+10	1.87E+10
TL-208	0.00E+00	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04	4.63E+04
TL-210	0.00E+00	4.20E-02	4.42E-02	5.82E-02	1.12E-01	8.81E-01	3.99E+00	7.37E+00	1.27E+01	1.67E+01	2.17E+01	2.63E+01	2.75E+01
PB-204M	0.00E+00	2.90E+05	6.28E+05	6.28E+05	6.28E+05	6.28E+05	6.28E+05	6.28E+05	6.28E+05	6.28E+05	6.28E+05	6.28E+05	6.28E+05
PB-210	0.00E+00	8.78E+02	2.11E+04	1.47E+05	6.31E+05	7.57E+06	3.56E+07	6.61E+07	1.15E+08	1.50E+08	1.95E+08	2.37E+08	2.48E+08
PB-212	0.00E+00	8.24E+04	3.08E+06	4.00E+06	4.00E+06	4.00E+06	4.00E+06	4.00E+06	4.00E+06	4.00E+06	4.00E+06	4.00E+06	4.00E+06
PB-214	0.00E+00	1.21E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05	2.13E+05
BI-210M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BI-212	0.00E+00	5.71E+04	1.20E+05	1.20E+05	1.20E+05	1.20E+05	1.20E+05	1.20E+05	1.20E+05	1.20E+05	1.20E+05	1.20E+05	1.20E+05
BI-214	0.00E+00	1.20E+05	1.36E+05	1.36E+05	1.36E+05	1.36E+05	1.36E+05	1.36E+05	1.36E+05	1.36E+05	1.37E+05	1.37E+05	1.37E+05

TABLE 3-2B (continued)

DOSE RATE (MREM/YR) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
PO-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PO-214	0.00E+00	1.37E-06	1.37E-06	1.40E-06	1.52E-06	3.13E-06	9.68E-06	1.68E-05	2.81E-05	3.64E-05	4.69E-05	5.65E-05	5.91E-05
PO-218	0.00E+00	1.28E+04	2.42E+04	2.42E+04	2.42E+04	2.42E+04	2.42E+04	2.42E+04	2.42E+04	2.42E+04	2.42E+04	2.42E+04	2.42E+04
RN-220	0.00E+00	1.17E+02	4.47E+03	5.81E+03	5.81E+03	5.81E+03	5.81E+03	5.81E+03	5.81E+03	5.81E+03	5.81E+03	5.81E+03	5.81E+03
RN-222	0.00E+00	7.63E+04	6.92E+06	3.13E+07	4.35E+07	4.36E+07	4.37E+07	4.37E+07	4.37E+07	4.37E+07	4.37E+07	4.38E+07	4.38E+07
RA-224	0.00E+00	3.90E+03	2.68E+06	2.30E+07	3.30E+07	3.31E+07	3.31E+07	3.31E+07	3.31E+07	3.31E+07	3.31E+07	3.31E+07	3.31E+07
RA-226	0.00E+00	1.43E+03	6.46E+05	2.39E+07	1.94E+08	2.85E+09	1.44E+10	2.89E+10	5.77E+10	8.64E+10	1.43E+11	2.84E+11	1.31E+12
RA-228	0.00E+00	1.35E+04	2.33E+06	2.31E+07	1.04E+08	1.54E+09	9.74E+09	1.82E+10	2.62E+10	2.86E+10	2.96E+10	2.97E+10	2.97E+10
AC-228	0.00E+00	1.31E+05	1.15E+06	1.24E+06	1.28E+06	1.93E+06	3.18E+06	3.50E+06	3.56E+06	3.56E+06	3.56E+06	3.56E+06	3.56E+06
TH-228	0.00E+00	6.72E+02	1.99E+05	1.68E+07	1.50E+08	1.91E+09	5.32E+09	6.20E+09	6.36E+09	6.37E+09	6.37E+09	6.37E+09	6.37E+09
TH-230	0.00E+00	2.72E+02	6.53E+03	4.58E+04	1.99E+05	2.99E+06	2.75E+07	8.63E+07	2.97E+08	6.33E+08	1.68E+09	6.42E+09	1.47E+11
TH-231	0.00E+00	5.39E+03	9.63E+04	1.99E+05	2.01E+05	2.01E+05	2.01E+05	2.01E+05	2.01E+05	2.01E+05	2.01E+05	2.01E+05	2.01E+05
TH-232	0.00E+00	4.59E+03	2.07E+04	7.71E+04	6.74E+05	8.94E+07	2.78E+09	1.14E+10	3.90E+10	7.23E+10	1.43E+11	3.22E+11	1.75E+12
TH-234	0.00E+00	3.15E+03	7.57E+04	4.87E+05	1.54E+06	2.67E+06	2.67E+06	2.67E+06	2.67E+06	2.67E+06	2.67E+06	2.67E+06	2.67E+06
PA-233	0.00E+00	3.75E+04	8.89E+05	5.77E+06	1.88E+07	3.50E+07	3.50E+07	3.50E+07	3.50E+07	3.50E+07	3.50E+07	3.50E+07	3.50E+07
PA-234M	0.00E+00	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01
PA-234	0.00E+00	5.52E+05	5.13E+06	5.59E+06	5.59E+06	5.59E+06	5.59E+06	5.59E+06	5.59E+06	5.59E+06	5.59E+06	5.59E+06	5.59E+06
U-232	0.00E+00	3.34E+02	8.07E+03	9.51E+04	2.13E+06	3.62E+08	6.07E+09	1.62E+10	3.66E+10	5.52E+10	8.76E+10	1.46E+11	2.38E+11
U-233	0.00E+00	3.06E+02	7.34E+03	5.14E+04	2.20E+05	2.68E+06	1.34E+07	2.68E+07	5.36E+07	8.04E+07	1.34E+08	2.68E+08	1.34E+09
U-234	0.00E+00	2.85E+02	6.84E+03	4.79E+04	2.05E+05	2.50E+06	1.25E+07	2.50E+07	4.99E+07	7.50E+07	1.25E+08	2.52E+08	1.47E+09
U-235	0.00E+00	2.90E+04	7.28E+05	5.57E+06	2.45E+07	3.01E+08	1.50E+09	3.01E+09	6.02E+09	9.03E+09	1.50E+10	3.01E+10	1.50E+11
U-236	0.00E+00	2.66E+02	5.94E+03	4.14E+04	1.77E+05	2.16E+06	1.08E+07	2.15E+07	4.31E+07	6.46E+07	1.08E+08	2.15E+08	1.08E+09
U-237	0.00E+00	2.81E+04	6.43E+05	3.38E+06	6.29E+06	6.59E+06	6.59E+06	6.59E+06	6.59E+06	6.59E+06	6.59E+06	6.59E+06	6.59E+06
U-238	0.00E+00	6.67E+03	1.43E+04	9.58E+04	9.28E+05	2.73E+07	1.47E+08	2.97E+08	5.97E+08	8.97E+08	1.50E+09	3.00E+09	1.50E+10
U-240	0.00E+00	5.02E+04	8.75E+05	1.27E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06	1.27E+06
NP-237	0.00E+00	1.57E+04	3.88E+05	3.17E+06	1.95E+07	4.31E+08	2.30E+09	4.63E+09	9.29E+09	1.39E+10	2.33E+10	4.66E+10	2.33E+11
NP-238	0.00E+00	1.04E+05	2.15E+06	6.93E+06	7.71E+06	7.71E+06	7.71E+06	7.71E+06	7.71E+06	7.71E+06	7.72E+06	7.72E+06	7.73E+06
NP-239	0.00E+00	2.54E+04	5.32E+05	1.82E+06	2.08E+06	2.08E+06	2.08E+06	2.08E+06	2.08E+06	2.08E+06	2.08E+06	2.08E+06	2.08E+06
NP-240M	0.00E+00	1.10E+04	1.10E+04	1.10E+04	1.10E+04	1.10E+04	1.10E+04	1.10E+04	1.10E+04	1.10E+04	1.10E+04	1.10E+04	1.10E+04
PU-236	0.00E+00	3.27E+02	7.85E+03	5.48E+04	2.34E+05	3.65E+06	9.01E+07	3.71E+08	1.14E+09	1.90E+09	3.23E+09	5.63E+09	9.43E+09
PU-238	0.00E+00	2.80E+02	6.72E+03	4.70E+04	2.02E+05	2.44E+06	1.20E+07	2.36E+07	4.54E+07	6.55E+07	1.01E+08	1.70E+08	3.05E+08
PU-239	0.00E+00	1.10E+02	2.64E+03	1.85E+04	7.92E+04	9.64E+05	4.82E+06	9.63E+06	1.93E+07	2.89E+07	4.81E+07	9.62E+07	4.78E+08
PU-240	0.00E+00	2.41E+02	5.78E+03	4.05E+04	1.74E+05	2.11E+06	1.06E+07	2.11E+07	4.22E+07	6.32E+07	1.05E+08	2.10E+08	1.03E+09
PU-241	0.00E+00	4.42E-04	2.55E-01	1.25E+01	2.29E+02	3.34E+04	7.84E+05	2.91E+06	1.01E+07	1.99E+07	4.34E+07	1.08E+08	4.91E+08
PU-242	0.00E+00	2.39E+02	5.71E+03	4.00E+04	1.71E+05	2.08E+06	1.04E+07	2.08E+07	4.17E+07	6.25E+07	1.04E+08	2.08E+08	1.04E+09
PU-244	0.00E+00	1.12E+03	6.10E+05	9.19E+06	4.36E+07	5.45E+08	2.73E+09	5.46E+09	1.09E+10	1.64E+10	2.73E+10	5.46E+10	2.73E+11
AM-241	0.00E+00	4.84E+03	1.16E+05	8.13E+05	3.48E+06	4.24E+07	2.11E+08	4.21E+08	8.35E+08	1.24E+09	2.04E+09	3.92E+09	1.46E+10
AM-242	0.00E+00	3.02E+03	4.61E+04	7.15E+04	7.20E+04	7.56E+04	7.69E+04	7.71E+04	7.75E+04	7.79E+04	7.85E+04	7.97E+04	8.21E+04
AM-243	0.00E+00	9.51E+03	3.07E+05	4.05E+06	2.31E+07	3.04E+08	1.53E+09	3.06E+09	6.12E+09	9.17E+09	1.53E+10	3.05E+10	1.50E+11
CM-242	0.00E+00	2.73E+02	6.54E+03	4.52E+04	1.85E+05	1.22E+06	1.59E+06	1.65E+06	1.76E+06	1.87E+06	2.05E+06	2.40E+06	3.09E+06
CM-243	0.00E+00	2.44E+04	5.86E+05	4.10E+06	1.76E+07	2.11E+08	1.01E+09	1.89E+09	3.37E+09	4.53E+09	6.13E+09	7.91E+09	8.64E+09
CM-244	0.00E+00	1.34E+03	3.22E+04	2.25E+05	9.63E+05	1.15E+07	5.34E+07	9.74E+07	1.63E+08	2.08E+08	2.60E+08	2.97E+08	3.06E+08
CF-252	0.00E+00	1.00E+05	2.40E+06	1.68E+07	7.12E+07	7.71E+08	2.45E+09	3.11E+09	3.34E+09	3.35E+09	3.36E+09	3.36E+09	3.36E+09

TABLE 3-3A

DOSE (MREM) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
H-3	0.00E+00	3.33E-02	1.92E+01	9.40E+02	1.73E+04	2.51E+06	5.84E+07	2.14E+08	7.27E+08	1.41E+09	3.03E+09	7.49E+09	4.39E+10
BE-7	0.00E+00	4.69E-04	2.69E-01	1.28E+01	2.14E+02	1.20E+04	7.27E+04	1.49E+05	3.00E+05	4.52E+05	7.55E+05	1.51E+06	7.58E+06
C-11	0.00E+00	1.19E+00	4.88E+01	3.48E+02	1.49E+03	1.82E+04	9.10E+04	1.82E+05	3.64E+05	5.46E+05	9.10E+05	1.82E+06	9.10E+06
C-14	0.00E+00	2.90E-01	1.67E+02	8.18E+03	1.50E+05	2.22E+07	5.56E+08	2.22E+09	8.89E+09	2.00E+10	5.55E+10	2.22E+11	5.45E+12
N-13	0.00E+00	9.93E-01	3.09E+01	2.18E+02	9.36E+02	1.14E+04	5.69E+04	1.14E+05	2.28E+05	3.42E+05	5.69E+05	1.14E+06	5.69E+06
O-15	0.00E+00	3.82E-01	9.61E+00	6.74E+01	2.89E+02	3.52E+03	1.76E+04	3.52E+04	7.03E+04	1.05E+05	1.76E+05	3.52E+05	1.76E+06
F-18	0.00E+00	1.16E+00	1.47E+02	1.14E+03	4.95E+03	6.05E+04	3.02E+05	6.05E+05	1.21E+06	1.81E+06	3.02E+06	6.05E+06	3.02E+07
NA-22	0.00E+00	1.04E+00	6.01E+02	2.94E+04	5.38E+05	7.35E+07	1.35E+09	3.92E+09	9.79E+09	1.58E+10	2.78E+10	5.79E+10	2.99E+11
NA-24	0.00E+00	2.95E+00	1.23E+03	1.90E+04	9.06E+04	1.13E+06	5.68E+06	1.14E+07	2.27E+07	3.41E+07	5.68E+07	1.14E+08	5.68E+08
MG-28	0.00E+00	6.82E+00	3.40E+03	6.35E+04	3.18E+05	4.03E+06	2.02E+07	4.04E+07	8.08E+07	1.21E+08	2.02E+08	4.04E+08	2.02E+09
AL-28	0.00E+00	6.81E-01	1.72E+01	1.21E+02	5.18E+02	6.30E+03	3.15E+04	6.30E+04	1.26E+05	1.89E+05	3.15E+05	6.30E+05	3.15E+06
P-32	0.00E+00	3.72E+00	2.11E+03	9.41E+04	1.25E+06	3.04E+07	1.59E+08	3.21E+08	6.43E+08	9.66E+08	1.61E+09	3.22E+09	1.61E+10
P-33	0.00E+00	1.34E-01	7.64E+01	3.50E+03	5.09E+04	1.53E+06	8.19E+06	1.65E+07	3.32E+07	4.98E+07	8.31E+07	1.66E+08	8.33E+08
S-35	0.00E+00	3.01E-01	1.73E+02	8.35E+03	1.45E+05	1.08E+07	7.42E+07	1.54E+08	3.13E+08	4.73E+08	7.92E+08	1.59E+09	7.97E+09
CL-36	0.00E+00	1.38E+00	7.92E+02	3.88E+04	7.13E+05	1.06E+08	2.64E+09	1.06E+10	4.22E+10	9.50E+10	2.64E+11	1.06E+12	2.64E+13
CL-38	0.00E+00	6.02E+00	3.49E+02	2.53E+03	1.09E+04	1.32E+05	6.62E+05	1.32E+06	2.65E+06	3.97E+06	6.62E+06	1.32E+07	6.62E+07
A-37	0.00E+00	1.13E-02	6.47E+00	3.05E+02	4.85E+03	2.06E+05	1.16E+06	2.35E+06	4.74E+06	7.13E+06	1.19E+07	2.38E+07	1.19E+08
A-39	0.00E+00	1.09E+00	6.28E+02	3.08E+04	5.65E+05	8.36E+07	2.08E+09	8.29E+09	3.29E+10	7.34E+10	2.00E+11	7.69E+11	1.42E+13
K-40	0.00E+00	2.45E+00	1.41E+03	6.91E+04	1.27E+06	1.88E+08	4.70E+09	1.88E+10	7.52E+10	1.69E+11	4.70E+11	1.88E+12	4.70E+13
K-42	0.00E+00	7.51E+00	2.95E+03	4.10E+04	1.92E+05	2.38E+06	1.19E+07	2.39E+07	4.78E+07	7.17E+07	1.19E+08	2.39E+08	1.19E+09
K-43	0.00E+00	1.62E+00	7.46E+02	1.43E+04	7.22E+04	9.16E+05	4.59E+06	9.19E+06	1.84E+07	2.76E+07	4.60E+07	9.19E+07	4.60E+08
CA-45	0.00E+00	4.69E-01	2.70E+02	1.31E+04	2.33E+05	2.28E+07	2.02E+08	4.34E+08	8.97E+08	1.36E+09	2.29E+09	4.61E+09	2.31E+10
CA-47	0.00E+00	1.88E+00	1.07E+03	4.53E+04	4.66E+05	7.58E+06	3.86E+07	7.73E+07	1.55E+08	2.32E+08	3.87E+08	7.75E+08	3.88E+09
CA-49	0.00E+00	1.91E+00	8.77E+01	6.34E+02	2.73E+03	3.32E+04	1.66E+05	3.32E+05	6.64E+05	9.97E+05	1.66E+06	3.32E+06	1.66E+07
SC-46	0.00E+00	6.62E-01	3.80E+02	1.83E+04	3.17E+05	2.31E+07	1.57E+08	3.25E+08	6.62E+08	9.99E+08	1.67E+09	3.36E+09	1.68E+10
SC-47	0.00E+00	9.28E-01	5.01E+02	1.72E+04	1.32E+05	1.90E+06	9.60E+06	1.92E+07	3.85E+07	5.77E+07	9.62E+07	1.92E+08	9.63E+08
SC-49	0.00E+00	3.50E+00	2.74E+02	2.02E+03	8.69E+03	1.06E+05	5.30E+05	1.06E+06	2.12E+06	3.18E+06	5.30E+06	1.06E+07	5.30E+07
CR-51	0.00E+00	2.00E-02	1.14E+01	5.34E+02	8.21E+03	3.00E+05	1.65E+06	3.33E+06	6.70E+06	1.01E+07	1.68E+07	3.36E+07	1.68E+08
MN-52M	0.00E+00	3.51E+00	1.48E+02	1.05E+03	4.53E+03	5.51E+04	2.76E+05	5.51E+05	1.10E+06	1.65E+06	2.76E+06	5.51E+06	2.76E+07
MN-52	0.00E+00	3.49E-01	1.94E+02	7.56E+03	7.23E+04	1.17E+06	5.95E+06	1.19E+07	2.39E+07	3.58E+07	5.97E+07	1.19E+08	5.98E+08
MN-54	0.00E+00	2.12E-02	1.22E+01	5.96E+02	1.08E+04	1.27E+06	1.52E+07	3.53E+07	7.55E+07	1.16E+08	1.96E+08	3.98E+08	2.01E+09
FE-52	0.00E+00	3.56E+00	2.27E+03	2.67E+04	1.21E+05	1.50E+06	7.52E+06	1.50E+07	3.01E+07	4.51E+07	7.52E+07	1.50E+08	7.52E+08
FE-55	0.00E+00	2.24E-02	1.29E+01	6.30E+02	1.15E+04	1.58E+06	2.92E+07	8.57E+07	2.16E+08	3.49E+08	6.17E+08	1.29E+09	6.64E+09
FE-59	0.00E+00	7.02E-01	4.02E+02	1.91E+04	3.13E+05	1.57E+07	9.16E+07	1.87E+08	3.77E+08	5.67E+08	9.46E+08	1.90E+09	9.49E+09
CO-56	0.00E+00	8.05E-01	4.62E+02	2.23E+04	3.83E+05	2.69E+07	1.80E+08	3.71E+08	7.55E+08	1.14E+09	1.90E+09	3.82E+09	1.92E+10
CO-57	0.00E+00	9.82E-02	5.65E+01	2.75E+03	4.96E+04	5.65E+06	6.36E+07	1.44E+08	3.06E+08	4.67E+08	7.90E+08	1.60E+09	8.06E+09
CO-58	0.00E+00	1.68E-01	9.63E+01	4.63E+03	7.91E+04	5.27E+06	3.43E+07	7.05E+07	1.43E+08	2.16E+08	3.61E+08	7.24E+08	3.63E+09
CO-60	0.00E+00	5.82E-01	3.35E+02	1.64E+04	3.01E+05	4.28E+07	9.07E+08	3.01E+09	8.79E+09	1.53E+10	2.88E+10	6.27E+10	3.34E+11
NI-56	0.00E+00	4.02E-02	2.36E+01	1.27E+03	2.62E+04	2.17E+06	1.46E+07	3.03E+07	6.15E+07	9.28E+07	1.55E+08	3.12E+08	1.56E+09
NI-63	0.00E+00	1.11E-01	6.41E+01	3.14E+03	5.77E+04	8.52E+06	2.11E+08	8.35E+08	3.26E+09	7.18E+09	1.91E+10	6.87E+10	8.88E+11
CU-64	0.00E+00	6.67E-01	2.65E+02	3.74E+03	1.75E+04	2.18E+05	1.09E+06	2.19E+06	4.37E+06	6.56E+06	1.09E+07	2.19E+07	1.09E+08
ZN-65	0.00E+00	3.54E-02	2.04E+01	9.92E+02	1.78E+04	1.98E+06	2.11E+07	4.73E+07	9.96E+07	1.52E+08	2.57E+08	5.18E+08	2.61E+09
ZN-69M	0.00E+00	4.75E-01	6.91E+02	1.11E+04	5.28E+04	6.60E+05	3.31E+06	6.62E+06	1.32E+07	1.99E+07	3.31E+07	6.62E+07	3.31E+08
ZN-69	0.00E+00	1.40E+00	1.09E+02	8.06E+02	3.47E+03	4.24E+04	2.12E+05	4.24E+05	8.47E+05	1.27E+06	2.12E+06	4.24E+06	2.12E+07
GA-67	0.00E+00	1.71E-01	9.23E+01	3.13E+03	2.36E+04	3.36E+05	1.70E+06	3.39E+06	6.79E+06	1.02E+07	1.70E+07	3.40E+07	1.70E+08
GA-68	0.00E+00	3.27E+00	2.91E+02	2.16E+03	9.33E+03	1.14E+05	5.69E+05	1.14E+06	2.28E+06	3.41E+06	5.69E+06	1.14E+07	5.69E+07

TABLE 3-3A (continued)

DOSE (MREM) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
GE-77	0.00E+00	3.23E+00	1.29E+03	2.05E+04	1.03E+05	1.30E+06	6.54E+06	1.31E+07	2.62E+07	3.92E+07	6.54E+07	1.31E+08	6.54E+08
AS-76	0.00E+00	5.62E+00	2.68E+03	5.62E+04	2.94E+05	3.76E+06	1.88E+07	3.77E+07	7.54E+07	1.13E+08	1.89E+08	3.77E+08	1.89E+09
AS-77	0.00E+00	1.28E+00	6.48E+02	1.66E+04	9.61E+04	1.26E+06	6.33E+06	1.27E+07	2.53E+07	3.80E+07	6.34E+07	1.27E+08	6.34E+08
SE-75	0.00E+00	7.93E-02	4.56E+01	2.21E+03	3.89E+04	3.37E+06	2.61E+07	5.50E+07	1.13E+08	1.71E+08	2.86E+08	5.75E+08	2.88E+09
SE-77M	0.00E+00	5.47E-03	1.32E-01	9.26E-01	3.97E+00	4.83E+01	2.41E+02	4.83E+02	9.66E+02	1.45E+03	2.41E+03	4.83E+03	2.41E+04
BR-80M	0.00E+00	2.11E+00	9.37E+02	8.69E+03	3.84E+04	4.72E+05	2.36E+06	4.72E+06	9.44E+06	1.42E+07	2.36E+07	4.72E+07	2.36E+08
BR-80	0.00E+00	2.02E+00	7.69E+01	5.47E+02	2.35E+03	2.86E+04	1.43E+05	2.86E+05	5.72E+05	8.57E+05	1.43E+06	2.86E+06	1.43E+07
BR-82	0.00E+00	8.17E-01	4.07E+02	9.98E+03	5.62E+04	7.31E+05	3.67E+06	7.35E+06	1.47E+07	2.21E+07	3.68E+07	7.35E+07	3.68E+08
BR-83	0.00E+00	8.26E-01	1.34E+02	1.08E+03	4.70E+03	5.74E+04	2.87E+05	5.74E+05	1.15E+06	1.72E+06	2.87E+06	5.74E+06	2.87E+07
BR-84	0.00E+00	4.45E+00	2.35E+02	1.69E+03	7.26E+03	8.85E+04	4.42E+05	8.85E+05	1.77E+06	2.65E+06	4.42E+06	8.85E+06	4.42E+07
KR-79	0.00E+00	1.19E-01	5.93E+01	1.44E+03	8.08E+03	1.05E+05	5.28E+05	1.06E+06	2.11E+06	3.17E+06	5.29E+06	1.06E+07	5.29E+07
KR-83M	0.00E+00	1.80E-01	2.32E+01	1.80E+02	7.82E+02	9.55E+03	4.78E+04	9.55E+04	1.91E+05	2.87E+05	4.78E+05	9.55E+05	4.78E+06
KR-85M	0.00E+00	1.34E+00	3.22E+02	2.94E+03	1.30E+04	1.61E+05	8.23E+05	1.69E+06	3.49E+06	5.35E+06	9.17E+06	1.88E+07	9.62E+07
KR-85	0.00E+00	1.30E+00	7.46E+02	3.66E+04	6.70E+05	9.73E+07	2.24E+09	8.11E+09	2.70E+10	5.16E+10	1.08E+11	2.60E+11	1.49E+12
KR-87	0.00E+00	5.99E+00	5.78E+02	4.33E+03	1.87E+04	2.28E+05	1.14E+06	2.28E+06	4.57E+06	6.85E+06	1.14E+07	2.28E+07	1.14E+08
KR-88	0.00E+00	6.76E+00	2.08E+03	1.74E+04	7.60E+04	9.30E+05	4.65E+06	9.30E+06	1.86E+07	2.79E+07	4.65E+07	9.30E+07	4.65E+08
RB-84	0.00E+00	6.45E-01	3.69E+02	1.74E+04	2.75E+05	1.15E+07	6.47E+07	1.31E+08	2.64E+08	3.97E+08	6.63E+08	1.33E+09	6.65E+09
RB-86	0.00E+00	3.46E+00	1.97E+03	8.98E+04	1.28E+06	3.63E+07	1.93E+08	3.89E+08	7.81E+08	1.17E+09	1.96E+09	3.92E+09	1.96E+10
RB-88	0.00E+00	5.89E+00	2.26E+02	1.60E+03	6.89E+03	8.39E+04	4.19E+05	8.39E+05	1.68E+06	2.52E+06	4.19E+06	8.39E+06	4.19E+07
RB-89	0.00E+00	1.54E+00	5.58E+01	4.10E+02	1.97E+03	3.58E+04	1.94E+05	3.92E+05	7.87E+05	1.18E+06	1.97E+06	3.95E+06	1.98E+07
RB-90	0.00E+00	1.18E+00	3.02E+01	2.12E+02	9.08E+02	1.11E+04	5.71E+04	1.18E+05	2.48E+05	3.89E+05	6.91E+05	1.52E+06	8.58E+06
SR-85	0.00E+00	4.53E-02	2.60E+01	1.25E+03	2.12E+04	1.34E+06	8.50E+06	1.75E+07	3.54E+07	5.33E+07	8.92E+07	1.79E+08	8.96E+08
SR-87M	0.00E+00	3.35E-01	5.88E+01	4.83E+02	2.11E+03	2.58E+04	1.29E+05	2.58E+05	5.16E+05	7.75E+05	1.29E+06	2.58E+06	1.29E+07
SR-89	0.00E+00	2.97E+00	1.70E+03	8.12E+04	1.35E+06	7.29E+07	4.37E+08	8.91E+08	1.80E+09	2.71E+09	4.53E+09	9.08E+09	4.55E+10
SR-90	0.00E+00	1.03E+00	8.10E+02	8.44E+04	2.48E+06	4.40E+08	1.08E+10	4.17E+10	1.55E+11	3.24E+11	7.86E+11	2.34E+12	1.73E+13
SR-91	0.00E+00	3.28E+00	1.19E+03	1.50E+04	7.61E+04	1.41E+06	7.72E+06	1.56E+07	3.14E+07	4.71E+07	7.87E+07	1.58E+08	7.88E+08
SR-92	0.00E+00	1.57E+00	1.11E+03	1.11E+04	4.97E+04	6.11E+05	3.06E+06	6.11E+06	1.22E+07	1.83E+07	3.06E+07	6.11E+07	3.06E+08
SR-93	0.00E+00	2.16E+00	8.83E+01	7.76E+02	3.44E+03	4.22E+04	2.11E+05	4.22E+05	8.44E+05	1.27E+06	2.11E+06	4.22E+06	2.11E+07
Y-87	0.00E+00	8.95E-02	1.75E+02	7.56E+03	5.92E+04	8.52E+05	4.30E+06	8.62E+06	1.73E+07	2.59E+07	4.32E+07	8.63E+07	4.32E+08
Y-88	0.00E+00	2.97E-02	1.71E+01	8.27E+02	1.45E+04	1.19E+06	8.81E+06	1.84E+07	3.77E+07	5.69E+07	9.54E+07	1.92E+08	9.61E+08
Y-90	0.00E+00	4.85E+00	2.58E+03	8.15E+04	5.64E+05	7.79E+06	3.93E+07	7.87E+07	1.57E+08	2.36E+08	3.94E+08	7.88E+08	3.94E+09
Y-91M	0.00E+00	1.27E-01	9.96E+00	1.17E+02	1.16E+03	5.47E+04	3.32E+05	6.78E+05	1.37E+06	2.06E+06	3.45E+06	6.91E+06	3.46E+07
Y-91	0.00E+00	3.14E+00	1.80E+03	8.63E+04	1.45E+06	8.41E+07	5.16E+08	1.06E+09	2.14E+09	3.22E+09	5.38E+09	1.08E+10	5.40E+10
Y-92	0.00E+00	7.23E+00	1.49E+03	1.28E+04	5.61E+04	6.87E+05	3.44E+06	6.88E+06	1.38E+07	2.06E+07	3.44E+07	6.88E+07	3.44E+08
Y-93	0.00E+00	6.08E+00	2.23E+03	2.81E+04	1.29E+05	1.60E+06	8.02E+06	1.60E+07	3.21E+07	4.81E+07	8.02E+07	1.60E+08	8.02E+08
ZR-95	0.00E+00	7.08E-01	4.08E+02	2.00E+04	3.59E+05	2.83E+07	1.87E+08	3.87E+08	7.85E+08	1.18E+09	1.98E+09	3.98E+09	1.99E+10
ZR-97	0.00E+00	4.13E+00	2.55E+03	4.38E+04	2.13E+05	2.67E+06	1.34E+07	2.68E+07	5.36E+07	8.05E+07	1.34E+08	2.68E+08	1.34E+09
NB-95M	0.00E+00	8.48E-01	4.61E+02	1.63E+04	1.36E+05	2.36E+06	1.23E+07	2.46E+07	4.94E+07	7.42E+07	1.24E+08	2.48E+08	1.24E+09
NB-95	0.00E+00	2.80E-01	1.60E+02	7.56E+03	1.20E+05	5.14E+06	2.90E+07	5.88E+07	1.19E+08	1.78E+08	2.98E+08	5.96E+08	2.98E+09
NB-97M	0.00E+00	2.77E-02	2.49E+00	1.86E+01	8.04E+01	9.81E+02	4.91E+03	9.81E+03	1.96E+04	2.94E+04	4.91E+04	9.81E+04	4.91E+05
NB-97	0.00E+00	2.10E+00	1.98E+02	1.48E+03	6.40E+03	7.81E+04	3.90E+05	7.81E+05	1.56E+06	2.34E+06	3.90E+06	7.81E+06	3.90E+07
MO-99	0.00E+00	2.22E+00	1.20E+03	3.91E+04	2.75E+05	3.81E+06	1.92E+07	3.85E+07	7.71E+07	1.16E+08	1.93E+08	3.86E+08	1.93E+09
TC-99M	0.00E+00	8.79E-02	2.52E+01	2.53E+02	1.13E+03	1.39E+04	6.95E+04	1.39E+05	2.78E+05	4.17E+05	6.95E+05	1.39E+06	6.98E+06
TC-99	0.00E+00	5.12E-01	2.95E+02	1.45E+04	2.65E+05	3.93E+07	9.82E+08	3.93E+09	1.57E+10	3.54E+10	9.82E+10	3.93E+11	9.82E+12
RU-103	0.00E+00	4.51E-01	3.37E+02	1.65E+04	2.67E+05	1.24E+07	7.10E+07	1.44E+08	2.91E+08	4.37E+08	7.31E+08	1.46E+09	7.33E+09
RU-106	0.00E+00	7.42E+00	4.37E+03	2.13E+05	3.87E+06	4.70E+08	6.10E+09	1.45E+10	3.15E+10	4.85E+10	8.26E+10	1.68E+11	8.48E+11
RH-103M	0.00E+00	1.59E-01	1.23E+01	9.02E+01	3.89E+02	4.74E+03	2.37E+04	4.74E+04	9.48E+04	1.42E+05	2.37E+05	4.74E+05	2.37E+06

TABLE 3-3A (continued)

DOSE (MREM) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
RH-105	0.00E+00	8.85E-01	4.41E+02	1.08E+04	6.10E+04	7.95E+05	3.99E+06	7.99E+06	1.60E+07	2.40E+07	4.00E+07	7.99E+07	4.00E+08
RH-106	0.00E+00	1.78E-01	4.33E+00	3.03E+01	1.30E+02	1.58E+03	7.91E+03	1.58E+04	3.16E+04	4.75E+04	7.91E+04	1.58E+05	7.91E+05
PD-103	0.00E+00	2.70E-01	1.53E+02	6.96E+03	9.77E+04	2.67E+06	1.41E+07	2.85E+07	5.71E+07	8.58E+07	1.43E+08	2.86E+08	1.43E+09
AG-110M	0.00E+00	4.26E-01	2.45E+02	1.19E+04	2.15E+05	2.40E+07	2.60E+08	5.83E+08	1.23E+09	1.88E+09	3.17E+09	6.41E+09	3.23E+10
AG-111	0.00E+00	1.92E+00	1.07E+03	4.42E+04	4.74E+05	8.44E+06	4.32E+07	8.67E+07	1.74E+08	2.61E+08	4.34E+08	8.69E+08	4.35E+09
CD-111M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD-113M	0.00E+00	3.90E-05	9.36E-04	6.55E-03	2.81E-02	3.42E-01	1.71E+00	3.42E+00	6.83E+00	1.02E+01	1.71E+01	3.42E+01	1.71E+02
CD-115M	0.00E+00	1.10E+00	6.45E+02	3.11E+04	5.10E+05	2.55E+07	1.49E+08	3.04E+08	6.14E+08	9.23E+08	1.54E+09	3.09E+09	1.55E+10
IN-113M	0.00E+00	6.14E-01	7.26E+01	5.56E+02	2.41E+03	2.94E+04	1.47E+05	2.94E+05	5.89E+05	8.83E+05	1.47E+06	2.94E+06	1.47E+07
IN-114M	0.00E+00	2.13E+00	1.26E+03	6.04E+04	1.00E+06	5.39E+07	3.22E+08	6.57E+08	1.33E+09	2.00E+09	3.34E+09	6.69E+09	3.35E+10
IN-114	0.00E+00	8.00E-02	1.97E+00	1.38E+01	5.93E+01	7.21E+02	3.61E+03	7.22E+03	1.44E+04	2.16E+04	3.61E+04	7.22E+04	3.61E+05
IN-115M	0.00E+00	9.17E-01	2.21E+02	2.02E+03	8.94E+03	1.10E+05	5.49E+05	1.10E+06	2.19E+06	3.29E+06	5.49E+06	1.10E+07	5.49E+07
SN-113	0.00E+00	1.25E-01	3.52E+02	2.00E+04	3.59E+05	3.07E+07	2.34E+08	4.92E+08	1.01E+09	1.52E+09	2.55E+09	5.13E+09	2.57E+10
SN-119M	0.00E+00	4.16E-01	2.39E+02	1.17E+04	2.10E+05	2.33E+07	2.50E+08	5.58E+08	1.18E+09	1.80E+09	3.03E+09	6.12E+09	3.09E+10
SN-123	0.00E+00	2.81E+00	1.62E+03	7.84E+04	1.38E+06	1.24E+08	9.89E+08	2.09E+09	4.29E+09	6.50E+09	1.09E+10	2.19E+10	1.10E+11
SN-125	0.00E+00	4.62E+00	2.60E+03	1.11E+05	1.31E+06	2.65E+07	1.45E+08	3.00E+08	6.19E+08	9.38E+08	1.58E+09	3.17E+09	1.60E+10
SB-122	0.00E+00	3.02E+00	1.61E+03	5.12E+04	3.57E+05	4.95E+06	2.49E+07	4.99E+07	9.99E+07	1.50E+08	2.50E+08	5.00E+08	2.50E+09
SB-124	0.00E+00	2.09E+00	1.20E+03	5.76E+04	9.71E+05	5.86E+07	3.64E+08	7.47E+08	1.51E+09	2.28E+09	3.81E+09	7.63E+09	3.82E+10
SB-125	0.00E+00	7.02E-01	4.05E+02	1.99E+04	3.69E+05	5.56E+07	1.08E+09	3.19E+09	8.09E+09	1.31E+10	2.32E+10	4.84E+10	2.50E+11
SB-127	0.00E+00	1.73E+00	1.16E+03	5.08E+04	4.32E+05	7.11E+06	3.81E+07	7.69E+07	1.55E+08	2.32E+08	3.88E+08	7.76E+08	3.88E+09
TE-123M	0.00E+00	5.25E-01	3.02E+02	1.46E+04	2.57E+05	2.23E+07	1.73E+08	3.63E+08	7.45E+08	1.13E+09	1.89E+09	3.80E+09	1.91E+10
TE-125M	0.00E+00	5.49E-01	3.15E+02	1.51E+04	2.53E+05	1.49E+07	9.22E+07	1.89E+08	3.82E+08	5.75E+08	9.62E+08	1.93E+09	9.66E+09
TE-127M	0.00E+00	2.44E+00	1.67E+03	9.62E+04	1.75E+06	1.47E+08	1.10E+09	2.30E+09	4.71E+09	7.12E+09	1.19E+10	2.40E+10	1.20E+11
TE-127	0.00E+00	1.23E+00	4.35E+02	5.26E+03	2.40E+04	2.98E+05	1.49E+06	2.98E+06	5.96E+06	8.94E+06	1.49E+07	2.98E+07	1.49E+08
TE-129M	0.00E+00	1.89E+00	2.17E+03	1.10E+05	1.76E+06	7.30E+07	4.09E+08	8.30E+08	1.67E+09	2.51E+09	4.19E+09	8.40E+09	4.20E+10
TE-129	0.00E+00	3.56E+00	3.23E+02	2.41E+03	1.04E+04	1.27E+05	6.35E+05	1.27E+06	2.54E+06	3.81E+06	6.35E+06	1.27E+07	6.35E+07
TE-131M	0.00E+00	1.64E+00	9.99E+02	2.50E+04	1.62E+05	2.38E+06	1.21E+07	2.42E+07	4.84E+07	7.26E+07	1.21E+08	2.42E+08	1.21E+09
TE-131	0.00E+00	2.31E+00	1.07E+02	8.11E+02	3.87E+03	5.10E+04	2.56E+05	5.13E+05	1.03E+06	1.54E+06	2.57E+06	5.13E+06	2.57E+07
TE-132	0.00E+00	6.43E-01	1.42E+03	5.89E+04	4.54E+05	6.49E+06	3.28E+07	6.56E+07	1.31E+08	1.97E+08	3.29E+08	6.57E+08	3.29E+09
I-123	0.00E+00	1.44E-01	5.77E+01	8.27E+02	3.89E+03	4.86E+04	2.44E+05	4.87E+05	9.75E+05	1.46E+06	2.44E+06	4.88E+06	2.44E+07
I-124	0.00E+00	1.01E+00	5.54E+02	2.02E+04	1.69E+05	2.53E+06	1.28E+07	2.57E+07	5.14E+07	7.71E+07	1.28E+08	2.57E+08	1.29E+09
I-125	0.00E+00	1.12E-01	6.42E+01	3.07E+03	5.18E+04	3.11E+06	1.93E+07	3.96E+07	8.01E+07	1.21E+08	2.02E+08	4.04E+08	2.03E+09
I-126	0.00E+00	7.98E-01	4.52E+02	2.00E+04	2.60E+05	5.98E+06	3.12E+07	6.27E+07	1.26E+08	1.89E+08	3.15E+08	6.30E+08	3.15E+09
I-129	0.00E+00	3.29E-01	1.90E+02	9.30E+03	1.71E+05	2.53E+07	6.32E+08	2.53E+09	1.01E+10	2.27E+10	6.32E+10	2.53E+11	6.32E+12
I-130	0.00E+00	1.60E+00	6.30E+02	8.77E+03	4.10E+04	5.11E+05	2.56E+06	5.12E+06	1.02E+07	1.53E+07	2.56E+07	5.12E+07	2.56E+08
I-131	0.00E+00	1.11E+00	6.23E+02	2.60E+04	2.88E+05	5.30E+06	2.72E+07	5.46E+07	1.09E+08	1.64E+08	2.74E+08	5.48E+08	2.74E+09
I-132	0.00E+00	2.69E+00	4.04E+02	3.22E+03	1.40E+04	1.71E+05	8.55E+05	1.71E+06	3.42E+06	5.13E+06	8.55E+06	1.71E+07	8.55E+07
I-133	0.00E+00	2.32E+00	1.07E+03	2.17E+04	1.23E+05	1.66E+06	8.38E+06	1.68E+07	3.36E+07	5.04E+07	8.39E+07	1.68E+08	8.40E+08
I-134	0.00E+00	2.81E+00	2.07E+02	1.51E+03	6.53E+03	7.96E+04	3.98E+05	7.96E+05	1.59E+06	2.39E+06	3.98E+06	7.96E+06	3.98E+07
I-135	0.00E+00	1.80E+00	7.81E+02	1.06E+04	4.90E+04	6.09E+05	3.05E+06	6.10E+06	1.22E+07	1.83E+07	3.05E+07	6.10E+07	3.05E+08
I-136	0.00E+00	6.46E-01	1.60E+01	1.12E+02	4.82E+02	5.86E+03	2.93E+04	5.86E+04	1.17E+05	1.76E+05	2.93E+05	5.86E+05	2.93E+06
XE-131M	0.00E+00	7.59E-01	4.29E+02	1.88E+04	2.38E+05	5.26E+06	2.74E+07	5.50E+07	1.10E+08	1.65E+08	2.76E+08	5.52E+08	2.76E+09
XE-133M	0.00E+00	1.02E+00	5.50E+02	1.91E+04	1.59E+05	2.41E+06	1.22E+07	2.45E+07	4.91E+07	7.36E+07	1.23E+08	2.46E+08	1.23E+09
XE-133	0.00E+00	7.92E-01	4.38E+02	1.69E+04	1.57E+05	2.49E+06	1.27E+07	2.54E+07	5.09E+07	7.63E+07	1.27E+08	2.55E+08	1.27E+09
XE-135M	0.00E+00	2.78E-01	2.55E+01	2.65E+02	1.19E+03	1.47E+04	7.37E+04	1.47E+05	2.95E+05	4.42E+05	7.37E+05	1.47E+06	7.37E+06
XE-135	0.00E+00	1.72E+00	6.03E+02	7.22E+03	3.30E+04	4.08E+05	2.04E+06	4.09E+06	8.18E+06	1.23E+07	2.04E+07	4.09E+07	2.04E+08
XE-137	0.00E+00	1.65E+00	4.33E+01	3.04E+02	1.31E+03	1.59E+04	8.00E+04	1.61E+05	3.26E+05	4.94E+05	8.37E+05	1.72E+06	8.90E+06

TABLE 3-3A (continued)

DOSE (MREM) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
XE-138	0.00E+00	2.82E+00	1.60E+02	1.15E+03	4.95E+03	6.03E+04	3.02E+05	6.03E+05	1.21E+06	1.81E+06	3.02E+06	6.03E+06	3.02E+07
CS-134	0.00E+00	9.70E-01	5.59E+02	2.73E+04	4.98E+05	6.68E+07	1.14E+09	3.16E+09	7.54E+09	1.20E+10	2.08E+10	4.30E+10	2.20E+11
CS-135	0.00E+00	3.54E-01	2.04E+02	1.00E+04	1.84E+05	2.72E+07	6.80E+08	2.72E+09	1.09E+10	2.45E+10	6.80E+10	2.72E+11	6.80E+12
CS-136	0.00E+00	8.10E-01	4.59E+02	2.03E+04	2.63E+05	6.06E+06	3.16E+07	6.36E+07	1.28E+08	1.91E+08	3.19E+08	6.39E+08	3.20E+09
CS-137	0.00E+00	1.26E+00	7.46E+02	3.66E+04	6.71E+05	9.87E+07	2.39E+09	9.23E+09	3.43E+10	7.20E+10	1.75E+11	5.26E+11	3.95E+12
CS-138	0.00E+00	3.91E+00	2.07E+02	1.49E+03	6.42E+03	7.82E+04	3.91E+05	7.82E+05	1.56E+06	2.35E+06	3.91E+06	7.82E+06	3.91E+07
CS-139	0.00E+00	3.43E+00	1.42E+02	1.03E+03	4.43E+03	5.39E+04	2.70E+05	5.39E+05	1.08E+06	1.62E+06	2.70E+06	5.39E+06	2.70E+07
BA-133	0.00E+00	2.81E-01	1.62E+02	7.92E+03	1.45E+05	2.11E+07	4.84E+08	1.75E+09	5.79E+09	1.10E+10	2.30E+10	5.50E+10	3.14E+11
BA-137M	0.00E+00	3.71E-02	9.45E-01	6.63E+00	2.84E+01	3.46E+02	1.73E+03	3.46E+03	6.92E+03	1.04E+04	1.73E+04	3.46E+04	1.73E+05
BA-139	0.00E+00	4.10E+00	4.24E+02	3.20E+03	1.38E+04	1.69E+05	8.43E+05	1.69E+06	3.37E+06	5.06E+06	8.43E+06	1.69E+07	8.43E+07
BA-140	0.00E+00	1.74E+00	1.18E+03	8.23E+04	1.37E+06	3.38E+07	1.77E+08	3.55E+08	7.13E+08	1.07E+09	1.78E+09	3.57E+09	1.79E+10
LA-140	0.00E+00	2.85E+00	1.45E+03	3.77E+04	2.21E+05	2.90E+06	1.46E+07	2.92E+07	5.84E+07	8.77E+07	1.46E+08	2.92E+08	1.46E+09
CE-141	0.00E+00	9.81E-01	5.61E+02	2.64E+04	4.15E+05	1.68E+07	9.40E+07	1.90E+08	3.83E+08	5.76E+08	9.62E+08	1.93E+09	9.64E+09
CE-143	0.00E+00	2.26E+00	1.13E+03	2.94E+04	2.02E+05	3.32E+06	1.70E+07	3.41E+07	6.83E+07	1.02E+08	1.71E+08	3.42E+08	1.71E+09
CE-144	0.00E+00	3.63E+00	3.87E+03	1.94E+05	3.51E+06	4.04E+08	4.65E+09	1.06E+10	2.26E+10	3.45E+10	5.84E+10	1.18E+11	5.96E+11
PR-143	0.00E+00	1.74E+00	9.86E+02	4.38E+04	5.75E+05	1.36E+07	7.09E+07	1.43E+08	2.86E+08	4.29E+08	7.16E+08	1.43E+09	7.17E+09
PR-144	0.00E+00	3.30E+00	1.25E+02	8.90E+02	3.82E+03	4.65E+04	2.33E+05	4.65E+05	9.31E+05	1.40E+06	2.33E+06	4.65E+06	2.33E+07
ND-147	0.00E+00	1.51E+00	8.50E+02	3.70E+04	4.57E+05	9.95E+06	5.57E+07	1.17E+08	2.43E+08	3.69E+08	6.22E+08	1.25E+09	6.31E+09
PM-147	0.00E+00	3.77E-01	2.17E+02	1.06E+04	1.94E+05	2.65E+07	4.87E+08	1.42E+09	3.55E+09	5.74E+09	1.01E+10	2.11E+10	1.09E+11
PM-148M	0.00E+00	7.08E-01	4.10E+02	2.04E+04	3.60E+05	1.84E+07	1.07E+08	2.17E+08	4.37E+08	6.58E+08	1.10E+09	2.20E+09	1.10E+10
PM-148	0.00E+00	3.73E+00	2.06E+03	7.98E+04	7.48E+05	1.19E+07	6.06E+07	1.22E+08	2.43E+08	3.65E+08	6.09E+08	1.22E+09	6.09E+09
SM-151	0.00E+00	1.23E-01	7.07E+01	3.46E+03	6.36E+04	9.39E+06	2.32E+08	9.17E+08	3.57E+09	7.84E+09	2.07E+10	7.35E+10	8.91E+11
EU-154	0.00E+00	1.60E+00	9.20E+02	4.51E+04	8.27E+05	1.19E+08	2.69E+09	9.51E+09	3.05E+10	5.66E+10	1.14E+11	2.64E+11	1.47E+12
EU-155	0.00E+00	3.80E-01	2.19E+02	1.07E+04	1.96E+05	2.78E+07	5.85E+08	1.92E+09	5.54E+09	9.57E+09	1.79E+10	3.87E+10	2.06E+11
EU-156	0.00E+00	2.29E+00	1.30E+03	5.82E+04	7.90E+05	1.98E+07	1.04E+08	2.10E+08	4.21E+08	6.32E+08	1.05E+09	2.11E+09	1.06E+10
GD-162	0.00E+00	6.89E-01	2.15E+01	1.52E+02	6.50E+02	7.91E+03	3.96E+04	7.91E+04	1.58E+05	2.37E+05	3.96E+05	7.91E+05	3.96E+06
TB-160	0.00E+00	1.54E+00	8.85E+02	4.25E+04	7.26E+05	4.84E+07	3.14E+08	6.47E+08	1.31E+09	1.98E+09	3.31E+09	6.64E+09	3.33E+10
TA-182	0.00E+00	1.14E+00	6.53E+02	3.16E+04	5.55E+05	4.72E+07	3.60E+08	7.56E+08	1.55E+09	2.34E+09	3.93E+09	7.89E+09	3.96E+10
W-185	0.00E+00	7.36E-01	4.23E+02	2.03E+04	3.49E+05	2.39E+07	1.58E+08	3.25E+08	6.60E+08	9.95E+08	1.67E+09	3.34E+09	1.67E+10
W-187	0.00E+00	1.39E+00	6.50E+02	1.30E+04	6.64E+04	8.45E+05	4.24E+06	8.48E+06	1.70E+07	2.54E+07	4.24E+07	8.48E+07	4.24E+08
AU-195M	0.00E+00	1.38E-02	3.35E-01	2.36E+00	1.04E+01	1.53E+02	9.02E+02	1.85E+03	3.76E+03	5.66E+03	9.47E+03	1.90E+04	9.52E+04
AU-195	0.00E+00	3.18E-01	1.83E+02	8.91E+03	1.59E+05	1.63E+07	1.53E+08	3.31E+08	6.89E+08	1.05E+09	1.76E+09	3.55E+09	1.78E+10
AU-198	0.00E+00	1.81E+00	9.61E+02	3.05E+04	2.12E+05	2.94E+06	1.48E+07	2.97E+07	5.94E+07	8.90E+07	1.48E+08	2.97E+08	1.48E+09
AU-199	0.00E+00	8.31E-01	4.47E+02	1.49E+04	1.11E+05	1.57E+06	7.92E+06	1.59E+07	3.17E+07	4.76E+07	7.94E+07	1.59E+08	7.94E+08
HG-197	0.00E+00	3.30E-01	1.75E+02	5.55E+03	3.84E+04	5.31E+05	2.68E+06	5.36E+06	1.07E+07	1.61E+07	2.68E+07	5.36E+07	2.68E+08
HG-203	0.00E+00	5.60E-01	3.21E+02	1.53E+04	2.52E+05	1.29E+07	7.62E+07	1.55E+08	3.14E+08	4.72E+08	7.88E+08	1.58E+09	7.91E+09
TL-204	0.00E+00	1.32E+00	7.63E+02	3.73E+04	6.83E+05	9.57E+07	1.91E+09	6.01E+09	1.63E+10	2.72E+10	4.94E+10	1.05E+11	5.48E+11
TL-208	0.00E+00	4.37E-01	1.13E+01	7.92E+01	3.40E+02	4.13E+03	2.07E+04	4.13E+04	8.27E+04	1.24E+05	2.07E+05	4.13E+05	2.07E+06
TL-210	0.00E+00	2.25E-08	1.96E-05	2.39E-03	8.99E-02	1.91E+01	4.72E+02	1.80E+03	6.56E+03	1.35E+04	3.17E+04	8.92E+04	6.03E+05
PB-204M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PB-210	0.00E+00	2.16E-01	1.77E+02	2.15E+04	8.11E+05	1.72E+08	4.26E+09	1.63E+10	5.92E+10	1.22E+11	2.86E+11	8.05E+11	5.44E+12
PB-212	0.00E+00	1.64E+00	1.61E+03	2.22E+04	1.03E+05	1.28E+06	6.42E+06	1.28E+07	2.57E+07	3.85E+07	6.42E+07	1.28E+08	6.42E+08
PB-214	0.00E+00	2.16E+00	1.55E+02	1.13E+03	4.85E+03	5.94E+04	3.05E+05	6.28E+05	1.32E+06	2.05E+06	3.61E+06	7.74E+06	4.20E+07
BI-210M	0.00E+00	2.14E+00	1.18E+03	4.48E+04	4.08E+05	6.38E+06	3.24E+07	6.49E+07	1.30E+08	1.95E+08	3.25E+08	6.51E+08	3.25E+09
BI-212	0.00E+00	2.95E+00	2.54E+02	1.85E+03	8.00E+03	9.73E+04	4.86E+05	9.73E+05	1.95E+06	2.91E+06	4.86E+06	9.31E+06	4.86E+07
BI-214	0.00E+00	1.95E+00	7.89E+01	5.62E+02	2.41E+03	2.97E+04	1.54E+05	3.21E+05	6.88E+05	1.09E+06	1.95E+06	4.30E+06	2.39E+07

TABLE 3-3A (continued)

DOSE (MREM) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
PO-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PO-214	0.00E+00	5.03E-14	4.13E-11	5.02E-09	1.89E-07	4.02E-05	9.93E-04	3.79E-03	1.38E-02	2.84E-02	6.67E-02	1.88E-01	1.27E+00
PO-218	0.00E+00	2.13E-01	1.76E+01	1.28E+02	5.51E+02	6.76E+03	3.47E+04	7.14E+04	1.50E+05	2.33E+05	4.10E+05	8.81E+05	4.77E+06
RN-220	0.00E+00	2.26E-03	2.33E+00	3.22E+01	1.50E+02	1.86E+03	9.32E+03	1.86E+04	3.73E+04	5.59E+04	9.32E+04	1.86E+05	9.32E+05
RN-222	0.00E+00	8.99E-01	2.60E+03	9.97E+04	8.12E+05	1.20E+07	6.24E+07	1.29E+08	2.70E+08	4.20E+08	7.40E+08	1.59E+09	8.61E+09
RA-224	0.00E+00	4.39E-02	8.54E+02	7.69E+04	6.98E+05	1.04E+07	5.27E+07	1.06E+08	2.11E+08	3.17E+08	5.29E+08	1.06E+09	5.29E+09
RA-226	0.00E+00	7.29E-02	1.94E+02	4.79E+04	1.92E+06	3.96E+08	1.03E+10	4.22E+10	1.75E+11	4.04E+11	1.17E+12	4.99E+12	1.32E+14
RA-228	0.00E+00	2.87E-01	3.51E+02	2.45E+04	4.89E+05	1.07E+08	4.72E+09	2.14E+10	7.76E+10	1.46E+11	2.93E+11	6.65E+11	3.64E+12
AC-228	0.00E+00	6.49E-01	1.88E+02	1.91E+03	9.09E+03	2.23E+05	2.56E+06	6.59E+06	1.52E+07	2.38E+07	4.11E+07	8.44E+07	4.30E+08
TH-228	0.00E+00	1.14E-01	1.08E+02	3.74E+04	1.72E+06	3.25E+08	5.56E+09	1.52E+10	3.58E+10	5.66E+10	9.82E+10	2.02E+11	1.03E+12
TH-230	0.00E+00	7.99E-02	4.60E+01	2.26E+03	4.14E+04	6.19E+06	1.61E+08	6.73E+08	2.95E+09	7.23E+09	2.36E+10	1.31E+11	1.10E+13
TH-231	0.00E+00	8.99E-01	4.25E+02	8.79E+03	4.56E+04	5.83E+05	2.92E+06	5.85E+06	1.17E+07	1.75E+07	2.92E+07	5.85E+07	2.92E+08
TH-232	0.00E+00	2.33E-01	4.86E+01	1.98E+03	3.64E+04	9.04E+06	9.80E+08	8.66E+09	6.77E+10	2.04E+11	7.41E+11	3.66E+12	1.09E+14
TH-234	0.00E+00	7.61E+00	4.48E+03	2.08E+05	3.12E+06	1.04E+08	5.64E+08	1.14E+09	2.29E+09	3.44E+09	5.74E+09	1.15E+10	5.75E+10
PA-233	0.00E+00	1.18E+00	6.71E+02	3.13E+04	4.79E+05	1.72E+07	9.42E+07	1.90E+08	3.83E+08	5.76E+08	9.61E+08	1.92E+09	9.62E+09
PA-234M	0.00E+00	2.49E-01	6.14E+00	4.30E+01	1.84E+02	2.24E+03	1.12E+04	2.24E+04	4.49E+04	6.73E+04	1.12E+05	2.24E+05	1.12E+06
PA-234	0.00E+00	3.94E+00	1.19E+03	1.24E+04	5.57E+04	6.86E+05	3.44E+06	6.87E+06	1.37E+07	2.06E+07	3.44E+07	6.87E+07	3.44E+08
U-232	0.00E+00	9.08E-02	5.23E+01	2.63E+03	6.18E+04	4.66E+07	3.91E+09	2.24E+10	1.11E+11	2.64E+11	7.42E+11	2.72E+12	3.14E+13
U-233	0.00E+00	3.73E-02	2.15E+01	1.05E+03	1.93E+04	2.86E+06	7.15E+07	2.86E+08	1.14E+09	2.57E+09	7.15E+09	2.86E+10	7.15E+11
U-234	0.00E+00	7.36E-02	4.24E+01	2.08E+03	3.82E+04	5.65E+06	1.41E+08	5.65E+08	2.26E+09	5.09E+09	1.41E+10	5.65E+10	1.42E+12
U-235	0.00E+00	2.19E-01	2.19E+02	2.28E+04	5.34E+05	8.53E+07	2.14E+09	8.58E+09	3.43E+10	7.72E+10	2.15E+11	8.58E+11	2.15E+13
U-236	0.00E+00	6.23E-02	3.55E+01	1.74E+03	3.20E+04	4.73E+06	1.18E+08	4.73E+08	1.89E+09	4.26E+09	1.18E+10	4.73E+10	1.18E+12
U-237	0.00E+00	1.06E+00	5.91E+02	2.39E+04	2.47E+05	4.23E+06	2.16E+07	4.34E+07	8.68E+07	1.30E+08	2.17E+08	4.35E+08	2.17E+09
U-238	0.00E+00	2.37E-01	8.09E+01	1.58E+04	9.86E+05	5.04E+08	1.46E+10	5.96E+10	2.41E+11	5.43E+11	1.51E+12	6.07E+12	1.52E+14
U-240	0.00E+00	3.31E+00	1.77E+03	2.66E+04	1.26E+05	1.58E+06	7.90E+06	1.58E+07	3.16E+07	4.74E+07	7.90E+07	1.58E+08	7.91E+08
NP-237	0.00E+00	1.09E-01	6.82E+01	4.96E+03	1.87E+05	8.14E+07	2.37E+09	9.66E+09	3.90E+10	8.81E+10	2.45E+11	9.84E+11	2.46E+13
NP-238	0.00E+00	1.27E+00	6.59E+02	1.91E+04	1.21E+05	1.62E+06	8.18E+06	1.64E+07	3.28E+07	4.93E+07	8.25E+07	1.66E+08	8.47E+08
NP-239	0.00E+00	1.46E+00	7.68E+02	2.31E+04	1.52E+05	2.07E+06	1.04E+07	2.09E+07	4.18E+07	6.27E+07	1.05E+08	2.09E+08	1.05E+09
NP-240M	0.00E+00	1.08E+00	3.12E+01	2.20E+02	9.44E+02	1.15E+04	5.74E+04	1.15E+05	2.30E+05	3.45E+05	5.75E+05	1.15E+06	5.75E+06
PU-236	0.00E+00	7.08E-02	4.08E+01	1.99E+03	3.65E+04	5.13E+06	1.34E+08	6.70E+08	3.55E+09	9.02E+09	2.70E+10	1.04E+11	1.25E+12
PU-238	0.00E+00	5.76E-02	3.32E+01	1.63E+03	2.99E+04	4.41E+06	1.09E+08	4.31E+08	1.68E+09	3.69E+09	9.74E+09	3.46E+10	4.22E+11
PU-239	0.00E+00	4.09E-02	2.36E+01	1.16E+03	2.12E+04	3.14E+06	7.85E+07	3.14E+08	1.26E+09	2.83E+09	7.85E+09	3.14E+10	7.81E+11
PU-240	0.00E+00	5.16E-02	2.97E+01	1.46E+03	2.67E+04	3.96E+06	9.90E+07	3.96E+08	1.58E+09	3.56E+09	9.88E+09	3.95E+10	9.73E+11
PU-241	0.00E+00	3.09E-02	1.78E+01	8.71E+02	1.60E+04	2.34E+06	5.58E+07	2.11E+08	7.58E+08	1.55E+09	3.67E+09	1.10E+10	1.33E+11
PU-242	0.00E+00	5.03E-02	2.89E+01	1.42E+03	2.60E+04	3.85E+06	9.64E+07	3.85E+08	1.54E+09	3.47E+09	9.64E+09	3.85E+10	9.63E+11
PU-244	0.00E+00	5.13E-02	7.54E+02	9.83E+04	2.17E+06	3.39E+08	8.50E+09	3.40E+10	1.36E+11	3.06E+11	8.51E+11	3.40E+12	8.51E+13
AM-241	0.00E+00	1.75E-01	1.01E+02	4.93E+03	9.05E+04	1.34E+07	3.34E+08	1.33E+09	5.30E+09	1.19E+10	3.26E+10	1.27E+11	2.61E+12
AM-242	0.00E+00	1.26E-01	5.36E+01	8.60E+02	4.20E+03	6.06E+04	3.39E+05	6.94E+05	1.41E+06	2.15E+06	3.65E+06	7.58E+06	4.23E+07
AM-243	0.00E+00	8.82E-02	1.25E+02	2.06E+04	6.51E+05	1.17E+08	2.96E+09	1.19E+10	4.75E+10	1.07E+11	2.97E+11	1.18E+12	2.93E+13
CM-242	0.00E+00	5.33E-02	3.07E+01	1.49E+03	2.65E+04	2.60E+06	2.34E+07	5.12E+07	1.10E+08	1.73E+08	3.08E+08	6.97E+08	4.77E+09
CM-243	0.00E+00	7.19E-01	4.14E+02	2.03E+04	3.73E+05	5.47E+07	1.32E+09	5.09E+09	1.88E+10	3.94E+10	9.51E+10	2.81E+11	2.05E+12
CM-244	0.00E+00	2.56E-02	1.47E+01	7.22E+02	1.32E+04	1.94E+06	4.61E+07	1.73E+08	6.17E+08	1.25E+09	2.84E+09	7.64E+09	5.05E+10
CF-252	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 3-3B

DOSE (MREM) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
H-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BE-7	0.00E+00	5.24E-01	3.01E+02	1.44E+04	2.40E+05	1.34E+07	8.12E+07	1.66E+08	3.36E+08	5.05E+08	8.45E+08	1.69E+09	8.48E+09
C-11	0.00E+00	6.13E+00	2.51E+02	1.79E+03	7.69E+03	9.37E+04	4.68E+05	9.37E+05	1.87E+06	2.81E+06	4.68E+06	9.37E+06	4.68E+07
C-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-13	0.00E+00	3.99E+00	1.24E+02	8.77E+02	3.76E+03	4.58E+04	2.29E+05	4.58E+05	9.16E+05	1.37E+06	2.29E+06	4.58E+06	2.29E+07
O-15	0.00E+00	1.01E+00	2.55E+01	1.79E+02	7.68E+02	9.34E+03	4.67E+04	9.34E+04	1.87E+05	2.80E+05	4.67E+05	9.34E+05	4.67E+06
F-18	0.00E+00	9.34E+00	1.19E+03	9.22E+03	4.00E+04	4.88E+05	2.44E+06	4.88E+06	9.77E+06	1.47E+07	2.44E+07	4.89E+07	2.44E+08
NA-22	0.00E+00	2.35E+01	1.35E+04	6.61E+05	1.21E+07	1.65E+09	3.02E+10	8.80E+10	2.20E+11	3.55E+11	6.25E+11	1.30E+12	6.71E+12
NA-24	0.00E+00	4.33E+01	1.81E+04	2.79E+05	1.33E+06	1.66E+07	8.34E+07	1.67E+08	3.34E+08	5.00E+08	8.34E+08	1.67E+09	8.34E+09
MG-28	0.00E+00	3.10E+01	1.50E+04	2.79E+05	1.40E+06	1.77E+07	8.87E+07	1.77E+08	3.55E+08	5.32E+08	8.87E+08	1.77E+09	8.87E+09
AL-28	0.00E+00	1.93E+00	4.89E+01	3.43E+02	1.47E+03	1.79E+04	8.94E+04	1.79E+05	3.58E+05	5.36E+05	8.94E+05	1.79E+06	8.94E+06
P-32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
P-33	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
S-35	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CL-36	0.00E+00	4.91E-05	2.83E-02	1.39E+00	2.54E+01	3.77E+03	9.42E+04	3.77E+05	1.51E+06	3.39E+06	9.42E+06	3.77E+07	9.41E+08
CL-38	0.00E+00	1.13E+01	6.59E+02	4.76E+03	2.05E+04	2.50E+05	1.25E+06	2.50E+06	5.00E+06	7.49E+06	1.25E+07	2.50E+07	1.25E+08
A-37	0.00E+00	2.89E-03	1.66E+00	7.80E+01	1.24E+03	5.27E+04	2.97E+05	6.03E+05	1.21E+06	1.82E+06	3.05E+06	6.10E+06	3.05E+07
A-39	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
K-40	0.00E+00	1.67E+00	9.60E+02	4.70E+04	8.64E+05	1.28E+08	3.20E+09	1.28E+10	5.12E+10	1.15E+11	3.20E+11	1.28E+12	3.20E+13
K-42	0.00E+00	2.89E+00	1.13E+03	1.57E+04	7.36E+04	9.16E+05	4.59E+06	9.18E+06	1.84E+07	2.75E+07	4.59E+07	9.18E+07	4.59E+08
K-43	0.00E+00	1.04E+01	4.78E+03	9.16E+04	4.63E+05	5.87E+06	2.94E+07	5.89E+07	1.18E+08	1.77E+08	2.95E+08	5.89E+08	2.95E+09
CA-45	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CA-47	0.00E+00	1.13E+01	6.26E+03	2.40E+05	2.18E+06	3.39E+07	1.72E+08	3.45E+08	6.91E+08	1.04E+09	1.73E+09	3.46E+09	1.73E+10
CA-49	0.00E+00	1.12E+01	3.36E+02	2.37E+03	1.02E+04	1.24E+05	6.19E+05	1.24E+06	2.47E+06	3.71E+06	6.19E+06	1.24E+07	6.19E+07
SC-46	0.00E+00	2.15E+01	1.23E+04	5.94E+05	1.03E+07	7.47E+08	5.09E+09	1.05E+10	2.15E+10	3.24E+10	5.42E+10	1.09E+11	5.45E+11
SC-47	0.00E+00	1.19E+00	6.43E+02	2.21E+04	1.70E+05	2.44E+06	1.23E+07	2.47E+07	4.93E+07	7.40E+07	1.23E+08	2.47E+08	1.23E+09
SC-49	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CR-51	0.00E+00	3.49E-01	2.00E+02	9.31E+03	1.43E+05	5.23E+06	2.87E+07	5.81E+07	1.17E+08	1.76E+08	2.93E+08	5.87E+08	2.94E+09
MN-52M	0.00E+00	1.50E+01	6.32E+02	4.54E+03	1.97E+04	2.42E+05	1.21E+06	2.42E+06	4.83E+06	7.25E+06	1.21E+07	2.42E+07	1.21E+08
MN-52	0.00E+00	3.62E+01	2.00E+04	7.83E+05	7.49E+06	1.21E+08	6.16E+08	1.24E+09	2.47E+09	3.71E+09	6.19E+09	1.24E+10	6.19E+10
MN-54	0.00E+00	8.90E+00	5.12E+03	2.50E+05	4.52E+06	5.31E+08	6.39E+09	1.48E+10	3.17E+10	4.86E+10	8.23E+10	1.67E+11	8.42E+11
FE-52	0.00E+00	1.84E+01	1.08E+04	1.27E+05	5.84E+05	7.25E+06	3.63E+07	7.27E+07	1.45E+08	2.18E+08	3.63E+08	7.27E+08	3.63E+09
FE-55	0.00E+00	1.63E-02	9.40E+00	4.60E+02	8.40E+03	1.15E+06	2.13E+07	6.25E+07	1.57E+08	2.55E+08	4.50E+08	9.38E+08	4.84E+09
FE-59	0.00E+00	1.27E+01	7.29E+03	3.47E+05	5.68E+06	2.84E+08	1.66E+09	3.38E+09	6.83E+09	1.03E+10	1.72E+10	3.44E+10	1.72E+11
CO-56	0.00E+00	3.86E+01	2.22E+04	1.07E+06	1.84E+07	1.29E+09	8.63E+09	1.78E+10	3.62E+10	5.46E+10	9.15E+10	1.83E+11	9.20E+11
CO-57	0.00E+00	1.34E+00	7.69E+02	3.75E+04	6.75E+05	7.69E+07	8.65E+08	1.96E+09	4.16E+09	6.36E+09	1.08E+10	2.17E+10	1.10E+11
CO-58	0.00E+00	1.04E+01	5.96E+03	2.87E+05	4.90E+06	3.26E+08	2.12E+09	4.37E+09	8.86E+09	1.34E+10	2.23E+10	4.48E+10	2.25E+11
CO-60	0.00E+00	2.67E+01	1.54E+04	7.53E+05	1.38E+07	1.96E+09	4.16E+10	1.38E+11	4.03E+11	7.02E+11	1.32E+12	2.88E+12	1.53E+13
NI-56	0.00E+00	1.86E+01	1.04E+04	4.29E+05	4.91E+06	1.65E+08	1.01E+09	2.07E+09	4.19E+09	6.31E+09	1.06E+10	2.12E+10	1.06E+11
NI-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CU-64	0.00E+00	2.07E+00	8.23E+02	1.16E+04	5.45E+04	6.79E+05	3.40E+06	6.80E+06	1.36E+07	2.04E+07	3.40E+07	6.80E+07	3.40E+08
ZN-65	0.00E+00	6.22E+00	3.58E+03	1.74E+05	3.14E+06	3.48E+08	3.72E+09	8.31E+09	1.75E+10	2.67E+10	4.51E+10	9.11E+10	4.59E+11
ZN-69M	0.00E+00	4.37E+00	1.78E+03	2.63E+04	1.25E+05	1.56E+06	7.79E+06	1.56E+07	3.12E+07	4.68E+07	7.80E+07	1.56E+08	7.80E+08
ZN-69	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GA-67	0.00E+00	1.96E+00	1.06E+03	3.58E+04	2.70E+05	3.85E+06	1.94E+07	3.89E+07	7.79E+07	1.17E+08	1.95E+08	3.90E+08	1.95E+09
GA-68	0.00E+00	8.33E+00	7.41E+02	5.51E+03	2.38E+04	2.90E+05	1.45E+06	2.90E+06	5.81E+06	8.71E+06	1.45E+07	2.90E+07	1.45E+08

TABLE 3-3B (continued)

DOSE (MREM) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
GE-77	0.00E+00	1.02E+01	3.88E+03	5.17E+04	2.41E+05	2.99E+06	1.50E+07	3.00E+07	5.99E+07	8.99E+07	1.50E+08	3.00E+08	1.50E+09
AS-76	0.00E+00	4.59E+00	2.19E+03	4.59E+04	2.40E+05	3.07E+06	1.54E+07	3.08E+07	6.16E+07	9.24E+07	1.54E+08	3.08E+08	1.54E+09
AS-77	0.00E+00	1.02E-01	5.18E+01	1.33E+03	7.67E+03	1.01E+05	5.06E+05	1.01E+06	2.02E+06	3.04E+06	5.06E+06	1.01E+07	5.06E+07
SE-75	0.00E+00	5.99E+00	3.45E+03	1.67E+05	2.93E+06	2.54E+08	1.97E+09	4.16E+09	8.52E+09	1.29E+10	2.16E+10	4.34E+10	2.18E+11
SE-77M	0.00E+00	1.23E-02	2.98E-01	2.09E+00	8.94E+00	1.09E+02	5.44E+02	1.09E+03	2.18E+03	3.26E+03	5.44E+03	1.09E+04	5.44E+04
BR-80M	0.00E+00	6.57E-01	2.57E+02	2.38E+03	1.05E+04	1.29E+05	6.45E+05	1.29E+06	2.58E+06	3.87E+06	6.45E+06	1.29E+07	6.45E+07
BR-80	0.00E+00	4.68E-01	1.78E+01	1.26E+02	5.43E+02	6.61E+03	3.31E+04	6.61E+04	1.32E+05	1.98E+05	3.31E+05	6.61E+05	3.31E+06
BR-82	0.00E+00	2.84E+01	1.42E+04	3.47E+05	1.95E+06	2.54E+07	1.28E+08	2.56E+08	5.12E+08	7.67E+08	1.28E+09	2.56E+09	1.28E+10
BR-83	0.00E+00	1.83E-01	2.92E+01	2.35E+02	1.02E+03	1.25E+04	6.26E+04	1.25E+05	2.50E+05	3.76E+05	6.26E+05	1.25E+06	6.26E+06
BR-84	0.00E+00	1.34E+01	7.08E+02	5.10E+03	2.19E+04	2.67E+05	1.33E+06	2.67E+06	5.34E+06	8.01E+06	1.33E+07	2.67E+07	1.33E+08
KR-79	0.00E+00	2.53E+00	1.26E+03	3.07E+04	1.72E+05	2.24E+06	1.12E+07	2.25E+07	4.50E+07	6.75E+07	1.13E+08	2.25E+08	1.13E+09
KR-83M	0.00E+00	2.57E-02	3.31E+00	2.57E+01	1.11E+02	1.36E+03	6.80E+03	1.36E+04	2.72E+04	4.08E+04	6.80E+04	1.36E+05	6.80E+05
KR-85M	0.00E+00	1.59E+00	3.84E+02	3.50E+03	1.55E+04	1.90E+05	9.51E+05	1.90E+06	3.81E+06	5.71E+06	9.52E+06	1.91E+07	9.53E+07
KR-85	0.00E+00	2.19E-02	1.26E+01	6.18E+02	1.13E+04	1.65E+06	3.79E+07	1.37E+08	4.57E+08	8.72E+08	1.83E+09	4.41E+09	2.52E+10
KR-87	0.00E+00	6.95E+00	6.71E+02	5.03E+03	2.17E+04	2.65E+05	1.33E+06	2.65E+06	5.30E+06	7.95E+06	1.33E+07	2.65E+07	1.33E+08
KR-88	0.00E+00	2.29E+01	4.59E+03	3.79E+04	1.65E+05	2.02E+06	1.01E+07	2.02E+07	4.05E+07	6.07E+07	1.01E+08	2.02E+08	1.01E+09
RB-84	0.00E+00	9.42E+00	5.39E+03	2.54E+05	4.02E+06	1.68E+08	9.45E+08	1.92E+09	3.86E+09	5.80E+09	9.69E+09	1.94E+10	9.71E+10
RB-86	0.00E+00	1.01E+00	5.75E+02	2.62E+04	3.73E+05	1.06E+07	5.63E+07	1.13E+08	2.28E+08	3.42E+08	5.71E+08	1.14E+09	5.72E+09
RB-88	0.00E+00	3.80E+00	1.45E+02	1.03E+03	4.44E+03	5.41E+04	2.70E+05	5.41E+05	1.08E+06	1.62E+06	2.70E+06	5.41E+06	2.70E+07
RB-89	0.00E+00	1.22E+01	4.39E+02	3.11E+03	1.34E+04	1.63E+05	8.13E+05	1.63E+06	3.25E+06	4.88E+06	8.13E+06	1.63E+07	8.13E+07
RB-90	0.00E+00	3.34E+00	8.55E+01	6.00E+02	2.57E+03	3.13E+04	1.56E+05	3.13E+05	6.26E+05	9.39E+05	1.56E+06	3.13E+06	1.56E+07
SR-85	0.00E+00	5.53E+00	3.17E+03	1.52E+05	2.59E+06	1.64E+08	1.04E+09	2.13E+09	4.32E+09	6.51E+09	1.09E+10	2.18E+10	1.09E+11
SR-87M	0.00E+00	3.24E+00	5.69E+02	4.67E+03	2.04E+04	2.50E+05	1.25E+06	2.50E+06	4.99E+06	7.49E+06	1.25E+07	2.50E+07	1.25E+08
SR-89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR-91	0.00E+00	8.48E+00	3.81E+03	4.73E+04	2.17E+05	2.69E+06	1.35E+07	2.69E+07	5.39E+07	8.09E+07	1.35E+08	2.70E+08	1.35E+09
SR-92	0.00E+00	1.25E+01	2.42E+03	2.05E+04	8.98E+04	1.10E+06	5.50E+06	1.10E+07	2.20E+07	3.30E+07	5.50E+07	1.10E+08	5.50E+08
SR-93	0.00E+00	4.75E+00	1.41E+02	1.02E+03	4.37E+03	5.32E+04	2.66E+05	5.32E+05	1.06E+06	1.60E+06	2.66E+06	5.32E+06	2.66E+07
Y-87	0.00E+00	5.32E+00	4.10E+03	1.55E+05	1.20E+06	1.72E+07	8.68E+07	1.74E+08	3.48E+08	5.22E+08	8.71E+08	1.74E+09	8.71E+09
Y-88	0.00E+00	2.87E+01	1.65E+04	7.98E+05	1.40E+07	1.15E+09	8.50E+09	1.78E+10	3.64E+10	5.49E+10	9.21E+10	1.85E+11	9.28E+11
Y-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y-91M	0.00E+00	4.29E+00	3.04E+02	2.22E+03	9.58E+03	1.17E+05	5.86E+05	1.17E+06	2.34E+06	3.52E+06	5.86E+06	1.17E+07	5.86E+07
Y-91	0.00E+00	2.58E-02	1.48E+01	7.08E+02	1.19E+04	6.90E+05	4.23E+06	8.66E+06	1.75E+07	2.64E+07	4.41E+07	8.84E+07	4.43E+08
Y-92	0.00E+00	2.47E+00	5.09E+02	4.38E+03	1.92E+04	2.35E+05	1.18E+06	2.35E+06	4.71E+06	7.06E+06	1.18E+07	2.35E+07	1.18E+08
Y-93	0.00E+00	7.87E-01	2.88E+02	3.63E+03	1.67E+04	2.07E+05	1.04E+06	2.08E+06	4.15E+06	6.23E+06	1.04E+07	2.08E+07	1.04E+08
ZR-95	0.00E+00	7.76E+00	4.49E+03	2.24E+05	4.30E+06	4.30E+08	2.96E+09	6.12E+09	1.25E+10	1.88E+10	3.15E+10	6.31E+10	3.16E+11
ZR-97	0.00E+00	9.89E+00	6.56E+03	1.13E+05	5.49E+05	6.91E+06	3.46E+07	6.92E+07	1.39E+08	2.08E+08	3.46E+08	6.93E+08	3.46E+09
NB-95M	0.00E+00	6.06E-01	3.57E+02	1.90E+04	3.53E+05	1.64E+07	9.32E+07	1.89E+08	3.81E+08	5.73E+08	9.57E+08	1.92E+09	9.60E+09
NB-95	0.00E+00	8.16E+00	4.67E+03	2.20E+05	3.51E+06	1.50E+08	8.45E+08	1.71E+09	3.45E+09	5.19E+09	8.67E+09	1.74E+10	8.69E+10
NB-97M	0.00E+00	3.98E-01	1.49E+01	1.07E+02	4.62E+02	5.63E+03	2.81E+04	5.63E+04	1.13E+05	1.69E+05	2.81E+05	5.63E+05	2.81E+06
NB-97	0.00E+00	5.91E+00	5.57E+02	4.17E+03	1.80E+04	2.19E+05	1.10E+06	2.20E+06	4.39E+06	6.59E+06	1.10E+07	2.20E+07	1.10E+08
MO-99	0.00E+00	1.77E+00	1.24E+03	4.75E+04	3.43E+05	4.78E+06	2.41E+07	4.83E+07	9.66E+07	1.45E+08	2.41E+08	4.83E+08	2.42E+09
TC-99M	0.00E+00	1.29E+00	3.70E+02	3.71E+03	1.66E+04	2.04E+05	1.02E+06	2.04E+06	4.08E+06	6.12E+06	1.02E+07	2.04E+07	1.02E+08
TC-99	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU-103	0.00E+00	5.17E+00	2.97E+03	1.41E+05	2.27E+06	1.05E+08	6.03E+08	1.23E+09	2.47E+09	3.72E+09	6.21E+09	1.24E+10	6.23E+10
RU-106	0.00E+00	1.94E+00	1.14E+03	5.58E+04	1.01E+06	1.23E+08	1.60E+09	3.80E+09	8.24E+09	1.27E+10	2.16E+10	4.38E+10	2.22E+11
RH-103M	0.00E+00	1.48E-02	1.14E+00	8.38E+00	3.61E+01	4.40E+02	2.20E+03	4.40E+03	8.81E+03	1.32E+04	2.20E+04	4.40E+04	2.20E+05

TABLE 3-3B (continued)

DOSE (MREM) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
RH-105	0.00E+00	8.28E-01	4.13E+02	1.01E+04	5.71E+04	7.44E+05	3.74E+06	7.48E+06	1.50E+07	2.24E+07	3.74E+07	7.48E+07	3.74E+08
RH-106	0.00E+00	4.70E-02	1.14E+00	8.00E+00	3.43E+01	4.17E+02	2.09E+03	4.17E+03	8.34E+03	1.25E+04	2.09E+04	4.17E+04	2.09E+05
PD-103	0.00E+00	2.24E-02	1.27E+01	5.77E+02	8.10E+03	2.21E+05	1.17E+06	2.36E+06	4.74E+06	7.11E+06	1.19E+07	2.37E+07	1.19E+08
AG-110M	0.00E+00	2.91E+01	1.68E+04	8.16E+05	1.47E+07	1.64E+09	1.78E+10	3.99E+10	8.41E+10	1.28E+11	2.17E+11	4.38E+11	2.21E+12
AG-111	0.00E+00	4.14E-01	3.75E+02	1.61E+04	1.74E+05	3.10E+06	1.59E+07	3.19E+07	6.38E+07	9.58E+07	1.60E+08	3.20E+08	1.60E+09
CD-111M	0.00E+00	3.25E+00	2.26E+02	1.66E+03	7.13E+03	8.69E+04	4.35E+05	8.69E+05	1.74E+06	2.61E+06	4.35E+06	8.69E+06	4.35E+07
CD-113M	0.00E+00	1.51E-07	3.63E-06	2.54E-05	1.09E-04	1.33E-03	6.63E-03	1.33E-02	2.65E-02	3.98E-02	6.63E-02	1.33E-01	6.63E-01
CD-115M	0.00E+00	3.52E-01	2.26E+02	1.14E+04	1.89E+05	9.46E+06	5.54E+07	1.13E+08	2.28E+08	3.42E+08	5.72E+08	1.15E+09	5.74E+09
IN-113M	0.00E+00	2.35E+00	2.78E+02	2.13E+03	9.23E+03	1.13E+05	5.63E+05	1.13E+06	2.25E+06	3.38E+06	5.63E+06	1.13E+07	5.63E+07
IN-114M	0.00E+00	9.17E-01	5.27E+02	2.51E+04	4.17E+05	2.24E+07	1.34E+08	2.73E+08	5.52E+08	8.31E+08	1.39E+09	2.78E+09	1.39E+10
IN-114	0.00E+00	1.62E-03	4.00E-02	2.80E-01	1.20E+00	1.46E+01	7.30E+01	1.46E+02	2.92E+02	4.38E+02	7.30E+02	1.46E+03	7.30E+03
IN-115M	0.00E+00	1.43E+00	3.46E+02	3.16E+03	1.40E+04	1.71E+05	8.57E+05	1.71E+06	3.43E+06	5.14E+06	8.57E+06	1.71E+07	8.57E+07
SN-113	0.00E+00	6.50E-01	1.45E+03	8.14E+04	1.46E+06	1.25E+08	9.51E+08	2.00E+09	4.09E+09	6.18E+09	1.04E+10	2.08E+10	1.05E+11
SN-119M	0.00E+00	1.16E-01	6.67E+01	3.25E+03	5.84E+04	6.48E+06	6.95E+07	1.56E+08	3.28E+08	5.00E+08	8.44E+08	1.71E+09	8.59E+09
SN-123	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SN-125	0.00E+00	3.32E+00	1.87E+03	8.02E+04	9.55E+05	2.18E+07	1.57E+08	3.73E+08	8.43E+08	1.32E+09	2.28E+09	4.67E+09	2.38E+10
SB-122	0.00E+00	4.40E+00	2.34E+03	7.45E+04	5.20E+05	7.20E+06	3.63E+07	7.27E+07	1.45E+08	2.18E+08	3.64E+08	7.28E+08	3.64E+09
SB-124	0.00E+00	1.96E+01	1.12E+04	5.38E+05	9.07E+06	5.47E+08	3.40E+09	6.98E+09	1.41E+10	2.13E+10	3.56E+10	7.13E+10	3.57E+11
SB-125	0.00E+00	4.75E+00	2.74E+03	1.34E+05	2.45E+06	3.40E+08	6.34E+09	1.87E+10	4.71E+10	7.64E+10	1.35E+11	2.82E+11	1.45E+12
SB-127	0.00E+00	7.06E+00	3.85E+03	1.37E+05	1.10E+06	1.62E+07	8.20E+07	1.64E+08	3.29E+08	4.93E+08	8.22E+08	1.65E+09	8.23E+09
TE-123M	0.00E+00	1.57E+00	9.02E+02	4.37E+04	7.69E+05	6.66E+07	5.16E+08	1.09E+09	2.23E+09	3.37E+09	5.65E+09	1.13E+10	5.70E+10
TE-125M	0.00E+00	3.78E-01	2.17E+02	1.04E+04	1.75E+05	1.03E+07	6.35E+07	1.30E+08	2.63E+08	3.96E+08	6.63E+08	1.33E+09	6.65E+09
TE-127M	0.00E+00	9.80E-02	6.55E+01	3.70E+03	6.71E+04	5.63E+06	4.21E+07	8.81E+07	1.80E+08	2.72E+08	4.57E+08	9.17E+08	4.60E+09
TE-127	0.00E+00	4.23E-02	1.49E+01	1.81E+02	8.26E+02	1.02E+04	5.12E+04	1.02E+05	2.05E+05	3.07E+05	5.12E+05	1.02E+06	5.12E+06
TE-129M	0.00E+00	4.79E-01	4.53E+02	2.27E+04	3.62E+05	1.50E+07	8.40E+07	1.70E+08	3.43E+08	5.15E+08	8.60E+08	1.72E+09	8.62E+09
TE-129	0.00E+00	5.86E-01	5.32E+01	3.96E+02	1.71E+03	2.09E+04	1.04E+05	2.09E+05	4.18E+05	6.26E+05	1.04E+06	2.09E+06	1.04E+07
TE-131M	0.00E+00	1.51E+01	7.62E+03	1.80E+05	1.07E+06	1.48E+07	7.47E+07	1.50E+08	2.99E+08	4.49E+08	7.48E+08	1.50E+09	7.48E+09
TE-131	0.00E+00	2.73E+00	1.29E+02	1.09E+03	6.07E+03	8.78E+04	4.44E+05	8.90E+05	1.78E+06	2.67E+06	4.46E+06	8.91E+06	4.46E+07
TE-132	0.00E+00	4.44E+00	1.11E+04	4.64E+05	3.58E+06	5.11E+07	2.58E+08	5.17E+08	1.04E+09	1.55E+09	2.59E+09	5.18E+09	2.59E+10
I-123	0.00E+00	1.77E+00	7.10E+02	1.02E+04	4.78E+04	5.96E+05	2.99E+06	5.98E+06	1.20E+07	1.79E+07	2.99E+07	5.98E+07	2.99E+08
I-124	0.00E+00	1.16E+01	6.35E+03	2.31E+05	1.94E+06	2.90E+07	1.47E+08	2.94E+08	5.89E+08	8.83E+08	1.47E+09	2.95E+09	1.47E+10
I-125	0.00E+00	4.40E-01	2.53E+02	1.21E+04	2.04E+05	1.22E+07	7.59E+07	1.56E+08	3.15E+08	4.74E+08	7.93E+08	1.59E+09	7.97E+09
I-126	0.00E+00	4.61E+00	2.61E+03	1.16E+05	1.50E+06	3.46E+07	1.80E+08	3.62E+08	7.27E+08	1.09E+09	1.82E+09	3.64E+09	1.82E+10
I-129	0.00E+00	2.64E-01	1.52E+02	7.44E+03	1.37E+05	2.02E+07	5.06E+08	2.02E+09	8.09E+09	1.82E+10	5.06E+10	2.02E+11	5.06E+12
I-130	0.00E+00	2.13E+01	8.37E+03	1.16E+05	5.45E+05	6.78E+06	3.40E+07	6.80E+07	1.36E+08	2.04E+08	3.40E+08	6.80E+08	3.40E+09
I-131	0.00E+00	4.04E+00	2.26E+03	9.42E+04	1.04E+06	1.91E+07	9.80E+07	1.97E+08	3.94E+08	5.91E+08	9.86E+08	1.97E+09	9.86E+09
I-132	0.00E+00	2.18E+01	3.28E+03	2.61E+04	1.14E+05	1.39E+06	6.94E+06	1.39E+07	2.78E+07	4.16E+07	6.94E+07	1.39E+08	6.94E+08
I-133	0.00E+00	7.06E+00	3.22E+03	6.08E+04	3.13E+05	4.03E+06	2.02E+07	4.04E+07	8.09E+07	1.21E+08	2.02E+08	4.05E+08	2.02E+09
I-134	0.00E+00	1.98E+01	1.46E+03	1.07E+04	4.62E+04	5.63E+05	2.81E+06	5.63E+06	1.13E+07	1.69E+07	2.81E+07	5.63E+07	2.81E+08
I-135	0.00E+00	1.86E+01	6.10E+03	6.71E+04	3.03E+05	3.74E+06	1.87E+07	3.74E+07	7.49E+07	1.12E+08	1.87E+08	3.74E+08	1.87E+09
I-136	0.00E+00	1.94E+00	4.82E+01	3.38E+02	1.45E+03	1.76E+04	8.81E+04	1.76E+05	3.52E+05	5.28E+05	8.81E+05	1.76E+06	8.81E+06
XE-131M	0.00E+00	2.12E-01	1.20E+02	5.26E+03	6.67E+04	1.47E+06	7.65E+06	1.54E+07	3.08E+07	4.63E+07	7.72E+07	1.54E+08	7.72E+08
XE-133M	0.00E+00	4.31E-01	2.35E+02	8.68E+03	7.72E+04	1.21E+06	6.12E+06	1.23E+07	2.46E+07	3.69E+07	6.14E+07	1.23E+08	6.15E+08
XE-133	0.00E+00	4.76E-01	2.63E+02	1.01E+04	9.45E+04	1.50E+06	7.63E+06	1.53E+07	3.06E+07	4.59E+07	7.65E+07	1.53E+08	7.66E+08
XE-135M	0.00E+00	2.24E+00	1.04E+02	8.61E+02	3.78E+03	4.63E+04	2.32E+05	4.63E+05	9.26E+05	1.39E+06	2.32E+06	4.63E+06	2.32E+07
XE-135	0.00E+00	2.55E+00	8.94E+02	1.07E+04	4.89E+04	6.05E+05	3.03E+06	6.06E+06	1.21E+07	1.82E+07	3.03E+07	6.06E+07	3.03E+08
XE-137	0.00E+00	3.21E-01	8.47E+00	5.95E+01	2.56E+02	3.21E+03	1.80E+04	4.08E+04	9.83E+04	1.69E+05	3.40E+05	8.66E+05	5.72E+06

TABLE 3-3B (continued)

DOSE (MREM) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
XE-138	0.00E+00	8.10E+00	5.24E+02	3.79E+03	1.63E+04	1.99E+05	9.94E+05	1.99E+06	3.98E+06	5.96E+06	9.94E+06	1.99E+07	9.94E+07
CS-134	0.00E+00	1.66E+01	9.53E+03	4.66E+05	8.50E+06	1.14E+09	1.95E+10	5.39E+10	1.29E+11	2.04E+11	3.55E+11	7.33E+11	3.76E+12
CS-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CS-136	0.00E+00	2.26E+01	1.28E+04	5.67E+05	7.36E+06	1.70E+08	8.85E+08	1.78E+09	3.57E+09	5.35E+09	8.93E+09	1.79E+10	8.94E+10
CS-137	0.00E+00	4.99E+00	3.23E+03	1.59E+05	2.92E+06	4.29E+08	1.04E+10	4.01E+10	1.49E+11	3.13E+11	7.63E+11	2.29E+12	1.72E+13
CS-138	0.00E+00	1.56E+01	8.25E+02	5.94E+03	2.55E+04	3.11E+05	1.56E+06	3.11E+06	6.22E+06	9.33E+06	1.56E+07	3.11E+07	1.56E+08
CS-139	0.00E+00	8.43E-01	3.02E+01	2.16E+02	9.29E+02	1.13E+04	5.65E+04	1.13E+05	2.26E+05	3.39E+05	5.65E+05	1.13E+06	5.65E+06
BA-133	0.00E+00	3.86E+00	2.23E+03	1.09E+05	2.00E+06	2.90E+08	6.65E+09	2.40E+10	7.97E+10	1.52E+11	3.16E+11	7.57E+11	4.32E+12
BA-137M	0.00E+00	6.90E-01	1.76E+01	1.23E+02	5.29E+02	6.44E+03	3.22E+04	6.44E+04	1.29E+05	1.93E+05	3.22E+05	6.44E+05	3.22E+06
BA-139	0.00E+00	4.85E-01	5.01E+01	3.78E+02	1.64E+03	1.99E+04	9.98E+04	2.00E+05	3.99E+05	5.99E+05	9.98E+05	2.00E+06	9.98E+06
BA-140	0.00E+00	2.22E+00	2.92E+03	3.86E+05	7.62E+06	1.95E+08	1.02E+09	2.06E+09	4.12E+09	6.19E+09	1.03E+10	2.07E+10	1.03E+11
LA-140	0.00E+00	2.44E+01	1.24E+04	3.23E+05	1.89E+06	2.48E+07	1.25E+08	2.50E+08	5.00E+08	7.49E+08	1.25E+09	2.50E+09	1.25E+10
CE-141	0.00E+00	8.27E-01	4.73E+02	2.22E+04	3.50E+05	1.42E+07	7.92E+07	1.60E+08	3.23E+08	4.86E+08	8.11E+08	1.62E+09	8.13E+09
CE-143	0.00E+00	3.25E+00	1.61E+03	3.85E+04	2.14E+05	2.77E+06	1.39E+07	2.78E+07	5.57E+07	8.36E+07	1.39E+08	2.79E+08	1.39E+09
CE-144	0.00E+00	3.62E-01	2.98E+02	1.48E+04	2.67E+05	3.08E+07	3.54E+08	8.08E+08	1.72E+09	2.63E+09	4.45E+09	9.00E+09	4.54E+10
PR-143	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR-144	0.00E+00	1.67E-01	6.32E+00	4.49E+01	1.93E+02	2.35E+03	1.17E+04	2.35E+04	4.69E+04	7.04E+04	1.17E+05	2.35E+05	1.17E+06
ND-147	0.00E+00	1.51E+00	8.50E+02	3.69E+04	4.56E+05	9.67E+06	5.01E+07	1.01E+08	2.02E+08	3.03E+08	5.05E+08	1.01E+09	5.06E+09
PM-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM-148M	0.00E+00	2.12E+01	1.22E+04	5.79E+05	9.46E+06	4.52E+08	2.61E+09	5.31E+09	1.07E+10	1.61E+10	2.69E+10	5.39E+10	2.70E+11
PM-148	0.00E+00	6.72E+00	3.72E+03	1.44E+05	1.35E+06	2.15E+07	1.09E+08	2.19E+08	4.38E+08	6.58E+08	1.10E+09	2.19E+09	1.10E+10
SM-151	0.00E+00	2.92E-04	1.68E-01	8.23E+00	1.51E+02	2.23E+04	5.52E+05	2.18E+06	8.50E+06	1.86E+07	4.92E+07	1.75E+08	2.12E+09
EU-154	0.00E+00	1.36E+01	7.86E+03	3.85E+05	7.06E+06	1.02E+09	2.30E+10	8.12E+10	2.60E+11	4.83E+11	9.75E+11	2.25E+12	1.25E+13
EU-155	0.00E+00	6.85E-01	3.94E+02	1.93E+04	3.54E+05	5.02E+07	1.05E+09	3.47E+09	1.00E+10	1.73E+10	3.23E+10	6.99E+10	3.71E+11
EU-156	0.00E+00	1.49E+01	8.45E+03	3.79E+05	5.14E+06	1.29E+08	6.79E+08	1.37E+09	2.74E+09	4.11E+09	6.86E+09	1.37E+10	6.87E+10
GD-162	0.00E+00	1.66E+00	5.17E+01	3.65E+02	1.57E+03	1.90E+04	9.52E+04	1.90E+05	3.81E+05	5.71E+05	9.52E+05	1.90E+06	9.52E+06
TB-160	0.00E+00	1.16E+01	6.69E+03	3.21E+05	5.49E+06	3.65E+08	2.37E+09	4.89E+09	9.92E+09	1.49E+10	2.50E+10	5.02E+10	2.51E+11
TA-182	0.00E+00	1.39E+01	8.01E+03	3.88E+05	6.80E+06	5.79E+08	4.42E+09	9.28E+09	1.90E+10	2.87E+10	4.81E+10	9.67E+10	4.85E+11
W-185	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
W-187	0.00E+00	1.80E+00	8.40E+02	1.67E+04	8.58E+04	1.09E+06	5.48E+06	1.10E+07	2.19E+07	3.29E+07	5.48E+07	1.10E+08	5.48E+08
AU-195M	0.00E+00	5.17E-02	1.26E+00	8.84E+00	3.86E+01	5.56E+02	3.21E+03	6.57E+03	1.33E+04	2.00E+04	3.35E+04	6.71E+04	3.36E+05
AU-195	0.00E+00	9.99E-01	5.75E+02	2.79E+04	4.99E+05	5.10E+07	4.79E+08	1.04E+09	2.16E+09	3.28E+09	5.52E+09	1.11E+10	5.60E+10
AU-198	0.00E+00	4.30E+00	2.29E+03	7.26E+04	5.05E+05	6.98E+06	3.52E+07	7.05E+07	1.41E+08	2.12E+08	3.53E+08	7.06E+08	3.53E+09
AU-199	0.00E+00	1.03E+00	5.54E+02	1.85E+04	1.37E+05	1.94E+06	9.82E+06	1.97E+07	3.93E+07	5.90E+07	9.84E+07	1.97E+08	9.84E+08
HG-197	0.00E+00	7.68E-01	4.08E+02	1.29E+04	8.95E+04	1.24E+06	6.23E+06	1.25E+07	2.50E+07	3.75E+07	6.24E+07	1.25E+08	6.24E+08
HG-203	0.00E+00	2.53E+00	1.45E+03	6.91E+04	1.14E+06	5.85E+07	3.45E+08	7.03E+08	1.42E+09	2.14E+09	3.57E+09	7.15E+09	3.58E+10
TL-204	0.00E+00	3.99E+00	1.12E+04	6.16E+05	1.14E+07	1.61E+09	3.22E+10	1.01E+11	2.74E+11	4.58E+11	8.31E+11	1.76E+12	9.22E+12
TL-208	0.00E+00	4.90E+00	1.27E+02	8.88E+02	3.81E+03	4.63E+04	2.32E+05	4.63E+05	9.27E+05	1.39E+06	2.32E+06	4.63E+06	2.32E+07
TL-210	0.00E+00	4.64E-06	1.18E-04	9.60E-04	6.32E-03	4.64E-01	1.03E+01	3.90E+01	1.41E+02	2.89E+02	6.78E+02	1.91E+03	1.29E+04
PB-204M	0.00E+00	1.83E+01	1.60E+03	1.19E+04	5.15E+04	6.27E+05	3.14E+06	6.28E+06	1.26E+07	1.88E+07	3.14E+07	6.28E+07	3.14E+08
PB-210	0.00E+00	5.01E-02	2.89E+01	1.41E+03	2.60E+04	3.81E+06	9.14E+07	3.48E+08	1.26E+09	2.60E+09	6.10E+09	1.71E+10	1.16E+11
PB-212	0.00E+00	3.65E+00	4.94E+03	6.91E+04	3.21E+05	3.99E+06	2.00E+07	4.00E+07	8.00E+07	1.20E+08	2.00E+08	4.00E+08	2.00E+09
PB-214	0.00E+00	6.57E+00	5.57E+02	4.05E+03	1.74E+04	2.13E+05	1.06E+06	2.13E+06	4.25E+06	6.38E+06	1.06E+07	2.13E+07	1.07E+08
BI-210M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BI-212	0.00E+00	3.41E+00	3.22E+02	2.29E+03	9.85E+03	1.20E+05	6.00E+05	1.20E+06	2.40E+06	3.59E+06	6.00E+06	1.20E+07	6.00E+07
BI-214	0.00E+00	9.05E+00	3.66E+02	2.60E+03	1.12E+04	1.36E+05	6.81E+05	1.36E+06	2.73E+06	4.09E+06	6.82E+06	1.36E+07	6.83E+07

TABLE 3-3B (continued)

DOSE (MREM) FROM SUBMERSION IN CONTAMINATED WATER. CONTINUOUS INFLOW OF 1 MICROCURIE/ML/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
PO-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PO-214	0.00E+00	1.56E-10	3.76E-09	2.66E-08	1.19E-07	2.26E-06	2.81E-05	9.48E-05	3.22E-04	6.47E-04	1.49E-03	4.14E-03	2.77E-02
PO-218	0.00E+00	6.40E-01	6.31E+01	4.60E+02	1.98E+03	2.42E+04	1.21E+05	2.42E+05	4.84E+05	7.26E+05	1.21E+06	2.42E+06	1.21E+07
RN-220	0.00E+00	5.17E-03	7.16E+00	1.00E+02	4.66E+02	5.80E+03	2.90E+04	5.81E+04	1.16E+05	1.74E+05	2.90E+05	5.81E+05	2.90E+06
RN-222	0.00E+00	2.55E+00	9.30E+03	3.59E+05	2.92E+06	4.30E+07	2.18E+08	4.36E+08	8.73E+08	1.31E+09	2.18E+09	4.37E+09	2.19E+10
RA-224	0.00E+00	1.73E-01	2.64E+03	2.40E+05	2.18E+06	3.25E+07	1.65E+08	3.30E+08	6.61E+08	9.92E+08	1.65E+09	3.31E+09	1.65E+10
RA-226	0.00E+00	7.62E-02	5.86E+02	1.67E+05	6.83E+06	1.41E+09	3.60E+10	1.44E+11	5.77E+11	1.30E+12	3.60E+12	1.43E+13	3.38E+14
RA-228	0.00E+00	6.28E-01	2.55E+03	2.11E+05	4.22E+06	7.26E+08	2.30E+10	9.43E+10	3.23E+11	6.00E+11	1.19E+12	2.67E+12	1.45E+13
AC-228	0.00E+00	7.64E+00	2.21E+03	2.24E+04	1.02E+05	1.59E+06	1.24E+07	2.93E+07	6.47E+07	1.00E+08	1.71E+08	3.49E+08	1.77E+09
TH-228	0.00E+00	3.81E-02	1.51E+02	1.08E+05	5.21E+06	9.94E+08	1.70E+10	4.65E+10	1.10E+11	1.73E+11	3.01E+11	6.19E+11	3.17E+12
TH-230	0.00E+00	1.55E-02	8.94E+00	4.39E+02	8.12E+03	1.39E+06	5.57E+07	3.27E+08	2.14E+09	6.69E+09	2.90E+10	2.19E+11	2.51E+13
TH-231	0.00E+00	3.09E-01	1.46E+02	3.02E+03	1.57E+04	2.00E+05	1.00E+06	2.01E+06	4.02E+06	6.03E+06	1.00E+07	2.01E+07	1.00E+08
TH-232	0.00E+00	1.43E+00	6.50E+01	1.00E+03	2.22E+04	2.92E+07	4.44E+09	3.77E+10	2.82E+11	8.35E+11	2.98E+12	1.46E+13	4.29E+14
TH-234	0.00E+00	1.77E-01	1.04E+02	4.83E+03	7.24E+04	2.42E+06	1.31E+07	2.65E+07	5.32E+07	7.99E+07	1.33E+08	2.67E+08	1.34E+09
PA-233	0.00E+00	2.14E+00	1.22E+03	5.69E+04	8.72E+05	3.13E+07	1.71E+08	3.47E+08	6.97E+08	1.05E+09	1.75E+09	3.50E+09	1.75E+10
PA-234M	0.00E+00	5.64E-03	1.39E-01	9.75E-01	4.18E+00	5.09E+01	2.54E+02	5.09E+02	1.02E+03	1.53E+03	2.54E+03	5.09E+03	2.54E+04
PA-234	0.00E+00	3.20E+01	9.68E+03	1.01E+05	4.53E+05	5.59E+06	2.80E+07	5.59E+07	1.12E+08	1.68E+08	2.80E+08	5.59E+08	2.80E+09
U-232	0.00E+00	1.91E-02	1.10E+01	7.21E+02	5.44E+04	1.23E+08	1.15E+10	6.68E+10	3.32E+11	7.92E+11	2.23E+12	8.18E+12	9.46E+13
U-233	0.00E+00	1.75E-02	1.01E+01	4.93E+02	9.05E+03	1.34E+06	3.35E+07	1.34E+08	5.36E+08	1.21E+09	3.35E+09	1.34E+10	3.35E+11
U-234	0.00E+00	1.63E-02	9.37E+00	4.59E+02	8.43E+03	1.25E+06	3.12E+07	1.25E+08	4.99E+08	1.12E+09	3.12E+09	1.25E+10	3.41E+11
U-235	0.00E+00	1.65E+00	9.84E+02	5.23E+04	1.00E+06	1.50E+08	3.76E+09	1.50E+10	6.02E+10	1.35E+11	3.76E+11	1.50E+12	3.76E+13
U-236	0.00E+00	1.86E-02	8.23E+00	3.97E+02	7.28E+03	1.08E+06	2.69E+07	1.08E+08	4.31E+08	9.70E+08	2.69E+09	1.08E+10	2.69E+11
U-237	0.00E+00	1.61E+00	8.96E+02	3.62E+04	3.74E+05	6.41E+06	3.28E+07	6.57E+07	1.32E+08	1.98E+08	3.29E+08	6.59E+08	3.30E+09
U-238	0.00E+00	5.82E-01	2.77E+01	8.75E+02	2.95E+04	1.26E+07	3.62E+08	1.47E+09	5.94E+09	1.34E+10	3.73E+10	1.50E+11	3.75E+12
U-240	0.00E+00	2.49E+00	1.42E+03	2.13E+04	1.01E+05	1.26E+06	6.33E+06	1.27E+07	2.53E+07	3.80E+07	6.34E+07	1.27E+08	6.34E+08
NP-237	0.00E+00	8.97E-01	5.27E+02	2.88E+04	7.02E+05	2.02E+08	5.65E+09	2.30E+10	9.25E+10	2.09E+11	5.81E+11	2.33E+12	5.82E+13
NP-238	0.00E+00	5.97E+00	3.10E+03	8.98E+04	5.69E+05	7.64E+06	3.85E+07	7.70E+07	1.54E+08	2.31E+08	3.86E+08	7.71E+08	3.86E+09
NP-239	0.00E+00	1.46E+00	7.65E+02	2.31E+04	1.52E+05	2.06E+06	1.04E+07	2.08E+07	4.16E+07	6.25E+07	1.04E+08	2.08E+08	1.04E+09
NP-240M	0.00E+00	1.03E+00	3.00E+01	2.11E+02	9.07E+02	1.10E+04	5.52E+04	1.10E+05	2.21E+05	3.31E+05	5.52E+05	1.10E+06	5.52E+06
PU-236	0.00E+00	1.87E-02	1.07E+01	5.26E+02	9.62E+03	1.61E+06	1.42E+08	1.23E+09	8.70E+09	2.39E+10	7.56E+10	3.02E+11	3.71E+12
PU-238	0.00E+00	1.60E-02	9.21E+00	4.51E+02	8.28E+03	1.22E+06	3.03E+07	1.19E+08	4.66E+08	1.02E+09	2.70E+09	9.59E+09	1.17E+11
PU-239	0.00E+00	6.28E-03	3.62E+00	1.77E+02	3.25E+03	4.82E+05	1.20E+07	4.82E+07	1.93E+08	4.33E+08	1.20E+09	4.81E+09	1.20E+11
PU-240	0.00E+00	1.38E-02	7.92E+00	3.88E+02	7.13E+03	1.06E+06	2.64E+07	1.06E+08	4.22E+08	9.49E+08	2.63E+09	1.05E+10	2.59E+11
PU-241	0.00E+00	1.68E-08	2.32E-04	7.97E-02	6.27E+00	1.12E+04	1.33E+06	1.01E+07	7.23E+07	2.20E+08	8.47E+08	4.63E+09	1.33E+11
PU-242	0.00E+00	1.36E-02	7.83E+00	3.83E+02	7.04E+03	1.04E+06	2.61E+07	1.04E+08	4.17E+08	9.38E+08	2.61E+09	1.04E+10	2.61E+11
PU-244	0.00E+00	4.48E-02	6.03E+02	7.88E+04	1.74E+06	2.72E+08	6.82E+09	2.73E+10	1.09E+11	2.46E+11	6.82E+11	2.73E+12	6.82E+13
AM-241	0.00E+00	2.76E-01	1.59E+02	7.80E+03	1.43E+05	2.12E+07	5.29E+08	2.11E+09	8.39E+09	1.88E+10	5.16E+10	2.01E+11	4.13E+12
AM-242	0.00E+00	1.74E-01	7.40E+01	1.18E+03	5.71E+03	7.38E+04	3.80E+05	7.66E+05	1.54E+06	2.32E+06	3.88E+06	7.84E+06	4.04E+07
AM-243	0.00E+00	5.40E-01	3.84E+02	3.32E+04	8.82E+05	1.51E+08	3.82E+09	1.53E+10	6.12E+10	1.38E+11	3.82E+11	1.53E+12	3.77E+13
CM-242	0.00E+00	1.56E-02	8.96E+00	4.35E+02	7.75E+03	7.61E+05	6.83E+06	1.49E+07	3.20E+07	5.02E+07	8.94E+07	2.01E+08	1.36E+09
CM-243	0.00E+00	1.39E+00	8.02E+02	3.93E+04	7.21E+05	1.06E+08	2.57E+09	9.86E+09	3.65E+10	7.62E+10	1.84E+11	5.44E+11	3.97E+12
CM-244	0.00E+00	7.65E-02	4.41E+01	2.16E+03	3.96E+04	5.79E+06	1.38E+08	5.18E+08	1.84E+09	3.72E+09	8.46E+09	2.27E+10	1.44E+11
CF-252	0.00E+00	5.71E+00	3.29E+03	1.61E+05	2.94E+06	4.02E+08	7.41E+09	2.16E+10	5.43E+10	8.78E+10	1.55E+11	3.23E+11	1.66E+12

TABLE 3-4

DOSE RATE FACTORS FOR IMMERSION IN CONTAMINATED AIR (mrem/yr per μCi/ml)[a]

	ELECTRON DOSE RATE			PHOTON DOSE RATE			TOTAL DOSE RATE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR
1	303	H3	0.555E 08	303	H3	0.0	303	H3	0.555E 08
2	302	BE7	0.782E 06	302	BE7	0.437E 09	302	BE7	0.438E 09
3	360	C11	0.353E 10	360	C11	0.905E 10	360	C11	0.126E 11
4	314	C14	0.483E 09	314	C14	0.0	314	C14	0.483E 09
5	361	N13	0.451E 10	361	N13	0.906E 10	361	N13	0.136E 11
6	362	O15	0.683E 10	362	O15	0.907E 10	362	O15	0.159E 11
7	363	F18	0.217E 10	363	F18	0.878E 10	363	F18	0.109E 11
8	312	NA22	0.174E 10	312	NA22	0.195E 11	312	NA22	0.213E 11
9	309	NA24	0.499E 10	309	NA24	0.366E 11	309	NA24	0.416E 11
10	376	MG28	0.149E 10	376	MG28	0.119E 11	376	MG28	0.134E 11
11	377	AL28	0.112E 11	377	AL28	0.158E 11	377	AL28	0.270E 11
12	310	P32	0.619E 10	310	P32	0.0	310	P32	0.619E 10
13	509	P33	0.224E 09	509	P33	0.0	509	P33	0.224E 09
14	318	S35	0.502E 09	318	S35	0.0	318	S35	0.502E 09
15	317	CL36	0.229E 10	317	CL36	0.409E 05	317	CL36	0.229E 10
16	378	CL38	0.140E 11	378	CL38	0.133E 11	378	CL38	0.273E 11
17	510	A37	0.188E 08	510	A37	0.241E 07	510	A37	0.213E 08
18	506	A39	0.182E 10	506	A39	0.0	506	A39	0.182E 10
19	379	K40	0.408E 10	379	K40	0.139E 10	379	K40	0.547E 10
20	315	K42	0.128E 11	315	K42	0.245E 10	315	K42	0.152E 11
21	387	K43	0.272E 10	387	K43	0.873E 10	387	K43	0.115E 11
22	311	CA45	0.781E 09	311	CA45	0.0	311	CA45	0.781E 09
23	380	CA47	0.314E 10	380	CA47	0.944E 10	380	CA47	0.126E 11
24	382	CA49	0.774E 10	382	CA49	0.280E 11	382	CA49	0.358E 11
25	316	SC46	0.110E 10	316	SC46	0.178E 11	316	SC46	0.190E 11
26	381	SC47	0.155E 10	381	SC47	0.991E 09	381	SC47	0.254E 10
27	383	SC49	0.731E 10	383	SC49	0.0	383	SC49	0.731E 10
28	304	CR51	0.333E 08	304	CR51	0.291E 09	304	CR51	0.324E 09
29	364	MN52M	0.101E 11	364	MN52M	0.217E 11	364	MN52M	0.318E 11
30	365	MN52	0.583E 09	365	MN52	0.302E 11	365	MN52	0.308E 11
31	305	MN54	0.354E 08	305	MN54	0.743E 10	305	MN54	0.746E 10
32	371	FE52	0.175E 10	371	FE52	0.652E 10	371	FE52	0.826E 10
33	307	FE55	0.372E 08	307	FE55	0.136E 08	307	FE55	0.508E 08
34	308	FE59	0.117E 10	308	FE59	0.106E 11	308	FE59	0.118E 11
35	366	CO56	0.134E 10	366	CO56	0.322E 11	366	CO56	0.335E 11
36	342	CO57	0.163E 09	342	CO57	0.111E 10	342	CO57	0.127E 10
37	343	CO58	0.279E 09	343	CO58	0.866E 10	343	CO58	0.894E 10
38	323	CO60	0.966E 09	323	CO60	0.222E 11	323	CO60	0.232E 11
39	390	NI56	0.669E 08	390	NI56	0.155E 11	390	NI56	0.156E 11
40	384	NI63	0.186E 09	384	NI63	0.0	384	NI63	0.186E 09
41	324	CU64	0.113E 10	324	CU64	0.176E 10	324	CU64	0.289E 10
42	325	ZN65	0.590E 08	325	ZN65	0.517E 10	325	ZN65	0.522E 10

[a]Contributions of radioactive daughter products are not included.

TABLE 3-4 (continued)

NO.	ELECTRON DOSE RATE NUCLIDE LABEL	ELECTRON DOSE RATE NUCLIDE NAME	ELECTRON DOSE RATE DOSE RATE MILLIREMS/YR	PHOTON DOSE RATE NUCLIDE LABEL	PHOTON DOSE RATE NUCLIDE NAME	PHOTON DOSE RATE DOSE RATE MILLIREMS/YR	TOTAL DOSE RATE NUCLIDE LABEL	TOTAL DOSE RATE NUCLIDE NAME	TOTAL DOSE RATE DOSE RATE MILLIREMS/YR
43	350	ZN69M	0.202E 09	350	ZN69M	0.370E 10	350	ZN69M	0.390E 10
44	351	ZN69	0.294E 10	351	ZN69	0.0	351	ZN69	0.294E 10
45	401	GA67	0.286E 09	401	GA67	0.164E 10	401	GA67	0.193E 10
46	372	GA68	0.660E 10	372	GA68	0.841E 10	372	GA68	0.150E 11
47	3	GE77	0.547E 10	3	GE77	0.866E 10	3	GE77	0.141E 11
48	385	AS76	0.945E 10	385	AS76	0.386E 10	385	AS76	0.133E 11
49	4	AS77	0.214E 10	4	AS77	0.710E 08	4	AS77	0.221E 10
50	391	SE75	0.132E 09	391	SE75	0.501E 10	391	SE75	0.514E 10
51	505	SE77M	0.672E 09	505	SE77M	0.754E 09	505	SE77M	0.143E 10
52	504	BR80M	0.544E 09	504	BR80M	0.211E 09	504	BR80M	0.755E 09
53	495	BR80	0.650E 10	495	BR80	0.750E 09	495	BR80	0.725E 10
54	14	BR82	0.136E 10	14	BR82	0.238E 11	14	BR82	0.252E 11
55	16	BR83	0.150E 10	16	BR83	0.166E 09	16	BR83	0.167E 10
56	21	BR84	0.109E 11	21	BR84	0.165E 11	21	BR84	0.274E 11
57	367	KR79	0.200E 09	367	KR79	0.212E 10	367	KR79	0.232E 10
58	17	KR83M	0.338E 09	17	KR83M	0.241E 08	17	KR83M	0.362E 09
59	25	KR85M	0.235E 10	25	KR85M	0.140E 10	25	KR85M	0.375E 10
60	26	KR85	0.215E 10	26	KR85	0.183E 08	26	KR85	0.217E 10
61	31	KR87	0.119E 11	31	KR87	0.689E 10	31	KR87	0.188E 11
62	33	KR88	0.315E 10	33	KR88	0.178E 11	33	KR88	0.209E 11
63	373	RB84	0.108E 10	373	RB84	0.786E 10	373	RB84	0.894E 10
64	386	RB86	0.577E 10	386	RB86	0.842E 09	386	RB86	0.662E 10
65	34	RB88	0.187E 11	34	RB88	0.605E 10	34	RB88	0.247E 11
66	37	RB89	0.534E 10	37	RB89	0.212E 11	37	RB89	0.265E 11
67	41	RB90	0.161E 11	41	RB90	0.229E 11	41	RB90	0.390E 11
68	346	SR85	0.755E 08	346	SR85	0.461E 10	346	SR85	0.468E 10
69	392	SR87M	0.605E 09	392	SR87M	0.293E 10	392	SR87M	0.353E 10
70	38	SR89	0.495E 10	38	SR89	0.0	38	SR89	0.495E 10
71	42	SR90	0.168E 10	42	SR90	0.0	42	SR90	0.168E 10
72	46	SR91	0.556E 10	46	SR91	0.659E 10	46	SR91	0.122E 11
73	51	SR92	0.203E 10	51	SR92	0.112E 11	51	SR92	0.132E 11
74	55	SR93	0.118E 11	55	SR93	0.133E 11	55	SR93	0.252E 11
75	368	Y87	0.103E 09	368	Y87	0.422E 10	368	Y87	0.432E 10
76	369	Y88	0.495E 08	369	Y88	0.239E 11	369	Y88	0.240E 11
77	43	Y90	0.811E 10	43	Y90	0.0	43	Y90	0.811E 10
78	47	Y91M	0.273E 09	47	Y91M	0.464E 10	47	Y91M	0.491E 10
79	48	Y91	0.524E 10	48	Y91	0.215E 08	48	Y91	0.526E 10
80	52	Y92	0.129E 11	52	Y92	0.219E 10	52	Y92	0.151E 11
81	56	Y93	0.104E 11	56	Y93	0.668E 09	56	Y93	0.110E 11
82	65	ZR95	0.118E 10	65	ZR95	0.645E 10	65	ZR95	0.763E 10
83	69	ZR97	0.621E 10	69	ZR97	0.160E 10	69	ZR97	0.781E 10
84	66	NB95M	0.142E 10	66	NB95M	0.506E 09	66	NB95M	0.193E 10
85	67	NB95	0.467E 09	67	NB95	0.679E 10	67	NB95	0.726E 10
86	70	NB97M	0.117E 09	70	NB97M	0.648E 10	70	NB97M	0.660E 10
87	71	NB97	0.419E 10	71	NB97	0.590E 10	71	NB97	0.101E 11
88	77	MO99	0.371E 10	77	MO99	0.144E 10	77	MO99	0.515E 10
89	78	TC99M	0.152E 09	78	TC99M	0.111E 10	78	TC99M	0.127E 10
90	79	TC99	0.853E 09	79	TC99	0.0	79	TC99	0.853E 09
91	88	RU103	0.682E 09	88	RU103	0.430E 10	88	RU103	0.498E 10
92	97	RU106	0.106E 09	97	RU106	0.0	97	RU106	0.106E 09

TABLE 3-4 (continued)

	ELECTRON DOSE RATE			PHOTON DOSE RATE			TOTAL DOSE RATE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR
93	89	RH103M	0.335E 09	89	RH103M	0.156E 08	89	RH103M	0.350E 09
94	96	RH105	0.149E 10	96	RH105	0.693E 09	96	RH105	0.218E 10
95	98	RH106	0.125E 11	98	RH106	0.165E 10	98	RH106	0.142E 11
96	398	PD103	0.450E 09	398	PD103	0.186E 08	398	PD103	0.468E 09
97	333	AG110M	0.709E 09	333	AG110M	0.242E 11	333	AG110M	0.249E 11
98	114	AG111	0.320E 10	114	AG111	0.272E 09	114	AG111	0.347E 10
99	507	CD111M	0.0	507	CD111M	0.353E 10	507	CD111M	0.353E 10
100	511	CD113M	0.176E 10	511	CD113M	0.341E 07	511	CD113M	0.176E 10
101	125	CD115M	0.182E 10	125	CD115M	0.291E 09	125	CD115M	0.211E 10
102	394	IN113M	0.116E 10	394	IN113M	0.224E 10	394	IN113M	0.341E 10
103	427	IN114M	0.131E 10	427	IN114M	0.743E 09	427	IN114M	0.205E 10
104	514	IN114	0.237E 10	514	IN114	0.240E 08	514	IN114	0.240E 10
105	127	IN115M	0.161E 10	127	IN115M	0.126E 10	127	IN115M	0.286E 10
106	393	SN113	0.608E 08	393	SN113	0.259E 09	393	SN113	0.320E 09
107	405	SN119M	0.692E 09	405	SN119M	0.964E 08	405	SN119M	0.789E 09
108	154	SN123	0.468E 10	154	SN123	0.0	154	SN123	0.468E 10
109	161	SN125	0.771E 10	161	SN125	0.277E 10	161	SN125	0.105E 11
110	428	SB122	0.505E 10	428	SB122	0.367E 10	428	SB122	0.872E 10
111	159	SB124	0.349E 10	159	SB124	0.163E 11	159	SB124	0.198E 11
112	162	SB125	0.117E 10	162	SB125	0.396E 10	162	SB125	0.513E 10
113	168	SB127	0.285E 10	168	SB127	0.590E 10	168	SB127	0.875E 10
114	396	TE123M	0.875E 09	396	TE123M	0.131E 10	396	TE123M	0.218E 10
115	163	TE125M	0.914E 09	163	TE125M	0.315E 09	163	TE125M	0.123E 10
116	169	TE127M	0.401E 10	169	TE127M	0.807E 08	169	TE127M	0.409E 10
117	170	TE127	0.210E 10	170	TE127	0.361E 08	170	TE127	0.213E 10
118	176	TE129M	0.237E 10	176	TE129M	0.335E 09	176	TE129M	0.270E 10
119	177	TE129	0.717E 10	177	TE129	0.592E 09	177	TE129	0.776E 10
120	185	TE131M	0.232E 10	185	TE131M	0.124E 11	185	TE131M	0.147E 11
121	186	TE131	0.624E 10	186	TE131	0.368E 10	186	TE131	0.992E 10
122	191	TE132	0.608E 09	191	TE132	0.182E 10	191	TE132	0.243E 10
123	395	I123	0.244E 09	395	I123	0.150E 10	395	I123	0.174E 10
124	374	I124	0.169E 10	374	I124	0.968E 10	374	I124	0.114E 11
125	399	I125	0.186E 09	399	I125	0.367E 09	399	I125	0.553E 09
126	375	I126	0.133E 10	375	I126	0.385E 10	375	I126	0.518E 10
127	178	I129	0.548E 09	178	I129	0.220E 09	178	I129	0.768E 09
128	388	I130	0.272E 10	388	I130	0.181E 11	388	I130	0.208E 11
129	187	I131	0.185E 10	187	I131	0.337E 10	187	I131	0.522E 10
130	192	I132	0.494E 10	192	I132	0.201E 11	192	I132	0.250E 11
131	196	I133	0.391E 10	196	I133	0.593E 10	196	I133	0.984E 10
132	200	I134	0.598E 10	200	I134	0.212E 11	200	I134	0.271E 11
133	202	I135	0.290E 10	202	I135	0.154E 11	202	I135	0.183E 11
134	206	I136	0.164E 11	206	I136	0.246E 11	206	I136	0.410E 11
135	188	XE131M	0.126E 10	188	XE131M	0.177E 09	188	XE131M	0.144E 10
136	197	XE133M	0.170E 10	197	XE133M	0.359E 09	197	XE133M	0.206E 10
137	198	XE133	0.132E 10	198	XE133	0.398E 09	198	XE133	0.172E 10
138	203	XE135M	0.873E 09	203	XE135M	0.381E 10	203	XE135M	0.468E 10
139	204	XE135	0.294E 10	204	XE135	0.218E 10	204	XE135	0.511E 10
140	209	XE137	0.163E 11	209	XE137	0.160E 10	209	XE137	0.179E 11
141	213	XE138	0.630E 10	213	XE138	0.708E 10	213	XE138	0.134E 11
142	327	CS134	0.162E 10	327	CS134	0.138E 11	327	CS134	0.154E 11

TABLE 3-4 (continued)

	ELECTRON DOSE RATE			PHOTON DOSE RATE			TOTAL DOSE RATE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR
143	205	CS135	0.590E 09	205	CS135	0.0	205	CS135	0.590E 09
144	207	CS136	0.135E 10	207	CS136	0.189E 11	207	CS136	0.202E 11
145	210	CS137	0.165E 10	210	CS137	0.0	210	CS137	0.165E 10
146	214	CS138	0.957E 10	214	CS138	0.191E 11	214	CS138	0.287E 11
147	217	CS139	0.149E 11	217	CS139	0.193E 10	217	CS139	0.168E 11
148	400	BA133	0.467E 09	400	BA133	0.322E 10	400	BA133	0.368E 10
149	211	BA137M	0.536E 09	211	BA137M	0.499E 10	211	BA137M	0.553E 10
150	218	BA139	0.800E 10	218	BA139	0.473E 09	218	BA139	0.848E 10
151	221	BA140	0.288E 10	221	BA140	0.173E 10	221	BA140	0.461E 10
152	222	LA140	0.478E 10	222	LA140	0.204E 11	222	LA140	0.252E 11
153	227	CE141	0.163E 10	227	CE141	0.689E 09	227	CE141	0.232E 10
154	236	CE143	0.380E 10	236	CE143	0.273E 10	236	CE143	0.653E 10
155	238	CE144	0.904E 09	238	CE144	0.172E 09	238	CE144	0.108E 10
156	237	PR143	0.290E 10	237	PR143	0.0	237	PR143	0.290E 10
157	239	PR144	0.106E 11	239	PR144	0.268E 09	239	PR144	0.109E 11
158	246	ND147	0.251E 10	246	ND147	0.125E 10	246	ND147	0.376E 10
159	247	PM147	0.628E 09	247	PM147	0.0	247	PM147	0.628E 09
160	406	PM148M	0.118E 10	406	PM148M	0.177E 11	406	PM148M	0.189E 11
161	407	PM148	0.623E 10	407	PM148	0.560E 10	407	PM148	0.118E 11
162	255	SM151	0.205E 09	255	SM151	0.243E 06	255	SM151	0.205E 09
163	260	EU154	0.266E 10	260	EU154	0.114E 11	260	EU154	0.140E 11
164	262	EU155	0.632E 09	262	EU155	0.569E 09	262	EU155	0.120E 10
165	264	EU156	0.381E 10	264	EU156	0.124E 11	264	EU156	0.162E 11
166	332	GD162	0.312E 10	332	GD162	0.376E 10	332	GD162	0.689E 10
167	272	TB160	0.257E 10	272	TB160	0.967E 10	272	TB160	0.122E 11
168	341	TA182	0.189E 10	341	TA182	0.116E 11	341	TA182	0.135E 11
169	290	W185	0.122E 10	290	W185	0.0	290	W185	0.122E 10
170	291	W187	0.234E 10	291	W187	0.151E 10	291	W187	0.385E 10
171	370	AU195M	0.951E 09	370	AU195M	0.178E 10	370	AU195M	0.273E 10
172	279	AU195	0.531E 09	279	AU195	0.834E 09	279	AU195	0.136E 10
173	288	AU198	0.302E 10	288	AU198	0.359E 10	288	AU198	0.661E 10
174	389	AU199	0.139E 10	389	AU199	0.861E 09	389	AU199	0.225E 10
175	397	HG197	0.551E 09	397	HG197	0.640E 09	397	HG197	0.119E 10
176	301	HG203	0.932E 09	301	HG203	0.211E 10	301	HG203	0.304E 10
177	300	TL204	0.220E 10	300	TL204	0.104E 08	300	TL204	0.221E 10
178	476	TL208	0.535E 10	476	TL208	0.300E 11	476	TL208	0.353E 11
179	518	TL210	0.0	518	TL210	0.635E 05	518	TL210	0.635E 05
180	296	PB204M	0.0	296	PB204M	0.185E 11	296	PB204M	0.185E 11
181	299	PB210	0.352E 09	299	PB210	0.417E 08	299	PB210	0.394E 09
182	455	PB212	0.162E 10	455	PB212	0.130E 10	455	PB212	0.292E 10
183	515	PB214	0.283E 10	515	PB214	0.206E 10	515	PB214	0.489E 10
184	321	BI210	0.356E 10	321	BI210	0.0	321	BI210	0.356E 10
185	457	BI212	0.454E 10	457	BI212	0.973E 09	457	BI212	0.551E 10
186	516	BI214	0.586E 10	516	BI214	0.136E 11	516	BI214	0.195E 11
187	517	PO214	0.0	517	PO214	0.989E 06	517	PO214	0.989E 06
188	513	PO218	0.0	513	PO218	0.818E 06	513	PO218	0.818E 06
189	508	RN220	0.0	508	RN220	0.318E 07	508	RN220	0.318E 07
190	519	RN222	0.0	519	RN222	0.346E 07	519	RN222	0.346E 07
191	460	RA224	0.234E 08	460	RA224	0.891E 08	460	RA224	0.113E 09
192	348	RA226	0.119E 09	348	RA226	0.600E 08	348	RA226	0.179E 09

TABLE 3-4 (continued)

	ELECTRON DOSE RATE			PHOTON DOSE RATE			TOTAL DOSE RATE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR
193	461	RA228	0.436E 09	461	RA228	0.281E 09	461	RA228	0.717E 09
194	463	AC228	0.112E 10	463	AC228	0.659E 10	463	AC228	0.771E 10
195	352	TH228	0.189E 09	352	TH228	0.314E 08	352	TH228	0.221E 09
196	355	TH230	0.133E 09	355	TH230	0.129E 08	355	TH230	0.146E 09
197	465	TH231	0.151E 10	465	TH231	0.260E 09	465	TH231	0.177E 10
198	349	TH232	0.110E 09	349	TH232	0.103E 08	349	TH232	0.121E 09
199	356	TH234	0.555E 09	356	TH234	0.663E 08	356	TH234	0.622E 09
200	358	PA233	0.196E 10	358	PA233	0.178E 10	358	PA233	0.374E 10
201	354	PA234M	0.755E 10	354	PA234M	0.857E 08	354	PA234M	0.763E 10
202	409	PA234	0.679E 10	409	PA234	0.276E 11	409	PA234	0.344E 11
203	359	U232	0.151E 09	359	U232	0.159E 08	359	U232	0.167E 09
204	353	U233	0.620E 08	353	U233	0.145E 08	353	U233	0.766E 08
205	338	U234	0.122E 09	338	U234	0.136E 08	338	U234	0.136E 09
206	339	U235	0.352E 09	339	U235	0.137E 10	339	U235	0.172E 10
207	468	U236	0.103E 09	468	U236	0.117E 08	468	U236	0.115E 09
208	313	U237	0.177E 10	313	U237	0.134E 10	313	U237	0.311E 10
209	340	U238	0.854E 08	340	U238	0.105E 08	340	U238	0.999E 08
210	496	U240	0.133E 10	496	U240	0.526E 08	496	U240	0.138E 10
211	345	NP237	0.181E 09	345	NP237	0.745E 09	345	NP237	0.926E 09
212	512	NP238	0.212E 10	512	NP238	0.497E 10	512	NP238	0.709E 10
213	330	NP239	0.244E 10	330	NP239	0.121E 10	330	NP239	0.365E 10
214	497	NP240M	0.606E 10	497	NP240M	0.291E 10	497	NP240M	0.896E 10
215	494	PU236	0.118E 09	494	PU236	0.156E 08	494	PU236	0.134E 09
216	280	PU238	0.956E 08	280	PU238	0.133E 08	280	PU238	0.109E 09
217	281	PU239	0.682E 08	281	PU239	0.521E 07	281	PU239	0.734E 08
218	282	PU240	0.860E 08	282	PU240	0.115E 08	282	PU240	0.974E 08
219	283	PU241	0.514E 08	283	PU241	0.0	283	PU241	0.514E 08
220	284	PU242	0.836E 08	284	PU242	0.113E 08	284	PU242	0.950E 08
221	286	PU244	0.0	286	PU244	0.0	286	PU244	0.0
222	334	AM241	0.291E 09	334	AM241	0.230E 09	334	AM241	0.521E 09
223	404	AM242	0.213E 09	404	AM242	0.147E 09	404	AM242	0.360E 09
224	335	AM243	0.137E 09	335	AM243	0.445E 09	335	AM243	0.581E 09
225	336	CM242	0.888E 08	336	CM242	0.130E 08	336	CM242	0.102E 09
226	403	CM243	0.120E 10	403	CM243	0.116E 10	403	CM243	0.235E 10
227	337	CM244	0.426E 08	337	CM244	0.637E 08	337	CM244	0.106E 09
228	474	CF252	0.0	474	CF252	0.476E 10	474	CF252	0.476E 10

TABLE 3-5A[a]

DOSE RATE (MREM/YR) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
H-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BE-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C-11	0.00E+00	2.21E+06	2.54E+06	2.54E+06	2.54E+06	2.54E+06	2.54E+06	2.54E+06	2.54E+06	2.54E+06	2.54E+06	2.54E+06	2.54E+06
C-14	0.00E+00	1.86E-10	4.46E-09	3.12E-08	1.34E-07	1.63E-06	8.14E-06	1.63E-05	3.25E-05	4.88E-05	8.12E-05	1.62E-04	7.91E-04
N-13	0.00E+00	2.23E+06	2.27E+06	2.27E+06	2.27E+06	2.27E+06	2.27E+06	2.27E+06	2.27E+06	2.27E+06	2.27E+06	2.27E+06	2.27E+06
O-15	0.00E+00	9.78E+05	9.78E+05	9.78E+05	9.78E+05	9.78E+05	9.78E+05	9.78E+05	9.78E+05	9.78E+05	9.78E+05	9.78E+05	9.78E+05
F-18	0.00E+00	6.29E+05	2.00E+06	2.00E+06	2.00E+06	2.00E+06	2.00E+06	2.00E+06	2.00E+06	2.00E+06	2.00E+06	2.00E+06	2.00E+06
NA-22	0.00E+00	2.73E+05	6.55E+06	4.57E+07	1.94E+08	2.10E+09	6.61E+09	8.35E+09	8.93E+09	8.97E+09	8.98E+09	8.98E+09	8.98E+09
NA-24	0.00E+00	1.17E+07	1.74E+08	2.60E+08	2.60E+08	2.60E+08	2.60E+08	2.60E+08	2.60E+08	2.60E+08	2.60E+08	2.60E+08	2.60E+08
MG-28	0.00E+00	2.66E+07	4.73E+08	8.66E+08	8.69E+08	8.69E+08	8.69E+08	8.69E+08	8.69E+08	8.69E+08	8.69E+08	8.69E+08	8.69E+08
AL-28	0.00E+00	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06	1.53E+06
P-32	0.00E+00	1.80E+07	4.22E+08	2.56E+09	6.83E+09	8.91E+09	8.91E+09	8.91E+09	8.91E+09	8.91E+09	8.91E+09	8.91E+09	8.91E+09
P-33	0.00E+00	1.37E-70	3.23E-69	2.05E-68	6.19E-68	9.71E-68	9.71E-68	9.71E-68	9.71E-68	9.71E-68	9.71E-68	9.71E-68	9.71E-68
S-35	0.00E+00	1.85E-08	4.42E-07	3.02E-06	1.19E-05	5.28E-05	5.59E-05	5.59E-05	5.59E-05	5.59E-05	5.59E-05	5.59E-05	5.59E-05
CL-36	0.00E+00	1.34E+06	3.22E+07	2.25E+08	9.65E+08	1.17E+10	5.87E+10	1.17E+11	2.35E+11	3.52E+11	5.87E+11	1.17E+12	5.87E+12
CL-38	0.00E+00	1.56E+07	2.32E+07	2.32E+07	2.32E+07	2.32E+07	2.32E+07	2.32E+07	2.32E+07	2.32E+07	2.32E+07	2.32E+07	2.32E+07
A-37	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A-39	0.00E+00	3.31E+05	7.94E+06	5.56E+07	2.38E+08	2.90E+09	1.44E+10	2.86E+10	5.65E+10	8.37E+10	1.36E+11	2.56E+11	8.16E+11
K-40	0.00E+00	9.38E+06	2.25E+08	1.58E+09	6.75E+09	8.22E+10	4.11E+11	8.22E+11	1.64E+12	2.47E+12	4.11E+12	8.22E+12	4.11E+13
K-42	0.00E+00	2.88E+07	3.90E+08	5.28E+08	5.28E+08	5.28E+08	5.28E+08	5.28E+08	5.28E+08	5.28E+08	5.28E+08	5.28E+08	5.28E+08
K-43	0.00E+00	2.87E+06	4.93E+07	9.30E+07	9.35E+07	9.35E+07	9.35E+07	9.35E+07	9.35E+07	9.35E+07	9.35E+07	9.35E+07	9.35E+07
CA-45	0.00E+00	1.84E+00	4.41E+01	3.05E+02	1.24E+03	8.19E+03	1.04E+04	1.04E+04	1.04E+04	1.04E+04	1.04E+04	1.04E+04	1.04E+04
CA-47	0.00E+00	4.73E+06	1.06E+08	4.99E+08	7.64E+08	7.72E+08	7.72E+08	7.72E+08	7.72E+08	7.72E+08	7.72E+08	7.72E+08	7.72E+08
CA-49	0.00E+00	6.46E+06	9.04E+06	9.04E+06	9.04E+06	9.04E+06	9.04E+06	9.04E+06	9.04E+06	9.04E+06	9.04E+06	9.04E+06	9.04E+06
SC-46	0.00E+00	3.32E+03	7.94E+04	5.42E+05	2.12E+06	9.16E+06	9.63E+06	9.63E+06	9.63E+06	9.63E+06	9.63E+06	9.63E+06	9.63E+06
SC-47	0.00E+00	1.71E+05	3.74E+06	1.54E+07	2.03E+07	2.03E+07	2.03E+07	2.03E+07	2.03E+07	2.03E+07	2.03E+07	2.03E+07	2.03E+07
SC-49	0.00E+00	1.51E+07	2.94E+07	2.94E+07	2.94E+07	2.94E+07	2.94E+07	2.94E+07	2.94E+07	2.94E+07	2.94E+07	2.94E+07	2.94E+07
CR-51	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MN-52M	0.00E+00	1.19E+07	1.38E+07	1.38E+07	1.38E+07	1.38E+07	1.38E+07	1.38E+07	1.38E+07	1.38E+07	1.38E+07	1.38E+07	1.38E+07
MN-52	0.00E+00	1.12E+05	2.53E+06	1.26E+07	2.13E+07	2.18E+07	2.18E+07	2.18E+07	2.18E+07	2.18E+07	2.18E+07	2.18E+07	2.18E+07
MN-54	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FE-52	0.00E+00	1.60E+07	2.93E+08	3.40E+08	3.40E+08	3.40E+08	3.40E+08	3.40E+08	3.40E+08	3.40E+08	3.40E+08	3.40E+08	3.40E+08
FE-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FE-59	0.00E+00	7.56E+04	1.80E+06	1.20E+07	4.35E+07	1.16E+08	1.17E+08	1.17E+08	1.17E+08	1.17E+08	1.17E+08	1.17E+08	1.17E+08
CO-56	0.00E+00	3.19E+06	7.62E+07	5.20E+08	2.02E+09	8.33E+09	8.67E+09	8.67E+09	8.67E+09	8.67E+09	8.67E+09	8.67E+09	8.67E+09
CO-57	0.00E+00	9.02E-18	2.16E-16	1.50E-15	6.25E-15	5.14E-14	8.39E-14	8.47E-14	8.47E-14	8.47E-14	8.47E-14	8.47E-14	8.47E-14
CO-58	0.00E+00	1.05E+04	2.51E+05	1.71E+06	6.56E+06	2.52E+07	2.59E+07	2.59E+07	2.59E+07	2.59E+07	2.59E+07	2.59E+07	2.59E+07
CO-60	0.00E+00	1.31E+04	3.14E+05	2.20E+06	9.38E+06	1.08E+08	4.20E+08	6.38E+08	8.09E+08	8.55E+08	8.70E+08	8.72E+08	8.72E+08
NI-56	0.00E+00	7.61E+02	3.28E+05	1.27E+07	1.15E+08	6.45E+08	6.74E+08	6.74E+08	6.74E+08	6.74E+08	6.74E+08	6.74E+08	6.74E+08
NI-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CU-64	0.00E+00	3.04E+05	4.18E+06	5.73E+06	5.74E+06	5.74E+06	5.74E+06	5.74E+06	5.74E+06	5.74E+06	5.74E+06	5.74E+06	5.74E+06
ZN-65	0.00E+00	7.98E+00	1.91E+02	1.33E+03	5.51E+03	4.35E+04	6.70E+04	6.73E+04	6.73E+04	6.73E+04	6.73E+04	6.73E+04	6.73E+04
ZN-69M	0.00E+00	1.07E+06	5.06E+07	7.48E+07	7.48E+07	7.48E+07	7.48E+07	7.48E+07	7.48E+07	7.48E+07	7.48E+07	7.48E+07	7.48E+07
ZN-69	0.00E+00	2.65E+06	5.11E+06	5.11E+06	5.11E+06	5.11E+06	5.11E+06	5.11E+06	5.11E+06	5.11E+06	5.11E+06	5.11E+06	5.11E+06
GA-67	0.00E+00	8.02E-02	1.74E+00	7.05E+00	9.09E+00	9.10E+00	9.10E+00	9.10E+00	9.10E+00	9.10E+00	9.10E+00	9.10E+00	9.10E+00
GA-68	0.00E+00	1.44E+07	3.15E+07	3.15E+07	3.15E+07	3.15E+07	3.15E+07	3.15E+07	3.15E+07	3.15E+07	3.15E+07	3.15E+07	3.15E+07

[a]Point receptor 1 meter above surface.

TABLE 3-5A (continued)

DOSE RATE (MREM/YR) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
GE-77	0.00E+00	1.38E+07	2.02E+08	3.57E+08	3.67E+08	3.67E+08	3.67E+08	3.67E+08	3.67E+08	3.67E+08	3.67E+08	3.67E+08	3.67E+08
AS-76	0.00E+00	2.41E+07	4.34E+08	9.15E+08	9.26E+08	9.26E+08	9.26E+08	9.26E+08	9.26E+08	9.26E+08	9.26E+08	9.26E+08	9.26E+08
AS-77	0.00E+00	8.16E+06	1.62E+08	4.41E+08	4.64E+08	4.64E+08	4.64E+08	4.64E+08	4.64E+08	4.64E+08	4.64E+08	4.64E+08	4.64E+08
SE-75	0.00E+00	1.72E-01	4.12E+00	2.83E+01	1.14E+02	6.28E+02	7.15E+02	7.15E+02	7.15E+02	7.15E+02	7.15E+02	7.15E+02	7.15E+02
SE-77M	0.00E+00	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06	2.47E+06
BR-80M	0.00E+00	1.08E+07	1.15E+08	1.18E+08	1.18E+08	1.18E+08	1.18E+08	1.18E+08	1.18E+08	1.18E+08	1.18E+08	1.18E+08	1.18E+08
BR-80	0.00E+00	7.03E+06	7.74E+06	7.74E+06	7.74E+06	7.74E+06	7.74E+06	7.74E+06	7.74E+06	7.74E+06	7.74E+06	7.74E+06	7.74E+06
BR-82	0.00E+00	3.78E+04	7.32E+05	1.88E+06	1.95E+06	1.95E+06	1.95E+06	1.95E+06	1.95E+06	1.95E+06	1.95E+06	1.95E+06	1.95E+06
BR-83	0.00E+00	5.79E+04	2.31E+05	2.32E+05	2.32E+05	2.32E+05	2.32E+05	2.32E+05	2.32E+05	2.32E+05	2.32E+05	2.32E+05	2.32E+05
BR-84	0.00E+00	1.21E+07	1.66E+07	1.66E+07	1.66E+07	1.66E+07	1.66E+07	1.66E+07	1.66E+07	1.66E+07	1.66E+07	1.66E+07	1.66E+07
KR-79	0.00E+00	4.22E+04	8.13E+05	2.07E+06	2.15E+06	2.15E+06	2.15E+06	2.15E+06	2.15E+06	2.15E+06	2.15E+06	2.15E+06	2.15E+06
KR-83M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KR-85M	0.00E+00	2.07E+06	1.41E+07	1.44E+07	1.44E+07	1.45E+07	1.49E+07	1.52E+07	1.56E+07	1.58E+07	1.60E+07	1.60E+07	1.61E+07
KR-85	0.00E+00	1.10E+06	2.64E+07	1.85E+08	7.90E+08	9.33E+09	4.12E+10	7.10E+10	1.08E+11	1.28E+11	1.43E+11	1.49E+11	1.49E+11
KR-87	0.00E+00	2.03E+07	4.81E+07	4.81E+07	4.81E+07	4.81E+07	4.81E+07	4.81E+07	4.81E+07	4.81E+07	4.81E+07	4.81E+07	4.81E+07
KR-88	0.00E+00	2.28E+07	1.52E+08	1.53E+08	1.53E+08	1.53E+08	1.53E+08	1.53E+08	1.53E+08	1.53E+08	1.53E+08	1.53E+08	1.53E+08
RB-84	0.00E+00	2.24E+06	5.32E+07	3.51E+08	1.21E+09	2.64E+09	2.64E+09	2.64E+09	2.64E+09	2.64E+09	2.64E+09	2.64E+09	2.64E+09
RB-86	0.00E+00	1.64E+07	3.86E+08	2.43E+09	7.12E+09	1.06E+10	1.06E+10	1.06E+10	1.06E+10	1.06E+10	1.06E+10	1.06E+10	1.06E+10
RB-88	0.00E+00	1.26E+07	1.40E+07	1.40E+07	1.40E+07	1.40E+07	1.40E+07	1.40E+07	1.40E+07	1.40E+07	1.40E+07	1.40E+07	1.40E+07
RB-89	0.00E+00	4.34E+06	4.70E+06	5.05E+06	6.15E+06	9.07E+06	9.10E+06	9.10E+06	9.10E+06	9.10E+06	9.10E+06	9.10E+06	9.10E+06
RB-90	0.00E+00	1.92E+06	1.92E+06	1.92E+06	1.92E+06	1.95E+06	2.09E+06	2.24E+06	2.49E+06	2.69E+06	2.98E+06	3.30E+06	3.44E+06
SR-85	0.00E+00	2.15E+03	5.13E+04	3.48E+05	1.33E+06	4.75E+06	4.85E+06	4.85E+06	4.85E+06	4.85E+06	4.85E+06	4.85E+06	4.85E+06
SR-87M	0.00E+00	1.76E+03	8.04E+03	8.07E+03	8.07E+03	8.07E+03	8.07E+03	8.07E+03	8.07E+03	8.07E+03	8.07E+03	8.07E+03	8.07E+03
SR-89	0.00E+00	1.22E+07	2.91E+08	1.95E+09	7.20E+09	2.12E+10	2.13E+10	2.13E+10	2.13E+10	2.13E+10	2.13E+10	2.13E+10	2.13E+10
SR-90	0.00E+00	6.50E+05	7.82E+07	2.16E+09	1.47E+10	2.01E+11	9.65E+11	1.82E+12	3.26E+12	4.39E+12	5.99E+12	7.80E+12	8.59E+12
SR-91	0.00E+00	1.28E+07	1.51E+08	1.97E+08	2.43E+08	3.83E+08	3.85E+08	3.85E+08	3.85E+08	3.85E+08	3.85E+08	3.85E+08	3.85E+08
SR-92	0.00E+00	3.95E+06	1.16E+08	1.19E+08	1.19E+08	1.19E+08	1.19E+08	1.19E+08	1.19E+08	1.19E+08	1.19E+08	1.19E+08	1.19E+08
SR-93	0.00E+00	5.18E+06	8.76E+06	9.70E+06	9.70E+06	9.70E+06	9.70E+06	9.70E+06	9.70E+06	9.70E+06	9.70E+06	9.70E+06	9.70E+06
Y-87	0.00E+00	3.11E+04	7.08E+05	2.92E+06	3.82E+06	3.82E+06	3.82E+06	3.82E+06	3.82E+06	3.82E+06	3.82E+06	3.82E+06	3.82E+06
Y-88	0.00E+00	4.27E+03	1.02E+05	7.01E+05	2.79E+06	1.43E+07	1.58E+07	1.58E+07	1.58E+07	1.58E+07	1.58E+07	1.58E+07	1.58E+07
Y-90	0.00E+00	2.28E+07	4.84E+08	1.77E+09	2.11E+09	2.11E+09	2.11E+09	2.11E+09	2.11E+09	2.11E+09	2.11E+09	2.11E+09	2.11E+09
Y-91M	0.00E+00	7.81E+04	3.39E+05	1.59E+06	5.60E+06	1.77E+07	1.79E+07	1.79E+07	1.79E+07	1.79E+07	1.79E+07	1.79E+07	1.79E+07
Y-91	0.00E+00	1.49E+07	3.55E+08	2.40E+09	8.98E+09	2.89E+10	2.92E+10	2.92E+10	2.92E+10	2.92E+10	2.92E+10	2.92E+10	2.92E+10
Y-92	0.00E+00	2.61E+07	1.45E+08	1.47E+08	1.47E+08	1.47E+08	1.47E+08	1.47E+08	1.47E+08	1.47E+08	1.47E+08	1.47E+08	1.47E+08
Y-93	0.00E+00	2.55E+07	3.12E+08	3.89E+08	3.89E+08	3.89E+08	3.89E+08	3.89E+08	3.89E+08	3.89E+08	3.89E+08	3.89E+08	3.89E+08
ZR-95	0.00E+00	9.96E+04	2.38E+06	1.62E+07	6.29E+07	2.42E+08	2.47E+08	2.47E+08	2.47E+08	2.47E+08	2.47E+08	2.47E+08	2.47E+08
ZR-97	0.00E+00	1.94E+07	4.04E+08	6.53E+08	6.53E+08	6.53E+08	6.53E+08	6.53E+08	6.53E+08	6.53E+08	6.53E+08	6.53E+08	6.53E+08
NB-95M	0.00E+00	3.93E+00	2.09E+03	7.00E+04	4.54E+05	1.18E+06	1.18E+06	1.18E+06	1.18E+06	1.18E+06	1.18E+06	1.18E+06	1.18E+06
NB-95	0.00E+00	9.46E+03	2.25E+05	1.48E+06	5.14E+06	1.15E+07	1.15E+07	1.15E+07	1.15E+07	1.15E+07	1.15E+07	1.15E+07	1.15E+07
NB-97M	0.00E+00	8.69E+04	2.02E+05	2.02E+05	2.02E+05	2.02E+05	2.02E+05	2.02E+05	2.02E+05	2.02E+05	2.02E+05	2.02E+05	2.02E+05
NB-97	0.00E+00	7.09E+06	1.64E+07	1.64E+07	1.64E+07	1.64E+07	1.64E+07	1.64E+07	1.64E+07	1.64E+07	1.64E+07	1.64E+07	1.64E+07
MO-99	0.00E+00	7.03E+06	1.50E+08	5.59E+08	6.75E+08	6.75E+08	6.75E+08	6.75E+08	6.75E+08	6.75E+08	6.75E+08	6.75E+08	6.75E+08
TC-99M	0.00E+00	7.40E-09	2.12E-06	2.13E-05	9.50E-05	1.17E-03	5.85E-03	1.17E-02	2.34E-02	3.51E-02	5.85E-02	1.17E-01	5.84E-01
TC-99	0.00E+00	4.12E+01	9.89E+02	6.92E+03	2.97E+04	3.61E+05	1.80E+06	3.61E+06	7.22E+06	1.08E+07	1.80E+07	3.61E+07	1.80E+08
RU-103	0.00E+00	5.29E+04	1.26E+06	8.36E+06	2.96E+07	7.24E+07	7.25E+07	7.25E+07	7.25E+07	7.25E+07	7.25E+07	7.25E+07	7.25E+07
RU-106	0.00E+00	2.85E+07	6.90E+08	4.81E+09	2.02E+10	1.83E+11	3.56E+11	3.68E+11	3.68E+11	3.68E+11	3.68E+11	3.68E+11	3.68E+11
RH-103M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 3-5A (continued)

DOSE RATE (MREM/YR) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
RH-105	0.00E+00	2.39E+05	4.62E+06	1.19E+07	1.23E+07	1.23E+07	1.23E+07	1.23E+07	1.23E+07	1.23E+07	1.23E+07	1.23E+07	1.23E+07
RH-106	0.00E+00	3.45E+05	3.45E+05	3.45E+05	3.45E+05	3.45E+05	3.45E+05	3.45E+05	3.45E+05	3.45E+05	3.45E+05	3.45E+05	3.45E+05
PD-103	0.00E+00	3.62E-44	8.52E-43	5.31E-42	1.53E-41	2.19E-41	2.19E-41	2.19E-41	2.19E-41	2.19E-41	2.19E-41	2.19E-41	2.19E-41
AG-110M	0.00E+00	1.10E+05	2.64E+06	1.83E+07	7.60E+07	6.07E+08	9.48E+08	9.54E+08	9.54E+08	9.54E+08	9.54E+08	9.54E+08	9.54E+08
AG-111	0.00E+00	5.16E+06	1.18E+08	6.38E+08	1.25E+09	1.33E+09	1.33E+09	1.33E+09	1.33E+09	1.33E+09	1.33E+09	1.33E+09	1.33E+09
CD-111M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD-113M	0.00E+00	6.91E+00	6.91E+00	6.91E+00	6.91E+00	6.91E+00	6.91E+00	6.91E+00	6.91E+00	6.91E+00	6.91E+00	6.91E+00	6.91E+00
CD-115M	0.00E+00	5.25E+05	1.25E+07	8.36E+07	3.02E+08	8.08E+08	8.11E+08	8.11E+08	8.11E+08	8.11E+08	8.11E+08	8.11E+08	8.11E+08
IN-113M	0.00E+00	2.63E+03	7.70E+03	7.70E+03	7.70E+03	7.70E+03	7.70E+03	7.70E+03	7.70E+03	7.70E+03	7.70E+03	7.70E+03	7.70E+03
IN-114M	0.00E+00	1.92E+06	4.71E+07	3.17E+08	1.17E+09	3.41E+09	3.43E+09	3.43E+09	3.43E+09	3.43E+09	3.43E+09	3.43E+09	3.43E+09
IN-114	0.00E+00	5.71E+04	5.71E+04	5.71E+04	5.71E+04	5.71E+04	5.71E+04	5.71E+04	5.71E+04	5.71E+04	5.71E+04	5.71E+04	5.71E+04
IN-115M	0.00E+00	3.28E+02	2.24E+03	2.30E+03	2.30E+03	2.30E+03	2.30E+03	2.30E+03	2.30E+03	2.30E+03	2.30E+03	2.30E+03	2.30E+03
SN-113	0.00E+00	5.88E+02	6.94E+04	5.22E+05	2.11E+06	1.14E+07	1.28E+07	1.28E+07	1.28E+07	1.28E+07	1.28E+07	1.28E+07	1.28E+07
SN-119M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SN-123	0.00E+00	1.14E+07	2.73E+08	1.88E+09	7.58E+09	4.38E+10	5.09E+10	5.09E+10	5.09E+10	5.09E+10	5.09E+10	5.09E+10	5.09E+10
SN-125	0.00E+00	2.07E+07	4.79E+08	2.73E+09	6.11E+09	6.92E+09	6.93E+09	6.94E+09	6.94E+09	6.94E+09	6.94E+09	6.94E+09	6.94E+09
SB-122	0.00E+00	1.29E+07	2.75E+08	1.02E+09	1.22E+09	1.22E+09	1.22E+09	1.22E+09	1.22E+09	1.22E+09	1.22E+09	1.22E+09	1.22E+09
SB-124	0.00E+00	6.97E+06	1.66E+08	1.13E+09	4.24E+09	1.43E+10	1.45E+10	1.45E+10	1.45E+10	1.45E+10	1.45E+10	1.45E+10	1.45E+10
SB-125	0.00E+00	8.45E+04	2.03E+06	1.42E+07	6.02E+07	6.54E+08	2.10E+09	2.69E+09	2.90E+09	2.92E+09	2.92E+09	2.92E+09	2.92E+09
SB-127	0.00E+00	3.89E+06	9.58E+07	4.51E+08	6.36E+08	6.90E+08	6.97E+08	6.97E+08	6.97E+08	6.97E+08	6.97E+08	6.97E+08	6.97E+08
TE-123M	0.00E+00	9.07E-12	2.17E-10	1.49E-09	5.99E-09	3.31E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08	3.76E-08
TE-125M	0.00E+00	1.33E-28	3.17E-27	2.14E-26	8.05E-26	2.64E-25	2.67E-25	2.67E-25	2.67E-25	2.67E-25	2.67E-25	2.67E-25	2.67E-25
TE-127M	0.00E+00	2.11E+06	6.31E+07	5.01E+08	2.04E+09	1.07E+10	1.18E+10	1.18E+10	1.18E+10	1.18E+10	1.18E+10	1.18E+10	1.18E+10
TE-127	0.00E+00	1.05E+06	1.22E+07	1.47E+07	1.47E+07	1.47E+07	1.47E+07	1.47E+07	1.47E+07	1.47E+07	1.47E+07	1.47E+07	1.47E+07
TE-129M	0.00E+00	7.63E+06	3.47E+08	2.38E+09	8.21E+09	1.77E+10	1.77E+10	1.77E+10	1.77E+10	1.77E+10	1.77E+10	1.77E+10	1.77E+10
TE-129	0.00E+00	1.21E+07	2.71E+07	2.71E+07	2.71E+07	2.71E+07	2.71E+07	2.71E+07	2.71E+07	2.71E+07	2.71E+07	2.71E+07	2.71E+07
TE-131M	0.00E+00	4.23E+06	1.05E+08	2.50E+08	2.67E+08	2.69E+08	2.69E+08	2.69E+08	2.69E+08	2.69E+08	2.69E+08	2.69E+08	2.69E+08
TE-131	0.00E+00	8.14E+06	1.01E+07	1.02E+07	1.03E+07	1.03E+07	1.03E+07	1.03E+07	1.03E+07	1.03E+07	1.03E+07	1.03E+07	1.03E+07
TE-132	0.00E+00	1.46E+06	2.00E+08	9.17E+08	1.19E+09	1.19E+09	1.19E+09	1.19E+09	1.19E+09	1.19E+09	1.19E+09	1.19E+09	1.19E+09
I-123	0.00E+00	8.83E-12	1.23E-10	1.71E-10	1.71E-10	1.72E-10	1.72E-10	1.72E-10	1.72E-10	1.72E-10	1.72E-10	1.72E-10	1.72E-10
I-124	0.00E+00	4.64E+06	1.03E+08	4.63E+08	6.68E+08	6.73E+08	6.73E+08	6.73E+08	6.73E+08	6.73E+08	6.73E+08	6.73E+08	6.73E+08
I-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-126	0.00E+00	1.81E+06	4.23E+07	2.54E+08	6.50E+08	8.15E+08	8.15E+08	8.15E+08	8.15E+08	8.15E+08	8.15E+08	8.15E+08	8.15E+08
I-129	0.00E+00	8.46E-12	2.03E-10	1.42E-09	6.09E-09	7.41E-08	3.71E-07	7.41E-07	1.48E-06	2.22E-06	3.71E-06	7.41E-06	3.71E-05
I-130	0.00E+00	3.20E+06	4.35E+07	5.89E+07	5.89E+07	5.89E+07	5.89E+07	5.89E+07	5.89E+07	5.89E+07	5.89E+07	5.89E+07	5.89E+07
I-131	0.00E+00	4.73E+05	1.09E+07	5.98E+07	1.22E+08	1.32E+08	1.32E+08	1.32E+08	1.32E+08	1.32E+08	1.32E+08	1.32E+08	1.32E+08
I-132	0.00E+00	9.14E+06	3.48E+07	3.49E+07	3.49E+07	3.49E+07	3.49E+07	3.49E+07	3.49E+07	3.49E+07	3.49E+07	3.49E+07	3.49E+07
I-133	0.00E+00	8.26E+06	1.39E+08	2.53E+08	2.54E+08	2.54E+08	2.54E+08	2.54E+08	2.54E+08	2.54E+08	2.54E+08	2.54E+08	2.54E+08
I-134	0.00E+00	1.09E+07	1.99E+07	1.99E+07	1.99E+07	1.99E+07	1.99E+07	1.99E+07	1.99E+07	1.99E+07	1.99E+07	1.99E+07	1.99E+07
I-135	0.00E+00	4.68E+06	6.31E+07	7.95E+07	7.95E+07	7.95E+07	7.95E+07	7.95E+07	7.95E+07	7.95E+07	7.95E+07	7.95E+07	7.95E+07
I-136	0.00E+00	1.08E+06	1.08E+06	1.08E+06	1.08E+06	1.08E+06	1.08E+06	1.08E+06	1.08E+06	1.08E+06	1.08E+06	1.08E+06	1.08E+06
XE-131M	0.00E+00	1.51E-09	3.52E-08	2.09E-07	5.16E-07	6.27E-07	6.27E-07	6.27E-07	6.27E-07	6.27E-07	6.27E-07	6.27E-07	6.27E-07
XE-133M	0.00E+00	2.83E+00	1.40E+03	3.12E+04	7.68E+04	7.95E+04	7.95E+04	7.95E+04	7.95E+04	7.95E+04	7.95E+04	7.95E+04	7.95E+04
XE-133	0.00E+00	1.03E+03	2.32E+04	1.13E+05	1.85E+05	1.89E+05	1.89E+05	1.89E+05	1.89E+05	1.89E+05	1.89E+05	1.89E+05	1.89E+05
XE-135M	0.00E+00	8.36E+04	1.11E+06	1.33E+06	1.33E+06	1.33E+06	1.33E+06	1.33E+06	1.33E+06	1.33E+06	1.33E+06	1.33E+06	1.33E+06
XE-135	0.00E+00	3.42E+06	3.93E+07	4.70E+07	4.70E+07	4.70E+07	4.70E+07	4.70E+07	4.70E+07	4.70E+07	4.70E+07	4.70E+07	4.70E+07
XE-137	0.00E+00	3.01E+06	3.01E+06	3.01E+06	3.01E+06	3.01E+06	3.02E+06	3.02E+06	3.04E+06	3.04E+06	3.06E+06	3.07E+06	3.08E+06

TABLE 3-5A (continued)

DOSE RATE (MREM/YR) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
XE-138	0.00E+00	1.01E+07	1.46E+07	1.46E+07	1.46E+07	1.46E+07	1.46E+07	1.46E+07	1.46E+07	1.46E+07	1.46E+07	1.46E+07	1.46E+07
CS-134	0.00E+00	6.64E+05	1.59E+07	1.11E+08	4.72E+08	4.94E+09	1.41E+10	1.67E+10	1.73E+10	1.73E+10	1.73E+10	1.73E+10	1.73E+10
CS-135	0.00E+00	2.06E-03	4.94E-02	3.46E-01	1.48E+00	1.80E+01	9.02E+01	1.80E+02	3.61E+02	5.41E+02	9.02E+02	1.80E+03	9.02E+03
CS-136	0.00E+00	1.16E+05	2.71E+06	1.63E+07	4.17E+07	5.22E+07	5.22E+07	5.22E+07	5.22E+07	5.22E+07	5.22E+07	5.22E+07	5.22E+07
CS-137	0.00E+00	7.45E+05	1.81E+07	1.27E+08	5.43E+08	6.54E+09	3.13E+10	5.91E+10	1.06E+11	1.43E+11	1.97E+11	2.59E+11	2.88E+11
CS-138	0.00E+00	1.40E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07	1.93E+07
CS-139	0.00E+00	8.29E+06	1.18E+07	1.18E+07	1.18E+07	1.18E+07	1.18E+07	1.18E+07	1.18E+07	1.18E+07	1.18E+07	1.18E+07	1.18E+07
BA-133	0.00E+00	1.71E+01	4.10E+02	2.87E+03	1.23E+04	1.45E+05	6.37E+05	1.09E+06	1.66E+06	1.94E+06	2.17E+06	2.25E+06	2.25E+06
BA-137M	0.00E+00	1.11E+04	1.11E+04	1.11E+04	1.11E+04	1.11E+04	1.11E+04	1.11E+04	1.11E+04	1.11E+04	1.11E+04	1.11E+04	1.11E+04
BA-139	0.00E+00	1.76E+07	4.47E+07	4.47E+07	4.47E+07	4.47E+07	4.47E+07	4.47E+07	4.47E+07	4.47E+07	4.47E+07	4.47E+07	4.47E+07
BA-140	0.00E+00	3.48E+06	1.30E+08	1.64E+09	5.28E+09	6.77E+09	6.77E+09	6.77E+09	6.77E+09	6.77E+09	6.77E+09	6.77E+09	6.77E+09
LA-140	0.00E+00	1.18E+07	2.34E+08	6.53E+08	6.91E+08	6.91E+08	6.91E+08	6.91E+08	6.91E+08	6.91E+08	6.91E+08	6.91E+08	6.91E+08
CE-141	0.00E+00	1.27E+05	3.02E+06	1.98E+07	6.75E+07	1.42E+08	1.42E+08	1.42E+08	1.42E+08	1.42E+08	1.42E+08	1.42E+08	1.42E+08
CE-143	0.00E+00	6.63E+06	1.29E+08	3.58E+08	4.71E+08	5.17E+08	5.17E+08	5.17E+08	5.17E+08	5.17E+08	5.17E+08	5.17E+08	5.17E+08
CE-144	0.00E+00	1.65E+07	6.24E+08	4.40E+09	1.84E+10	1.54E+11	2.58E+11	2.61E+11	2.61E+11	2.61E+11	2.61E+11	2.61E+11	2.61E+11
PR-143	0.00E+00	3.97E+06	9.29E+07	5.61E+08	1.46E+09	1.87E+09	1.87E+09	1.87E+09	1.87E+09	1.87E+09	1.87E+09	1.87E+09	1.87E+09
PR-144	0.00E+00	1.00E+07	1.10E+07	1.10E+07	1.10E+07	1.10E+07	1.10E+07	1.10E+07	1.10E+07	1.10E+07	1.10E+07	1.10E+07	1.10E+07
ND-147	0.00E+00	1.84E+06	4.28E+07	2.50E+08	5.97E+08	7.05E+08	7.05E+08	7.05E+08	7.05E+08	7.05E+08	7.05E+08	7.05E+08	7.05E+08
PM-147	0.00E+00	2.54E-02	6.09E-01	4.26E+00	1.81E+01	1.96E+02	6.18E+02	7.83E+02	8.38E+02	8.42E+02	8.43E+02	8.43E+02	8.43E+02
PM-148M	0.00E+00	1.15E+05	3.76E+06	5.79E+07	3.84E+08	1.20E+09	1.20E+09	1.20E+09	1.20E+09	1.20E+09	1.20E+09	1.20E+09	1.20E+09
PM-148	0.00E+00	1.58E+07	3.56E+08	1.75E+09	2.88E+09	2.94E+09	2.94E+09	2.94E+09	2.94E+09	2.94E+09	2.94E+09	2.94E+09	2.94E+09
SM-151	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EU-154	0.00E+00	3.08E+06	7.39E+07	5.17E+08	2.21E+09	2.59E+10	1.11E+11	1.85E+11	2.66E+11	3.02E+11	3.25E+11	3.31E+11	3.31E+11
EU-155	0.00E+00	4.39E+03	1.05E+05	7.37E+05	3.14E+06	3.59E+07	1.38E+08	2.07E+08	2.59E+08	2.71E+08	2.75E+08	2.75E+08	2.75E+08
EU-156	0.00E+00	8.36E+06	1.96E+08	1.20E+09	3.28E+09	4.41E+09	4.41E+09	4.41E+09	4.41E+09	4.41E+09	4.41E+09	4.41E+09	4.41E+09
GD-162	0.00E+00	1.03E+06	1.04E+06	1.04E+06	1.04E+06	1.04E+06	1.04E+06	1.04E+06	1.04E+06	1.04E+06	1.04E+06	1.04E+06	1.04E+06
TB-160	0.00E+00	1.87E+06	4.47E+07	3.04E+08	1.17E+09	4.48E+09	4.61E+09	4.61E+09	4.61E+09	4.61E+09	4.61E+09	4.61E+09	4.61E+09
TA-182	0.00E+00	1.63E+05	3.90E+06	2.68E+07	1.07E+08	5.77E+08	6.49E+08	6.49E+08	6.49E+08	6.49E+08	6.49E+08	6.49E+08	6.49E+08
W-185	0.00E+00	2.00E+04	4.78E+05	3.25E+06	1.26E+07	5.02E+07	5.19E+07	5.19E+07	5.19E+07	5.19E+07	5.19E+07	5.19E+07	5.19E+07
W-187	0.00E+00	1.89E+06	3.32E+07	6.57E+07	6.62E+07	6.62E+07	6.62E+07	6.62E+07	6.62E+07	6.62E+07	6.62E+07	6.62E+07	6.62E+07
AU-195M	0.00E+00	6.00E-03	6.00E-03	6.00E-03	6.00E-03	6.00E-03	6.00E-03	6.00E-03	6.00E-03	6.00E-03	6.00E-03	6.00E-03	6.00E-03
AU-195	0.00E+00	1.39E-20	3.33E-19	2.30E-18	9.47E-18	6.64E-17	8.89E-17	8.90E-17	8.90E-17	8.90E-17	8.90E-17	8.90E-17	8.90E-17
AU-198	0.00E+00	4.21E+06	8.95E+07	3.30E+08	3.95E+08	3.95E+08	3.95E+08	3.95E+08	3.95E+08	3.95E+08	3.95E+08	3.95E+08	3.95E+08
AU-199	0.00E+00	3.03E+03	6.55E+04	2.60E+05	3.30E+05	3.31E+05	3.31E+05	3.31E+05	3.31E+05	3.31E+05	3.31E+05	3.31E+05	3.31E+05
HG-197	0.00E+00	2.11E-09	4.48E-08	1.64E-07	1.96E-07	1.96E-07	1.96E-07	1.96E-07	1.96E-07	1.96E-07	1.96E-07	1.96E-07	1.96E-07
HG-203	0.00E+00	8.28E-01	1.97E+01	1.32E+02	4.81E+02	1.33E+03	1.34E+03	1.34E+03	1.34E+03	1.34E+03	1.34E+03	1.34E+03	1.34E+03
TL-204	0.00E+00	1.71E+06	4.10E+07	2.87E+08	1.22E+09	1.37E+10	4.90E+10	6.87E+10	7.96E+10	8.14E+10	8.17E+10	8.17E+10	8.17E+10
TL-208	0.00E+00	1.03E+06	1.03E+06	1.03E+06	1.03E+06	1.03E+06	1.03E+06	1.03E+06	1.03E+06	1.03E+06	1.03E+06	1.03E+06	1.03E+06
TL-210	0.00E+00	2.15E-03	1.26E+00	4.81E+01	4.37E+02	6.74E+03	3.22E+04	5.99E+04	1.04E+05	1.36E+05	1.77E+05	2.15E+05	2.25E+05
PB-204M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PB-210	0.00E+00	2.07E+04	1.14E+07	4.34E+08	3.94E+09	6.08E+10	2.91E+11	5.41E+11	9.38E+11	1.23E+12	1.60E+12	1.94E+12	2.03E+12
PB-212	0.00E+00	4.52E+06	2.02E+08	2.64E+08	2.64E+08	2.64E+08	2.64E+08	2.64E+08	2.64E+08	2.64E+08	2.64E+08	2.64E+08	2.64E+08
PB-214	0.00E+00	5.71E+06	1.02E+07	1.02E+07	1.02E+07	1.03E+07	1.09E+07	1.14E+07	1.23E+07	1.30E+07	1.38E+07	1.46E+07	1.48E+07
BI-210M	0.00E+00	7.17E+06	1.61E+08	7.74E+08	1.23E+09	1.25E+09	1.25E+09	1.25E+09	1.25E+09	1.25E+09	1.25E+09	1.25E+09	1.25E+09
BI-212	0.00E+00	1.22E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07	2.50E+07
BI-214	0.00E+00	5.93E+06	6.76E+06	6.76E+06	6.77E+06	6.86E+06	7.25E+06	7.67E+06	8.34E+06	8.84E+06	9.46E+06	1.00E+07	1.02E+07

TABLE 3-5A (continued)

DOSE RATE (MREM/YR) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
PO-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PO-214	0.00E+00	4.82E-09	2.66E-06	1.01E-04	9.20E-04	1.42E-02	6.78E-02	1.26E-01	2.19E-01	2.87E-01	3.73E-01	4.52E-01	4.73E-01
PO-218	0.00E+00	6.03E+05	1.16E+06	1.16E+06	1.16E+06	1.17E+06	1.23E+06	1.30E+06	1.40E+06	1.48E+06	1.57E+06	1.66E+06	1.69E+06
RN-220	0.00E+00	6.30E+03	2.94E+05	3.83E+05	3.83E+05	3.83E+05	3.83E+05	3.83E+05	3.83E+05	3.83E+05	3.83E+05	3.83E+05	3.83E+05
RN-222	0.00E+00	3.54E+06	3.31E+08	1.50E+09	2.08E+09	2.12E+09	2.23E+09	2.34E+09	2.53E+09	2.67E+09	2.84E+09	3.00E+09	3.04E+09
RA-224	0.00E+00	9.63E+04	1.72E+08	1.51E+09	2.16E+09	2.16E+09	2.16E+09	2.16E+09	2.16E+09	2.16E+09	2.16E+09	2.16E+09	2.16E+09
RA-226	0.00E+00	7.70E+03	2.94E+07	1.14E+09	9.27E+09	1.37E+11	7.12E+11	1.47E+12	3.07E+12	4.78E+12	8.38E+12	1.78E+13	8.88E+13
RA-228	0.00E+00	9.96E+04	2.88E+07	2.93E+08	1.41E+09	3.76E+10	3.85E+11	7.96E+11	1.20E+12	1.33E+12	1.38E+12	1.38E+12	1.38E+12
AC-228	0.00E+00	1.73E+06	1.51E+07	1.66E+07	1.97E+07	6.17E+07	1.43E+08	1.64E+08	1.68E+08	1.68E+08	1.68E+08	1.68E+08	1.68E+08
TH-228	0.00E+00	1.92E+02	1.17E+07	1.09E+09	9.79E+09	1.24E+11	3.47E+11	4.04E+11	4.15E+11	4.15E+11	4.15E+11	4.15E+11	4.15E+11
TH-230	0.00E+00	7.22E+00	2.05E+01	3.43E+03	1.41E+05	2.92E+07	7.60E+08	3.11E+09	1.29E+10	2.98E+10	8.66E+10	3.69E+11	9.76E+12
TH-231	0.00E+00	4.48E+01	8.00E+02	1.65E+03	1.67E+03	1.67E+03	1.67E+03	1.67E+03	1.67E+03	1.67E+03	1.67E+03	1.67E+03	1.67E+03
TH-232	0.00E+00	1.02E+05	7.29E+05	9.95E+05	7.25E+06	1.85E+09	9.79E+10	4.61E+11	1.71E+12	3.25E+12	6.53E+12	1.48E+13	8.14E+13
TH-234	0.00E+00	2.05E+07	4.99E+08	3.21E+09	1.02E+10	1.76E+10	1.76E+10	1.76E+10	1.76E+10	1.76E+10	1.76E+10	1.76E+10	1.76E+10
PA-233	0.00E+00	1.81E+05	4.29E+06	2.78E+07	9.09E+07	1.69E+08	1.69E+08	1.69E+08	1.69E+08	1.69E+08	1.69E+08	1.69E+08	1.69E+08
PA-234M	0.00E+00	5.96E+05	5.96E+05	5.96E+05	5.96E+05	5.96E+05	5.96E+05	5.96E+05	5.96E+05	5.96E+05	5.96E+05	5.96E+05	5.96E+05
PA-234	0.00E+00	1.24E+06	1.16E+07	1.26E+07	1.26E+07	1.26E+07	1.26E+07	1.26E+07	1.26E+07	1.26E+07	1.26E+07	1.26E+07	1.26E+07
U-232	0.00E+00	2.84E-03	2.95E+03	2.51E+06	1.23E+08	2.34E+10	3.95E+11	1.06E+12	2.38E+12	3.60E+12	5.70E+12	9.50E+12	1.55E+13
U-233	0.00E+00	2.66E-44	6.38E-43	4.47E-42	1.92E-41	2.33E-40	1.17E-39	2.33E-39	4.66E-39	6.99E-39	1.16E-38	2.33E-38	1.16E-37
U-234	0.00E+00	1.40E+01	2.78E+01	3.85E+01	3.51E+01	1.19E+02	1.13E+04	9.22E+04	7.59E+05	2.62E+06	1.26E+07	1.07E+08	1.46E+10
U-235	0.00E+00	6.17E-01	2.89E+02	5.97E+03	3.10E+04	3.96E+05	1.99E+06	3.98E+06	7.95E+06	1.19E+07	1.99E+07	3.98E+07	1.99E+08
U-236	0.00E+00	8.02E+02	1.62E+03	1.86E+03	2.02E+03	2.05E+03	2.05E+03	1.83E+03	2.27E+03	3.62E+03	8.21E+03	3.47E+04	9.87E+05
U-237	0.00E+00	9.76E-01	2.23E+01	1.17E+02	2.18E+02	2.40E+02	2.95E+02	3.64E+02	5.01E+02	6.37E+02	9.11E+02	1.60E+03	7.07E+03
U-238	0.00E+00	4.68E+05	7.63E+06	3.34E+08	5.01E+09	1.67E+11	9.07E+11	1.83E+12	3.68E+12	5.53E+12	9.22E+12	1.85E+13	9.24E+13
U-240	0.00E+00	1.32E+07	2.30E+08	3.34E+08	3.34E+08	3.34E+08	3.34E+08	3.34E+08	3.34E+08	3.34E+08	3.34E+08	3.34E+08	3.34E+08
NP-237	0.00E+00	9.68E+01	5.53E+04	2.58E+06	3.95E+07	1.42E+09	7.76E+09	1.57E+10	3.15E+10	4.74E+10	7.91E+10	1.58E+11	7.93E+11
NP-238	0.00E+00	3.74E+06	7.72E+07	2.49E+08	2.77E+08	2.77E+08	2.77E+08	2.77E+08	2.77E+08	2.77E+08	2.77E+08	2.77E+08	2.77E+08
NP-239	0.00E+00	1.36E+05	2.85E+06	9.73E+06	1.11E+07	1.11E+07	1.11E+07	1.11E+07	1.11E+07	1.11E+07	1.11E+07	1.11E+07	1.11E+07
NP-240M	0.00E+00	2.95E+06	2.96E+06	2.96E+06	2.96E+06	2.96E+06	2.96E+06	2.96E+06	2.96E+06	2.96E+06	2.96E+06	2.96E+06	2.96E+06
PU-236	0.00E+00	8.33E-05	1.57E-02	1.13E+02	2.78E+04	7.16E+07	5.32E+09	2.34E+10	7.32E+10	1.23E+11	2.10E+11	3.66E+11	6.14E+11
PU-238	0.00E+00	1.01E-02	2.22E-02	1.85E-02	1.57E-02	1.61E-02	5.61E-02	6.54E-01	1.03E+01	5.26E+01	4.08E+02	6.44E+03	2.78E+06
PU-239	0.00E+00	2.54E-07	1.01E-06	2.71E-06	8.12E-06	1.98E-04	4.88E-03	1.95E-02	7.82E-02	1.76E-01	4.89E-01	1.95E+00	4.87E+01
PU-240	0.00E+00	3.47E-01	6.11E-01	6.05E-01	5.59E-01	6.12E-01	6.06E-01	5.53E-01	5.07E-01	5.53E-01	5.53E-01	5.53E-01	5.22E+00
PU-241	0.00E+00	2.60E-07	4.94E-07	1.65E-06	2.11E-05	1.00E-01	1.52E+01	1.18E+02	8.62E+02	2.64E+03	1.02E+04	5.59E+04	1.60E+06
PU-242	0.00E+00	8.39E+01	1.15E+02	9.94E+01	1.21E+02	1.36E+02	5.00E+02	1.53E+03	5.80E+03	1.29E+04	3.58E+04	1.43E+05	3.58E+06
PU-244	0.00E+00	2.83E+05	1.61E+08	2.42E+09	1.15E+10	1.43E+11	7.18E+11	1.44E+12	2.87E+12	4.31E+12	7.18E+12	1.44E+13	7.18E+13
AM-241	0.00E+00	7.41E-06	2.11E-05	5.44E-03	3.71E-01	2.08E+02	6.13E+03	2.50E+04	1.00E+05	2.26E+05	6.22E+05	2.43E+06	5.00E+07
AM-242	0.00E+00	4.01E-07	5.13E-07	6.22E-07	5.59E-07	6.04E-07	1.32E-06	1.06E-05	1.64E-04	8.56E-04	6.80E-03	1.10E-01	4.85E+01
AM-243	0.00E+00	8.38E+02	4.41E+05	1.33E+07	8.75E+07	1.19E+09	5.99E+09	1.20E+10	2.40E+10	3.59E+10	5.99E+10	1.19E+11	5.86E+11
CM-242	0.00E+00	9.88E-05	1.13E-04	1.16E-04	1.17E-04	1.19E-04	2.53E-04	2.67E-03	4.65E-02	2.46E-01	1.97E+00	3.19E+01	1.41E+04
CM-243	0.00E+00	5.52E-01	1.32E+01	9.27E+01	3.97E+02	4.78E+03	2.27E+04	4.28E+04	7.63E+04	1.02E+05	1.39E+05	1.79E+05	1.96E+05
CM-244	0.00E+00	7.70E-04	1.57E-03	1.36E-03	1.36E-03	1.57E-03	1.57E-03	1.36E-03	1.57E-03	1.57E-03	1.36E-03	1.57E-03	1.24E-02
CF-252	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 3-5B[a]

DOSE RATE (MREM/YR) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
H-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BE-7	0.00E+00	7.77E+04	1.85E+06	1.25E+07	4.63E+07	1.42E+08	1.43E+08	1.43E+08	1.43E+08	1.43E+08	1.43E+08	1.43E+08	1.43E+08
C-11	0.00E+00	6.87E+05	7.90E+05	7.90E+05	7.90E+05	7.90E+05	7.90E+05	7.90E+05	7.90E+05	7.90E+05	7.90E+05	7.90E+05	7.90E+05
C-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-13	0.00E+00	3.80E+05	3.86E+05	3.86E+05	3.86E+05	3.86E+05	3.86E+05	3.86E+05	3.86E+05	3.86E+05	3.86E+05	3.86E+05	3.86E+05
O-15	0.00E+00	7.87E+04	7.87E+04	7.87E+04	7.87E+04	7.87E+04	7.87E+04	7.87E+04	7.87E+04	7.87E+04	7.87E+04	7.87E+04	7.87E+04
F-18	0.00E+00	1.30E+06	4.12E+06	4.12E+06	4.12E+06	4.12E+06	4.12E+06	4.12E+06	4.12E+06	4.12E+06	4.12E+06	4.12E+06	4.12E+06
NA-22	0.00E+00	3.30E+06	7.92E+07	5.53E+08	2.35E+09	2.54E+10	7.99E+10	1.01E+11	1.08E+11	1.08E+11	1.09E+11	1.09E+11	1.09E+11
NA-24	0.00E+00	5.20E+06	7.71E+07	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08
MG-28	0.00E+00	4.26E+06	7.40E+07	1.35E+08	1.36E+08	1.36E+08	1.36E+08	1.36E+08	1.36E+08	1.36E+08	1.36E+08	1.36E+08	1.36E+08
AL-28	0.00E+00	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05	1.29E+05
P-32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
P-33	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
S-35	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CL-36	0.00E+00	1.04E+02	2.50E+03	1.75E+04	7.49E+04	9.11E+05	4.56E+06	9.11E+06	1.82E+07	2.73E+07	4.55E+07	9.11E+07	4.55E+08
CL-38	0.00E+00	1.19E+06	1.76E+06	1.76E+06	1.76E+06	1.76E+06	1.76E+06	1.76E+06	1.76E+06	1.76E+06	1.76E+06	1.76E+06	1.76E+06
A-37	0.00E+00	6.13E+03	1.46E+05	9.61E+05	3.32E+06	7.38E+06	7.39E+06	7.39E+06	7.39E+06	7.39E+06	7.39E+06	7.39E+06	7.39E+06
A-39	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
K-40	0.00E+00	2.21E+05	5.30E+06	3.71E+07	1.59E+08	1.94E+09	9.68E+09	1.94E+10	3.87E+10	5.81E+10	9.68E+10	1.94E+11	9.68E+11
K-42	0.00E+00	3.74E+05	5.08E+06	6.86E+06	6.87E+06	6.87E+06	6.87E+06	6.87E+06	6.87E+06	6.87E+06	6.87E+06	6.87E+06	6.87E+06
K-43	0.00E+00	1.52E+06	2.60E+07	4.91E+07	4.93E+07	4.93E+07	4.93E+07	4.93E+07	4.93E+07	4.93E+07	4.93E+07	4.93E+07	4.93E+07
CA-45	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CA-47	0.00E+00	1.54E+06	3.46E+07	1.67E+08	2.63E+08	2.67E+08	2.67E+08	2.67E+08	2.67E+08	2.67E+08	2.67E+08	2.67E+08	2.67E+08
CA-49	0.00E+00	7.78E+05	7.84E+05	7.84E+05	7.84E+05	7.84E+05	7.84E+05	7.84E+05	7.84E+05	7.84E+05	7.84E+05	7.84E+05	7.84E+05
SC-46	0.00E+00	3.01E+06	7.19E+07	4.91E+08	1.92E+09	8.31E+09	8.73E+09	8.73E+09	8.73E+09	8.73E+09	8.73E+09	8.73E+09	8.73E+09
SC-47	0.00E+00	1.55E+05	3.39E+06	1.40E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07
SC-49	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CR-51	0.00E+00	7.34E+04	1.74E+06	1.13E+07	3.72E+07	7.04E+07	7.04E+07	7.04E+07	7.04E+07	7.04E+07	7.04E+07	7.04E+07	7.04E+07
MN-52M	0.00E+00	1.59E+06	1.86E+06	1.89E+06	1.91E+06	1.91E+06	1.91E+06	1.91E+06	1.91E+06	1.91E+06	1.91E+06	1.91E+06	1.91E+06
MN-52	0.00E+00	5.05E+06	1.14E+08	5.70E+08	9.62E+08	9.87E+08	9.87E+08	9.87E+08	9.87E+08	9.87E+08	9.87E+08	9.87E+08	9.87E+08
MN-54	0.00E+00	1.31E+06	3.14E+07	2.18E+08	9.13E+08	7.87E+09	1.39E+10	1.42E+10	1.42E+10	1.42E+10	1.42E+10	1.42E+10	1.42E+10
FE-52	0.00E+00	3.06E+06	4.91E+07	5.77E+07	5.82E+07	5.82E+07	5.82E+07	5.82E+07	5.82E+07	5.82E+07	5.82E+07	5.82E+07	5.82E+07
FE-55	0.00E+00	3.45E+04	8.28E+05	5.78E+06	2.46E+07	2.67E+08	8.51E+08	1.09E+09	1.17E+09	1.18E+09	1.18E+09	1.18E+09	1.18E+09
FE-59	0.00E+00	1.74E+06	4.14E+07	2.77E+08	1.00E+09	2.68E+09	2.69E+09	2.69E+09	2.69E+09	2.69E+09	2.69E+09	2.69E+09	2.69E+09
CO-56	0.00E+00	5.11E+06	1.22E+08	8.32E+08	3.23E+09	1.33E+10	1.39E+10	1.39E+10	1.39E+10	1.39E+10	1.39E+10	1.39E+10	1.39E+10
CO-57	0.00E+00	2.67E+05	6.40E+06	4.45E+07	1.85E+08	1.52E+09	2.48E+09	2.51E+09	2.51E+09	2.51E+09	2.51E+09	2.51E+09	2.51E+09
CO-58	0.00E+00	1.54E+06	3.68E+07	2.50E+08	9.62E+08	3.69E+09	3.80E+09	3.80E+09	3.80E+09	3.80E+09	3.80E+09	3.80E+09	3.80E+09
CO-60	0.00E+00	3.62E+06	8.69E+07	6.07E+08	2.59E+09	2.97E+10	1.16E+11	1.76E+11	2.24E+11	2.36E+11	2.41E+11	2.41E+11	2.41E+11
NI-56	0.00E+00	2.68E+06	6.15E+07	3.32E+08	7.34E+08	1.60E+09	1.65E+09	1.65E+09	1.65E+09	1.65E+09	1.65E+09	1.65E+09	1.65E+09
NI-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CU-64	0.00E+00	3.25E+05	4.48E+06	6.14E+06	6.14E+06	6.14E+06	6.14E+06	6.14E+06	6.14E+06	6.14E+06	6.14E+06	6.14E+06	6.14E+06
ZN-65	0.00E+00	9.12E+05	2.19E+07	1.52E+08	6.29E+08	4.97E+09	7.65E+09	7.70E+09	7.70E+09	7.70E+09	7.70E+09	7.70E+09	7.70E+09
ZN-69M	0.00E+00	6.46E+05	9.26E+06	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07	1.33E+07
ZN-69	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GA-67	0.00E+00	3.59E+05	7.81E+06	3.16E+07	4.07E+07	4.08E+07	4.08E+07	4.08E+07	4.08E+07	4.08E+07	4.08E+07	4.08E+07	4.08E+07
GA-68	0.00E+00	1.12E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06	2.46E+06

[a]Point receptor 1 meter above surface.

TABLE 3-5B (continued)

DOSE RATE (MREM/YR) FROM EXPCSURE TO CONTAMINATED GROUND. CCNTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
GE-77	0.00E+00	1.44E+06	1.86E+07	2.44E+07	2.44E+07	2.44E+07	2.44E+07	2.44E+07	2.44E+07	2.44E+07	2.44E+07	2.44E+07	2.44E+07
AS-76	0.00E+00	6.57E+05	1.18E+07	2.50E+07	2.53E+07	2.53E+07	2.53E+07	2.53E+07	2.53E+07	2.53E+07	2.53E+07	2.53E+07	2.53E+07
AS-77	0.00E+00	1.55E+04	3.05E+05	8.32E+05	8.76E+05	8.76E+05	8.76E+05	8.76E+05	8.76E+05	8.76E+05	8.76E+05	8.76E+05	8.76E+05
SE-75	0.00E+00	9.61E+05	2.30E+07	1.58E+08	6.35E+08	3.51E+09	3.99E+09	3.99E+09	3.99E+09	3.99E+09	3.99E+09	3.99E+09	3.99E+09
SE-77M	0.00E+00	1.21E+03	1.21E+03	1.21E+03	1.21E+03	1.21E+03	1.21E+03	1.21E+03	1.21E+03	1.21E+03	1.21E+03	1.21E+03	1.21E+03
BR-80M	0.00E+00	3.18E+05	2.47E+06	2.53E+06	2.53E+06	2.53E+C6	2.53E+06	2.53E+06	2.53E+06	2.53E+06	2.53E+06	2.53E+06	2.53E+06
BR-80	0.00E+00	5.36E+04	5.90E+04	5.90E+04	5.90E+04	5.90E+04	5.90E+04	5.90E+04	5.90E+04	5.90E+04	5.90E+04	5.90E+04	5.90E+04
BR-82	0.00E+00	4.03E+06	7.79E+07	2.00E+08	2.08E+08	2.08E+08	2.08E+08	2.08E+08	2.08E+08	2.08E+08	2.08E+08	2.08E+08	2.08E+08
BR-83	0.00E+00	2.34E+05	9.69E+05	9.70E+05	9.70E+05	9.70E+05	9.70E+05	9.70E+05	9.70E+05	9.70E+05	9.70E+05	9.70E+05	9.70E+05
BR-84	0.00E+00	1.38E+06	1.89E+06	1.89E+06	1.89E+06	1.89E+06	1.89E+06	1.89E+06	1.89E+06	1.89E+06	1.89E+06	1.89E+06	1.89E+06
KR-79	0.00E+00	4.99E+05	9.62E+06	2.45E+07	2.54E+C7	2.54E+07	2.54E+07	2.54E+07	2.54E+07	2.54E+07	2.54E+07	2.54E+07	2.54E+07
KR-83M	0.00E+00	4.95E+04	1.59E+05	1.59E+05	1.59E+05	1.59E+05	1.59E+05	1.59E+05	1.59E+05	1.59E+05	1.59E+05	1.59E+05	1.59E+05
KR-85M	0.00E+00	2.23E+05	1.52E+06	1.56E+06	1.56E+06	1.56E+06	1.56E+06	1.56E+C6	1.56E+06	1.56E+06	1.56E+06	1.56E+06	1.56E+06
KR-85	0.00E+00	3.25E+03	7.80E+04	5.46E+05	2.33E+06	2.76E+07	1.22E+08	2.10E+08	3.20E+08	3.77E+08	4.24E+08	4.40E+08	4.41E+08
KR-87	0.00E+00	8.24E+05	1.96E+06	1.96E+06	1.96E+06	1.96E+06	1.96E+06	1.96E+06	1.96E+06	1.96E+06	1.96E+06	1.96E+06	1.96E+06
KR-88	0.00E+00	2.86E+06	1.44E+07	1.44E+07	1.44E+07	1.44E+C7	1.44E+07	1.44E+07	1.44E+07	1.44E+07	1.44E+07	1.44E+07	1.44E+07
RB-84	0.00E+00	1.48E+06	3.52E+07	2.32E+08	7.97E+08	1.74E+09	1.74E+09	1.74E+09	1.74E+09	1.74E+09	1.74E+09	1.74E+09	1.74E+09
RB-86	0.00E+00	1.41E+05	3.32E+06	2.09E+07	6.12E+07	9.11E+07	9.11E+07	9.11E+07	9.11E+07	9.11E+07	9.11E+07	9.11E+07	9.11E+07
RB-88	0.00E+00	3.56E+05	3.93E+05	3.93E+05	3.93E+05	3.93E+05	3.93E+05	3.93E+05	3.93E+05	3.93E+05	3.93E+05	3.93E+05	3.93E+05
RB-89	0.00E+00	1.14E+06	1.22E+06	1.22E+06	1.22E+06	1.22E+C6	1.22E+06	1.22E+06	1.22E+06	1.22E+06	1.22E+06	1.22E+06	1.22E+06
RB-90	0.00E+00	2.05E+05	2.05E+05	2.05E+05	2.05E+05	2.05E+05	2.05E+05	2.05E+05	2.05E+05	2.05E+05	2.05E+05	2.05E+05	2.05E+05
SR-85	0.00E+00	9.77E+05	2.33E+07	1.58E+08	6.02E+08	2.16E+09	2.21E+09	2.21E+09	2.21E+09	2.21E+09	2.21E+09	2.21E+09	2.21E+09
SR-87M	0.00E+00	4.59E+05	2.09E+06	2.10E+06	2.10E+06	2.10E+06	2.10E+06	2.10E+06	2.10E+06	2.10E+06	2.10E+06	2.10E+06	2.10E+06
SR-89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR-90	0.00E+00	0.00E+00	0.C0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR-91	0.00E+00	1.23E+06	1.81E+07	2.20E+07	2.21E+07	2.21E+07	2.21E+07	2.21E+07	2.21E+07	2.21E+07	2.21E+07	2.21E+07	2.21E+07
SR-92	0.00E+00	1.62E+06	8.42E+06	8.48E+06	8.48E+06	8.48E+06	8.48E+06	8.48E+06	8.48E+06	8.48E+06	8.48E+06	8.48E+06	8.48E+06
SR-93	0.00E+00	4.14E+05	4.30E+05	4.34E+05	4.34E+05	4.34E+05	4.34E+05	4.34E+05	4.34E+05	4.34E+05	4.34E+05	4.34E+05	4.34E+05
Y-87	0.00E+00	9.93E+05	2.98E+07	1.29E+08	1.68E+08	1.69E+C8	1.69E+08	1.69E+08	1.69E+08	1.69E+08	1.69E+08	1.69E+08	1.69E+08
Y-88	0.00E+00	3.91E+06	9.35E+07	6.42E+08	2.56E+09	1.31E+10	1.44E+10	1.44E+10	1.44E+10	1.44E+10	1.44E+10	1.44E+10	1.44E+10
Y-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+C0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y-91M	0.00E+00	5.64E+05	9.96E+05	9.96E+05	9.97E+05	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06	1.00E+06
Y-91	0.00E+00	3.52E+03	8.40E+04	5.67E+05	2.12E+06	6.82E+C6	6.90E+06	6.90E+06	6.90E+06	6.90E+06	6.90E+06	6.90E+06	6.90E+06
Y-92	0.00E+00	3.35E+05	1.86E+06	1.88E+06	1.88E+06	1.88E+C6	1.88E+06	1.88E+06	1.88E+06	1.88E+06	1.88E+06	1.88E+06	1.88E+06
Y-93	0.00E+00	1.04E+05	1.28E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06	1.59E+06
ZR-95	0.00E+00	1.13E+06	2.73E+07	1.96E+08	8.86E+08	5.09E+09	5.27E+09	5.27E+09	5.27E+09	5.27E+09	5.27E+09	5.27E+09	5.27E+09
ZR-97	0.00E+00	1.53E+06	3.55E+07	5.77E+07	5.78E+07	5.78E+07	5.78E+07	5.78E+07	5.78E+07	5.78E+07	5.78E+07	5.78E+07	5.78E+07
NB-95M	0.00E+00	8.51E+04	2.12E+06	1.67E+07	6.77E+07	1.59E+08	1.59E+08	1.59E+08	1.59E+08	1.59E+08	1.59E+08	1.59E+08	1.59E+08
NB-95	0.00E+00	1.19E+06	2.83E+07	1.87E+08	6.47E+08	1.45E+09	1.45E+09	1.45E+09	1.45E+09	1.45E+09	1.45E+09	1.45E+09	1.45E+09
NB-97M	0.00E+00	3.42E+04	4.72E+04	4.72E+04	4.72E+04	4.72E+04	4.72E+04	4.72E+04	4.72E+04	4.72E+04	4.72E+04	4.72E+04	4.72E+04
NB-97	0.00E+00	7.95E+05	1.84E+06	1.84E+06	1.84E+06	1.84E+06	1.84E+06	1.84E+06	1.84E+06	1.84E+06	1.84E+06	1.84E+06	1.84E+06
MO-99	0.00E+00	2.85E+05	8.24E+06	3.46E+07	4.21E+07	4.21E+07	4.21E+07	4.21E+07	4.21E+07	4.21E+07	4.21E+07	4.21E+07	4.21E+07
TC-99M	0.00E+00	1.79E+05	1.55E+C6	1.65E+06	1.65E+06	1.65E+06	1.65E+06	1.65E+06	1.65E+06	1.65E+06	1.65E+06	1.65E+06	1.65E+06
TC-99	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU-103	0.00E+00	7.91E+05	1.92E+07	1.28E+08	4.52E+08	1.10E+09	1.11E+09	1.11E+09	1.11E+09	1.11E+09	1.11E+09	1.11E+09	1.11E+09
RU-106	0.00E+00	2.88E+05	7.00E+06	4.87E+07	2.04E+08	1.85E+C9	3.61E+09	3.73E+09	3.73E+09	3.73E+09	3.73E+09	3.73E+09	3.73E+09
RH-103M	0.00E+00	1.52E+04	2.91E+04	2.91E+04	2.91E+04	2.91E+04	2.91E+04	2.91E+04	2.91E+04	2.91E+04	2.91E+04	2.91E+04	2.91E+04

TABLE 3-5B (continued)

DOSE RATE (MREM/YR) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
RH-105	0.00E+00	1.21E+05	2.34E+06	6.01E+06	6.25E+06	6.25E+06	6.25E+06	6.25E+06	6.25E+06	6.25E+06	6.25E+06	6.25E+06	6.25E+06
RH-106	0.00E+00	3.50E+03	3.50E+03	3.50E+03	3.50E+03	3.50E+03	3.50E+03	3.50E+03	3.50E+03	3.50E+03	3.50E+03	3.50E+03	3.50E+03
PD-103	0.00E+00	3.71E+03	8.73E+04	5.44E+05	1.56E+06	2.25E+06	2.25E+06	2.25E+06	2.25E+06	2.25E+06	2.25E+06	2.25E+06	2.25E+06
AG-110M	0.00E+00	4.13E+06	9.90E+07	6.87E+08	2.85E+09	2.28E+10	3.56E+10	3.58E+10	3.58E+10	3.58E+10	3.58E+10	3.58E+10	3.58E+10
AG-111	0.00E+00	6.48E+04	2.23E+06	1.23E+07	2.42E+07	2.58E+07	2.58E+07	2.58E+07	2.58E+07	2.58E+07	2.58E+07	2.58E+07	2.58E+07
CD-111M	0.00E+00	3.89E+05	6.77E+05	6.77E+05	6.77E+05	6.77E+05	6.77E+05	6.77E+05	6.77E+05	6.77E+05	6.77E+05	6.77E+05	6.77E+05
CD-113M	0.00E+00	1.74E-02	1.74E-02	1.74E-02	1.74E-02	1.74E-02	1.74E-02	1.74E-02	1.74E-02	1.74E-02	1.74E-02	1.74E-02	1.74E-02
CD-115M	0.00E+00	4.98E+04	1.41E+06	9.93E+06	3.61E+07	9.68E+07	9.72E+07	9.72E+07	9.72E+07	9.72E+07	9.72E+07	9.72E+07	9.72E+07
IN-113M	0.00E+00	3.24E+05	9.50E+05	9.50E+05	9.50E+05	9.50E+05	9.50E+05	9.50E+05	9.50E+05	9.50E+05	9.50E+05	9.50E+05	9.50E+05
IN-114M	0.00E+00	1.95E+05	4.66E+06	3.13E+07	1.15E+08	3.37E+08	3.39E+08	3.39E+08	3.39E+08	3.39E+08	3.39E+08	3.39E+08	3.39E+08
IN-114	0.00E+00	1.93E+02	1.93E+02	1.93E+02	1.93E+02	1.93E+02	1.93E+02	1.93E+02	1.93E+02	1.93E+02	1.93E+02	1.93E+02	1.93E+02
IN-115M	0.00E+00	2.61E+05	1.79E+06	1.83E+06	1.83E+06	1.83E+06	1.83E+06	1.83E+06	1.83E+06	1.83E+06	1.83E+06	1.83E+06	1.83E+06
SN-113	0.00E+00	2.81E+05	1.36E+07	9.88E+07	3.98E+08	2.15E+09	2.41E+09	2.41E+09	2.41E+09	2.41E+09	2.41E+09	2.41E+09	2.41E+09
SN-119M	0.00E+00	9.30E+04	2.23E+06	1.55E+07	6.42E+07	5.08E+08	7.84E+08	7.89E+08	7.89E+08	7.89E+08	7.89E+08	7.89E+08	7.89E+08
SN-123	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SN-125	0.00E+00	4.58E+05	1.06E+07	6.09E+07	1.39E+08	2.15E+08	3.59E+08	4.17E+08	4.39E+08	4.40E+08	4.40E+08	4.40E+08	4.40E+08
SB-122	0.00E+00	6.51E+05	1.39E+07	5.12E+07	6.16E+07	6.16E+07	6.16E+07	6.16E+07	6.16E+07	6.16E+07	6.16E+07	6.16E+07	6.16E+07
SB-124	0.00E+00	2.67E+06	6.37E+07	4.31E+08	1.63E+09	5.48E+09	5.57E+09	5.57E+09	5.57E+09	5.57E+09	5.57E+09	5.57E+09	5.57E+09
SB-125	0.00E+00	8.07E+05	1.94E+07	1.36E+08	5.81E+08	6.57E+09	2.13E+10	2.73E+10	2.95E+10	2.97E+10	2.97E+10	2.97E+10	2.97E+10
SB-127	0.00E+00	1.04E+06	2.29E+07	9.92E+07	1.37E+08	1.39E+08	1.39E+08	1.39E+08	1.39E+08	1.39E+08	1.39E+08	1.39E+08	1.39E+08
TE-123M	0.00E+00	2.81E+05	6.72E+06	4.63E+07	1.86E+08	1.02E+09	1.16E+09	1.17E+09	1.17E+09	1.17E+09	1.17E+09	1.17E+09	1.17E+09
TE-125M	0.00E+00	2.23E+05	5.32E+06	3.59E+07	1.35E+08	4.42E+08	4.48E+08	4.48E+08	4.48E+08	4.48E+08	4.48E+08	4.48E+08	4.48E+08
TE-127M	0.00E+00	6.18E+04	1.55E+06	1.11E+07	4.45E+07	2.31E+08	2.56E+08	2.56E+08	2.56E+08	2.56E+08	2.56E+08	2.56E+08	2.56E+08
TE-127	0.00E+00	6.26E+03	7.28E+04	8.75E+04	8.75E+04	8.75E+04	8.75E+04	8.75E+04	8.75E+04	8.75E+04	8.75E+04	8.75E+04	8.75E+04
TE-129M	0.00E+00	1.19E+05	4.19E+06	2.84E+07	9.77E+07	2.11E+08	2.11E+08	2.11E+08	2.11E+08	2.11E+08	2.11E+08	2.11E+08	2.11E+08
TE-129	0.00E+00	9.95E+04	2.22E+05	2.22E+05	2.22E+05	2.22E+05	2.22E+05	2.22E+05	2.22E+05	2.22E+05	2.22E+05	2.22E+05	2.22E+05
TE-131M	0.00E+00	2.16E+06	4.18E+07	1.04E+08	1.21E+08	1.23E+08	1.23E+08	1.23E+08	1.23E+08	1.23E+08	1.23E+08	1.23E+08	1.23E+08
TE-131	0.00E+00	3.10E+05	4.11E+05	5.44E+05	7.15E+05	7.42E+05	7.42E+05	7.42E+05	7.42E+05	7.42E+05	7.42E+05	7.42E+05	7.42E+05
TE-132	0.00E+00	7.93E+05	7.37E+07	3.34E+08	4.33E+08	4.34E+08	4.34E+08	4.34E+08	4.34E+08	4.34E+08	4.34E+08	4.34E+08	4.34E+08
I-123	0.00E+00	3.54E+05	4.93E+06	6.86E+06	6.86E+06	6.87E+06	6.87E+06	6.87E+06	6.87E+06	6.87E+06	6.87E+06	6.87E+06	6.87E+06
I-124	0.00E+00	1.70E+06	3.78E+07	1.70E+08	2.45E+08	2.47E+08	2.47E+08	2.47E+08	2.47E+08	2.47E+08	2.47E+08	2.47E+08	2.47E+08
I-125	0.00E+00	2.60E+05	6.20E+06	4.20E+07	1.58E+08	5.30E+08	5.38E+08	5.38E+08	5.38E+08	5.38E+08	5.38E+08	5.38E+08	5.38E+08
I-126	0.00E+00	7.35E+05	1.72E+07	1.03E+08	2.64E+08	3.31E+08	3.31E+08	3.31E+08	3.31E+08	3.31E+08	3.31E+08	3.31E+08	3.31E+08
I-129	0.00E+00	1.32E+05	3.17E+06	2.22E+07	9.50E+07	1.16E+09	5.78E+09	1.16E+10	2.31E+10	3.47E+10	5.78E+10	1.16E+11	5.78E+11
I-130	0.00E+00	3.07E+06	4.18E+07	5.65E+07	5.65E+07	5.65E+07	5.65E+07	5.65E+07	5.65E+07	5.65E+07	5.65E+07	5.65E+07	5.65E+07
I-131	0.00E+00	5.97E+05	1.38E+07	7.55E+07	1.54E+08	1.67E+08	1.67E+08	1.67E+08	1.67E+08	1.67E+08	1.67E+08	1.67E+08	1.67E+08
I-132	0.00E+00	3.06E+06	1.17E+07	1.17E+07	1.17E+07	1.17E+07	1.17E+07	1.17E+07	1.17E+07	1.17E+07	1.17E+07	1.17E+07	1.17E+07
I-133	0.00E+00	1.02E+06	1.74E+07	3.33E+07	3.50E+07	3.51E+07	3.51E+07	3.51E+07	3.51E+07	3.51E+07	3.51E+07	3.51E+07	3.51E+07
I-134	0.00E+00	2.50E+06	4.57E+06	4.57E+06	4.57E+06	4.57E+06	4.57E+06	4.57E+06	4.57E+06	4.57E+06	4.57E+06	4.57E+06	4.57E+06
I-135	0.00E+00	2.51E+06	2.58E+07	2.92E+07	2.92E+07	2.92E+07	2.92E+07	2.92E+07	2.92E+07	2.92E+07	2.92E+07	2.92E+07	2.92E+07
I-136	0.00E+00	1.28E+05	1.28E+05	1.28E+05	1.28E+05	1.28E+05	1.28E+05	1.28E+05	1.28E+05	1.28E+05	1.28E+05	1.28E+05	1.28E+05
XE-131M	0.00E+00	9.87E+04	2.30E+06	1.37E+07	3.38E+07	4.10E+07	4.10E+07	4.10E+07	4.10E+07	4.10E+07	4.10E+07	4.10E+07	4.10E+07
XE-133M	0.00E+00	1.31E+05	2.88E+06	1.25E+07	1.88E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07
XE-133	0.00E+00	1.16E+05	2.61E+06	1.28E+07	2.08E+07	2.12E+07	2.12E+07	2.12E+07	2.12E+07	2.12E+07	2.12E+07	2.12E+07	2.12E+07
XE-135M	0.00E+00	2.45E+05	3.70E+05	3.94E+05	3.94E+05	3.94E+05	3.94E+05	3.94E+05	3.94E+05	3.94E+05	3.94E+05	3.94E+05	3.94E+05
XE-135	0.00E+00	3.62E+05	4.16E+06	4.98E+06	4.98E+06	4.98E+06	4.98E+06	4.98E+06	4.98E+06	4.98E+06	4.98E+06	4.98E+06	4.98E+06
XE-137	0.00E+00	2.54E+04	2.54E+04	2.54E+04	2.55E+04	2.71E+04	3.38E+04	4.12E+04	5.38E+04	6.39E+04	7.81E+04	9.48E+04	1.03E+05

TABLE 3-5B (continued)

DOSE RATE (MREM/YR) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
XE-138	0.00E+00	9.98E+05	1.52E+06	1.52E+06	1.52E+06	1.52E+06	1.52E+06	1.52E+06	1.52E+06	1.52E+06	1.52E+06	1.52E+06	1.52E+06
CS-134	0.00E+00	2.41E+06	5.78E+07	4.04E+08	1.71E+09	1.79E+10	5.11E+10	6.06E+10	6.27E+10	6.28E+10	6.28E+10	6.28E+10	6.28E+10
CS-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CS-136	0.00E+00	3.22E+06	7.53E+07	4.52E+08	1.16E+09	1.45E+09	1.45E+09	1.45E+09	1.45E+09	1.45E+09	1.45E+09	1.45E+09	1.45E+09
CS-137	0.00E+00	7.84E+05	2.00E+07	1.40E+08	6.01E+08	7.24E+09	3.46E+10	6.54E+10	1.17E+11	1.59E+11	2.17E+11	2.86E+11	3.18E+11
CS-138	0.00E+00	1.68E+06	2.31E+06	2.31E+06	2.31E+06	2.31E+06	2.31E+06	2.31E+06	2.31E+06	2.31E+06	2.31E+06	2.31E+06	2.31E+06
CS-139	0.00E+00	7.12E+04	8.38E+04	8.38E+04	8.38E+04	8.38E+04	8.38E+04	8.38E+04	8.38E+04	8.38E+04	8.38E+04	8.38E+04	8.38E+04
BA-133	0.00E+00	6.80E+05	1.63E+07	1.14E+08	4.88E+08	5.76E+09	2.53E+10	4.35E+10	6.58E+10	7.73E+10	8.63E+10	8.93E+10	8.95E+10
BA-137M	0.00E+00	5.44E+04	5.44E+04	5.44E+04	5.44E+04	5.44E+04	5.44E+04	5.44E+04	5.44E+04	5.44E+04	5.44E+04	5.44E+04	5.44E+04
BA-139	0.00E+00	6.11E+04	1.55E+05	1.55E+05	1.55E+05	1.55E+05	1.55E+05	1.55E+05	1.55E+05	1.55E+05	1.55E+05	1.55E+05	1.55E+05
BA-140	0.00E+00	3.71E+05	2.20E+07	3.69E+08	1.25E+09	1.61E+09	1.61E+09	1.61E+09	1.61E+09	1.61E+09	1.61E+09	1.61E+09	1.61E+09
LA-140	0.00E+00	3.25E+06	6.45E+07	1.80E+08	1.91E+08	1.91E+08	1.91E+08	1.91E+08	1.91E+08	1.91E+08	1.91E+08	1.91E+08	1.91E+08
CE-141	0.00E+00	1.23E+05	2.92E+06	1.92E+07	6.53E+07	1.38E+08	1.38E+08	1.38E+08	1.38E+08	1.38E+08	1.38E+08	1.38E+08	1.38E+08
CE-143	0.00E+00	5.26E+05	1.01E+07	2.50E+07	2.58E+07	2.58E+07	2.58E+07	2.58E+07	2.58E+07	2.58E+07	2.58E+07	2.58E+07	2.58E+07
CE-144	0.00E+00	6.19E+04	1.85E+06	1.30E+07	5.41E+07	4.52E+08	7.57E+08	7.66E+08	7.66E+08	7.66E+08	7.66E+08	7.66E+08	7.66E+08
PR-143	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR-144	0.00E+00	1.60E+04	1.75E+04	1.75E+04	1.75E+04	1.75E+04	1.75E+04	1.75E+04	1.75E+04	1.75E+04	1.75E+04	1.75E+04	1.75E+04
ND-147	0.00E+00	2.49E+05	5.79E+06	3.39E+07	8.08E+07	9.54E+07	9.54E+07	9.54E+07	9.54E+07	9.54E+07	9.54E+07	9.54E+07	9.54E+07
PM-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM-148M	0.00E+00	3.11E+06	7.41E+07	4.95E+08	1.78E+09	4.50E+09	4.51E+09	4.51E+09	4.51E+09	4.51E+09	4.51E+09	4.51E+09	4.51E+09
PM-148	0.00E+00	9.26E+05	2.09E+07	1.03E+08	1.69E+08	1.73E+08	1.73E+08	1.73E+08	1.73E+08	1.73E+08	1.73E+08	1.73E+08	1.73E+08
SM-151	0.00E+00	4.56E+02	1.09E+04	7.66E+04	3.28E+05	3.98E+06	1.96E+07	3.84E+07	7.39E+07	1.07E+08	1.65E+08	2.75E+08	4.92E+08
EU-154	0.00E+00	1.92E+06	4.61E+07	3.22E+08	1.38E+09	1.62E+10	6.91E+10	1.15E+11	1.66E+11	1.88E+11	2.03E+11	2.06E+11	2.06E+11
EU-155	0.00E+00	1.08E+05	2.59E+06	1.81E+07	7.73E+07	8.83E+08	3.40E+09	5.10E+09	6.36E+09	6.67E+09	6.77E+09	6.78E+09	6.78E+09
EU-156	0.00E+00	1.99E+06	4.67E+07	2.86E+08	7.81E+08	1.05E+09	1.05E+09	1.05E+09	1.05E+09	1.05E+09	1.05E+09	1.05E+09	1.05E+09
GD-162	0.00E+00	1.61E+05	1.64E+05	1.64E+05	1.64E+05	1.64E+05	1.64E+05	1.64E+05	1.64E+05	1.64E+05	1.64E+05	1.64E+05	1.64E+05
TB-160	0.00E+00	1.65E+06	3.94E+07	2.68E+08	1.03E+09	3.95E+09	4.07E+09	4.07E+09	4.07E+09	4.07E+09	4.07E+09	4.07E+09	4.07E+09
TA-182	0.00E+00	1.96E+06	4.69E+07	3.22E+08	1.29E+09	6.94E+09	7.81E+09	7.81E+09	7.81E+09	7.81E+09	7.81E+09	7.81E+09	7.81E+09
W-185	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
W-187	0.00E+00	2.60E+05	4.56E+06	9.03E+06	9.10E+06	9.10E+06	9.10E+06	9.10E+06	9.10E+06	9.10E+06	9.10E+06	9.10E+06	9.10E+06
AU-195M	0.00E+00	4.71E+03	4.72E+03	4.79E+03	5.05E+03	7.13E+03	7.95E+03	7.96E+03	7.96E+03	7.96E+03	7.96E+03	7.96E+03	7.96E+03
AU-195	0.00E+00	2.66E+05	6.37E+06	4.41E+07	1.81E+08	1.27E+09	1.70E+09	1.70E+09	1.70E+09	1.70E+09	1.70E+09	1.70E+09	1.70E+09
AU-198	0.00E+00	6.36E+05	1.35E+07	4.98E+07	5.96E+07	5.97E+07	5.97E+07	5.97E+07	5.97E+07	5.97E+07	5.97E+07	5.97E+07	5.97E+07
AU-199	0.00E+00	1.68E+05	3.64E+06	1.45E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07	1.84E+07
HG-197	0.00E+00	2.05E+05	4.35E+06	1.60E+07	1.90E+07	1.91E+07	1.91E+07	1.91E+07	1.91E+07	1.91E+07	1.91E+07	1.91E+07	1.91E+07
HG-203	0.00E+00	3.74E+05	8.91E+06	5.97E+07	2.17E+08	6.01E+08	6.03E+08	6.03E+08	6.03E+08	6.03E+08	6.03E+08	6.03E+08	6.03E+08
TL-204	0.00E+00	8.18E+05	7.15E+07	5.30E+08	2.28E+09	2.56E+10	9.16E+10	1.28E+11	1.49E+11	1.52E+11	1.53E+11	1.53E+11	1.53E+11
TL-208	0.00E+00	3.25E+05	3.25E+05	3.25E+05	3.25E+05	3.25E+05	3.25E+05	3.25E+05	3.25E+05	3.25E+05	3.25E+05	3.25E+05	3.25E+05
TL-210	0.00E+00	3.35E-01	5.05E-01	1.57E+00	5.63E+00	6.39E+01	2.99E+02	5.55E+02	9.62E+02	1.26E+03	1.64E+03	1.99E+03	2.08E+03
PB-204M	0.00E+00	2.38E+06	5.13E+06	5.13E+06	5.13E+06	5.13E+06	5.13E+06	5.13E+06	5.13E+06	5.13E+06	5.13E+06	5.13E+06	5.13E+06
PB-210	0.00E+00	6.65E+04	1.60E+06	1.12E+07	4.78E+07	5.74E+08	2.70E+09	5.01E+09	8.68E+09	1.14E+10	1.48E+10	1.79E+10	1.88E+10
PB-212	0.00E+00	6.44E+05	2.28E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07	2.95E+07
PB-214	0.00E+00	9.50E+05	1.66E+06	1.66E+06	1.66E+06	1.66E+06	1.66E+06	1.67E+06	1.68E+06	1.68E+06	1.69E+06	1.70E+06	1.70E+06
BI-210M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BI-212	0.00E+00	1.48E+06	3.10E+06	3.10E+06	3.10E+06	3.10E+06	3.10E+06	3.10E+06	3.10E+06	3.10E+06	3.10E+06	3.10E+06	3.10E+06
BI-214	0.00E+00	9.11E+05	1.04E+06	1.04E+06	1.04E+06	1.04E+06	1.04E+06	1.05E+06	1.05E+06	1.06E+06	1.06E+06	1.07E+06	1.07E+06

TABLE 3-5B (continued)

DOSE RATE (MREM/YR) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
PO-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PO-214	0.00E+00	1.13E-05	1.17E-05	1.39E-05	2.25E-05	1.45E-04	6.41E-04	1.18E-03	2.04E-03	2.66E-03	3.46E-03	4.19E-03	4.39E-03
PO-218	0.00E+00	1.01E+05	1.89E+05	1.89E+05	1.89E+05	1.89E+05	1.89E+05	1.90E+05	1.91E+05	1.91E+05	1.92E+05	1.93E+05	1.93E+05
RN-220	0.00E+00	9.16E+02	3.31E+04	4.29E+04	4.29E+04	4.29E+04	4.29E+04	4.29E+04	4.29E+04	4.29E+04	4.29E+04	4.29E+04	4.29E+04
RN-222	0.00E+00	6.07E+05	5.40E+07	2.44E+08	3.39E+08	3.41E+08	3.42E+08	3.43E+08	3.44E+08	3.46E+08	3.47E+08	3.49E+08	3.49E+08
RA-224	0.00E+00	3.22E+04	1.99E+07	1.71E+08	2.44E+08	2.45E+08	2.45E+08	2.45E+08	2.45E+08	2.45E+08	2.45E+08	2.45E+08	2.45E+08
RA-226	0.00E+00	1.29E+04	5.08E+06	1.87E+08	1.52E+09	2.23E+10	1.13E+11	2.26E+11	4.53E+11	6.80E+11	1.13E+12	2.25E+12	1.04E+13
RA-228	0.00E+00	2.10E+05	2.11E+07	2.02E+08	9.07E+08	1.30E+10	7.87E+10	1.45E+11	2.07E+11	2.27E+11	2.34E+11	2.35E+11	2.35E+11
AC-228	0.00E+00	1.05E+06	9.17E+06	9.87E+06	1.02E+07	1.50E+07	2.44E+07	2.68E+07	2.72E+07	2.73E+07	2.73E+07	2.73E+07	2.73E+07
TH-228	0.00E+00	2.84E+04	2.05E+06	1.28E+08	1.13E+09	1.43E+10	3.98E+10	4.64E+10	4.76E+10	4.77E+10	4.77E+10	4.77E+10	4.77E+10
TH-230	0.00E+00	2.20E+04	5.28E+05	3.70E+06	1.59E+07	1.97E+08	1.09E+09	2.42E+09	5.81E+09	1.02E+10	2.19E+10	6.82E+10	1.26E+12
TH-231	0.00E+00	2.68E+05	4.80E+06	9.90E+06	1.00E+07	1.00E+07	1.00E+07	1.00E+07	1.00E+07	1.00E+07	1.00E+07	1.00E+07	1.00E+07
TH-232	0.00E+00	5.10E+04	6.14E+05	3.86E+06	1.96E+07	9.28E+08	2.36E+10	9.33E+10	3.14E+11	5.80E+11	1.14E+12	2.56E+12	1.40E+13
TH-234	0.00E+00	3.65E+04	8.75E+05	5.63E+06	1.78E+07	3.09E+07	3.09E+07	3.09E+07	3.09E+07	3.09E+07	3.09E+07	3.09E+07	3.09E+07
PA-233	0.00E+00	3.99E+05	9.45E+06	6.14E+07	2.00E+08	3.73E+08	3.73E+08	3.73E+08	3.73E+08	3.73E+08	3.73E+08	3.73E+08	3.73E+08
PA-234M	0.00E+00	4.52E+02	4.52E+02	4.52E+02	4.52E+02	4.52E+02	4.52E+02	4.52E+02	4.52E+02	4.52E+02	4.52E+02	4.52E+02	4.53E+02
PA-234	0.00E+00	4.32E+06	4.02E+07	4.38E+07	4.38E+07	4.38E+07	4.38E+07	4.38E+07	4.38E+07	4.38E+07	4.38E+07	4.38E+07	4.38E+07
U-232	0.00E+00	2.94E+04	7.06E+05	5.24E+06	3.54E+07	2.94E+09	4.66E+10	1.24E+11	2.78E+11	4.19E+11	6.65E+11	1.11E+12	1.81E+12
U-233	0.00E+00	1.76E+04	4.22E+05	2.96E+06	1.27E+07	1.54E+08	7.71E+08	1.54E+09	3.08E+09	4.62E+09	7.71E+09	1.54E+10	7.70E+10
U-234	0.00E+00	2.60E+04	6.24E+05	4.37E+06	1.87E+07	2.28E+08	1.14E+09	2.28E+09	4.56E+09	6.83E+09	1.14E+10	2.28E+10	1.16E+11
U-235	0.00E+00	3.64E+05	1.04E+07	9.63E+07	4.45E+08	5.53E+09	2.77E+10	5.54E+10	1.11E+11	1.66E+11	2.77E+11	5.54E+11	2.77E+12
U-236	0.00E+00	2.41E+04	5.76E+05	4.03E+06	1.73E+07	2.10E+08	1.05E+09	2.10E+09	4.20E+09	6.31E+09	1.05E+10	2.10E+10	1.05E+11
U-237	0.00E+00	4.91E+05	1.12E+07	5.90E+07	1.10E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08	1.15E+08
U-238	0.00E+00	7.16E+04	5.86E+05	4.23E+06	2.42E+07	4.80E+08	2.52E+09	5.08E+09	1.02E+10	1.53E+10	2.55E+10	5.10E+10	2.55E+11
U-240	0.00E+00	5.17E+05	8.77E+06	1.27E+07	1.27E+07	1.27E+07	1.27E+07	1.27E+07	1.27E+07	1.27E+07	1.27E+07	1.27E+07	1.27E+07
NP-237	0.00E+00	1.62E+05	4.01E+06	3.29E+07	2.04E+08	4.54E+09	2.42E+10	4.88E+10	9.79E+10	1.47E+11	2.45E+11	4.91E+11	2.46E+12
NP-238	0.00E+00	8.37E+05	1.73E+07	5.56E+07	6.19E+07	6.19E+07	6.20E+07	6.20E+07	6.22E+07	6.23E+07	6.25E+07	6.29E+07	6.38E+07
NP-239	0.00E+00	3.10E+05	6.48E+06	2.22E+07	2.54E+07	2.54E+07	2.54E+07	2.54E+07	2.54E+07	2.54E+07	2.54E+07	2.54E+07	2.54E+07
NP-240M	0.00E+00	9.59E+04	9.63E+04	9.63E+04	9.63E+04	9.63E+04	9.63E+04	9.63E+04	9.63E+04	9.63E+04	9.63E+04	9.64E+04	9.65E+04
PU-236	0.00E+00	2.97E+04	7.13E+05	4.98E+06	2.12E+07	2.40E+08	1.38E+09	3.73E+09	9.62E+09	1.54E+10	2.55E+10	4.37E+10	7.25E+10
PU-238	0.00E+00	2.61E+04	6.26E+05	4.38E+06	1.88E+07	2.28E+08	1.12E+09	2.20E+09	4.23E+09	6.11E+09	9.45E+09	1.58E+10	2.85E+10
PU-239	0.00E+00	9.90E+03	2.38E+05	1.66E+06	7.13E+06	8.67E+07	4.34E+08	8.67E+08	1.73E+09	2.60E+09	4.33E+09	8.66E+09	4.31E+10
PU-240	0.00E+00	2.24E+04	5.38E+05	3.76E+06	1.61E+07	1.96E+08	9.81E+08	1.96E+09	3.92E+09	5.88E+09	9.79E+09	1.95E+10	9.56E+10
PU-241	0.00E+00	1.10E-02	6.31E+00	3.09E+02	5.67E+03	8.28E+05	1.94E+07	7.21E+07	2.50E+08	4.92E+08	1.08E+09	2.68E+09	1.22E+10
PU-242	0.00E+00	2.22E+04	5.33E+05	3.73E+06	1.60E+07	1.94E+08	9.72E+08	1.94E+09	3.89E+09	5.83E+09	9.72E+09	1.94E+10	9.72E+10
PU-244	0.00E+00	1.16E+04	6.13E+06	9.21E+07	4.37E+08	5.46E+09	2.73E+10	5.47E+10	1.09E+11	1.64E+11	2.74E+11	5.47E+11	2.74E+12
AM-241	0.00E+00	1.20E+05	2.88E+06	2.02E+07	8.64E+07	1.05E+09	5.24E+09	1.04E+10	2.07E+10	3.08E+10	5.05E+10	9.72E+10	3.62E+11
AM-242	0.00E+00	8.23E+04	1.26E+06	1.95E+06	2.00E+06	2.31E+06	2.42E+06	2.44E+06	2.48E+06	2.51E+06	2.57E+06	2.68E+06	2.90E+06
AM-243	0.00E+00	9.54E+04	3.25E+06	4.60E+07	2.67E+08	3.53E+09	1.77E+10	3.55E+10	7.10E+10	1.06E+11	1.77E+11	3.54E+11	1.74E+12
CM-242	0.00E+00	2.37E+04	5.68E+05	3.92E+06	1.60E+07	1.06E+08	1.39E+08	1.44E+08	1.55E+08	1.64E+08	1.81E+08	2.14E+08	2.78E+08
CM-243	0.00E+00	2.95E+05	7.08E+06	4.95E+07	2.12E+08	2.55E+09	1.22E+10	2.29E+10	4.08E+10	5.47E+10	7.42E+10	9.57E+10	1.05E+11
CM-244	0.00E+00	2.55E+04	6.12E+05	4.28E+06	1.83E+07	2.19E+08	1.02E+09	1.85E+09	3.11E+09	3.97E+09	4.95E+09	5.69E+09	6.02E+09
CF-252	0.00E+00	7.86E+05	1.89E+07	1.32E+08	5.60E+08	6.06E+09	1.92E+10	2.44E+10	2.62E+10	2.64E+10	2.64E+10	2.64E+10	2.64E+10

TABLE 3-6A[a]

DOSE (MREM) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
H-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BE-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C-11	0.00E+00	1.66E+02	6.80E+03	4.85E+04	2.08E+05	2.54E+06	1.27E+07	2.54E+07	5.07E+07	7.61E+07	1.27E+08	2.54E+08	1.27E+09
C-14	0.00E+00	1.06E-14	6.12E-12	3.00E-10	5.50E-09	8.15E-07	2.04E-05	8.14E-05	3.26E-04	7.32E-04	2.03E-03	8.11E-03	2.00E-01
N-13	0.00E+00	1.98E+02	6.15E+03	4.34E+04	1.86E+05	2.27E+06	1.13E+07	2.27E+07	4.54E+07	6.80E+07	1.13E+08	2.27E+08	1.13E+09
O-15	0.00E+00	1.06E+02	2.67E+03	1.88E+04	8.04E+04	9.78E+05	4.89E+06	9.78E+06	1.96E+07	2.93E+07	4.89E+07	9.78E+07	4.89E+08
F-18	0.00E+00	3.82E+01	4.87E+03	3.77E+04	1.63E+05	2.00E+06	9.98E+06	2.00E+07	3.99E+07	5.99E+07	9.98E+07	2.00E+08	9.98E+08
NA-22	0.00E+00	1.56E+01	8.97E+03	4.39E+05	8.02E+06	1.10E+09	2.01E+10	5.84E+10	1.46E+11	2.36E+11	4.15E+11	8.64E+11	4.45E+12
NA-24	0.00E+00	6.75E+02	2.82E+05	4.34E+06	2.07E+07	2.59E+08	1.30E+09	2.60E+09	5.19E+09	7.79E+09	1.30E+10	2.60E+10	1.30E+11
MG-28	0.00E+00	1.45E+03	7.31E+05	1.37E+07	6.84E+07	8.66E+08	4.34E+09	8.69E+09	1.74E+10	2.61E+10	4.34E+10	8.69E+10	4.35E+11
AL-28	0.00E+00	1.66E+02	4.20E+03	2.94E+04	1.26E+05	1.53E+06	7.67E+06	1.53E+07	3.07E+07	4.60E+07	7.67E+07	1.53E+08	7.67E+08
P-32	0.00E+00	1.03E+03	5.82E+05	2.60E+07	3.46E+08	8.40E+09	4.40E+10	8.86E+10	1.78E+11	2.67E+11	4.45E+11	8.90E+11	4.45E+12
P-33	0.00E+00	7.82E-75	4.45E-72	2.04E-70	2.97E-69	8.92E-68	4.78E-67	9.63E-67	1.93E-66	2.90E-66	4.85E-66	9.70E-66	4.85E-65
S-35	0.00E+00	1.06E-12	6.07E-10	2.93E-08	5.06E-07	3.77E-05	2.60E-04	5.39E-04	1.10E-03	1.66E-03	2.77E-03	5.57E-03	2.79E-02
CL-36	0.00E+00	7.65E+01	4.41E+04	2.16E+06	3.96E+07	5.87E+09	1.47E+11	5.87E+11	2.35E+12	5.28E+12	1.47E+13	5.87E+13	1.47E+15
CL-38	0.00E+00	1.05E+03	6.12E+04	4.42E+05	1.90E+06	2.32E+07	1.16E+08	2.32E+08	4.64E+08	6.96E+08	1.16E+09	2.32E+09	1.16E+10
A-37	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A-39	0.00E+00	1.89E+01	1.09E+04	5.33E+05	9.79E+06	1.45E+09	3.61E+10	1.44E+11	5.70E+11	1.27E+12	3.47E+12	1.33E+13	2.46E+14
K-40	0.00E+00	5.35E+02	3.08E+05	1.51E+07	2.78E+08	4.11E+10	1.03E+12	4.11E+12	1.64E+13	3.70E+13	1.03E+14	4.11E+14	1.03E+16
K-42	0.00E+00	1.66E+03	6.51E+05	9.05E+06	4.23E+07	5.27E+08	2.64E+09	5.28E+09	1.06E+10	1.58E+10	2.64E+10	5.28E+10	2.64E+11
K-43	0.00E+00	1.65E+02	7.59E+04	1.45E+06	7.35E+06	9.32E+07	4.67E+08	9.35E+08	1.87E+09	2.81E+09	4.68E+09	9.35E+09	4.68E+10
CA-45	0.00E+00	1.05E-04	6.04E-02	2.93E+00	5.22E+01	5.11E+03	4.53E+04	9.72E+04	2.01E+05	3.05E+05	5.13E+05	1.03E+06	5.19E+06
CA-47	0.00E+00	2.70E+02	1.49E+05	5.58E+06	4.94E+07	7.58E+08	3.85E+09	7.71E+09	1.54E+10	2.32E+10	3.86E+10	7.72E+10	3.86E+11
CA-49	0.00E+00	5.15E+02	2.38E+04	1.72E+05	7.42E+05	9.04E+06	4.52E+07	9.04E+07	1.81E+08	2.71E+08	4.52E+08	9.04E+08	4.52E+09
SC-46	0.00E+00	1.89E-01	1.09E+02	5.25E+03	9.06E+04	6.60E+06	4.50E+07	9.32E+07	1.89E+08	2.86E+08	4.79E+08	9.60E+08	4.81E+09
SC-47	0.00E+00	9.79E+00	5.29E+03	1.82E+05	1.40E+06	2.00E+07	1.01E+08	2.03E+08	4.06E+08	6.09E+08	1.02E+09	2.03E+09	1.02E+10
SC-49	0.00E+00	9.68E+02	7.58E+04	5.58E+05	2.41E+06	2.93E+07	1.47E+08	2.94E+08	5.87E+08	8.81E+08	1.47E+09	2.94E+09	1.47E+10
CR-51	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MN-52M	0.00E+00	8.84E+02	3.71E+04	2.65E+05	1.14E+06	1.38E+07	6.92E+07	1.38E+08	2.77E+08	4.15E+08	6.92E+08	1.38E+09	6.92E+09
MN-52	0.00E+00	6.38E+00	3.54E+03	1.38E+05	1.32E+06	2.14E+07	1.09E+08	2.18E+08	4.36E+08	6.55E+08	1.09E+09	2.18E+09	1.09E+10
MN-54	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FE-52	0.00E+00	7.22E+02	5.14E+05	6.04E+06	2.75E+07	3.40E+08	1.70E+09	3.40E+09	6.81E+09	1.02E+10	1.70E+10	3.40E+10	1.70E+11
FE-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FE-59	0.00E+00	4.31E+00	2.47E+03	1.17E+05	1.93E+06	9.62E+07	5.63E+08	1.15E+09	2.31E+09	3.48E+09	5.82E+09	1.17E+10	5.84E+10
CO-56	0.00E+00	1.82E+02	1.05E+05	5.03E+06	8.66E+07	6.09E+09	4.07E+10	8.40E+10	1.71E+11	2.58E+11	4.31E+11	8.65E+11	4.33E+12
CO-57	0.00E+00	5.15E-22	2.96E-19	1.44E-17	2.60E-16	2.96E-14	3.34E-13	7.56E-13	1.60E-12	2.45E-12	4.14E-12	8.38E-12	4.23E-11
CO-58	0.00E+00	5.99E-01	3.44E+02	1.65E+04	2.83E+05	1.88E+07	1.22E+08	2.52E+08	5.11E+08	7.70E+08	1.29E+09	2.59E+09	1.30E+10
CO-60	0.00E+00	7.48E-01	4.31E+02	2.11E+04	3.86E+05	5.49E+07	1.17E+09	3.87E+09	1.13E+10	1.97E+10	3.70E+10	8.05E+10	4.29E+11
NI-56	0.00E+00	3.23E-02	3.05E+02	8.66E+04	3.95E+06	4.58E+08	3.14E+09	6.51E+09	1.33E+10	2.00E+10	3.35E+10	6.72E+10	3.37E+11
NI-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CU-64	0.00E+00	1.75E+01	6.94E+03	9.80E+04	4.59E+05	5.72E+06	2.87E+07	5.73E+07	1.15E+08	1.72E+08	2.87E+08	5.74E+08	2.87E+09
ZN-65	0.00E+00	4.55E-04	2.62E-01	1.28E+01	2.30E+02	2.54E+04	2.72E+05	6.09E+05	1.28E+06	1.96E+06	3.30E+06	6.67E+06	3.36E+07
ZN-69M	0.00E+00	4.32E+01	7.76E+04	1.25E+06	5.97E+06	7.46E+07	3.74E+08	7.48E+08	1.50E+09	2.24E+09	3.74E+09	7.48E+09	3.74E+10
ZN-69	0.00E+00	1.69E+02	1.32E+04	9.73E+04	4.19E+05	5.11E+06	2.56E+07	5.11E+07	1.02E+08	1.53E+08	2.56E+08	5.11E+08	2.56E+09
GA-67	0.00E+00	4.59E-06	2.47E-03	8.37E-02	6.31E-01	8.98E+00	4.54E+01	9.09E+01	1.82E+02	2.73E+02	4.55E+02	9.10E+02	4.55E+03
GA-68	0.00E+00	9.03E+02	8.04E+04	5.98E+05	2.58E+06	3.15E+07	1.57E+08	3.15E+08	6.30E+08	9.45E+08	1.57E+09	3.15E+09	1.57E+10

[a]Point receptor 1 meter above surface.

TABLE 3-6A (continued)

DOSE (MREM) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
GE-77	0.00E+00	7.97E+02	3.27E+05	5.54E+06	2.86E+07	3.65E+08	1.83E+09	3.66E+09	7.33E+09	1.10E+10	1.83E+10	3.67E+10	1.83E+11
AS-76	0.00E+00	1.38E+03	6.57E+05	1.38E+07	7.21E+07	9.22E+08	4.63E+09	9.26E+09	1.85E+10	2.78E+10	4.63E+10	9.26E+10	4.63E+11
AS-77	0.00E+00	4.64E+02	2.37E+05	6.08E+06	3.51E+07	4.61E+08	2.32E+09	4.63E+09	9.27E+09	1.39E+10	2.32E+10	4.64E+10	2.32E+11
SE-75	0.00E+00	9.82E-06	5.64E-03	2.73E-01	4.81E+00	4.17E+02	3.23E+03	6.81E+03	1.40E+04	2.11E+04	3.54E+04	7.11E+04	3.57E+05
SE-77M	0.00E+00	2.80E+02	6.76E+03	4.74E+04	2.03E+05	2.47E+06	1.23E+07	2.47E+07	4.94E+07	7.41E+07	1.23E+08	2.47E+08	1.23E+09
BR-80M	0.00E+00	4.87E+02	2.34E+05	2.17E+06	9.61E+06	1.18E+08	5.90E+08	1.18E+09	2.36E+09	3.54E+09	5.90E+09	1.18E+10	5.90E+10
BR-80	0.00E+00	5.48E+02	2.08E+04	1.48E+05	6.36E+05	7.74E+06	3.87E+07	7.74E+07	1.55E+08	2.32E+08	3.87E+08	7.74E+08	3.87E+09
BR-82	0.00E+00	2.17E+00	1.08E+03	2.65E+04	1.49E+05	1.94E+06	9.74E+06	1.95E+07	3.90E+07	5.85E+07	9.75E+07	1.95E+08	9.75E+08
BR-83	0.00E+00	3.46E+00	5.43E+02	4.35E+03	1.89E+04	2.31E+05	1.16E+06	2.32E+06	4.63E+06	6.95E+06	1.16E+07	2.32E+07	1.16E+08
BR-84	0.00E+00	8.35E+02	4.41E+04	3.17E+05	1.36E+06	1.66E+07	8.31E+07	1.66E+08	3.32E+08	4.98E+08	8.31E+08	1.66E+09	8.31E+09
KR-79	0.00E+00	2.42E+00	1.20E+03	2.92E+04	1.64E+05	2.13E+06	1.07E+07	2.14E+07	4.29E+07	6.43E+07	1.07E+08	2.14E+08	1.07E+09
KR-83M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KR-85M	0.00E+00	1.21E+02	2.91E+04	2.66E+05	1.17E+06	1.45E+07	7.33E+07	1.48E+08	3.03E+08	4.60E+08	7.78E+08	1.58E+09	8.00E+09
KR-85	0.00E+00	6.28E+01	3.62E+04	1.77E+06	3.25E+07	4.72E+09	1.08E+11	3.93E+11	1.31E+12	2.50E+12	5.24E+12	1.26E+13	7.23E+13
KR-87	0.00E+00	1.26E+03	1.22E+05	9.12E+05	3.94E+06	4.81E+07	2.40E+08	4.81E+08	9.61E+08	1.44E+09	2.40E+09	4.81E+09	2.40E+10
KR-88	0.00E+00	1.10E+03	3.42E+05	2.86E+06	1.25E+07	1.53E+08	7.64E+08	1.53E+09	3.06E+09	4.59E+09	7.64E+09	1.53E+10	7.64E+10
RB-84	0.00E+00	1.28E+02	7.31E+04	3.44E+06	5.46E+07	2.28E+09	1.28E+10	2.60E+10	5.24E+10	7.88E+10	1.32E+11	2.63E+11	1.32E+12
RB-86	0.00E+00	9.36E+02	5.33E+05	2.43E+07	3.46E+08	9.81E+09	5.22E+10	1.05E+11	2.11E+11	3.17E+11	5.29E+11	1.06E+12	5.30E+12
RB-88	0.00E+00	9.80E+02	3.76E+04	2.67E+05	1.15E+06	1.40E+07	6.98E+07	1.40E+08	2.79E+08	4.19E+08	6.98E+08	1.40E+09	6.98E+09
RB-89	0.00E+00	3.49E+02	1.26E+04	9.28E+04	4.47E+05	8.22E+06	4.46E+07	9.01E+07	1.81E+08	2.72E+08	4.54E+08	9.09E+08	4.55E+09
RB-90	0.00E+00	2.04E+02	5.23E+03	3.67E+04	1.58E+05	1.93E+06	1.00E+07	2.08E+07	4.45E+07	7.05E+07	1.27E+08	2.86E+08	1.65E+09
SR-85	0.00E+00	1.23E-01	7.04E+01	3.38E+03	5.74E+04	3.63E+06	2.30E+07	4.73E+07	9.58E+07	1.44E+08	2.41E+08	4.84E+08	2.43E+09
SR-87M	0.00E+00	1.05E-01	1.84E+01	1.51E+02	6.59E+02	8.06E+03	4.03E+04	8.07E+04	1.61E+05	2.42E+05	4.03E+05	8.07E+05	4.03E+06
SR-89	0.00E+00	6.96E+02	3.99E+05	1.90E+07	3.16E+08	1.71E+10	1.02E+11	2.09E+11	4.23E+11	6.36E+11	1.06E+12	2.13E+12	1.07E+13
SR-90	0.00E+00	3.47E+01	7.85E+04	1.59E+07	5.41E+08	9.97E+10	2.46E+12	9.47E+12	3.52E+13	7.37E+13	1.79E+14	5.32E+14	3.94E+15
SR-91	0.00E+00	7.36E+02	2.64E+05	3.33E+06	1.73E+07	3.40E+08	1.88E+09	3.81E+09	7.66E+09	1.15E+10	1.92E+10	3.85E+10	1.93E+11
SR-92	0.00E+00	1.87E+02	2.10E+05	2.17E+06	9.69E+06	1.19E+08	5.97E+08	1.19E+09	2.39E+09	3.58E+09	5.97E+09	1.19E+10	5.97E+10
SR-93	0.00E+00	4.76E+02	2.00E+04	1.78E+05	7.89E+05	9.70E+06	4.85E+07	9.70E+07	1.94E+08	2.91E+08	4.85E+08	9.70E+08	4.85E+09
Y-87	0.00E+00	1.77E+00	9.97E+02	3.45E+04	2.64E+05	3.77E+06	1.91E+07	3.82E+07	7.64E+07	1.15E+08	1.91E+08	3.82E+08	1.91E+09
Y-88	0.00E+00	2.44E-01	1.40E+02	6.78E+03	1.19E+05	9.74E+06	7.22E+07	1.51E+08	3.09E+08	4.66E+08	7.81E+08	1.57E+09	7.87E+09
Y-90	0.00E+00	1.30E+03	6.92E+05	2.19E+07	1.52E+08	2.09E+09	1.06E+10	2.11E+10	4.23E+10	6.34E+10	1.06E+11	2.11E+11	1.06E+12
Y-91M	0.00E+00	5.00E+00	6.15E+02	1.66E+04	2.49E+05	1.40E+07	8.57E+07	1.75E+08	3.55E+08	5.34E+08	8.93E+08	1.79E+09	8.97E+09
Y-91	0.00E+00	8.50E+02	4.88E+05	2.33E+07	3.92E+08	2.27E+10	1.39E+11	2.86E+11	5.78E+11	8.70E+11	1.45E+12	2.91E+12	1.46E+13
Y-92	0.00E+00	1.54E+03	3.17E+05	2.73E+06	1.20E+07	1.47E+08	7.33E+08	1.47E+09	2.93E+09	4.40E+09	7.34E+09	1.47E+10	7.34E+10
Y-93	0.00E+00	1.47E+03	5.40E+05	6.80E+06	3.13E+07	3.88E+08	1.94E+09	3.89E+09	7.77E+09	1.17E+10	1.94E+10	3.89E+10	1.94E+11
ZR-95	0.00E+00	5.68E+00	3.26E+03	1.57E+05	2.70E+06	1.82E+08	1.17E+09	2.41E+09	4.88E+09	7.35E+09	1.23E+10	2.47E+10	1.24E+11
ZR-97	0.00E+00	1.08E+03	6.26E+05	1.07E+07	5.18E+07	6.51E+08	3.26E+09	6.53E+09	1.31E+10	1.96E+10	3.27E+10	6.53E+10	3.27E+11
NB-95M	0.00E+00	1.51E-04	1.94E+00	4.99E+02	1.74E+04	1.00E+06	5.73E+06	1.16E+07	2.35E+07	3.53E+07	5.89E+07	1.18E+08	5.91E+08
NB-95	0.00E+00	5.40E-01	3.09E+02	1.46E+04	2.32E+05	9.90E+06	5.59E+07	1.13E+08	2.28E+08	3.43E+08	5.73E+08	1.15E+09	5.75E+09
NB-97M	0.00E+00	5.38E+00	5.14E+02	3.84E+03	1.66E+04	2.02E+05	1.01E+06	2.02E+06	4.05E+06	6.07E+06	1.01E+07	2.02E+07	1.01E+08
NB-97	0.00E+00	4.43E+02	4.17E+04	3.12E+05	1.35E+06	1.64E+07	8.21E+07	1.64E+08	3.29E+08	4.93E+08	8.21E+08	1.64E+09	8.21E+09
MO-99	0.00E+00	4.02E+02	2.14E+05	6.86E+06	4.81E+07	6.68E+08	3.37E+09	6.75E+09	1.35E+10	2.03E+10	3.38E+10	6.75E+10	3.38E+11
TC-99M	0.00E+00	2.84E-13	2.29E-09	1.94E-07	3.86E-06	5.84E-04	1.46E-02	5.85E-02	2.34E-01	5.26E-01	1.46E+00	5.85E+00	1.46E+02
TC-99	0.00E+00	2.35E-03	1.35E+00	6.64E+01	1.22E+03	1.80E+05	4.51E+06	1.80E+07	7.22E+07	1.62E+08	4.51E+08	1.80E+09	4.51E+10
RU-103	0.00E+00	3.02E+00	1.73E+03	8.18E+04	1.32E+06	6.12E+07	3.51E+08	7.14E+08	1.44E+09	2.16E+09	3.62E+09	7.24E+09	3.63E+10
RU-106	0.00E+00	1.60E+03	9.45E+05	4.62E+07	8.36E+08	1.02E+11	1.32E+12	3.14E+12	6.82E+12	1.05E+13	1.79E+13	3.63E+13	1.83E+14
RH-103M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 3-6A (continued)

DOSE (MREM) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
RH-105	0.00E+00	1.37E+01	6.82E+03	1.67E+05	9.43E+05	1.23E+07	6.17E+07	1.23E+08	2.47E+08	3.70E+08	6.17E+08	1.23E+09	6.17E+09
RH-106	0.00E+00	3.89E+01	9.45E+02	6.62E+03	2.84E+04	3.45E+05	1.73E+06	3.45E+06	6.90E+06	1.04E+07	1.73E+07	3.45E+07	1.73E+08
PD-103	0.00E+00	2.07E-48	1.17E-45	5.33E-44	7.48E-43	2.04E-41	1.08E-40	2.18E-40	4.37E-40	6.57E-40	1.10E-39	2.19E-39	1.10E-38
AG-110M	0.00E+00	6.28E+00	3.61E+03	1.76E+05	3.17E+06	3.53E+08	3.83E+09	8.60E+09	1.81E+10	2.77E+10	4.68E+10	9.45E+10	4.76E+11
AG-111	0.00E+00	2.95E+02	1.65E+05	6.78E+06	7.28E+07	1.29E+09	6.63E+09	1.33E+10	2.66E+10	4.00E+10	6.67E+10	1.33E+11	6.67E+11
CD-111M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD-113M	0.00E+00	7.88E-04	1.89E-02	1.32E-01	5.68E-01	6.91E+00	3.45E+01	6.91E+01	1.38E+02	2.07E+02	3.45E+02	6.91E+02	3.45E+03
CD-115M	0.00E+00	3.00E+01	1.72E+04	8.16E+05	1.34E+07	6.68E+08	3.91E+09	7.97E+09	1.61E+10	2.42E+10	4.04E+10	8.10E+10	4.05E+11
IN-113M	0.00E+00	1.61E-01	1.90E+01	1.46E+02	6.31E+02	7.70E+03	3.85E+04	7.70E+04	1.54E+05	2.31E+05	3.85E+05	7.70E+05	3.85E+06
IN-114M	0.00E+00	1.07E+02	6.46E+04	3.09E+06	5.12E+07	2.76E+09	1.65E+10	3.36E+10	6.79E+10	1.02E+11	1.71E+11	3.42E+11	1.71E+12
IN-114	0.00E+00	6.33E+00	1.56E+02	1.10E+03	4.70E+03	5.71E+04	2.86E+05	5.71E+05	1.14E+06	1.71E+06	2.86E+06	5.71E+06	2.86E+07
IN-115M	0.00E+00	1.92E-02	4.64E+00	4.24E+01	1.87E+02	2.30E+03	1.15E+04	2.30E+04	4.60E+04	6.90E+04	1.15E+05	2.30E+05	1.15E+06
SN-113	0.00E+00	2.31E-02	8.67E+01	4.97E+03	8.92E+04	7.64E+06	5.83E+07	1.22E+08	2.51E+08	3.79E+08	6.35E+08	1.28E+09	6.41E+09
SN-119M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SN-123	0.00E+00	6.51E+02	3.74E+05	1.81E+07	3.20E+08	2.86E+10	2.29E+11	4.83E+11	9.93E+11	1.50E+12	2.52E+12	5.07E+12	2.54E+13
SN-125	0.00E+00	1.18E+03	6.65E+05	2.84E+07	3.35E+08	6.65E+09	3.44E+10	6.90E+10	1.38E+11	2.08E+11	3.47E+11	6.94E+11	3.47E+12
SB-122	0.00E+00	7.39E+02	3.93E+05	1.25E+07	8.75E+07	1.21E+09	6.11E+09	1.22E+10	2.45E+10	3.67E+10	6.12E+10	1.22E+11	6.12E+11
SB-124	0.00E+00	3.98E+02	2.28E+05	1.09E+07	1.84E+08	1.11E+10	6.92E+10	1.42E+11	2.87E+11	4.32E+11	7.23E+11	1.45E+12	7.26E+12
SB-125	0.00E+00	4.82E+00	2.78E+03	1.36E+05	2.48E+06	3.41E+08	6.32E+09	1.86E+10	4.69E+10	7.60E+10	1.34E+11	2.80E+11	1.45E+12
SB-127	0.00E+00	2.22E+02	1.31E+05	5.13E+06	4.25E+07	6.60E+08	3.45E+09	6.93E+09	1.39E+10	2.09E+10	3.48E+10	6.97E+10	3.49E+11
TE-123M	0.00E+00	5.18E-16	2.98E-13	1.44E-11	2.53E-10	2.20E-08	1.70E-07	3.58E-07	7.34E-07	1.11E-06	1.86E-06	3.74E-06	1.88E-05
TE-125M	0.00E+00	7.59E-33	4.36E-30	2.08E-28	3.50E-27	2.07E-25	1.27E-24	2.61E-24	5.28E-24	7.95E-24	1.33E-23	2.67E-23	1.33E-22
TE-127M	0.00E+00	1.20E+02	8.19E+04	4.73E+06	8.60E+07	7.23E+09	5.40E+10	1.13E+11	2.31E+11	3.50E+11	5.86E+11	1.18E+12	5.91E+12
TE-127	0.00E+00	6.07E+01	2.15E+04	2.59E+05	1.19E+06	1.47E+07	7.35E+07	1.47E+08	2.94E+08	4.41E+08	7.35E+08	1.47E+09	7.35E+09
TE-129M	0.00E+00	3.92E+02	4.57E+05	2.32E+07	3.71E+08	1.54E+10	8.63E+10	1.75E+11	3.52E+11	5.30E+11	8.84E+11	1.77E+12	8.86E+12
TE-129	0.00E+00	7.61E+02	6.90E+04	5.15E+05	2.22E+06	2.71E+07	1.36E+08	2.71E+08	5.42E+08	8.13E+08	1.36E+09	2.71E+09	1.36E+10
TE-131M	0.00E+00	2.20E+02	1.55E+05	3.61E+06	2.02E+07	2.67E+08	1.34E+09	2.69E+09	5.37E+09	8.06E+09	1.34E+10	2.69E+10	1.34E+11
TE-131	0.00E+00	5.88E+02	2.69E+04	1.93E+05	8.40E+05	1.03E+07	5.16E+07	1.03E+08	2.07E+08	3.10E+08	5.16E+08	1.03E+09	5.16E+09
TE-132	0.00E+00	5.68E+01	2.50E+05	1.07E+07	8.23E+07	1.18E+09	5.95E+09	1.19E+10	2.38E+10	3.58E+10	5.96E+10	1.19E+11	5.96E+11
I-123	0.00E+00	5.09E-16	2.04E-13	2.92E-12	1.37E-11	1.71E-10	8.58E-10	1.72E-09	3.43E-09	5.15E-09	8.58E-09	1.72E-08	8.58E-08
I-124	0.00E+00	2.65E+02	1.45E+05	5.28E+06	4.43E+07	6.62E+08	3.35E+09	6.72E+09	1.34E+10	2.02E+10	3.36E+10	6.73E+10	3.36E+11
I-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-126	0.00E+00	1.03E+02	5.85E+04	2.58E+06	3.36E+07	7.73E+08	4.03E+09	8.11E+09	1.63E+10	2.44E+10	4.07E+10	8.15E+10	4.07E+11
I-129	0.00E+00	4.83E-16	2.78E-13	1.36E-11	2.50E-10	3.71E-08	9.26E-07	3.71E-06	1.48E-05	3.33E-05	9.26E-05	3.71E-04	9.26E-03
I-130	0.00E+00	1.84E+02	7.25E+04	1.01E+06	4.72E+06	5.87E+07	2.94E+08	5.88E+08	1.18E+09	1.77E+09	2.94E+09	5.89E+09	2.94E+10
I-131	0.00E+00	2.70E+01	1.51E+04	6.31E+05	6.97E+06	1.28E+08	6.56E+08	1.32E+09	2.64E+09	3.96E+09	6.60E+09	1.32E+10	6.60E+10
I-132	0.00E+00	5.48E+02	8.24E+04	6.56E+05	2.85E+06	3.49E+07	1.74E+08	3.49E+08	6.97E+08	1.05E+09	1.74E+09	3.49E+09	1.74E+10
I-133	0.00E+00	4.74E+02	2.16E+05	4.00E+06	2.00E+07	2.54E+08	1.27E+09	2.54E+09	5.09E+09	7.63E+09	1.27E+10	2.54E+10	1.27E+11
I-134	0.00E+00	7.00E+02	5.15E+04	3.78E+05	1.63E+06	1.99E+07	9.93E+07	1.99E+08	3.97E+08	5.96E+08	9.93E+08	1.99E+09	9.93E+09
I-135	0.00E+00	2.69E+02	1.06E+05	1.39E+06	6.40E+06	7.94E+07	3.98E+08	7.95E+08	1.59E+09	2.39E+09	3.98E+09	7.95E+09	3.98E+10
I-136	0.00E+00	1.19E+02	2.95E+03	2.06E+04	8.85E+04	1.08E+06	5.38E+06	1.08E+07	2.15E+07	3.23E+07	5.38E+07	1.08E+08	5.38E+08
XE-131M	0.00E+00	8.61E-14	4.87E-11	2.14E-09	2.71E-08	5.97E-07	3.11E-06	6.24E-06	1.25E-05	1.88E-05	3.13E-05	6.27E-05	3.14E-04
XE-133M	0.00E+00	1.09E-04	1.33E+00	2.52E+02	4.23E+03	7.72E+04	3.95E+05	7.93E+05	1.59E+06	2.38E+06	3.97E+06	7.95E+06	3.98E+07
XE-133	0.00E+00	5.87E-02	3.24E+01	1.25E+03	1.16E+04	1.85E+05	9.39E+05	1.88E+06	3.77E+06	5.66E+06	9.43E+06	1.89E+07	9.43E+07
XE-135M	0.00E+00	4.51E+00	1.94E+03	2.34E+04	1.07E+05	1.33E+06	6.64E+06	1.33E+07	2.66E+07	3.98E+07	6.64E+07	1.33E+08	6.64E+08
XE-135	0.00E+00	1.98E+02	6.93E+04	8.30E+05	3.79E+06	4.69E+07	2.35E+08	4.70E+08	9.39E+08	1.41E+09	2.35E+09	4.70E+09	2.35E+10
XE-137	0.00E+00	3.12E+02	8.22E+03	5.77E+04	2.47E+05	3.01E+06	1.51E+07	3.02E+07	6.05E+07	9.09E+07	1.52E+08	3.05E+08	1.54E+09

TABLE 3-6A (continued)

DOSE (MREM) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
XE-138	0.00E+00	6.75E+02	3.86E+04	2.79E+05	1.20E+06	1.46E+07	7.31E+07	1.46E+08	2.92E+08	4.38E+08	7.31E+08	1.46E+09	7.31E+09
CS-134	0.00E+00	3.79E+01	2.18E+04	1.07E+06	1.95E+07	2.61E+09	4.46E+10	1.23E+11	2.95E+11	4.68E+11	8.14E+11	1.68E+12	8.60E+12
CS-135	0.00E+00	1.18E-07	6.77E-05	3.32E-03	6.1CE-02	9.02E+00	2.26E+02	9.02E+02	3.61E+03	8.12E+03	2.26E+04	9.02E+04	2.26E+06
CS-136	0.00E+00	6.62E+00	3.75E+03	1.66E+05	2.15E+06	4.95E+07	2.58E+08	5.20E+08	1.04E+09	1.56E+09	2.61E+09	5.22E+09	2.61E+10
CS-137	0.00E+00	4.20E+01	2.48E+04	1.22E+06	2.23E+07	3.28E+09	7.96E+10	3.07E+11	1.14E+12	2.40E+12	5.84E+12	1.75E+13	1.31E+14
CS-138	0.00E+00	9.65E+02	5.11E+04	3.68E+05	1.58E+06	1.93E+07	9.64E+07	1.93E+08	3.85E+08	5.78E+08	9.64E+08	1.93E+09	9.64E+09
CS-139	0.00E+00	6.83E+02	3.08E+04	2.24E+05	9.66E+05	1.18E+07	5.88E+07	1.18E+08	2.35E+08	3.53E+08	5.88E+08	1.18E+09	5.88E+09
BA-133	0.00E+00	9.76E-04	5.62E-01	2.75E+01	5.05E+02	7.33E+04	1.68E+06	6.07E+06	2.01E+07	3.83E+07	7.99E+07	1.91E+08	1.09E+09
BA-137M	0.00E+00	1.19E+00	3.03E+01	2.13E+02	9.12E+02	1.11E+04	5.55E+04	1.11E+05	2.22E+05	3.33E+05	5.55E+05	1.11E+06	5.55E+06
BA-139	0.00E+00	1.09E+03	1.12E+05	8.46E+05	3.66E+06	4.47E+07	2.23E+08	4.47E+08	8.93E+08	1.34E+09	2.23E+09	4.47E+09	2.23E+10
BA-140	0.00E+00	1.97E+02	1.57E+05	1.41E+07	2.54E+08	6.40E+09	3.35E+10	6.74E+10	1.35E+11	2.03E+11	3.38E+11	6.77E+11	3.39E+12
LA-140	0.00E+00	6.75E+02	3.43E+05	8.93E+06	5.22E+07	6.87E+08	3.45E+09	6.91E+09	1.38E+10	2.07E+10	3.46E+10	6.91E+10	3.46E+11
CE-141	0.00E+00	7.25E+00	4.15E+03	1.95E+05	3.07E+06	1.24E+08	6.94E+08	1.41E+09	2.83E+09	4.25E+09	7.10E+09	1.42E+10	7.12E+10
CE-143	0.00E+00	3.79E+02	1.90E+05	4.83E+06	3.18E+07	5.04E+08	2.57E+09	5.16E+09	1.03E+10	1.55E+10	2.59E+10	5.17E+10	2.59E+11
CE-144	0.00E+00	7.31E+02	8.41E+05	4.22E+07	7.64E+08	8.81E+10	1.01E+12	2.31E+12	4.92E+12	7.52E+12	1.27E+13	2.58E+13	1.30E+14
PR-143	0.00E+00	2.26E+02	1.28E+05	5.70E+06	7.49E+07	1.77E+09	9.23E+09	1.86E+10	3.72E+10	5.59E+10	9.32E+10	1.87E+11	9.33E+11
PR-144	0.00E+00	7.82E+02	2.96E+04	2.11E+05	9.04E+05	1.10E+07	5.50E+07	1.10E+08	2.20E+08	3.30E+08	5.50E+08	1.10E+09	5.50E+09
ND-147	0.00E+00	1.05E+02	5.92E+04	2.57E+06	3.18E+07	6.74E+08	3.49E+09	7.02E+09	1.41E+10	2.11E+10	3.52E+10	7.04E+10	3.52E+11
PM-147	0.00E+00	1.45E-06	8.35E-04	4.08E-02	7.46E-01	1.02E+02	1.87E+03	5.46E+03	1.37E+04	2.21E+04	3.89E+04	8.11E+04	4.18E+05
PM-148M	0.00E+00	6.52E+00	4.69E+03	4.52E+05	1.44E+07	9.83E+08	5.79E+09	1.18E+10	2.38E+10	3.58E+10	5.98E+10	1.20E+11	6.00E+11
PM-148	0.00E+00	9.00E+02	4.98E+05	1.92E+07	1.80E+08	2.88E+09	1.46E+10	2.93E+10	5.87E+10	8.81E+10	1.47E+11	2.94E+11	1.47E+12
SM-151	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EU-154	0.00E+00	1.76E+02	1.01E+05	4.96E+06	9.09E+07	1.31E+10	2.96E+11	1.05E+12	3.36E+12	6.22E+12	1.26E+13	2.90E+13	1.61E+14
EU-155	0.00E+00	2.51E-01	1.44E+02	7.07E+03	1.29E+05	1.84E+07	3.86E+08	1.27E+09	3.66E+09	6.32E+09	1.18E+10	2.56E+10	1.36E+11
EU-156	0.00E+00	4.77E+02	2.71E+05	1.22E+07	1.65E+08	4.14E+09	2.18E+10	4.38E+10	8.78E+10	1.32E+11	2.20E+11	4.40E+11	2.20E+12
GD-162	0.00E+00	9.07E+01	2.82E+03	1.99E+04	8.56E+04	1.04E+06	5.21E+06	1.04E+07	2.08E+07	3.12E+07	5.21E+07	1.04E+08	5.21E+08
TB-160	0.00E+00	1.07E+02	6.13E+04	2.95E+06	5.03E+07	3.35E+09	2.18E+10	4.48E+10	9.09E+10	1.37E+11	2.29E+11	4.60E+11	2.30E+12
TA-182	0.00E+00	9.30E+00	5.35E+03	2.59E+05	4.55E+06	3.87E+08	2.95E+09	6.20E+09	1.27E+10	1.92E+10	3.22E+10	6.46E+10	3.24E+11
W-185	0.00E+00	1.14E+00	6.56E+02	3.15E+04	5.41E+05	3.71E+07	2.44E+08	5.04E+08	1.02E+09	1.54E+09	2.58E+09	5.18E+09	2.60E+10
W-187	0.00E+00	1.09E+02	5.07E+04	1.01E+06	5.18E+06	6.59E+07	3.31E+08	6.62E+08	1.32E+09	1.99E+09	3.31E+09	6.62E+09	3.31E+10
AU-195M	0.00E+00	6.77E-07	1.64E-05	1.15E-04	4.93E-04	6.00E-03	3.00E-02	6.00E-02	1.20E-01	1.80E-01	3.00E-01	6.00E-01	3.00E+00
AU-195	0.00E+00	7.93E-25	4.56E-22	2.22E-20	3.96E-19	4.05E-17	3.80E-16	8.25E-16	1.72E-15	2.61E-15	4.39E-15	8.84E-15	4.45E-14
AU-198	0.00E+00	2.41E+02	1.28E+05	4.06E+06	2.83E+07	3.91E+08	1.97E+09	3.95E+09	7.89E+09	1.18E+10	1.97E+10	3.95E+10	1.97E+11
AU-199	0.00E+00	1.73E-01	9.30E+01	3.11E+03	2.31E+04	3.26E+05	1.65E+06	3.30E+06	6.61E+06	9.91E+06	1.65E+07	3.31E+07	1.65E+08
HG-197	0.00E+00	1.21E-13	6.40E-11	2.03E-09	1.40E-08	1.94E-07	9.79E-07	1.96E-06	3.92E-06	5.88E-06	9.80E-06	1.96E-05	9.81E-05
HG-203	0.00E+00	4.73E-05	2.71E-02	1.29E+00	2.12E+01	1.09E+03	6.43E+03	1.31E+04	2.65E+04	3.98E+04	6.65E+04	1.33E+05	6.68E+05
TL-204	0.00E+00	9.76E+01	5.62E+04	2.75E+06	5.03E+07	7.05E+09	1.41E+11	4.43E+11	1.20E+12	2.01E+12	3.64E+12	7.73E+12	4.04E+13
TL-208	0.00E+00	1.09E+02	2.81E+03	1.97E+04	8.45E+04	1.03E+06	5.14E+06	1.03E+07	2.06E+07	3.08E+07	5.14E+07	1.03E+08	5.14E+08
TL-210	0.00E+00	7.96E-08	1.16E-03	3.31E-01	1.49E+01	3.32E+03	8.23E+04	3.14E+05	1.15E+06	2.35E+06	5.53E+06	1.56E+07	1.05E+08
PB-204M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PB-210	0.00E+00	7.87E-01	1.05E+04	2.98E+06	1.34E+08	3.00E+10	7.42E+11	2.84E+12	1.03E+13	2.12E+13	4.99E+13	1.40E+14	9.49E+14
PB-212	0.00E+00	1.80E+02	3.23E+05	4.55E+06	2.12E+07	2.63E+08	1.32E+09	2.63E+09	5.27E+09	7.91E+09	1.32E+10	2.64E+10	1.32E+11
PB-214	0.00E+00	3.06E+02	2.67E+04	1.94E+05	8.36E+05	1.03E+07	5.26E+07	1.08E+08	2.27E+08	3.54E+08	6.23E+08	1.34E+09	7.26E+09
BI-210M	0.00E+00	4.10E+02	2.26E+05	8.60E+06	7.82E+07	1.22E+09	6.21E+09	1.25E+10	2.49E+10	3.74E+10	6.24E+10	1.25E+11	6.24E+11
BI-212	0.00E+00	7.58E+02	6.53E+04	4.76E+05	2.05E+06	2.50E+07	1.25E+08	2.50E+08	5.00E+08	7.48E+08	1.25E+09	2.50E+09	1.25E+10
BI-214	0.00E+00	4.49E+02	1.82E+04	1.29E+05	5.56E+05	6.81E+06	3.51E+07	7.24E+07	1.53E+08	2.39E+08	4.22E+08	9.13E+08	4.98E+09

TABLE 3-6A (continued)

DOSE (MREM) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: ELECTRON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
PO-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PO-214	0.00E+00	1.84E-13	2.46E-09	6.96E-07	3.14E-05	6.99E-03	1.73E-01	6.62E-01	2.41E+00	4.95E+00	1.16E+01	3.27E+01	2.21E+02
PO-218	0.00E+00	2.97E+01	3.02E+03	2.21E+04	9.51E+04	1.17E+06	5.99E+06	1.23E+07	2.59E+07	4.03E+07	7.09E+07	1.52E+08	8.26E+08
RN-220	0.00E+00	2.46E-01	4.68E+02	6.60E+03	3.07E+04	3.82E+05	1.91E+06	3.83E+06	7.65E+06	1.15E+07	1.91E+07	3.83E+07	1.91E+08
RN-222	0.00E+00	1.16E+02	4.45E+05	1.72E+07	1.40E+08	2.07E+09	1.08E+10	2.22E+10	4.66E+10	7.27E+10	1.28E+11	2.75E+11	1.49E+12
RA-224	0.00E+00	2.76E+00	1.68E+05	1.57E+07	1.43E+08	2.13E+09	1.08E+10	2.16E+10	4.32E+10	6.49E+10	1.08E+11	2.16E+11	1.08E+12
RA-226	0.00E+00	1.92E-01	2.60E+04	7.91E+06	3.26E+08	6.74E+10	1.76E+12	7.18E+12	2.98E+13	6.89E+13	2.00E+14	8.54E+14	2.26E+16
RA-228	0.00E+00	3.83E+00	3.11E+04	2.66E+06	5.54E+07	1.54E+10	8.13E+11	3.83E+12	1.42E+13	2.70E+13	5.42E+13	1.23E+14	6.76E+14
AC-228	0.00E+00	1.01E+02	2.91E+04	2.96E+05	1.44E+06	3.99E+07	4.87E+08	1.27E+09	2.94E+09	4.62E+09	7.98E+09	1.64E+10	8.36E+10
TH-228	0.00E+00	4.36E-03	8.15E+03	6.95E+06	3.39E+08	6.49E+10	1.11E+12	3.03E+12	7.15E+12	1.13E+13	1.96E+13	4.04E+13	2.07E+14
TH-230	0.00E+00	4.14E-04	4.05E-02	1.74E+01	3.38E+03	9.56E+06	1.26E+09	1.02E+10	8.44E+10	2.92E+11	1.40E+12	1.20E+13	1.63E+15
TH-231	0.00E+00	2.57E-03	1.21E+00	2.51E+01	1.30E+02	1.66E+03	8.34E+03	1.67E+04	3.34E+04	5.01E+04	8.35E+04	1.67E+05	8.35E+05
TH-232	0.00E+00	4.21E+01	2.22E+03	2.18E+04	2.82E+05	5.45E+08	1.43E+11	1.44E+12	1.19E+13	3.65E+13	1.34E+14	6.68E+14	1.99E+16
TH-234	0.00E+00	1.14E+03	6.85E+05	3.18E+07	4.78E+08	1.59E+10	8.64E+10	1.74E+11	3.51E+11	5.27E+11	8.79E+11	1.76E+12	8.80E+12
PA-233	0.00E+00	1.03E+01	5.90E+03	2.75E+05	4.21E+06	1.51E+08	8.28E+08	1.67E+09	3.37E+09	5.06E+09	8.44E+09	1.69E+10	8.46E+10
PA-234M	0.00E+00	6.61E+01	1.63E+03	1.14E+04	4.90E+04	5.96E+05	2.98E+06	5.96E+06	1.19E+07	1.79E+07	2.98E+07	5.96E+07	2.98E+08
PA-234	0.00E+00	7.22E+01	2.18E+04	2.28E+05	1.02E+06	1.26E+07	6.30E+07	1.26E+08	2.52E+08	3.78E+08	6.30E+08	1.26E+09	6.30E+09
U-232	0.00E+00	1.79E-07	1.61E+00	1.17E+04	2.90E+06	7.91E+09	7.46E+11	4.35E+12	2.16E+13	5.16E+13	1.45E+14	5.33E+14	6.16E+15
U-233	0.00E+00	1.52E-48	8.75E-46	4.29E-44	7.87E-43	1.17E-40	2.91E-39	1.17E-38	4.66E-38	1.05E-37	2.91E-37	1.16E-36	2.91E-35
U-234	0.00E+00	9.42E-04	1.48E-01	6.08E-01	3.53E+00	6.98E+01	1.42E+04	2.29E+05	3.75E+06	1.94E+07	1.55E+08	2.63E+09	1.82E+12
U-235	0.00E+00	2.34E-05	2.78E-01	4.80E+01	1.21E+03	1.97E+05	4.96E+06	1.99E+07	7.95E+07	1.79E+08	4.97E+08	1.99E+09	4.97E+10
U-236	0.00E+00	1.63E-01	5.95E+00	4.77E+01	2.19E+02	2.57E+03	1.28E+04	2.58E+04	5.01E+04	1.04E+05	2.17E+05	1.22E+06	1.62E+08
U-237	0.00E+00	5.57E-05	3.11E-02	1.26E+00	1.30E+01	2.28E+02	1.30E+03	2.95E+03	7.27E+03	1.30E+04	2.84E+04	9.11E+04	1.82E+06
U-238	0.00E+00	3.67E+01	7.85E+03	2.18E+06	1.47E+08	7.65E+10	2.22E+12	9.07E+12	3.66E+13	8.26E+13	2.30E+14	9.22E+14	2.31E+16
U-240	0.00E+00	6.50E+02	3.73E+05	5.62E+06	2.66E+07	3.33E+08	1.67E+09	3.34E+09	6.67E+09	1.00E+10	1.67E+10	3.34E+10	1.67E+11
NP-237	0.00E+00	3.68E-03	5.06E+01	1.67E+04	1.15E+06	6.42E+08	1.90E+10	7.76E+10	3.14E+11	7.08E+11	1.97E+12	7.91E+12	1.98E+14
NP-238	0.00E+00	2.14E+02	1.11E+05	3.22E+06	2.04E+07	2.74E+08	1.38E+09	2.77E+09	5.53E+09	8.30E+09	1.38E+10	2.77E+10	1.38E+11
NP-239	0.00E+00	7.79E+00	4.09E+03	1.23E+05	8.13E+05	1.10E+07	5.56E+07	1.11E+08	2.23E+08	3.34E+08	5.57E+08	1.11E+09	5.57E+09
NP-240M	0.00E+00	2.77E+02	8.04E+03	5.67E+04	2.43E+05	2.96E+06	1.48E+07	2.96E+07	5.92E+07	8.87E+07	1.48E+08	2.96E+08	1.48E+09
PU-236	0.00E+00	9.67E-09	7.45E-06	4.15E-01	5.00E+02	1.82E+07	7.63E+09	7.55E+10	5.54E+11	1.54E+12	4.89E+12	1.96E+13	2.41E+14
PU-238	0.00E+00	5.32E-07	5.63E-05	2.84E-04	1.09E-03	1.50E-02	1.35E-01	1.45E+00	4.15E+01	3.15E+02	4.07E+03	1.30E+05	3.03E+08
PU-239	0.00E+00	4.83E-12	4.94E-09	5.44E-08	3.16E-07	6.96E-05	8.15E-03	6.52E-02	5.21E-01	1.76E+00	8.15E+00	6.52E+01	8.12E+03
PU-240	0.00E+00	4.63E-05	1.59E-03	1.62E-02	5.87E-02	7.05E-01	3.69E+00	7.83E+00	1.34E+01	2.05E+01	3.71E+01	6.70E+01	9.74E+02
PU-241	0.00E+00	-3.01E-12	1.22E-08	1.44E-08	6.93E-07	2.32E-02	1.88E+01	2.99E+02	4.48E+03	2.10E+04	1.40E+05	1.63E+06	2.72E+08
PU-242	0.00E+00	8.57E-03	3.05E-01	1.48E+00	9.81E+00	1.39E+02	1.06E+03	6.05E+03	3.98E+04	1.31E+05	5.99E+05	4.77E+06	5.96E+08
PU-244	0.00E+00	9.87E+00	1.59E+05	2.07E+07	4.58E+08	7.15E+10	1.79E+12	7.18E+12	2.87E+13	6.46E+13	1.80E+14	7.18E+14	1.80E+16
AM-241	0.00E+00	-8.93E-11	3.61E-07	2.65E-05	7.91E-03	6.34E+01	1.00E+04	8.25E+04	6.68E+05	2.26E+06	1.04E+07	8.20E+07	8.85E+09
AM-242	0.00E+00	3.24E-11	1.51E-09	1.07E-08	4.19E-08	5.58E-07	3.75E-06	2.66E-05	6.58E-04	5.07E-03	6.73E-02	2.20E+00	5.27E+03
AM-243	0.00E+00	3.19E-02	4.12E+02	9.73E+04	3.24E+06	5.89E+08	1.49E+10	5.99E+10	2.40E+11	5.39E+11	1.50E+12	5.98E+12	1.48E+14
CM-242	0.00E+00	4.68E-09	3.52E-07	2.13E-06	7.39E-06	1.01E-04	6.35E-04	6.07E-03	1.82E-01	1.44E+00	1.94E+01	6.38E+02	1.53E+06
CM-243	0.00E+00	3.15E-05	1.81E-02	8.89E-01	1.63E+01	2.40E+03	5.80E+04	2.23E+05	8.26E+05	1.72E+06	4.17E+06	1.23E+07	8.99E+07
CM-244	0.00E+00	8.14E-08	4.41E-06	3.35E-05	1.62E-04	2.02E-03	1.02E-02	2.06E-02	3.66E-02	5.72E-02	1.05E-01	2.03E-01	2.23E+00
CF-252	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 3-6B[a]

DOSE (MREM) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
H-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BE-7	0.00E+00	4.43E+00	2.54E+03	1.21E+05	2.03E+06	1.13E+08	6.87E+08	1.40E+09	2.84E+09	4.27E+09	7.14E+09	1.43E+10	7.17E+10
C-11	0.00E+00	5.17E+01	2.12E+03	1.51E+04	6.49E+04	7.90E+05	3.95E+06	7.90E+06	1.58E+07	2.37E+07	3.95E+07	7.90E+07	3.95E+08
C-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-13	0.00E+00	3.37E+01	1.05E+03	7.39E+03	3.17E+04	3.86E+05	1.93E+06	3.86E+06	7.72E+06	1.16E+07	1.93E+07	3.86E+07	1.93E+08
O-15	0.00E+00	8.55E+00	2.15E+02	1.51E+03	6.47E+03	7.87E+04	3.94E+05	7.87E+05	1.57E+06	2.36E+06	3.94E+06	7.87E+06	3.94E+07
F-18	0.00E+00	7.88E+01	1.00E+04	7.78E+04	3.37E+05	4.12E+06	2.06E+07	4.12E+07	8.24E+07	1.24E+08	2.06E+08	4.12E+08	2.06E+09
NA-22	0.00E+00	1.88E+02	1.08E+05	5.31E+06	9.69E+07	1.33E+10	2.43E+11	7.06E+11	1.76E+12	2.85E+12	5.02E+12	1.04E+13	5.39E+13
NA-24	0.00E+00	2.99E+02	1.25E+05	1.92E+06	9.18E+06	1.15E+08	5.75E+08	1.15E+09	2.30E+09	3.45E+09	5.76E+09	1.15E+10	5.76E+10
MG-28	0.00E+00	2.38E+02	1.14E+05	2.13E+06	1.07E+07	1.35E+08	6.78E+08	1.36E+09	2.71E+09	4.07E+09	6.79E+09	1.36E+10	6.79E+10
AL-28	0.00E+00	1.39E+01	3.52E+02	2.47E+03	1.06E+04	1.29E+05	6.44E+05	1.29E+06	2.57E+06	3.86E+06	6.44E+06	1.29E+07	6.44E+07
P-32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
P-33	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
S-35	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CL-36	0.00E+00	5.94E-03	3.42E+00	1.68E+02	3.08E+03	4.56E+05	1.14E+07	4.56E+07	1.82E+08	4.10E+08	1.14E+09	4.55E+09	1.14E+11
CL-38	0.00E+00	8.01E+01	4.65E+03	3.36E+04	1.45E+05	1.76E+06	8.82E+06	1.76E+07	3.53E+07	5.29E+07	8.82E+07	1.76E+08	8.82E+08
A-37	0.00E+00	3.50E-01	2.00E+02	9.43E+03	1.50E+05	6.37E+06	3.59E+07	7.29E+07	1.47E+08	2.21E+08	3.68E+08	7.38E+08	3.69E+09
A-39	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
K-40	0.00E+00	1.26E+01	7.27E+03	3.56E+05	6.54E+06	9.68E+08	2.42E+10	9.68E+10	3.87E+11	8.71E+11	2.42E+12	9.68E+12	2.42E+14
K-42	0.00E+00	2.16E+01	8.47E+03	1.18E+05	5.50E+05	6.85E+06	3.43E+07	6.86E+07	1.37E+08	2.06E+08	3.43E+08	6.87E+08	3.43E+09
K-43	0.00E+00	8.70E+01	4.00E+04	7.67E+05	3.87E+06	4.91E+07	2.46E+08	4.93E+08	9.86E+08	1.48E+09	2.47E+09	4.93E+09	2.47E+10
CA-45	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CA-47	0.00E+00	8.77E+01	4.85E+04	1.86E+06	1.69E+07	2.62E+08	1.33E+09	2.66E+09	5.33E+09	7.99E+09	1.33E+10	2.67E+10	1.33E+11
CA-49	0.00E+00	7.09E+01	2.13E+03	1.50E+04	6.45E+04	7.84E+05	3.92E+06	7.84E+06	1.57E+07	2.35E+07	3.92E+07	7.84E+07	3.92E+08
SC-46	0.00E+00	1.72E+02	9.87E+04	4.76E+06	8.21E+07	5.98E+09	4.08E+10	8.45E+10	1.72E+11	2.59E+11	4.34E+11	8.71E+11	4.36E+12
SC-47	0.00E+00	8.88E+00	4.80E+03	1.65E+05	1.27E+06	1.82E+07	9.19E+07	1.84E+08	3.68E+08	5.52E+08	9.21E+08	1.84E+09	9.21E+09
SC-49	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CR-51	0.00E+00	4.19E+00	2.39E+03	1.12E+05	1.72E+06	6.27E+07	3.44E+08	6.97E+08	1.40E+09	2.11E+09	3.51E+09	7.04E+09	3.52E+10
MN-52M	0.00E+00	1.19E+02	4.99E+03	3.59E+04	1.56E+05	1.91E+06	9.55E+06	1.91E+07	3.82E+07	5.73E+07	9.55E+07	1.91E+08	9.55E+08
MN-52	0.00E+00	2.88E+02	1.60E+05	6.24E+06	5.97E+07	9.65E+08	4.91E+09	9.84E+09	1.97E+10	2.96E+10	4.93E+10	9.86E+10	4.93E+11
MN-54	0.00E+00	7.48E+01	4.30E+04	2.10E+06	3.79E+07	4.46E+09	5.37E+10	1.24E+11	2.66E+11	4.08E+11	6.91E+11	1.40E+12	7.07E+12
FE-52	0.00E+00	1.49E+02	8.67E+04	1.02E+06	4.68E+06	5.81E+07	2.91E+08	5.82E+08	1.16E+09	1.75E+09	2.91E+09	5.82E+09	2.91E+10
FE-55	0.00E+00	1.97E+00	1.13E+03	5.55E+04	1.01E+06	1.39E+08	2.57E+09	7.54E+09	1.90E+10	3.07E+10	5.43E+10	1.13E+11	5.84E+11
FE-59	0.00E+00	9.93E+01	5.69E+04	2.70E+06	4.43E+07	2.22E+09	1.30E+10	2.64E+10	5.33E+10	8.01E+10	1.34E+11	2.68E+11	1.34E+12
CO-56	0.00E+00	2.92E+02	1.68E+05	8.07E+06	1.39E+08	9.75E+09	6.52E+10	1.35E+11	2.74E+11	4.12E+11	6.90E+11	1.39E+12	6.94E+12
CO-57	0.00E+00	1.52E+01	8.77E+03	4.28E+05	7.70E+06	8.77E+08	9.87E+09	2.24E+10	4.75E+10	7.25E+10	1.23E+11	2.48E+11	1.25E+12
CO-58	0.00E+00	8.79E+01	5.05E+04	2.43E+06	4.14E+07	2.76E+09	1.79E+10	3.70E+10	7.50E+10	1.13E+11	1.89E+11	3.79E+11	1.90E+12
CO-60	0.00E+00	2.07E+02	1.19E+05	5.83E+06	1.07E+08	1.52E+10	3.22E+11	1.07E+12	3.12E+12	5.43E+12	1.02E+13	2.23E+13	1.19E+14
NI-56	0.00E+00	1.53E+02	8.57E+04	3.52E+06	3.98E+07	1.29E+09	7.86E+09	1.61E+10	3.26E+10	4.91E+10	8.20E+10	1.64E+11	8.23E+11
NI-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CU-64	0.00E+00	1.87E+01	7.43E+03	1.05E+05	4.92E+05	6.13E+06	3.07E+07	6.14E+07	1.23E+08	1.84E+08	3.07E+08	6.14E+08	3.07E+09
ZN-65	0.00E+00	5.21E+01	3.00E+04	1.46E+06	2.62E+07	2.91E+09	3.11E+10	6.95E+10	1.47E+11	2.23E+11	3.77E+11	7.62E+11	3.84E+12
ZN-69M	0.00E+00	3.72E+01	1.52E+04	2.24E+05	1.06E+06	1.32E+07	6.63E+07	1.33E+08	2.65E+08	3.98E+08	6.63E+08	1.33E+09	6.63E+09
ZN-69	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GA-67	0.00E+00	2.05E+01	1.11E+04	3.75E+05	2.83E+06	4.02E+07	2.03E+08	4.07E+08	8.15E+08	1.22E+09	2.04E+09	4.08E+09	2.04E+10
GA-68	0.00E+00	7.06E+01	6.28E+03	4.67E+04	2.02E+05	2.46E+06	1.23E+07	2.46E+07	4.92E+07	7.38E+07	1.23E+08	2.46E+08	1.23E+09

[a]Point receptor 1 meter above surface.

TABLE 3-6B (continued)

DOSE (MREM) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
GE-77	0.00E+00	8.28E+01	3.16E+04	4.21E+05	1.96E+06	2.43E+07	1.22E+08	2.44E+08	4.88E+08	7.32E+08	1.22E+09	2.44E+09	1.22E+10
AS-76	0.00E+00	3.77E+01	1.79E+04	3.77E+05	1.97E+06	2.52E+07	1.26E+08	2.53E+08	5.05E+08	7.58E+08	1.26E+09	2.53E+09	1.26E+10
AS-77	0.00E+00	8.85E-01	4.48E+02	1.15E+04	6.64E+04	8.70E+05	4.37E+06	8.75E+06	1.75E+07	2.63E+07	4.38E+07	8.76E+07	4.38E+08
SE-75	0.00E+00	5.48E+01	3.15E+04	1.53E+06	2.69E+07	2.33E+09	1.81E+10	3.80E+10	7.80E+10	1.18E+11	1.98E+11	3.97E+11	1.99E+12
SE-77M	0.00E+00	1.37E-01	3.32E+00	2.32E+01	9.95E+01	1.21E+03	6.05E+03	1.21E+04	2.42E+04	3.63E+04	6.05E+04	1.21E+05	6.05E+05
BR-80M	0.00E+00	1.75E+01	5.08E+03	4.66E+04	2.06E+05	2.52E+06	1.26E+07	2.53E+07	5.05E+07	7.58E+07	1.26E+08	2.53E+08	1.26E+09
BR-80	0.00E+00	4.18E+00	1.59E+02	1.13E+03	4.85E+03	5.90E+04	2.95E+05	5.90E+05	1.18E+06	1.77E+06	2.95E+06	5.90E+06	2.95E+07
BR-82	0.00E+00	2.31E+02	1.15E+05	2.82E+06	1.59E+07	2.07E+08	1.04E+09	2.08E+09	4.16E+09	6.23E+09	1.04E+10	2.08E+10	1.04E+11
BR-83	0.00E+00	1.39E+01	2.26E+03	1.82E+04	7.93E+04	9.69E+05	4.85E+06	9.70E+06	1.94E+07	2.91E+07	4.85E+07	9.70E+07	4.85E+08
BR-84	0.00E+00	9.51E+01	5.02E+03	3.61E+04	1.55E+05	1.89E+06	9.46E+06	1.89E+07	3.78E+07	5.68E+07	9.46E+07	1.89E+08	9.46E+08
KR-79	0.00E+00	2.86E+01	1.42E+04	3.46E+05	1.94E+06	2.52E+07	1.27E+08	2.54E+08	5.07E+08	7.61E+08	1.27E+09	2.54E+09	1.27E+10
KR-83M	0.00E+00	3.00E+00	3.87E+02	3.00E+03	1.30E+04	1.59E+05	7.96E+05	1.59E+06	3.18E+06	4.77E+06	7.96E+06	1.59E+07	7.96E+07
KR-85M	0.00E+00	1.31E+01	3.15E+03	2.87E+04	1.27E+05	1.56E+06	7.79E+06	1.56E+07	3.12E+07	4.68E+07	7.81E+07	1.56E+08	7.81E+08
KR-85	0.00E+00	1.86E-01	1.07E+02	5.23E+03	9.60E+04	1.39E+07	3.20E+08	1.16E+09	3.87E+09	7.38E+09	1.55E+10	3.73E+10	2.14E+11
KR-87	0.00E+00	5.13E+01	4.95E+03	3.71E+04	1.60E+05	1.96E+06	9.78E+06	1.96E+07	3.91E+07	5.87E+07	9.78E+07	1.96E+08	9.78E+08
KR-88	0.00E+00	1.62E+02	3.26E+04	2.69E+05	1.18E+06	1.44E+07	7.20E+07	1.44E+08	2.88E+08	4.32E+08	7.20E+08	1.44E+09	7.20E+09
RB-84	0.00E+00	8.45E+01	4.83E+04	2.27E+06	3.61E+07	1.51E+09	8.48E+09	1.72E+10	3.46E+10	5.20E+10	8.69E+10	1.74E+11	8.71E+11
RB-86	0.00E+00	8.04E+00	4.58E+03	2.09E+05	2.97E+06	8.44E+07	4.49E+08	9.04E+08	1.81E+09	2.73E+09	4.55E+09	9.10E+09	4.55E+10
RB-88	0.00E+00	2.76E+01	1.06E+03	7.52E+03	3.23E+04	3.93E+05	1.97E+06	3.93E+06	7.87E+06	1.18E+07	1.97E+07	3.93E+07	1.97E+08
RB-89	0.00E+00	9.17E+01	3.29E+03	2.34E+04	1.00E+05	1.22E+06	6.10E+06	1.22E+07	2.44E+07	3.66E+07	6.10E+07	1.22E+08	6.10E+08
RB-90	0.00E+00	2.18E+01	5.59E+02	3.92E+03	1.68E+04	2.05E+05	1.02E+06	2.05E+06	4.09E+06	6.14E+06	1.02E+07	2.05E+07	1.02E+08
SR-85	0.00E+00	5.58E+01	3.20E+04	1.54E+06	2.61E+07	1.65E+09	1.05E+10	2.15E+10	4.35E+10	6.56E+10	1.10E+11	2.20E+11	1.10E+12
SR-87M	0.00E+00	2.73E+01	4.78E+03	3.93E+04	1.72E+05	2.10E+06	1.05E+07	2.10E+07	4.20E+07	6.30E+07	1.05E+08	2.10E+08	1.05E+09
SR-89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR-91	0.00E+00	6.87E+01	3.12E+04	3.87E+05	1.78E+06	2.20E+07	1.10E+08	2.21E+08	4.42E+08	6.63E+08	1.10E+09	2.21E+09	1.10E+10
SR-92	0.00E+00	9.57E+01	1.86E+04	1.58E+05	6.93E+05	8.48E+06	4.24E+07	8.48E+07	1.70E+08	2.54E+08	4.24E+08	8.48E+08	4.24E+09
SR-93	0.00E+00	3.89E+01	1.15E+03	8.29E+03	3.57E+04	4.34E+05	2.17E+06	4.34E+06	8.69E+06	1.30E+07	2.17E+07	4.34E+07	2.17E+08
Y-87	0.00E+00	5.57E+01	4.03E+04	1.51E+06	1.16E+07	1.66E+08	8.41E+08	1.68E+09	3.37E+09	5.06E+09	8.43E+09	1.69E+10	8.44E+10
Y-88	0.00E+00	2.23E+02	1.28E+05	6.20E+06	1.09E+08	8.92E+09	6.61E+10	1.38E+11	2.83E+11	4.27E+11	7.16E+11	1.44E+12	7.21E+12
Y-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y-91M	0.00E+00	3.67E+01	2.59E+03	1.90E+04	8.17E+04	9.99E+05	5.00E+06	1.00E+07	2.00E+07	3.00E+07	5.00E+07	1.00E+08	5.00E+08
Y-91	0.00E+00	2.01E-01	1.15E+02	5.51E+03	9.25E+04	5.37E+06	3.30E+07	6.74E+07	1.36E+08	2.05E+08	3.43E+08	6.88E+08	3.45E+09
Y-92	0.00E+00	1.97E+01	4.07E+03	3.50E+04	1.53E+05	1.88E+06	9.40E+06	1.88E+07	3.76E+07	5.64E+07	9.40E+07	1.88E+08	9.40E+08
Y-93	0.00E+00	6.03E+00	2.21E+03	2.78E+04	1.28E+05	1.59E+06	7.95E+06	1.59E+07	3.18E+07	4.77E+07	7.95E+07	1.59E+08	7.95E+08
ZR-95	0.00E+00	6.45E+01	3.73E+04	1.86E+06	3.57E+07	3.57E+09	2.46E+10	5.09E+10	1.04E+11	1.56E+11	2.62E+11	5.25E+11	2.63E+12
ZR-97	0.00E+00	8.22E+01	5.47E+04	9.43E+05	4.58E+06	5.76E+07	2.89E+08	5.78E+08	1.16E+09	1.73E+09	2.89E+09	5.78E+09	2.89E+10
NB-95M	0.00E+00	4.86E+00	2.87E+03	1.55E+05	2.91E+06	1.36E+08	7.74E+08	1.57E+09	3.16E+09	4.76E+09	7.95E+09	1.59E+10	7.97E+10
NB-95	0.00E+00	6.79E+01	3.89E+04	1.83E+06	2.92E+07	1.25E+09	7.03E+09	1.43E+10	2.87E+10	4.32E+10	7.21E+10	1.44E+11	7.23E+11
NB-97M	0.00E+00	3.34E+00	1.25E+02	9.00E+02	3.87E+03	4.72E+04	2.36E+05	4.72E+05	9.44E+05	1.42E+06	2.36E+06	4.72E+06	2.36E+07
NB-97	0.00E+00	4.96E+01	4.67E+03	3.49E+04	1.51E+05	1.84E+06	9.20E+06	1.84E+07	3.68E+07	5.52E+07	9.21E+07	1.84E+08	9.21E+08
MO-99	0.00E+00	1.61E+01	1.10E+04	4.15E+05	2.99E+06	4.16E+07	2.10E+08	4.21E+08	8.42E+08	1.26E+09	2.11E+09	4.21E+09	2.11E+10
TC-99M	0.00E+00	1.04E+01	2.99E+03	3.00E+04	1.34E+05	1.65E+06	8.25E+06	1.65E+07	3.30E+07	4.95E+07	8.25E+07	1.65E+08	8.25E+08
TC-99	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU-103	0.00E+00	4.51E+01	2.63E+04	1.25E+06	2.02E+07	9.33E+08	5.36E+09	1.09E+10	2.19E+10	3.30E+10	5.51E+10	1.10E+11	5.53E+11
RU-106	0.00E+00	1.63E+01	9.58E+03	4.68E+05	8.48E+06	1.03E+09	1.34E+10	3.19E+10	6.92E+10	1.06E+11	1.81E+11	3.68E+11	1.86E+12
RH-103M	0.00E+00	9.77E-01	7.52E+01	5.53E+02	2.39E+03	2.91E+04	1.45E+05	2.91E+05	5.82E+05	8.73E+05	1.45E+06	2.91E+06	1.45E+07

TABLE 3-6B (continued)

DOSE (MREM) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
RH-105	0.00E+00	6.92E+00	3.45E+03	8.47E+04	4.77E+05	6.21E+06	3.12E+07	6.25E+07	1.25E+08	1.87E+08	3.12E+08	6.25E+08	3.12E+09
RH-106	0.00E+00	3.95E-01	9.58E+00	6.71E+01	2.88E+02	3.50E+03	1.75E+04	3.50E+04	7.00E+04	1.05E+05	1.75E+05	3.50E+05	1.75E+06
PD-103	0.00E+00	2.12E-01	1.20E+02	5.46E+03	7.67E+04	2.09E+06	1.11E+07	2.23E+07	4.48E+07	6.73E+07	1.12E+08	2.25E+08	1.12E+09
AG-110M	0.00E+00	2.36E+02	1.36E+05	6.61E+06	1.19E+08	1.33E+10	1.44E+11	3.23E+11	6.81E+11	1.04E+12	1.76E+12	3.55E+12	1.79E+13
AG-111	0.00E+00	3.42E+00	3.03E+03	1.30E+05	1.40E+06	2.50E+07	1.28E+08	2.57E+08	5.15E+08	7.73E+08	1.29E+09	2.58E+09	1.29E+10
CD-111M	0.00E+00	2.53E+01	1.76E+03	1.29E+04	5.56E+04	6.77E+05	3.38E+06	6.77E+06	1.35E+07	2.03E+07	3.38E+07	6.77E+07	3.38E+08
CD-113M	0.00E+00	1.99E-06	4.77E-05	3.34E-04	1.43E-03	1.74E-02	8.71E-02	1.74E-01	3.48E-01	5.22E-01	8.71E-01	1.74E+00	8.71E+00
CD-115M	0.00E+00	2.82E+00	1.87E+03	9.62E+04	1.60E+06	8.01E+07	4.69E+08	9.54E+08	1.93E+09	2.90E+09	4.84E+09	9.70E+09	4.86E+10
IN-113M	0.00E+00	1.98E+01	2.34E+03	1.80E+04	7.78E+04	9.50E+05	4.75E+06	9.50E+06	1.90E+07	2.85E+07	4.75E+07	9.50E+07	4.75E+08
IN-114M	0.00E+00	1.11E+01	6.40E+03	3.05E+05	5.06E+06	2.72E+08	1.63E+09	3.32E+09	6.71E+09	1.01E+10	1.69E+10	3.38E+10	1.69E+11
IN-114	0.00E+00	2.14E-02	5.28E-01	3.70E+00	1.59E+01	1.93E+02	9.65E+02	1.93E+03	3.86E+03	5.79E+03	9.65E+03	1.93E+04	9.65E+04
IN-115M	0.00E+00	1.53E+01	3.69E+03	3.38E+04	1.49E+05	1.83E+06	9.15E+06	1.83E+07	3.66E+07	5.49E+07	9.16E+07	1.83E+08	9.16E+08
SN-113	0.00E+00	1.48E+01	1.75E+04	9.45E+05	1.68E+07	1.44E+09	1.10E+10	2.30E+10	4.72E+10	7.13E+10	1.20E+11	2.40E+11	1.21E+12
SN-119M	0.00E+00	5.31E+00	3.05E+03	1.49E+05	2.68E+06	2.97E+08	3.18E+09	7.12E+09	1.50E+10	2.29E+10	3.87E+10	7.81E+10	3.94E+11
SN-123	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SN-125	0.00E+00	2.62E+01	1.47E+04	6.31E+05	7.54E+06	1.78E+08	1.37E+09	3.34E+09	7.66E+09	1.21E+10	2.09E+10	4.29E+10	2.19E+11
SB-122	0.00E+00	3.72E+01	1.98E+04	6.30E+05	4.40E+06	6.09E+07	3.07E+08	6.15E+08	1.23E+09	1.85E+09	3.08E+09	6.16E+09	3.08E+10
SB-124	0.00E+00	1.52E+02	8.74E+04	4.19E+06	7.06E+07	4.26E+09	2.65E+10	5.43E+10	1.10E+11	1.66E+11	2.77E+11	5.55E+11	2.78E+12
SB-125	0.00E+00	4.61E+01	2.65E+04	1.30E+06	2.39E+07	3.39E+09	6.41E+10	1.89E+11	4.77E+11	7.74E+11	1.37E+12	2.85E+12	1.47E+13
SB-127	0.00E+00	5.92E+01	3.23E+04	1.15E+06	9.26E+06	1.36E+08	6.93E+08	1.39E+09	2.78E+09	4.17E+09	6.95E+09	1.39E+10	6.95E+10
TE-123M	0.00E+00	1.60E+01	9.22E+03	4.47E+05	7.85E+06	6.80E+08	5.27E+09	1.11E+10	2.27E+10	3.44E+10	5.77E+10	1.16E+11	5.82E+11
TE-125M	0.00E+00	1.27E+01	7.30E+03	3.49E+05	5.88E+06	3.47E+08	2.14E+09	4.38E+09	8.85E+09	1.33E+10	2.23E+10	4.47E+10	2.24E+11
TE-127M	0.00E+00	3.52E+00	2.10E+03	1.06E+05	1.88E+06	1.57E+08	1.17E+09	2.45E+09	5.02E+09	7.58E+09	1.27E+10	2.55E+10	1.28E+11
TE-127	0.00E+00	3.61E-01	1.28E+02	1.54E+03	7.06E+03	8.74E+04	4.38E+05	8.75E+05	1.75E+06	2.63E+06	4.38E+06	8.75E+06	4.38E+07
TE-129M	0.00E+00	6.45E+00	5.60E+03	2.78E+05	4.42E+06	1.83E+08	1.03E+09	2.08E+09	4.19E+09	6.30E+09	1.05E+10	2.11E+10	1.05E+11
TE-129	0.00E+00	6.24E+00	5.66E+02	4.22E+03	1.82E+04	2.22E+05	1.11E+06	2.22E+06	4.44E+06	6.67E+06	1.11E+07	2.22E+07	1.11E+08
TE-131M	0.00E+00	1.23E+02	6.22E+04	1.47E+06	8.76E+06	1.22E+08	6.14E+08	1.23E+09	2.46E+09	3.69E+09	6.15E+09	1.23E+10	6.15E+10
TE-131	0.00E+00	2.24E+01	1.06E+03	9.00E+03	5.03E+04	7.31E+05	3.70E+06	7.41E+06	1.48E+07	2.23E+07	3.71E+07	7.42E+07	3.71E+08
TE-132	0.00E+00	3.65E+01	9.31E+04	3.89E+06	3.00E+07	4.28E+08	2.16E+09	4.33E+09	8.68E+09	1.30E+10	2.17E+10	4.34E+10	2.17E+11
I-123	0.00E+00	2.04E+01	8.15E+03	1.17E+05	5.49E+05	6.85E+06	3.43E+07	6.87E+07	1.37E+08	2.06E+08	3.43E+08	6.87E+08	3.43E+09
I-124	0.00E+00	9.74E+01	5.32E+04	1.94E+06	1.63E+07	2.43E+08	1.23E+09	2.47E+09	4.93E+09	7.40E+09	1.23E+10	2.47E+10	1.23E+11
I-125	0.00E+00	1.48E+01	8.51E+03	4.08E+05	6.87E+06	4.12E+08	2.56E+09	5.25E+09	1.06E+10	1.60E+10	2.67E+10	5.36E+10	2.69E+11
I-126	0.00E+00	4.20E+01	2.38E+04	1.05E+06	1.36E+07	3.14E+08	1.64E+09	3.30E+09	6.61E+09	9.92E+09	1.66E+10	3.31E+10	1.66E+11
I-129	0.00E+00	7.53E+00	4.34E+03	2.13E+05	3.91E+06	5.78E+08	1.45E+10	5.78E+10	2.31E+11	5.20E+11	1.45E+12	5.78E+12	1.45E+14
I-130	0.00E+00	1.77E+02	6.96E+04	9.69E+05	4.53E+06	5.64E+07	2.83E+08	5.65E+08	1.13E+09	1.70E+09	2.83E+09	5.65E+09	2.83E+10
I-131	0.00E+00	3.41E+01	1.91E+04	7.96E+05	8.80E+06	1.62E+08	8.29E+08	1.66E+09	3.33E+09	5.00E+09	8.34E+09	1.67E+10	8.34E+10
I-132	0.00E+00	1.84E+02	2.76E+04	2.20E+05	9.55E+05	1.17E+07	5.84E+07	1.17E+08	2.34E+08	3.50E+08	5.84E+08	1.17E+09	5.84E+09
I-133	0.00E+00	5.87E+01	2.68E+04	5.13E+05	2.69E+06	3.49E+07	1.75E+08	3.51E+08	7.02E+08	1.05E+09	1.76E+09	3.51E+09	1.76E+10
I-134	0.00E+00	1.61E+02	1.19E+04	8.69E+04	3.75E+05	4.57E+06	2.28E+07	4.57E+07	9.13E+07	1.37E+08	2.28E+08	4.57E+08	2.28E+09
I-135	0.00E+00	1.44E+02	4.74E+04	5.23E+05	2.36E+06	2.92E+07	1.46E+08	2.92E+08	5.84E+08	8.77E+08	1.46E+09	2.92E+09	1.46E+10
I-136	0.00E+00	1.41E+01	3.50E+02	2.46E+03	1.05E+04	1.28E+05	6.41E+05	1.28E+06	2.56E+06	3.84E+06	6.41E+06	1.28E+07	6.41E+07
XE-131M	0.00E+00	5.63E+00	3.19E+03	1.40E+05	1.77E+06	3.91E+07	2.03E+08	4.08E+08	8.19E+08	1.23E+09	2.05E+09	4.10E+09	2.05E+10
XE-133M	0.00E+00	7.51E+00	4.07E+03	1.44E+05	1.22E+06	1.88E+07	9.54E+07	1.91E+08	3.83E+08	5.74E+08	9.57E+08	1.91E+09	9.57E+09
XE-133	0.00E+00	6.61E+00	3.65E+03	1.41E+05	1.31E+06	2.08E+07	1.06E+08	2.12E+08	4.25E+08	6.37E+08	1.06E+09	2.12E+09	1.06E+10
XE-135M	0.00E+00	1.94E+01	8.88E+02	7.32E+03	3.21E+04	3.93E+05	1.97E+06	3.94E+06	7.87E+06	1.18E+07	1.97E+07	3.94E+07	1.97E+08
XE-135	0.00E+00	2.09E+01	7.34E+03	8.79E+04	4.01E+05	4.97E+06	2.49E+07	4.97E+07	9.95E+07	1.49E+08	2.49E+08	4.98E+08	2.49E+09
XE-137	0.00E+00	2.63E+00	6.93E+01	4.87E+02	2.09E+03	2.63E+04	1.48E+05	3.36E+05	8.14E+05	1.40E+06	2.84E+06	7.24E+06	4.79E+07

TABLE 3-6B (continued)

DOSE (MREM) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
XE-138	0.00E+00	6.35E+01	4.01E+03	2.90E+04	1.25E+05	1.52E+06	7.61E+06	1.52E+07	3.04E+07	4.57E+07	7.61E+07	1.52E+08	7.61E+08
CS-134	0.00E+00	1.38E+02	7.92E+04	3.87E+06	7.07E+07	9.47E+09	1.62E+11	4.48E+11	1.07E+12	1.70E+12	2.95E+12	6.09E+12	3.12E+13
CS-135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CS-136	0.00E+00	1.84E+02	1.04E+05	4.60E+06	5.97E+07	1.38E+09	7.17E+09	1.44E+10	2.89E+10	4.34E+10	7.24E+10	1.45E+11	7.25E+11
CS-137	0.00E+00	4.22E+01	2.73E+04	1.34E+06	2.47E+07	3.63E+09	8.81E+10	3.39E+11	1.26E+12	2.65E+12	6.46E+12	1.94E+13	1.45E+14
CS-138	0.00E+00	1.16E+02	6.14E+03	4.42E+04	1.90E+05	2.31E+06	1.16E+07	2.31E+07	4.63E+07	6.94E+07	1.16E+08	2.31E+08	1.16E+09
CS-139	0.00E+00	6.19E+00	2.23E+02	1.60E+03	6.88E+03	8.38E+04	4.19E+05	8.38E+05	1.68E+06	2.51E+06	4.19E+06	8.38E+06	4.19E+07
BA-133	0.00E+00	3.88E+01	2.24E+04	1.09E+06	2.01E+07	2.91E+09	6.68E+10	2.41E+11	8.00E+11	1.52E+12	3.18E+12	7.60E+12	4.34E+13
BA-137M	0.00E+00	5.83E+00	1.49E+02	1.04E+03	4.47E+03	5.44E+04	2.72E+05	5.44E+05	1.09E+06	1.63E+06	2.72E+06	5.44E+06	2.72E+07
BA-139	0.00E+00	3.78E+00	3.90E+02	2.95E+03	1.27E+04	1.55E+05	7.77E+05	1.55E+06	3.11E+06	4.66E+06	7.77E+06	1.55E+07	7.77E+07
BA-140	0.00E+00	2.06E+01	2.43E+04	3.04E+06	5.93E+07	1.52E+09	7.94E+09	1.60E+10	3.20E+10	4.81E+10	8.02E+10	1.61E+11	8.03E+11
LA-140	0.00E+00	1.86E+02	9.44E+04	2.46E+06	1.44E+07	1.89E+08	9.52E+08	1.90E+09	3.81E+09	5.72E+09	9.53E+09	1.91E+10	9.53E+10
CE-141	0.00E+00	7.02E+00	4.02E+03	1.89E+05	2.97E+06	1.20E+08	6.72E+08	1.36E+09	2.74E+09	4.12E+09	6.88E+09	1.38E+10	6.89E+10
CE-143	0.00E+00	3.01E+01	1.49E+04	3.56E+05	1.98E+06	2.56E+07	1.29E+08	2.58E+08	5.15E+08	7.73E+08	1.29E+09	2.58E+09	1.29E+10
CE-144	0.00E+00	3.20E+00	2.51E+03	1.24E+05	2.25E+06	2.59E+08	2.98E+09	6.80E+09	1.45E+10	2.21E+10	3.74E+10	7.57E+10	3.82E+11
PR-143	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR-144	0.00E+00	1.24E+00	4.72E+01	3.35E+02	1.44E+03	1.75E+04	8.77E+04	1.75E+05	3.51E+05	5.26E+05	8.77E+05	1.75E+06	8.77E+06
ND-147	0.00E+00	1.42E+01	8.02E+03	3.48E+05	4.31E+06	9.12E+07	4.73E+08	9.49E+08	1.90E+09	2.86E+09	4.76E+09	9.53E+09	4.77E+10
PM-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM-148M	0.00E+00	1.77E+02	1.02E+05	4.84E+06	7.90E+07	3.77E+09	2.18E+10	4.44E+10	8.94E+10	1.35E+11	2.25E+11	4.50E+11	2.25E+12
PM-148	0.00E+00	5.29E+01	2.92E+04	1.13E+06	1.06E+07	1.69E+08	8.59E+08	1.72E+09	3.45E+09	5.17E+09	8.63E+09	1.73E+10	8.63E+10
SM-151	0.00E+00	2.60E-02	1.50E+01	7.35E+02	1.35E+04	1.99E+06	4.93E+07	1.95E+08	7.58E+08	1.66E+09	4.39E+09	1.56E+10	1.89E+11
EU-154	0.00E+00	1.10E+02	6.31E+04	3.09E+06	5.67E+07	8.19E+09	1.84E+11	6.52E+11	2.09E+12	3.88E+12	7.83E+12	1.81E+13	1.01E+14
EU-155	0.00E+00	6.16E+00	3.55E+03	1.74E+05	3.18E+06	4.52E+08	9.49E+09	3.12E+10	9.00E+10	1.55E+11	2.90E+11	6.29E+11	3.34E+12
EU-156	0.00E+00	1.14E+02	6.44E+04	2.89E+06	3.92E+07	9.84E+08	5.17E+09	1.04E+10	2.09E+10	3.14E+10	5.23E+10	1.05E+11	5.24E+11
GD-162	0.00E+00	1.42E+01	4.44E+02	3.13E+03	1.34E+04	1.64E+05	8.18E+05	1.64E+06	3.27E+06	4.91E+06	8.18E+06	1.64E+07	8.18E+07
TB-160	0.00E+00	9.42E+01	5.41E+04	2.60E+06	4.44E+07	2.96E+09	1.92E+10	3.95E+10	8.02E+10	1.21E+11	2.02E+11	4.06E+11	2.03E+12
TA-182	0.00E+00	1.12E+02	6.43E+04	3.11E+06	5.47E+07	4.65E+09	3.55E+10	7.45E+10	1.53E+11	2.31E+11	3.87E+11	7.77E+11	3.90E+12
W-185	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
W-187	0.00E+00	1.49E+01	6.97E+03	1.39E+05	7.12E+05	9.07E+06	4.55E+07	9.10E+07	1.82E+08	2.73E+08	4.55E+08	9.10E+08	4.55E+09
AU-195M	0.00E+00	5.31E-01	1.29E+01	9.11E+01	4.01E+02	6.19E+03	3.74E+04	7.72E+04	1.57E+05	2.36E+05	3.96E+05	7.93E+05	3.98E+06
AU-195	0.00E+00	1.52E+01	8.73E+03	4.25E+05	7.58E+06	7.75E+08	7.28E+09	1.58E+10	3.28E+10	4.99E+10	8.40E+10	1.69E+11	8.51E+11
AU-198	0.00E+00	3.63E+01	1.93E+04	6.13E+05	4.27E+06	5.90E+07	2.98E+08	5.96E+08	1.19E+09	1.79E+09	2.98E+09	5.97E+09	2.98E+10
AU-199	0.00E+00	9.62E+00	5.17E+03	1.73E+05	1.28E+06	1.81E+07	9.17E+07	1.84E+08	3.67E+08	5.51E+08	9.19E+08	1.84E+09	9.19E+09
HG-197	0.00E+00	1.17E+01	6.22E+03	1.97E+05	1.37E+06	1.89E+07	9.51E+07	1.90E+08	3.81E+08	5.71E+08	9.53E+08	1.91E+09	9.53E+09
HG-203	0.00E+00	2.13E+01	1.22E+04	5.82E+05	9.59E+06	4.93E+08	2.91E+09	5.92E+09	1.20E+10	1.80E+10	3.01E+10	6.02E+10	3.02E+11
TL-204	0.00E+00	3.27E+01	9.19E+04	5.04E+06	9.36E+07	1.32E+10	2.63E+11	8.27E+11	2.24E+12	3.75E+12	6.80E+12	1.44E+13	7.55E+13
TL-208	0.00E+00	3.44E+01	8.88E+02	6.24E+03	2.67E+04	3.25E+05	1.63E+06	3.25E+06	6.51E+06	9.76E+06	1.63E+07	3.25E+07	1.63E+08
TL-210	0.00E+00	3.67E-05	1.14E-03	1.82E-02	2.45E-01	3.23E+01	7.69E+02	2.92E+03	1.06E+04	2.18E+04	5.12E+04	1.44E+05	9.73E+05
PB-204M	0.00E+00	1.50E+02	1.31E+04	9.75E+04	4.21E+05	5.13E+06	2.57E+07	5.13E+07	1.03E+08	1.54E+08	2.57E+08	5.13E+08	2.57E+09
PB-210	0.00E+00	3.80E+00	2.19E+03	1.07E+05	1.97E+06	2.88E+08	6.92E+09	2.63E+10	9.57E+10	1.97E+11	4.62E+11	1.30E+12	8.78E+12
PB-212	0.00E+00	2.92E+01	3.66E+04	5.10E+05	2.37E+06	2.95E+07	1.48E+08	2.95E+08	5.91E+08	8.86E+08	1.48E+09	2.95E+09	1.48E+10
PB-214	0.00E+00	5.22E+01	4.34E+03	3.16E+04	1.36E+05	1.66E+06	8.30E+06	1.66E+07	3.34E+07	5.02E+07	8.39E+07	1.69E+08	8.49E+08
BI-210M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BI-212	0.00E+00	8.88E+01	8.30E+03	5.93E+04	2.55E+05	3.10E+06	1.55E+07	3.10E+07	6.19E+07	9.27E+07	1.55E+08	3.10E+08	1.55E+09
BI-214	0.00E+00	6.90E+01	2.79E+03	1.99E+04	8.53E+04	1.04E+06	5.20E+06	1.04E+07	2.09E+07	3.15E+07	5.27E+07	1.06E+08	5.34E+08

TABLE 3-6B (continued)

DOSE (MREM) FROM EXPOSURE TO CONTAMINATED GROUND. CONTINUOUS DEPOSITION OF 1 MICROCURIE/CM**2/HR
RADIATION TYPE: PHOTON

NUCLIDE	T = 0	1 HOUR	1 DAY	1 WEEK	1 MONTH	1 YR	5 YR	10 YR	20 YR	30 YR	50 YR	100 YR	500 YR
PO-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PO-214	0.00E+00	1.29E-09	3.15E-08	2.42E-07	1.39E-06	7.85E-05	1.67E-03	6.25E-03	2.25E-02	4.62E-02	1.08E-01	3.04E-01	2.05E+00
PO-218	0.00E+00	5.09E+00	4.92E+02	3.59E+03	1.55E+04	1.89E+05	9.44E+05	1.89E+06	3.79E+06	5.71E+06	9.55E+06	1.92E+07	9.65E+07
RN-220	0.00E+00	4.15E-02	5.31E+01	7.41E+02	3.45E+03	4.28E+04	2.14E+05	4.29E+05	8.58E+05	1.29E+06	2.15E+06	4.29E+06	2.15E+07
RN-222	0.00E+00	2.04E+01	7.26E+04	2.80E+06	2.28E+07	3.35E+08	1.70E+09	3.41E+09	6.85E+09	1.03E+10	1.72E+10	3.46E+10	1.74E+11
RA-224	0.00E+00	1.45E+00	1.97E+04	1.78E+06	1.61E+07	2.41E+08	1.22E+09	2.44E+09	4.89E+09	7.34E+09	1.22E+10	2.45E+10	1.22E+11
RA-226	0.00E+00	6.96E-01	4.63E+03	1.31E+06	5.33E+07	1.10E+10	2.81E+11	1.13E+12	4.52E+12	1.02E+13	2.83E+13	1.13E+14	2.69E+15
RA-228	0.00E+00	1.09E+01	2.38E+04	1.85E+06	3.67E+07	6.18E+09	1.88E+11	7.59E+11	2.58E+12	4.77E+12	9.40E+12	2.11E+13	1.15E+14
AC-228	0.00E+00	6.10E+01	1.76E+04	1.79E+05	8.11E+05	1.25E+07	9.57E+07	2.25E+08	4.97E+08	7.69E+08	1.31E+09	2.68E+09	1.36E+10
TH-228	0.00E+00	1.62E+00	1.90E+03	8.35E+05	3.92E+07	7.44E+09	1.28E+11	3.48E+11	8.21E+11	1.30E+12	2.25E+12	4.63E+12	2.37E+13
TH-230	0.00E+00	1.26E+00	7.23E+02	3.54E+04	6.52E+05	9.79E+07	2.61E+09	1.13E+10	5.16E+10	1.31E+11	4.45E+11	2.60E+12	2.21E+14
TH-231	0.00E+00	1.54E+01	7.28E+03	1.50E+05	7.80E+05	9.97E+06	5.00E+07	1.00E+08	2.00E+08	3.00E+08	5.00E+08	1.00E+09	5.00E+09
TH-232	0.00E+00	1.11E+01	1.11E+03	3.88E+04	7.56E+05	3.33E+08	3.87E+10	3.14E+11	2.29E+12	6.74E+12	2.39E+13	1.17E+14	3.42E+15
TH-234	0.00E+00	2.06E+00	1.20E+03	5.58E+04	8.38E+05	2.79E+07	1.51E+08	3.06E+08	6.15E+08	9.24E+08	1.54E+09	3.09E+09	1.54E+10
PA-233	0.00E+00	2.28E+01	1.30E+04	6.06E+05	9.28E+06	3.33E+08	1.82E+09	3.69E+09	7.42E+09	1.11E+10	1.86E+10	3.73E+10	1.86E+11
PA-234M	0.00E+00	5.02E-02	1.24E+00	8.67E+00	3.72E+01	4.52E+02	2.26E+03	4.52E+03	9.04E+03	1.36E+04	2.26E+04	4.52E+04	2.26E+05
PA-234	0.00E+00	2.51E+02	7.58E+04	7.92E+05	3.55E+06	4.37E+07	2.19E+08	4.38E+08	8.76E+08	1.31E+09	2.19E+09	4.38E+09	2.19E+10
U-232	0.00E+00	1.68E+00	9.67E+02	4.88E+04	1.21E+06	1.04E+09	8.88E+10	5.11E+11	2.53E+12	6.03E+12	1.69E+13	6.21E+13	7.18E+14
U-233	0.00E+00	1.00E+00	5.79E+02	2.84E+04	5.21E+05	7.71E+07	1.93E+09	7.71E+09	3.08E+10	6.94E+10	1.93E+11	7.71E+11	1.93E+13
U-234	0.00E+00	1.48E+00	8.55E+02	4.19E+04	7.69E+05	1.14E+08	2.85E+09	1.14E+10	4.56E+10	1.02E+11	2.85E+11	1.14E+12	2.87E+13
U-235	0.00E+00	2.07E+01	1.35E+04	8.68E+05	1.79E+07	2.76E+09	6.92E+10	2.77E+11	1.11E+12	2.49E+12	6.92E+12	2.77E+13	6.92E+14
U-236	0.00E+00	1.40E+00	7.90E+02	3.87E+04	7.10E+05	1.05E+08	2.63E+09	1.05E+10	4.20E+10	9.46E+10	2.63E+11	1.05E+12	2.63E+13
U-237	0.00E+00	2.80E+01	1.56E+04	6.32E+05	6.52E+06	1.12E+08	5.72E+08	1.15E+09	2.30E+09	3.45E+09	5.75E+09	1.15E+10	5.75E+10
U-238	0.00E+00	5.63E+00	8.64E+02	3.96E+04	8.92E+05	2.27E+08	6.23E+09	2.52E+10	1.02E+11	2.29E+11	6.37E+11	2.55E+12	6.38E+13
U-240	0.00E+00	2.62E+01	1.42E+04	2.14E+05	1.01E+06	1.27E+07	6.35E+07	1.27E+08	2.54E+08	3.81E+08	6.35E+08	1.27E+09	6.36E+09
NP-237	0.00E+00	9.25E+00	5.44E+03	2.98E+05	7.32E+06	2.12E+09	5.96E+10	2.42E+11	9.75E+11	2.20E+12	6.12E+12	2.45E+13	6.14E+14
NP-238	0.00E+00	4.79E+01	2.49E+04	7.21E+05	4.57E+06	6.14E+07	3.09E+08	6.19E+08	1.24E+09	1.86E+09	3.11E+09	6.25E+09	3.17E+10
NP-239	0.00E+00	1.77E+01	9.32E+03	2.81E+05	1.85E+06	2.52E+07	1.27E+08	2.54E+08	5.07E+08	7.61E+08	1.27E+09	2.54E+09	1.27E+10
NP-240M	0.00E+00	9.02E+00	2.62E+02	1.85E+03	7.91E+03	9.63E+04	4.82E+05	9.63E+05	1.93E+06	2.89E+06	4.82E+06	9.63E+06	4.82E+07
PU-236	0.00E+00	1.70E+00	9.76E+02	4.78E+04	8.73E+05	1.23E+08	3.17E+09	1.56E+10	8.19E+10	2.07E+11	6.19E+11	2.39E+12	2.86E+13
PU-238	0.00E+00	1.49E+00	8.58E+02	4.20E+04	7.72E+05	1.14E+08	2.82E+09	1.11E+10	4.34E+10	9.52E+10	2.52E+11	8.94E+11	1.09E+13
PU-239	0.00E+00	5.65E-01	3.25E+02	1.59E+04	2.93E+05	4.34E+07	1.08E+09	4.34E+09	1.73E+10	3.90E+10	1.08E+11	4.33E+11	1.08E+13
PU-240	0.00E+00	1.28E+00	7.36E+02	3.61E+04	6.63E+05	9.81E+07	2.45E+09	9.81E+09	3.92E+10	8.82E+10	2.45E+11	9.78E+11	2.41E+13
PU-241	0.00E+00	4.17E-07	5.76E-03	1.98E+00	1.55E+02	2.77E+05	3.30E+07	2.50E+08	1.79E+09	5.46E+09	2.10E+10	1.15E+11	3.28E+12
PU-242	0.00E+00	1.27E+00	7.30E+02	3.58E+04	6.57E+05	9.72E+07	2.43E+09	9.72E+09	3.89E+10	8.75E+10	2.43E+11	9.72E+11	2.43E+13
PU-244	0.00E+00	4.52E-01	6.06E+03	7.91E+05	1.75E+07	2.72E+09	6.83E+10	2.73E+11	1.09E+12	2.46E+12	6.84E+12	2.74E+13	6.84E+14
AM-241	0.00E+00	6.85E+00	3.95E+03	1.93E+05	3.55E+06	5.25E+08	1.31E+10	5.23E+10	2.08E+11	4.66E+11	1.28E+12	4.99E+12	1.02E+14
AM-242	0.00E+00	4.73E+00	2.01E+03	3.23E+04	1.57E+05	2.17E+06	1.18E+07	2.39E+07	4.85E+07	7.34E+07	1.24E+08	2.56E+08	1.39E+09
AM-243	0.00E+00	5.41E+00	4.01E+03	3.72E+05	1.01E+07	1.75E+09	4.43E+10	1.77E+11	7.09E+11	1.60E+12	4.43E+12	1.77E+13	4.37E+14
CM-242	0.00E+00	1.35E+00	7.78E+02	3.78E+04	6.73E+05	6.60E+07	5.94E+08	1.30E+09	2.80E+09	4.39E+09	7.85E+09	1.78E+10	1.22E+11
CM-243	0.00E+00	1.68E+01	9.70E+03	4.75E+05	8.72E+06	1.28E+09	3.10E+10	1.19E+11	4.41E+11	9.22E+11	2.23E+12	6.58E+12	4.80E+13
CM-244	0.00E+00	1.46E+00	8.38E+02	4.11E+04	7.54E+05	1.10E+08	2.62E+09	9.86E+09	3.51E+10	7.08E+10	1.61E+11	4.33E+11	2.80E+12
CF-252	0.00E+00	4.49E+01	2.58E+04	1.26E+06	2.31E+07	3.16E+09	5.82E+10	1.70E+11	4.27E+11	6.90E+11	1.22E+12	2.54E+12	1.31E+13

TABLE 3-7

PHOTON DEPTH DOSE RATE FACTORS TO VARIOUS ORGANS (mrem/yr per μCi/ml)[a]

SUBMERSION IN CONTAMINATED WATER

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
H3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE7	0.586E 04	0.753E 04	0.544E 04	0.586E 04	0.544E 04	0.669E 04	0.628E 04	0.712E 04	0.919E 04	0.965E 04	0.879E 04
C11	0.121E 06	0.156E 06	0.113E 06	0.121E 06	0.113E 06	0.139E 06	0.130E 06	0.147E 06	0.191E 06	0.200E 06	0.182E 06
C14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N13	0.121E 06	0.156E 06	0.113E 06	0.121E 06	0.113E 06	0.139E 06	0.130E 06	0.148E 06	0.191E 06	0.200E 06	0.182E 06
O15	0.122E 06	0.156E 06	0.113E 06	0.122E 06	0.113E 06	0.139E 06	0.130E 06	0.148E 06	0.191E 06	0.200E 06	0.182E 06
F18	0.118E 06	0.151E 06	0.109E 06	0.118E 06	0.109E 06	0.134E 06	0.126E 06	0.143E 06	0.185E 06	0.194E 06	0.177E 06
NA22	0.313E 06	0.345E 06	0.271E 06	0.333E 06	0.291E 06	0.280E 06	0.302E 06	0.342E 06	0.396E 06	0.415E 06	0.378E 06
NA24	0.520E 06	0.612E 06	0.517E 06	0.754E 06	0.560E 06	0.494E 06	0.576E 06	0.631E 06	0.662E 06	0.701E 06	0.623E 06
MG28	0.198E 06	0.200E 06	0.166E 06	0.212E 06	0.175E 06	0.166E 06	0.182E 06	0.206E 06	0.231E 06	0.242E 06	0.218E 06
AL28	0.284E 06	0.284E 06	0.235E 06	0.311E 06	0.263E 06	0.214E 06	0.256E 06	0.291E 06	0.311E 06	0.325E 06	0.297E 06
P32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL36	0.671E-09	0.946E-02	0.734E-05	0.128E-04	0.153E-02	0.545E-05	0.398E-04	0.377E-02	0.734E-02	0.903E-02	0.567E-02
CL38	0.190E 06	0.222E 06	0.188E 06	0.272E 06	0.203E 06	0.179E 06	0.209E 06	0.229E 06	0.240E 06	0.255E 06	0.226E 06
A37	0.396E-07	0.558E 00	0.433E-03	0.756E-03	0.903E-01	0.322E-03	0.235E-02	0.223E 00	0.433E 00	0.533E 00	0.334E 00
A39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K40	0.249E 05	0.249E 05	0.207E 05	0.273E 05	0.231E 05	0.188E 05	0.225E 05	0.255E 05	0.273E 05	0.286E 05	0.261E 05
K42	0.438E 05	0.438E 05	0.364E 05	0.482E 05	0.406E 05	0.332E 05	0.396E 05	0.449E 05	0.482E 05	0.504E 05	0.460E 05
K43	0.117E 06	0.150E 06	0.109E 06	0.117E 06	0.108E 06	0.134E 06	0.125E 06	0.142E 06	0.183E 06	0.193E 06	0.175E 06
CA45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CA47	0.166E 06	0.167E 06	0.139E 06	0.182E 06	0.153E 06	0.130E 06	0.151E 06	0.171E 06	0.185E 06	0.194E 06	0.177E 06
CA49	0.946E 06	0.350E 06	0.498E 05	0.590E 06	0.453E 06	0.430E 06	0.499E 06	0.499E 06	0.499E 06	0.544E 06	0.454E 06
SC46	0.263E 06	0.244E 06	0.225E 06	0.263E 06	0.188E 06	0.272E 06	0.244E 06	0.272E 06	0.319E 06	0.338E 06	0.291E 06

[a]Contributions of radioactive daughter products are not included.

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
SC47	0.111E 05	0.113E 05	0.122E 05	0.125E 05	0.955E 04	0.125E 05	0.132E 05	0.153E 05	0.261E 05	0.277E 05	0.242E 05
SC49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CR51	0.316E 04	0.321E 04	0.345E 04	0.355E 04	0.271E 04	0.355E 04	0.375E 04	0.434E 04	0.740E 04	0.788E 04	0.687E 04
MN52M	0.351E 06	0.384E 06	0.302E 06	0.374E 06	0.325E 06	0.310E 06	0.336E 06	0.381E 06	0.439E 06	0.460E 06	0.420E 06
MN52	0.478E 06	0.501E 06	0.411E 06	0.502E 06	0.418E 06	0.437E 06	0.453E 06	0.512E 06	0.591E 06	0.620E 06	0.558E 06
MN54	0.109E 06	0.101E 06	0.936E 05	0.109E 06	0.780E 05	0.113E 06	0.101E 06	0.113E 06	0.133E 06	0.140E 06	0.121E 06
FE52	0.842E 05	0.104E 06	0.808E 05	0.862E 05	0.772E 05	0.960E 05	0.921E 05	0.105E 06	0.144E 06	0.152E 06	0.137E 06
FE55	0.223E-06	0.314E 01	0.244E-02	0.426E-02	0.509E 00	0.181E-02	0.132E-01	0.125E 01	0.244E 01	0.300E 01	0.188E 01
FE59	0.172E 06	0.166E 06	0.145E 06	0.181E 06	0.142E 06	0.153E 06	0.158E 06	0.178E 06	0.199E 06	0.210E 06	0.186E 06
CO56	0.568E 06	0.503E 06	0.458E 06	0.588E 06	0.456E 06	0.462E 06	0.496E 06	0.545E 06	0.597E 06	0.632E 06	0.558E 06
CO57	0.134E 05	0.126E 05	0.126E 05	0.123E 05	0.102E 05	0.142E 05	0.145E 05	0.163E 05	0.347E 05	0.374E 05	0.321E 05
CO58	0.126E 06	0.123E 06	0.109E 06	0.126E 06	0.940E 05	0.132E 06	0.119E 06	0.134E 06	0.159E 06	0.168E 06	0.146E 06
CO60	0.366E 06	0.355E 06	0.307E 06	0.386E 06	0.306E 06	0.319E 06	0.334E 06	0.376E 06	0.419E 06	0.441E 06	0.392E 06
NI56	0.225E 06	0.221E 06	0.199E 06	0.232E 06	0.177E 06	0.227E 06	0.218E 06	0.245E 06	0.306E 06	0.323E 06	0.283E 06
NI63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CU64	0.238E 05	0.302E 05	0.219E 05	0.239E 05	0.221E 05	0.266E 05	0.252E 05	0.286E 05	0.367E 05	0.385E 05	0.351E 05
ZN65	0.755E 05	0.708E 05	0.649E 05	0.755E 05	0.543E 05	0.784E 05	0.704E 05	0.785E 05	0.923E 05	0.977E 05	0.843E 05
ZN69M	0.455E 05	0.637E 05	0.460E 05	0.495E 05	0.460E 05	0.566E 05	0.531E 05	0.602E 05	0.778E 05	0.817E 05	0.743E 05
ZN69	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA67	0.191E 05	0.201E 05	0.195E 05	0.201E 05	0.162E 05	0.213E 05	0.217E 05	0.249E 05	0.426E 05	0.454E 05	0.396E 05
GA68	0.113E 06	0.143E 06	0.105E 06	0.113E 06	0.104E 06	0.129E 06	0.121E 06	0.136E 06	0.175E 06	0.184E 06	0.167E 06
GE77	0.115E 06	0.129E 06	0.109E 06	0.122E 06	0.101E 06	0.125E 06	0.122E 06	0.138E 06	0.188E 06	0.198E 06	0.176E 06
AS76	0.557E 05	0.668E 05	0.505E 05	0.588E 05	0.521E 05	0.572E 05	0.573E 05	0.648E 05	0.792E 05	0.831E 05	0.756E 05
AS77	0.843E 03	0.926E 03	0.874E 03	0.910E 03	0.740E 03	0.952E 03	0.968E 03	0.111E 04	0.178E 04	0.189E 04	0.166E 04
SE75	0.692E 05	0.708E 05	0.651E 05	0.745E 05	0.611E 05	0.659E 05	0.717E 05	0.819E 05	0.121E 06	0.128E 06	0.113E 06
SE77M	0.819E 04	0.832E 04	0.896E 04	0.922E 04	0.704E 04	0.922E 04	0.973E 04	0.113E 05	0.192E 05	0.204E 05	0.178E 05

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
BR80M	0.401E 03	0.503E 03	0.216E 03	0.301E 03	0.161E 03	0.689E 03	0.463E 03	0.632E 03	0.203E 04	0.233E 04	0.170E 04
BR80	0.101E 05	0.129E 05	0.932E 04	0.101E 05	0.934E 04	0.114E 05	0.107E 05	0.122E 05	0.157E 05	0.165E 05	0.150E 05
BR82	0.358E 06	0.377E 06	0.312E 06	0.368E 06	0.300E 06	0.354E 06	0.345E 06	0.389E 06	0.461E 06	0.485E 06	0.432E 06
BR83	0.878E 03	0.115E 04	0.815E 03	0.877E 03	0.829E 03	0.100E 04	0.941E 03	0.108E 04	0.142E 04	0.150E 04	0.135E 04
BR84	0.331E 06	0.238E 06	0.243E 06	0.313E 06	0.231E 06	0.241E 06	0.259E 06	0.276E 06	0.295E 06	0.316E 06	0.272E 06
KR79	0.272E 05	0.328E 05	0.258E 05	0.278E 05	0.245E 05	0.305E 05	0.293E 05	0.333E 05	0.453E 05	0.477E 05	0.429E 05
KR83M	0.913E 00	0.464E 01	0.600E 00	0.682E 00	0.117E 02	0.192E 01	0.145E 01	0.672E 01	0.309E 02	0.368E 02	0.248E 02
KR85M	0.156E 05	0.158E 05	0.170E 05	0.175E 05	0.134E 05	0.175E 05	0.185E 05	0.214E 05	0.365E 05	0.389E 05	0.339E 05
KR85	0.245E 03	0.315E 03	0.227E 03	0.245E 03	0.227E 03	0.280E 03	0.262E 03	0.297E 03	0.384E 03	0.403E 03	0.367E 03
KR87	0.952E 05	0.111E 06	0.928E 05	0.126E 06	0.950E 05	0.978E 05	0.104E 06	0.114E 06	0.128E 06	0.135E 06	0.120E 06
KR88	0.233E 06	0.283E 06	0.244E 06	0.355E 06	0.254E 06	0.242E 06	0.273E 06	0.297E 06	0.320E 06	0.340E 06	0.299E 06
RB84	0.112E 06	0.114E 06	0.985E 05	0.113E 06	0.865E 05	0.119E 06	0.108E 06	0.121E 06	0.146E 06	0.154E 06	0.135E 06
RB86	0.124E 05	0.115E 05	0.106E 05	0.124E 05	0.886E 04	0.128E 05	0.115E 05	0.128E 05	0.151E 05	0.159E 05	0.137E 05
RB88	0.834E 05	0.939E 05	0.830E 05	0.120E 06	0.843E 05	0.840E 05	0.924E 05	0.997E 05	0.106E 06	0.113E 06	0.980E 05
RB89	0.328E 06	0.334E 06	0.292E 06	0.386E 06	0.293E 06	0.301E 06	0.320E 06	0.354E 06	0.389E 06	0.411E 06	0.363E 06
RB90	0.653E 06	0.296E 06	0.377E 06	0.450E 06	0.340E 06	0.349E 06	0.384E 06	0.394E 06	0.408E 06	0.442E 06	0.372E 06
SR85	0.608E 05	0.781E 05	0.565E 05	0.608E 05	0.565E 05	0.694E 05	0.651E 05	0.738E 05	0.955E 05	0.100E 06	0.913E 05
SR87M	0.392E 05	0.504E 05	0.364E 05	0.392E 05	0.364E 05	0.448E 05	0.420E 05	0.476E 05	0.616E 05	0.646E 05	0.588E 05
SR89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR91	0.962E 05	0.104E 06	0.847E 05	0.977E 05	0.799E 05	0.992E 05	0.942E 05	0.106E 06	0.128E 06	0.135E 06	0.120E 06
SR92	0.199E 06	0.200E 06	0.166E 06	0.219E 06	0.185E 06	0.152E 06	0.181E 06	0.205E 06	0.221E 06	0.231E 06	0.211E 06
SR93	0.193E 06	0.210E 06	0.172E 06	0.197E 06	0.163E 06	0.199E 06	0.191E 06	0.216E 06	0.266E 06	0.280E 06	0.250E 06
Y87	0.553E 05	0.711E 05	0.514E 05	0.553E 05	0.514E 05	0.632E 05	0.593E 05	0.672E 05	0.869E 05	0.912E 05	0.830E 05
Y88	0.311E 06	0.365E 06	0.319E 06	0.454E 06	0.318E 06	0.334E 06	0.356E 06	0.387E 06	0.416E 06	0.443E 06	0.385E 06
Y90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
Y91M	0.621E 05	0.799E 05	0.577E 05	0.621E 05	0.577E 05	0.710E 05	0.666E 05	0.755E 05	0.975E 05	0.102E 06	0.932E 05
Y91	0.386E 03	0.386E 03	0.320E 03	0.423E 03	0.357E 03	0.292E 03	0.348E 03	0.395E 03	0.423E 03	0.442E 03	0.404E 03
Y92	0.337E 05	0.335E 05	0.291E 05	0.354E 05	0.274E 05	0.324E 05	0.318E 05	0.356E 05	0.410E 05	0.432E 05	0.381E 05
Y93	0.861E 04	0.963E 04	0.874E 04	0.113E 05	0.823E 04	0.918E 04	0.967E 04	0.107E 05	0.135E 05	0.143E 05	0.125E 05
ZR95	0.913E 05	0.981E 05	0.809E 05	0.913E 05	0.733E 05	0.985E 05	0.901E 05	0.101E 06	0.124E 06	0.131E 06	0.116E 06
ZR97	0.240E 05	0.257E 05	0.212E 05	0.256E 05	0.209E 05	0.233E 05	0.235E 05	0.265E 05	0.313E 05	0.329E 05	0.295E 05
NB95M	0.567E 04	0.576E 04	0.621E 04	0.639E 04	0.488E 04	0.639E 04	0.674E 04	0.780E 04	0.133E 05	0.142E 05	0.123E 05
NB95	0.100E 06	0.928E 05	0.857E 05	0.100E 06	0.714E 05	0.104E 06	0.928E 05	0.104E 06	0.121E 06	0.129E 06	0.111E 06
NB97M	0.869E 05	0.112E 06	0.807E 05	0.869E 05	0.807E 05	0.993E 05	0.931E 05	0.106E 06	0.136E 06	0.143E 06	0.130E 06
NB97	0.795E 05	0.101E 06	0.737E 05	0.795E 05	0.735E 05	0.904E 05	0.848E 05	0.961E 05	0.124E 06	0.130E 06	0.118E 06
MO99	0.192E 05	0.226E 05	0.177E 05	0.194E 05	0.167E 05	0.214E 05	0.200E 05	0.227E 05	0.295E 05	0.311E 05	0.278E 05
TC99M	0.138E 05	0.130E 05	0.130E 05	0.127E 05	0.105E 05	0.146E 05	0.149E 05	0.168E 05	0.360E 05	0.388E 05	0.332E 05
TC99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RU103	0.574E 05	0.738E 05	0.533E 05	0.574E 05	0.533E 05	0.656E 05	0.615E 05	0.697E 05	0.902E 05	0.947E 05	0.862E 05
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH103M	0.269E 01	0.871E 01	0.180E 01	0.311E 01	0.700E 01	0.186E 02	0.658E 01	0.103E 02	0.662E 02	0.785E 02	0.540E 02
RH105	0.776E 04	0.788E 04	0.849E 04	0.873E 04	0.667E 04	0.874E 04	0.922E 04	0.107E 05	0.182E 05	0.194E 05	0.169E 05
RH106	0.224E 05	0.281E 05	0.207E 05	0.224E 05	0.205E 05	0.252E 05	0.237E 05	0.269E 05	0.346E 05	0.364E 05	0.330E 05
PD103	0.152E 03	0.202E 03	0.141E 03	0.156E 03	0.133E 03	0.196E 03	0.185E 03	0.221E 03	0.558E 03	0.600E 03	0.478E 03
AG110M	0.365E 06	0.385E 06	0.318E 06	0.375E 06	0.306E 06	0.360E 06	0.352E 06	0.396E 06	0.470E 06	0.494E 06	0.441E 06
AG111	0.304E 04	0.308E 04	0.332E 04	0.342E 04	0.261E 04	0.342E 04	0.361E 04	0.418E 04	0.714E 04	0.760E 04	0.662E 04
CD111M	0.413E 05	0.406E 05	0.426E 05	0.430E 05	0.338E 05	0.454E 05	0.472E 05	0.542E 05	0.101E 06	0.108E 06	0.936E 05
CD113M	0.339E 02	0.345E 02	0.369E 02	0.381E 02	0.291E 02	0.386E 02	0.403E 02	0.468E 02	0.814E 02	0.868E 02	0.752E 02
CD115M	0.460E 04	0.447E 04	0.391E 04	0.479E 04	0.373E 04	0.425E 04	0.425E 04	0.478E 04	0.544E 04	0.572E 04	0.506E 04
IN113M	0.300E 05	0.386E 05	0.279E 05	0.300E 05	0.279E 05	0.343E 05	0.322E 05	0.365E 05	0.471E 05	0.495E 05	0.451E 05
IN114M	0.836E 04	0.996E 04	0.824E 04	0.873E 04	0.756E 04	0.960E 04	0.933E 04	0.107E 05	0.159E 05	0.168E 05	0.149E 05

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
IN114	0.360E 03	0.374E 03	0.302E 03	0.389E 03	0.333E 03	0.295E 03	0.334E 03	0.380E 03	0.435E 03	0.457E 03	0.413E 03
IN115M	0.132E 05	0.135E 05	0.144E 05	0.149E 05	0.114E 05	0.150E 05	0.157E 05	0.182E 05	0.314E 05	0.334E 05	0.290E 05
SN113	0.514E 03	0.607E 03	0.550E 03	0.583E 03	0.517E 03	0.811E 03	0.662E 03	0.805E 03	0.209E 04	0.234E 04	0.183E 04
SN119M	0.139E 03	0.186E 03	0.750E 02	0.107E 03	0.722E 02	0.287E 03	0.172E 03	0.237E 03	0.876E 03	0.101E 04	0.729E 03
SN123	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SN125	0.398E 05	0.396E 05	0.357E 05	0.440E 05	0.317E 05	0.412E 05	0.390E 05	0.433E 05	0.500E 05	0.530E 05	0.459E 05
SB122	0.493E 05	0.627E 05	0.457E 05	0.493E 05	0.454E 05	0.562E 05	0.526E 05	0.596E 05	0.768E 05	0.806E 05	0.733E 05
SB124	0.255E 06	0.284E 06	0.224E 06	0.279E 06	0.239E 06	0.234E 06	0.250E 06	0.283E 06	0.327E 06	0.343E 06	0.312E 06
SB125	0.507E 05	0.647E 05	0.471E 05	0.507E 05	0.466E 05	0.582E 05	0.545E 05	0.620E 05	0.829E 05	0.874E 05	0.788E 05
SB127	0.801E 05	0.960E 05	0.736E 05	0.806E 05	0.706E 05	0.894E 05	0.837E 05	0.947E 05	0.122E 06	0.128E 06	0.115E 06
TE123M	0.136E 05	0.139E 05	0.147E 05	0.152E 05	0.115E 05	0.155E 05	0.161E 05	0.188E 05	0.329E 05	0.352E 05	0.304E 05
TE125M	0.968E 03	0.116E 04	0.527E 03	0.727E 03	0.370E 03	0.164E 04	0.111E 04	0.149E 04	0.475E 04	0.545E 04	0.399E 04
TE127M	0.242E 03	0.290E 03	0.131E 03	0.181E 03	0.918E 02	0.412E 03	0.278E 03	0.373E 03	0.119E 04	0.137E 04	0.100E 04
TE127	0.476E 03	0.606E 03	0.446E 03	0.479E 03	0.440E 03	0.544E 03	0.513E 03	0.583E 03	0.770E 03	0.810E 03	0.734E 03
TE129M	0.378E 04	0.477E 04	0.341E 04	0.373E 04	0.335E 04	0.441E 04	0.404E 04	0.463E 04	0.658E 04	0.702E 04	0.616E 04
TE129	0.754E 04	0.903E 04	0.690E 04	0.756E 04	0.658E 04	0.850E 04	0.791E 04	0.898E 04	0.120E 05	0.127E 05	0.113E 05
TE131M	0.180E 06	0.177E 06	0.160E 06	0.191E 06	0.142E 06	0.182E 06	0.174E 06	0.195E 06	0.236E 06	0.250E 06	0.218E 06
TE131	0.504E 05	0.529E 05	0.453E 05	0.497E 05	0.404E 05	0.538E 05	0.509E 05	0.574E 05	0.833E 05	0.886E 05	0.775E 05
TE132	0.202E 05	0.206E 05	0.220E 05	0.226E 05	0.173E 05	0.228E 05	0.240E 05	0.278E 05	0.485E 05	0.517E 05	0.448E 05
I123	0.152E 05	0.159E 05	0.161E 05	0.167E 05	0.129E 05	0.176E 05	0.179E 05	0.208E 05	0.364E 05	0.390E 05	0.336E 05
I124	0.139E 06	0.166E 06	0.126E 06	0.150E 06	0.131E 06	0.141E 06	0.143E 06	0.162E 06	0.196E 06	0.206E 06	0.187E 06
I125	0.110E 04	0.132E 04	0.580E 03	0.817E 03	0.403E 03	0.189E 04	0.126E 04	0.170E 04	0.548E 04	0.630E 04	0.460E 04
I126	0.508E 05	0.647E 05	0.469E 05	0.508E 05	0.468E 05	0.577E 05	0.542E 05	0.614E 05	0.800E 05	0.842E 05	0.763E 05
I129	0.657E 03	0.794E 03	0.348E 03	0.489E 03	0.242E 03	0.113E 04	0.757E 03	0.102E 04	0.329E 04	0.378E 04	0.276E 04
I130	0.243E 06	0.304E 06	0.225E 06	0.243E 06	0.221E 06	0.276E 06	0.258E 06	0.292E 06	0.381E 06	0.401E 06	0.363E 06
I131	0.446E 05	0.569E 05	0.417E 05	0.448E 05	0.413E 05	0.510E 05	0.481E 05	0.545E 05	0.717E 05	0.754E 05	0.684E 05

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
I132	0.286E 06	0.314E 06	0.255E 06	0.293E 06	0.241E 06	0.301E 06	0.285E 06	0.320E 06	0.391E 06	0.412E 06	0.366E 06
I133	0.836E 05	0.998E 05	0.756E 05	0.848E 05	0.752E 05	0.896E 05	0.859E 05	0.972E 05	0.121E 06	0.127E 06	0.115E 06
I134	0.315E 06	0.306E 06	0.271E 06	0.319E 06	0.240E 06	0.319E 06	0.296E 06	0.332E 06	0.390E 06	0.412E 06	0.359E 06
I135	0.257E 06	0.253E 06	0.216E 06	0.274E 06	0.221E 06	0.218E 06	0.235E 06	0.265E 06	0.293E 06	0.308E 06	0.276E 06
I136	0.403E 06	0.411E 06	0.355E 06	0.488E 06	0.380E 06	0.337E 06	0.390E 06	0.430E 06	0.460E 06	0.486E 06	0.434E 06
XE131M	0.752E 03	0.849E 03	0.573E 03	0.678E 03	0.429E 03	0.111E 04	0.877E 03	0.111E 04	0.294E 04	0.331E 04	0.253E 04
XE133M	0.276E 04	0.289E 04	0.275E 04	0.293E 04	0.214E 04	0.338E 04	0.326E 04	0.387E 04	0.768E 04	0.837E 04	0.692E 04
XE133	0.368E 04	0.357E 04	0.329E 04	0.332E 04	0.264E 04	0.417E 04	0.401E 04	0.463E 04	0.106E 05	0.115E 05	0.958E 04
XE135M	0.507E 05	0.651E 05	0.470E 05	0.506E 05	0.470E 05	0.580E 05	0.543E 05	0.616E 05	0.799E 05	0.840E 05	0.763E 05
XE135	0.246E 05	0.255E 05	0.266E 05	0.275E 05	0.213E 05	0.278E 05	0.290E 05	0.335E 05	0.563E 05	0.598E 05	0.523E 05
XE137	0.222E 05	0.272E 05	0.205E 05	0.235E 05	0.207E 05	0.239E 05	0.233E 05	0.263E 05	0.327E 05	0.343E 05	0.311E 05
XE138	0.984E 05	0.112E 06	0.957E 05	0.127E 06	0.988E 05	0.954E 05	0.106E 06	0.119E 06	0.141E 06	0.150E 06	0.133E 06
CS134	0.196E 06	0.213E 06	0.174E 06	0.197E 06	0.160E 06	0.210E 06	0.194E 06	0.218E 06	0.267E 06	0.282E 06	0.250E 06
CS135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS136	0.276E 06	0.261E 06	0.241E 06	0.283E 06	0.208E 06	0.278E 06	0.262E 06	0.294E 06	0.360E 06	0.381E 06	0.331E 06
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS138	0.298E 06	0.319E 06	0.269E 06	0.361E 06	0.284E 06	0.265E 06	0.296E 06	0.330E 06	0.360E 06	0.379E 06	0.339E 06
CS139	0.328E 05	0.327E 05	0.281E 05	0.383E 05	0.304E 05	0.265E 05	0.308E 05	0.341E 05	0.364E 05	0.384E 05	0.345E 05
BA133	0.383E 05	0.463E 05	0.363E 05	0.386E 05	0.341E 05	0.440E 05	0.419E 05	0.480E 05	0.723E 05	0.768E 05	0.677E 05
BA137M	0.667E 05	0.857E 05	0.620E 05	0.667E 05	0.619E 05	0.763E 05	0.715E 05	0.811E 05	0.105E 06	0.110E 06	0.100E 06
BA139	0.562E 04	0.570E 04	0.583E 04	0.628E 04	0.489E 04	0.594E 04	0.635E 04	0.734E 04	0.119E 05	0.126E 05	0.110E 05
BA140	0.222E 05	0.279E 05	0.210E 05	0.225E 05	0.204E 05	0.254E 05	0.241E 05	0.274E 05	0.372E 05	0.392E 05	0.354E 05
LA140	0.337E 06	0.345E 06	0.289E 06	0.370E 06	0.305E 06	0.285E 06	0.316E 06	0.357E 06	0.401E 06	0.421E 06	0.380E 06
CE141	0.809E 04	0.764E 04	0.753E 04	0.741E 04	0.608E 04	0.869E 04	0.875E 04	0.993E 04	0.215E 05	0.232E 05	0.197E 05
CE143	0.324E 05	0.347E 05	0.315E 05	0.340E 05	0.269E 05	0.362E 05	0.352E 05	0.403E 05	0.621E 05	0.661E 05	0.573E 05
CE144	0.184E 04	0.176E 04	0.169E 04	0.168E 04	0.137E 04	0.202E 04	0.200E 04	0.228E 04	0.504E 04	0.547E 04	0.461E 04

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
PR143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PR144	0.363E 04	0.450E 04	0.361E 04	0.488E 04	0.380E 04	0.379E 04	0.408E 04	0.451E 04	0.508E 04	0.537E 04	0.480E 04
ND147	0.149E 05	0.179E 05	0.139E 05	0.147E 05	0.131E 05	0.170E 05	0.162E 05	0.185E 05	0.291E 05	0.310E 05	0.271E 05
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM148M	0.240E 06	0.290E 06	0.220E 06	0.241E 06	0.212E 06	0.269E 06	0.251E 06	0.284E 06	0.365E 06	0.384E 06	0.345E 06
PM148	0.907E 05	0.946E 05	0.774E 05	0.961E 05	0.805E 05	0.802E 05	0.853E 05	0.965E 05	0.110E 06	0.115E 06	0.104E 06
SM151	0.172E-01	0.931E-01	0.123E-01	0.222E-01	0.613E-01	0.148E 00	0.494E-01	0.892E-01	0.552E 00	0.656E 00	0.448E 00
EU154	0.177E 06	0.179E 06	0.152E 06	0.184E 06	0.149E 06	0.164E 06	0.167E 06	0.189E 06	0.226E 06	0.238E 06	0.211E 06
EU155	0.649E 04	0.640E 04	0.609E 04	0.605E 04	0.501E 04	0.710E 04	0.716E 04	0.817E 04	0.183E 05	0.197E 05	0.166E 05
EU156	0.178E 06	0.192E 06	0.166E 06	0.218E 06	0.163E 06	0.178E 06	0.183E 06	0.203E 06	0.228E 06	0.241E 06	0.212E 06
GD162	0.501E 05	0.645E 05	0.466E 05	0.501E 05	0.466E 05	0.574E 05	0.538E 05	0.610E 05	0.790E 05	0.830E 05	0.755E 05
TB160	0.142E 06	0.135E 06	0.124E 06	0.145E 06	0.108E 06	0.143E 06	0.135E 06	0.151E 06	0.185E 06	0.156E 06	0.170E 06
TA182	0.181E 06	0.176E 06	0.154E 06	0.190E 06	0.149E 06	0.164E 06	0.168E 06	0.190E 06	0.229E 06	0.242E 06	0.212E 06
W185	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W187	0.197E 05	0.248E 05	0.183E 05	0.196E 05	0.180E 05	0.225E 05	0.212E 05	0.241E 05	0.339E 05	0.357E 05	0.320E 05
AU195M	0.190E 05	0.197E 05	0.206E 05	0.213E 05	0.164E 05	0.216E 05	0.227E 05	0.263E 05	0.468E 05	0.499E 05	0.431E 05
AU195	0.620E 04	0.777E 04	0.579E 04	0.625E 04	0.520E 04	0.793E 04	0.763E 04	0.914E 04	0.251E 05	0.271E 05	0.215E 05
AU198	0.480E 05	0.617E 05	0.446E 05	0.480E 05	0.446E 05	0.549E 05	0.515E 05	0.584E 05	0.757E 05	0.795E 05	0.723E 05
AU199	0.920E 04	0.952E 04	0.592E 04	0.102E 05	0.788E 04	0.105E 05	0.109E 05	0.127E 05	0.229E 05	0.245E 05	0.211E 05
HG197	0.432E 04	0.578E 04	0.406E 04	0.449E 04	0.373E 04	0.579E 04	0.550E 04	0.669E 04	0.191E 05	0.206E 05	0.161E 05
HG203	0.233E 05	0.238E 05	0.254E 05	0.261E 05	0.200E 05	0.263E 05	0.277E 05	0.321E 05	0.559E 05	0.595E 05	0.516E 05
TL204	0.693E 02	0.934E 02	0.646E 02	0.717E 02	0.598E 02	0.933E 02	0.884E 02	0.108E 03	0.311E 03	0.335E 03	0.262E 03
TL208	0.377E 06	0.485E 06	0.403E 06	0.580E 06	0.421E 06	0.415E 06	0.456E 06	0.495E 06	0.541E 06	0.576E 06	0.507E 06
TL210	0.456E 00	0.613E 00	0.425E 00	0.472E 00	0.393E 00	0.613E 00	0.581E 00	0.707E 00	0.204E 01	0.220E 01	0.172E 01
PB204M	0.269E 06	0.264E 06	0.233E 06	0.269E 06	0.201E 06	0.283E 06	0.255E 06	0.286E 06	0.341E 06	0.360E 06	0.313E 06
PB210	0.120E 03	0.165E 03	0.112E 03	0.124E 03	0.112E 03	0.161E 03	0.153E 03	0.190E 03	0.559E 03	0.605E 03	0.470E 03

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
PB212	0.138E 05	0.144E 05	0.148E 05	0.153E 05	0.118E 05	0.158E 05	0.165E 05	0.191E 05	0.353E 05	0.377E 05	0.323E 05
PB214	0.252E 05	0.299E 05	0.247E 05	0.262E 05	0.226E 05	0.287E 05	0.280E 05	0.321E 05	0.484E 05	0.512E 05	0.453E 05
BI210	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI212	0.144E 05	0.161E 05	0.127E 05	0.150E 05	0.128E 05	0.142E 05	0.142E 05	0.161E 05	0.194E 05	0.204E 05	0.184E 05
BI214	0.207E 06	0.225E 06	0.186E 06	0.241E 06	0.193E 06	0.193E 06	0.207E 06	0.231E 06	0.261E 06	0.275E 06	0.246E 06
PO214	0.146E 02	0.135E 02	0.125E 02	0.146E 02	0.104E 02	0.151E 02	0.135E 02	0.151E 02	0.177E 02	0.187E 02	0.161E 02
PO218	0.120E 02	0.112E 02	0.103E 02	0.120E 02	0.860E 01	0.125E 02	0.112E 02	0.125E 02	0.146E 02	0.155E 02	0.133E 02
RN220	0.426E 02	0.547E 02	0.396E 02	0.426E 02	0.396E 02	0.486E 02	0.456E 02	0.517E 02	0.668E 02	0.701E 02	0.639E 02
RN222	0.463E 02	0.596E 02	0.430E 02	0.463E 02	0.430E 02	0.529E 02	0.497E 02	0.563E 02	0.727E 02	0.764E 02	0.695E 02
RA224	0.999E 03	0.101E 04	0.109E 04	0.112E 04	0.854E 03	0.112E 04	0.118E 04	0.137E 04	0.235E 04	0.250E 04	0.218E 04
RA226	0.669E 03	0.675E 03	0.723E 03	0.741E 03	0.569E 03	0.749E 03	0.788E 03	0.911E 03	0.158E 04	0.169E 04	0.147E 04
RA228	0.857E 03	0.103E 04	0.453E 03	0.638E 03	0.315E 03	0.148E 04	0.987E 03	0.133E 04	0.428E 04	0.492E 04	0.359E 04
AC228	0.982E 05	0.967E 05	0.854E 05	0.101E 06	0.784E 05	0.960E 05	0.936E 05	0.105E 06	0.130E 06	0.138E 06	0.121E 06
TH228	0.242E 03	0.235E 03	0.240E 03	0.240E 03	0.199E 03	0.263E 03	0.271E 03	0.311E 03	0.626E 03	0.674E 03	0.577E 03
TH230	0.288E 02	0.356E 02	0.280E 02	0.298E 02	0.301E 02	0.360E 02	0.353E 02	0.443E 02	0.118E 03	0.129E 03	0.102E 03
TH231	0.145E 04	0.142E 04	0.134E 04	0.133E 04	0.115E 04	0.164E 04	0.159E 04	0.185E 04	0.426E 04	0.465E 04	0.386E 04
TH232	0.754E 01	0.113E 02	0.708E 01	0.780E 01	0.122E 02	0.103E 02	0.982E 01	0.141E 02	0.468E 02	0.520E 02	0.389E 02
TH234	0.727E 03	0.700E 03	0.683E 03	0.673E 03	0.560E 03	0.783E 03	0.794E 03	0.902E 03	0.198E 04	0.213E 04	0.181E 04
PA233	0.200E 05	0.204E 05	0.210E 05	0.215E 05	0.169E 05	0.223E 05	0.232E 05	0.267E 05	0.470E 05	0.501E 05	0.436E 05
PA234M	0.124E 04	0.116E 04	0.107E 04	0.124E 04	0.892E 03	0.129E 04	0.116E 04	0.130E 04	0.159E 04	0.169E 04	0.145E 04
PA234	0.362E 06	0.421E 06	0.368E 06	0.510E 06	0.366E 06	0.383E 06	0.410E 06	0.449E 06	0.509E 06	0.542E 06	0.473E 06
U232	0.219E 02	0.255E 02	0.205E 02	0.210E 02	0.255E 02	0.266E 02	0.256E 02	0.329E 02	0.927E 02	0.103E 03	0.802E 02
U233	0.745E 02	0.773E 02	0.781E 02	0.800E 02	0.670E 02	0.848E 02	0.875E 02	0.103E 03	0.203E 03	0.219E 03	0.184E 03
U234	0.134E 02	0.166E 02	0.126E 02	0.130E 02	0.180E 02	0.171E 02	0.161E 02	0.216E 02	0.649E 02	0.724E 02	0.555E 02
U235	0.148E 05	0.148E 05	0.157E 05	0.160E 05	0.124E 05	0.165E 05	0.172E 05	0.199E 05	0.357E 05	0.381E 05	0.330E 05
U236	0.270E 01	0.523E 01	0.254E 01	0.282E 01	0.907E 01	0.479E 01	0.387E 01	0.732E 01	0.301E 02	0.347E 02	0.246E 02

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
U237	0.132E 05	0.135E 05	0.133E 05	0.135E 05	0.109E 05	0.149E 05	0.152E 05	0.176E 05	0.359E 05	0.385E 05	0.326E 05
U238	0.543E 01	0.730E 01	0.511E 01	0.524E 01	0.103E 02	0.734E 01	0.663E 01	0.100E 02	0.337E 02	0.383E 02	0.285E 02
U240	0.455E 02	0.678E 02	0.426E 02	0.472E 02	0.668E 02	0.660E 02	0.598E 02	0.834E 02	0.278E 03	0.309E 03	0.231E 03
NP237	0.859E 04	0.830E 04	0.847E 04	0.846E 04	0.679E 04	0.933E 04	0.958E 04	0.109E 05	0.218E 05	0.235E 05	0.201E 05
NP238	0.732E 05	0.679E 05	0.627E 05	0.732E 05	0.523E 05	0.758E 05	0.679E 05	0.758E 05	0.888E 05	0.941E 05	0.810E 05
NP239	0.133E 05	0.132E 05	0.138E 05	0.139E 05	0.110E 05	0.147E 05	0.153E 05	0.176E 05	0.329E 05	0.352E 05	0.304E 05
NP240M	0.417E 05	0.478E 05	0.374E 05	0.428E 05	0.370E 05	0.430E 05	0.421E 05	0.476E 05	0.590E 05	0.620E 05	0.559E 05
PU236	0.444E 01	0.733E 01	0.417E 01	0.439E 01	0.125E 02	0.742E 01	0.592E 01	0.104E 02	0.410E 02	0.473E 02	0.340E 02
PU238	0.190E 01	0.414E 01	0.181E 01	0.192E 01	0.936E 01	0.372E 01	0.280E 01	0.636E 01	0.281E 02	0.329E 02	0.230E 02
PU239	0.145E 01	0.256E 01	0.121E 01	0.139E 01	0.399E 01	0.258E 01	0.197E 01	0.359E 01	0.144E 02	0.166E 02	0.118E 02
PU240	0.209E 01	0.407E 01	0.198E 01	0.210E 01	0.840E 01	0.374E 01	0.294E 01	0.609E 01	0.257E 02	0.299E 02	0.211E 02
PU241	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU242	0.121E 01	0.320E 01	0.116E 01	0.128E 01	0.768E 01	0.278E 01	0.197E 01	0.497E 01	0.232E 02	0.272E 02	0.188E 02
PU244	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AM241	0.137E 04	0.184E 04	0.127E 04	0.141E 04	0.119E 04	0.185E 04	0.175E 04	0.213E 04	0.620E 04	0.669E 04	0.522E 04
AM242	0.135E 04	0.128E 04	0.127E 04	0.124E 04	0.105E 04	0.145E 04	0.146E 04	0.166E 04	0.362E 04	0.391E 04	0.333E 04
AM243	0.309E 04	0.416E 04	0.288E 04	0.320E 04	0.267E 04	0.416E 04	0.394E 04	0.480E 04	0.139E 05	0.150E 05	0.117E 05
CM242	0.131E 01	0.348E 01	0.125E 01	0.136E 01	0.872E 01	0.302E 01	0.211E 01	0.551E 01	0.258E 02	0.304E 02	0.210E 02
CM243	0.128E 05	0.126E 05	0.132E 05	0.133E 05	0.105E 05	0.141E 05	0.146E 05	0.168E 05	0.315E 05	0.337E 05	0.292E 05
CM244	0.506E 03	0.592E 03	0.474E 03	0.498E 03	0.417E 03	0.619E 03	0.603E 03	0.714E 03	0.186E 04	0.201E 04	0.162E 04
CF252	0.730E 05	0.775E 05	0.644E 05	0.773E 05	0.652E 05	0.675E 05	0.716E 05	0.806E 05	0.998E 05	0.105E 06	0.945E 05

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
H3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE7	0.753E 04	0.276E 04	0.460E 04	0.919E 04	0.919E 04	0.795E 04	0.837E 04	0.460E 04	0.793E 04	0.502E 04	0.753E 04
C11	0.156E 06	0.572E 05	0.953E 05	0.191E 06	0.191E 06	0.165E 06	0.173E 06	0.953E 05	0.164E 06	0.104E 06	0.156E 06
C14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N13	0.156E 06	0.572E 05	0.953E 05	0.191E 06	0.191E 06	0.165E 06	0.173E 06	0.953E 05	0.164E 06	0.104E 06	0.156E 06
O15	0.156E 06	0.572E 05	0.954E 05	0.191E 06	0.191E 06	0.165E 06	0.174E 06	0.954E 05	0.165E 06	0.104E 06	0.156E 06
F18	0.151E 06	0.554E 05	0.923E 05	0.185E 06	0.185E 06	0.160E 06	0.168E 06	0.923E 05	0.159E 06	0.101E 06	0.151E 06
NA22	0.360E 06	0.255E 06	0.275E 06	0.402E 06	0.411E 06	0.397E 06	0.321E 06	0.290E 06	0.367E 06	0.243E 06	0.360E 06
NA24	0.656E 06	0.669E 06	0.646E 06	0.682E 06	0.771E 06	0.531E 06	0.390E 06	0.662E 06	0.629E 06	0.496E 06	0.656E 06
MG28	0.218E 06	0.179E 06	0.187E 06	0.235E 06	0.251E 06	0.239E 06	0.178E 06	0.186E 06	0.209E 06	0.148E 06	0.218E 06
AL28	0.304E 06	0.284E 06	0.263E 06	0.319E 06	0.332E 06	0.346E 06	0.228E 06	0.284E 06	0.304E 06	0.207E 06	0.304E 06
P32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL36	0.155E-01	0.199E-02	0.273E-02	0.692E-02	0.860E 00	0.946E-02	0.335E-01	0.567E-06	0.191E-02	0.377E-06	0.462E-01
CL38	0.238E 06	0.242E 06	0.233E 06	0.248E 06	0.279E 06	0.196E 06	0.143E 06	0.240E 06	0.228E 06	0.179E 06	0.238E 06
A37	0.913E 00	0.118E 00	0.161E 00	0.408E 00	0.507E 02	0.558E 00	0.198E 01	0.334E-04	0.113E 00	0.223E-04	0.272E 01
A39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K40	0.267E 05	0.249E 05	0.231E 05	0.280E 05	0.292E 05	0.304E 05	0.200E 05	0.249E 05	0.267E 05	0.182E 05	0.267E 05
K42	0.471E 05	0.439E 05	0.407E 05	0.494E 05	0.515E 05	0.533E 05	0.353E 05	0.439E 05	0.470E 05	0.321E 05	0.471E 05
K43	0.150E 06	0.560E 05	0.929E 05	0.183E 06	0.184E 06	0.158E 06	0.167E 06	0.922E 05	0.157E 06	0.100E 06	0.150E 06
CA45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CA47	0.180E 06	0.162E 06	0.155E 06	0.190E 06	0.199E 06	0.203E 06	0.138E 06	0.164E 06	0.178E 06	0.123E 06	0.180E 06
CA49	0.544E 06	0.544E 06	0.947E 06	0.544E 06	0.590E 06	0.498E 06	0.326E 06	0.906E 06	0.947E 06	0.417E 06	0.544E 06
SC46	0.291E 06	0.178E 06	0.291E 06	0.319E 06	0.376E 06	0.291E 06	0.263E 06	0.197E 06	0.216E 06	0.207E 06	0.291E 06
SC47	0.158E 05	0.938E 04	0.102E 05	0.261E 05	0.209E 05	0.141E 05	0.225E 05	0.141E 05	0.165E 05	0.104E 05	0.172E 05
SC49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CR51	0.449E 04	0.267E 04	0.290E 04	0.740E 04	0.612E 04	0.400E 04	0.640E 04	0.400E 04	0.468E 04	0.296E 04	0.490E 04
MN52M	0.401E 06	0.290E 06	0.309E 06	0.446E 06	0.457E 06	0.444E 06	0.354E 06	0.326E 06	0.409E 06	0.271E 06	0.401E 06
MN52	0.540E 06	0.381E 06	0.449E 06	0.598E 06	0.635E 06	0.585E 06	0.477E 06	0.425E 06	0.514E 06	0.370E 06	0.540E 06
MN54	0.121E 06	0.741E 05	0.121E 06	0.133E 06	0.156E 06	0.121E 06	0.109E 06	0.819E 05	0.897E 05	0.858E 05	0.121E 06

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
FE52	0.110E 06	0.454E 05	0.682E 05	0.144E 06	0.137E 06	0.113E 06	0.130E 06	0.736E 05	0.116E 06	0.734E 05	0.112E 06
FE55	0.514E 01	0.663E 00	0.906E 00	0.230E 01	0.286E 03	0.314E 01	0.111E 02	0.188E-03	0.634E 00	0.125E-03	0.153E 02
FE59	0.188E 06	0.146E 06	0.174E 06	0.202E 06	0.223E 06	0.201E 06	0.155E 06	0.152E 06	0.165E 06	0.130E 06	0.188E 06
CO56	0.576E 06	0.488E 06	0.598E 06	0.613E 06	0.677E 06	0.560E 06	0.431E 06	0.558E 06	0.592E 06	0.415E 06	0.576E 06
CO57	0.169E 05	0.828E 04	0.102E 05	0.347E 05	0.234E 05	0.119E 05	0.183E 05	0.102E 05	0.238E 05	0.808E 04	0.196E 05
CO58	0.142E 06	0.820E 05	0.133E 06	0.159E 06	0.182E 06	0.144E 06	0.133E 06	0.953E 05	0.113E 06	0.100E 06	0.142E 06
CO60	0.398E 06	0.316E 06	0.366E 06	0.425E 06	0.468E 06	0.429E 06	0.324E 06	0.327E 06	0.354E 06	0.276E 06	0.398E 06
NI56	0.260E 06	0.164E 06	0.230E 06	0.307E 06	0.327E 06	0.263E 06	0.253E 06	0.192E 06	0.223E 06	0.180E 06	0.263E 06
NI63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CU64	0.303E 05	0.119E 05	0.188E 05	0.367E 05	0.370E 05	0.321E 05	0.331E 05	0.189E 05	0.318E 05	0.202E 05	0.303E 05
ZN65	0.839E 05	0.509E 05	0.831E 05	0.923E 05	0.109E 06	0.841E 05	0.763E 05	0.567E 05	0.630E 05	0.595E 05	0.840E 05
ZN69M	0.637E 05	0.233E 05	0.389E 05	0.778E 05	0.778E 05	0.673E 05	0.708E 05	0.389E 05	0.671E 05	0.425E 05	0.637E 05
ZN69	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA67	0.259E 05	0.137E 05	0.164E 05	0.426E 05	0.345E 05	0.229E 05	0.332E 05	0.200E 05	0.290E 05	0.161E 05	0.281E 05
GA68	0.144E 06	0.549E 05	0.909E 05	0.176E 06	0.177E 06	0.152E 06	0.159E 06	0.889E 05	0.150E 06	0.967E 05	0.144E 06
GE77	0.146E 06	0.789E 05	0.106E 06	0.188E 06	0.182E 06	0.145E 06	0.161E 06	0.107E 06	0.143E 06	0.989E 05	0.149E 06
AS76	0.683E 05	0.371E 05	0.477E 05	0.797E 05	0.812E 05	0.723E 05	0.677E 05	0.486E 05	0.704E 05	0.462E 05	0.683E 05
AS77	0.116E 04	0.606E 03	0.735E 03	0.178E 04	0.149E 04	0.108E 04	0.153E 04	0.924E 03	0.123E 04	0.759E 03	0.123E 04
SE75	0.853E 05	0.592E 05	0.617E 05	0.122E 06	0.105E 06	0.834E 05	0.927E 05	0.721E 05	0.917E 05	0.550E 05	0.901E 05
SE77M	0.117E 05	0.692E 04	0.753E 04	0.192E 05	0.159E 05	0.104E 05	0.166E 05	0.104E 05	0.122E 05	0.768E 04	0.127E 05
BR80M	0.117E 04	0.444E 03	0.164E 03	0.189E 04	0.444E 04	0.434E 03	0.174E 04	0.643E 03	0.129E 04	0.156E 03	0.132E 04
BR80	0.129E 05	0.482E 04	0.791E 04	0.157E 05	0.158E 05	0.136E 05	0.143E 05	0.792E 04	0.136E 05	0.859E 04	0.129E 05
BR82	0.412E 06	0.255E 06	0.345E 06	0.463E 06	0.501E 06	0.434E 06	0.383E 06	0.298E 06	0.375E 06	0.284E 06	0.412E 06
BR83	0.119E 04	0.420E 03	0.698E 03	0.142E 04	0.350E 04	0.121E 04	0.135E 04	0.689E 03	0.119E 04	0.752E 03	0.126E 04
BR84	0.293E 06	0.264E 06	0.366E 06	0.307E 06	0.347E 06	0.254E 06	0.198E 06	0.336E 06	0.343E 06	0.221E 06	0.293E 06
KR79	0.352E 05	0.153E 05	0.228E 05	0.453E 05	0.447E 05	0.358E 05	0.403E 05	0.236E 05	0.361E 05	0.234E 05	0.358E 05

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
KR83M	0.364E 02	0.339E 01	0.427E 01	0.292E 02	0.507E 03	0.449E 01	0.363E 02	0.161E 01	0.323E 01	0.342E 00	0.499E 02
KR85M	0.222E 05	0.131E 05	0.143E 05	0.365E 05	0.294E 05	0.197E 05	0.316E 05	0.197E 05	0.231E 05	0.146E 05	0.241E 05
KR85	0.315E 03	0.115E 03	0.192E 03	0.384E 03	0.384E 03	0.332E 03	0.350E 03	0.192E 03	0.332E 03	0.210E 03	0.315E 03
KR87	0.120E 06	0.984E 05	0.112E 06	0.130E 06	0.145E 06	0.991E 05	0.873E 05	0.108E 06	0.116E 06	0.888E 05	0.120E 06
KR88	0.309E 06	0.307E 06	0.311E 06	0.329E 06	0.374E 06	0.226E 06	0.188E 06	0.308E 06	0.287E 06	0.237E 06	0.310E 06
RB84	0.129E 06	0.722E 05	0.117E 06	0.146E 06	0.165E 06	0.130E 06	0.123E 06	0.863E 05	0.107E 06	0.906E 05	0.129E 06
RB86	0.137E 05	0.841E 04	0.137E 05	0.151E 05	0.177E 05	0.137E 05	0.124E 05	0.930E 04	0.102E 05	0.974E 04	0.137E 05
RB88	0.104E 06	0.102E 06	0.111E 06	0.109E 06	0.127E 06	0.751E 05	0.616E 05	0.105E 06	0.976E 05	0.808E 05	0.104E 06
RB89	0.373E 06	0.319E 06	0.365E 06	0.397E 06	0.445E 06	0.349E 06	0.274E 06	0.336E 06	0.346E 06	0.271E 06	0.373E 06
RB90	0.427E 06	0.396E 06	0.667E 06	0.436E 06	0.482E 06	0.394E 06	0.280E 06	0.616E 06	0.644E 06	0.322E 06	0.427E 06
SR85	0.782E 05	0.286E 05	0.477E 05	0.955E 05	0.969E 05	0.825E 05	0.869E 05	0.477E 05	0.823E 05	0.521E 05	0.783E 05
SR87M	0.504E 05	0.185E 05	0.308E 05	0.616E 05	0.616E 05	0.532E 05	0.560E 05	0.308E 05	0.531E 05	0.336E 05	0.504E 05
SR89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR91	0.113E 06	0.628E 05	0.919E 05	0.128E 06	0.139E 06	0.117E 06	0.109E 06	0.774E 05	0.103E 06	0.774E 05	0.113E 06
SR92	0.215E 06	0.198E 06	0.184E 06	0.226E 06	0.235E 06	0.244E 06	0.163E 06	0.199E 06	0.215E 06	0.146E 06	0.215E 06
SR93	0.229E 06	0.128E 06	0.181E 06	0.267E 06	0.281E 06	0.238E 06	0.226E 06	0.160E 06	0.214E 06	0.156E 06	0.229E 06
Y87	0.712E 05	0.260E 05	0.434E 05	0.869E 05	0.887E 05	0.751E 05	0.791E 05	0.434E 05	0.749E 05	0.474E 05	0.713E 05
Y88	0.404E 06	0.376E 06	0.418E 06	0.426E 06	0.503E 06	0.299E 06	0.254E 06	0.379E 06	0.354E 06	0.311E 06	0.404E 06
Y90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y91M	0.799E 05	0.293E 05	0.488E 05	0.975E 05	0.976E 05	0.843E 05	0.887E 05	0.488E 05	0.842E 05	0.532E 05	0.799E 05
Y91	0.414E 03	0.386E 03	0.357E 03	0.434E 03	0.452E 03	0.470E 03	0.310E 03	0.386E 03	0.414E 03	0.282E 03	0.414E 03
Y92	0.378E 05	0.263E 05	0.347E 05	0.413E 05	0.462E 05	0.391E 05	0.327E 05	0.287E 05	0.325E 05	0.264E 05	0.378E 05
Y93	0.112E 05	0.897E 04	0.101E 05	0.137E 05	0.141E 05	0.929E 04	0.985E 04	0.101E 05	0.104E 05	0.817E 04	0.115E 05
ZR95	0.108E 06	0.541E 05	0.890E 05	0.124E 06	0.136E 06	0.110E 06	0.107E 06	0.698E 05	0.950E 05	0.744E 05	0.108E 06
ZR97	0.279E 05	0.185E 05	0.231E 05	0.316E 05	0.336E 05	0.291E 05	0.255E 05	0.213E 05	0.263E 05	0.193E 05	0.280E 05

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
NB95M	0.807E 04	0.479E 04	0.522E 04	0.133E 05	0.106E 05	0.719E 04	0.115E 05	0.719E 04	0.842E 04	0.532E 04	0.878E 04
NB95	0.111E 06	0.678E 05	0.111E 06	0.121E 06	0.143E 06	0.111E 06	0.100E 06	0.750E 05	0.821E 05	0.786E 05	0.111E 06
NB97M	0.112E 06	0.409E 05	0.682E 05	0.136E 06	0.136E 06	0.118E 06	0.124E 06	0.682E 05	0.118E 06	0.745E 05	0.112E 06
NB97	0.102E 06	0.382E 05	0.630E 05	0.124E 06	0.124E 06	0.107E 06	0.112E 06	0.625E 05	0.107E 06	0.679E 05	0.102E 06
MO99	0.241E 05	0.106E 05	0.169E 05	0.295E 05	0.303E 05	0.247E 05	0.261E 05	0.155E 05	0.235E 05	0.162E 05	0.242E 05
TC99M	0.174E 05	0.856E 04	0.105E 05	0.360E 05	0.235E 05	0.122E 05	0.188E 05	0.105E 05	0.246E 05	0.828E 04	0.202E 05
TC99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RU103	0.738E 05	0.271E 05	0.451E 05	0.902E 05	0.905E 05	0.779E 05	0.821E 05	0.451E 05	0.778E 05	0.492E 05	0.739E 05
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH103M	0.578E 02	0.982E 01	0.127E 02	0.616E 02	0.327E 03	0.612E 01	0.886E 02	0.541E 01	0.240E 02	0.807E 00	0.635E 02
RH105	0.110E 05	0.655E 04	0.713E 04	0.182E 05	0.146E 05	0.983E 04	0.157E 05	0.982E 04	0.115E 05	0.728E 04	0.120E 05
RH106	0.284E 05	0.111E 05	0.180E 05	0.347E 05	0.348E 05	0.299E 05	0.311E 05	0.176E 05	0.296E 05	0.190E 05	0.285E 05
PD103	0.256E 03	0.163E 03	0.135E 03	0.519E 03	0.392E 03	0.194E 03	0.267E 03	0.185E 03	0.289E 03	0.746E 02	0.289E 03
AG110M	0.420E 06	0.258E 06	0.349E 06	0.473E 06	0.510E 06	0.443E 06	0.392E 06	0.303E 06	0.384E 06	0.289E 06	0.420E 06
AG111	0.432E 04	0.256E 04	0.279E 04	0.714E 04	0.571E 04	0.384E 04	0.615E 04	0.384E 04	0.452E 04	0.285E 04	0.471E 04
CD111M	0.560E 05	0.311E 05	0.353E 05	0.101E 06	0.742E 05	0.458E 05	0.725E 05	0.438E 05	0.662E 05	0.331E 05	0.624E 05
CD113M	0.497E 02	0.288E 02	0.313E 02	0.812E 02	0.718E 02	0.429E 02	0.710E 02	0.430E 02	0.511E 02	0.316E 02	0.541E 02
CD115M	0.506E 04	0.370E 04	0.469E 04	0.549E 04	0.611E 04	0.536E 04	0.431E 04	0.394E 04	0.436E 04	0.353E 04	0.507E 04
IN113M	0.386E 05	0.141E 05	0.236E 05	0.471E 05	0.471E 05	0.408E 05	0.429E 05	0.236E 05	0.407E 05	0.257E 05	0.386E 05
IN114M	0.115E 05	0.512E 04	0.700E 04	0.158E 05	0.156E 05	0.111E 05	0.142E 05	0.805E 04	0.119E 05	0.738E 04	0.119E 05
IN114	0.409E 03	0.336E 03	0.327E 03	0.442E 03	0.506E 03	0.445E 03	0.340E 03	0.351E 03	0.406E 03	0.268E 03	0.410E 03
IN115M	0.191E 05	0.112E 05	0.122E 05	0.313E 05	0.264E 05	0.167E 05	0.272E 05	0.167E 05	0.198E 05	0.124E 05	0.208E 05
SN113	0.153E 04	0.546E 03	0.633E 03	0.202E 04	0.545E 04	0.690E 03	0.227E 04	0.678E 03	0.105E 04	0.461E 03	0.167E 04
SN119M	0.564E 03	0.175E 03	0.937E 02	0.815E 03	0.203E 04	0.155E 03	0.848E 03	0.226E 03	0.499E 03	0.534E 02	0.614E 03
SN123	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SN125	0.460E 05	0.321E 05	0.454E 05	0.504E 05	0.583E 05	0.432E 05	0.387E 05	0.346E 05	0.367E 05	0.332E 05	0.460E 05

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
SB122	0.631E 05	0.237E 05	0.394E 05	0.768E 05	0.773E 05	0.665E 05	0.696E 05	0.387E 05	0.658E 05	0.421E 05	0.631E 05
SB124	0.297E 06	0.212E 06	0.232E 06	0.332E 06	0.343E 06	0.318E 06	0.261E 06	0.241E 06	0.301E 06	0.203E 06	0.297E 06
SB125	0.663E 05	0.248E 05	0.397E 05	0.827E 05	0.833E 05	0.684E 05	0.749E 05	0.409E 05	0.700E 05	0.432E 05	0.666E 05
SB127	0.100E 06	0.428E 05	0.688E 05	0.122E 06	0.124E 06	0.104E 06	0.108E 06	0.639E 05	0.998E 05	0.676E 05	0.101E 06
TE123M	0.199E 05	0.116E 05	0.123E 05	0.328E 05	0.275E 05	0.171E 05	0.284E 05	0.174E 05	0.208E 05	0.126E 05	0.216E 05
TE125M	0.267E 04	0.104E 04	0.381E 03	0.443E 04	0.663E 04	0.997E 03	0.396E 04	0.152E 04	0.306E 04	0.386E 03	0.290E 04
TE127M	0.669E 03	0.260E 03	0.947E 02	0.111E 04	0.170E 04	0.250E 03	0.995E 03	0.382E 03	0.767E 03	0.960E 02	0.728E 03
TE127	0.617E 03	0.234E 03	0.376E 03	0.770E 03	0.759E 03	0.644E 03	0.696E 03	0.385E 03	0.650E 03	0.409E 03	0.620E 03
TE129M	0.514E 04	0.196E 04	0.295E 04	0.651E 04	0.705E 04	0.501E 04	0.588E 04	0.313E 04	0.541E 04	0.312E 04	0.519E 04
TE129	0.966E 04	0.412E 04	0.642E 04	0.119E 05	0.124E 05	0.978E 04	0.107E 05	0.616E 04	0.968E 04	0.632E 04	0.974E 04
TE131M	0.207E 06	0.138E 06	0.193E 06	0.237E 06	0.261E 06	0.203E 06	0.189E 06	0.154E 06	0.173E 06	0.145E 06	0.209E 06
TE131	0.607E 05	0.309E 05	0.462E 05	0.833E 05	0.774E 05	0.576E 05	0.618E 05	0.393E 05	0.619E 05	0.386E 05	0.630E 05
TE132	0.289E 05	0.172E 05	0.185E 05	0.483E 05	0.383E 05	0.254E 05	0.406E 05	0.254E 05	0.304E 05	0.186E 05	0.315E 05
I123	0.224E 05	0.125E 05	0.135E 05	0.362E 05	0.316E 05	0.193E 05	0.315E 05	0.189E 05	0.236E 05	0.138E 05	0.242E 05
I124	0.171E 06	0.999E 05	0.122E 06	0.198E 06	0.204E 06	0.178E 06	0.164E 06	0.126E 06	0.175E 06	0.116E 06	0.171E 06
I125	0.309E 04	0.120E 04	0.416E 03	0.511E 04	0.771E 04	0.114E 04	0.460E 04	0.176E 04	0.353E 04	0.429E 03	0.335E 04
I126	0.654E 05	0.248E 05	0.401E 05	0.799E 05	0.809E 05	0.685E 05	0.724E 05	0.403E 05	0.686E 05	0.432E 05	0.655E 05
I129	0.185E 04	0.716E 03	0.250E 03	0.306E 04	0.462E 04	0.681E 03	0.276E 04	0.106E 04	0.212E 04	0.257E 03	0.201E 04
I130	0.309E 06	0.119E 06	0.197E 06	0.381E 06	0.380E 06	0.323E 06	0.339E 06	0.190E 06	0.322E 06	0.206E 06	0.310E 06
I131	0.577E 05	0.217E 05	0.352E 05	0.717E 05	0.708E 05	0.603E 05	0.648E 05	0.358E 05	0.609E 05	0.383E 05	0.579E 05
I132	0.340E 06	0.184E 06	0.273E 06	0.392E 06	0.422E 06	0.351E 06	0.333E 06	0.232E 06	0.313E 06	0.233E 06	0.340E 06
I133	0.103E 06	0.483E 05	0.711E 05	0.122E 06	0.125E 06	0.109E 06	0.107E 06	0.678E 05	0.104E 06	0.693E 05	0.103E 06
I134	0.353E 06	0.220E 06	0.332E 06	0.391E 06	0.445E 06	0.361E 06	0.321E 06	0.247E 06	0.285E 06	0.248E 06	0.353E 06
I135	0.280E 06	0.230E 06	0.252E 06	0.298E 06	0.324E 06	0.305E 06	0.225E 06	0.237E 06	0.257E 06	0.193E 06	0.280E 06
I136	0.450E 06	0.429E 06	0.439E 06	0.474E 06	0.517E 06	0.419E 06	0.304E 06	0.451E 06	0.459E 06	0.328E 06	0.450E 06
XE131M	0.169E 04	0.743E 03	0.453E 03	0.278E 04	0.372E 04	0.851E 03	0.248E 04	0.110E 04	0.188E 04	0.464E 03	0.183E 04

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
XE133M	0.456E 04	0.244E 04	0.229E 04	0.752E 04	0.756E 04	0.338E 04	0.658E 04	0.365E 04	0.489E 04	0.233E 04	0.496E 04
XE133	0.527E 04	0.248E 04	0.265E 04	0.104E 05	0.836E 04	0.331E 04	0.616E 04	0.315E 04	0.713E 04	0.213E 04	0.603E 04
XE135M	0.653E 05	0.239E 05	0.397E 05	0.799E 05	0.801E 05	0.687E 05	0.727E 05	0.399E 05	0.688E 05	0.434E 05	0.653E 05
XE135	0.348E 05	0.201E 05	0.224E 05	0.562E 05	0.458E 05	0.314E 05	0.487E 05	0.302E 05	0.363E 05	0.229E 05	0.376E 05
XE137	0.278E 05	0.138E 05	0.192E 05	0.328E 05	0.336E 05	0.287E 05	0.282E 05	0.190E 05	0.284E 05	0.189E 05	0.278E 05
XE138	0.124E 06	0.106E 06	0.107E 06	0.144E 06	0.149E 06	0.111E 06	0.100E 06	0.114E 06	0.123E 06	0.887E 05	0.126E 06
CS134	0.232E 06	0.118E 06	0.188E 06	0.268E 06	0.290E 06	0.239E 06	0.231E 06	0.152E 06	0.208E 06	0.160E 06	0.232E 06
CS135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS136	0.313E 06	0.203E 06	0.295E 06	0.361E 06	0.397E 06	0.314E 06	0.294E 06	0.229E 06	0.253E 06	0.218E 06	0.316E 06
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS138	0.346E 06	0.308E 06	0.318E 06	0.368E 06	0.402E 06	0.335E 06	0.251E 06	0.317E 06	0.332E 06	0.248E 06	0.346E 06
CS139	0.357E 05	0.339E 05	0.345E 05	0.375E 05	0.406E 05	0.347E 05	0.246E 05	0.358E 05	0.370E 05	0.257E 05	0.357E 05
BA133	0.515E 05	0.217E 05	0.305E 05	0.718E 05	0.677E 05	0.496E 05	0.609E 05	0.340E 05	0.559E 05	0.320E 05	0.533E 05
BA137M	0.858E 05	0.314E 05	0.523E 05	0.105E 06	0.105E 06	0.905E 05	0.954E 05	0.524E 05	0.905E 05	0.571E 05	0.859E 05
BA139	0.766E 04	0.493E 04	0.515E 04	0.119E 05	0.996E 04	0.706E 04	0.101E 05	0.683E 04	0.795E 04	0.502E 04	0.823E 04
BA140	0.291E 05	0.115E 05	0.177E 05	0.372E 05	0.365E 05	0.299E 05	0.336E 05	0.187E 05	0.307E 05	0.192E 05	0.295E 05
LA140	0.375E 06	0.312E 06	0.323E 06	0.409E 06	0.430E 06	0.406E 06	0.306E 06	0.326E 06	0.363E 06	0.258E 06	0.376E 06
CE141	0.105E 05	0.509E 04	0.608E 04	0.214E 05	0.145E 05	0.715E 04	0.115E 05	0.629E 04	0.147E 05	0.482E 04	0.121E 05
CE143	0.430E 05	0.232E 05	0.300E 05	0.617E 05	0.574E 05	0.402E 05	0.523E 05	0.326E 05	0.423E 05	0.276E 05	0.451E 05
CE144	0.247E 04	0.120E 04	0.137E 04	0.501E 04	0.361E 04	0.164E 04	0.277E 04	0.149E 04	0.342E 04	0.108E 04	0.285E 04
PR143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PR144	0.471E 04	0.380E 04	0.410E 04	0.518E 04	0.565E 04	0.403E 04	0.354E 04	0.415E 04	0.464E 04	0.345E 04	0.471E 04
ND147	0.199E 05	0.822E 04	0.116E 05	0.288E 05	0.264E 05	0.186E 05	0.228E 05	0.125E 05	0.224E 05	0.118E 05	0.208E 05
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM148M	0.301E 06	0.125E 06	0.205E 06	0.364E 06	0.372E 06	0.313E 06	0.325E 06	0.189E 06	0.300E 06	0.202E 06	0.302E 06
PM148	0.102E 06	0.758E 05	0.845E 05	0.112E 06	0.118E 06	0.111E 06	0.874E 05	0.826E 05	0.981E 05	0.695E 05	0.102E 06

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
SM151	0.515E 00	0.825E-01	0.113E 00	0.514E 00	0.511E 01	0.722E-01	0.817E 00	0.369E-01	0.191E 00	0.468E-02	0.647E 00
EU154	0.199E 06	0.141E 06	0.171E 06	0.228E 06	0.239E 06	0.210E 06	0.176E 06	0.155E 06	0.185E 06	0.135E 06	0.201E 06
EU155	0.861E 04	0.454E 04	0.506E 04	0.181E 05	0.120E 05	0.599E 04	0.921E 04	0.540E 04	0.118E 05	0.370E 04	0.100E 05
EU156	0.213E 06	0.173E 06	0.204E 06	0.231E 06	0.261E 06	0.193E 06	0.162E 06	0.181E 06	0.189E 06	0.155E 06	0.214E 06
GD162	0.646E 05	0.237E 05	0.393E 05	0.790E 05	0.792E 05	0.681E 05	0.718E 05	0.394E 05	0.681E 05	0.429E 05	0.646E 05
TB160	0.161E 06	0.105E 06	0.151E 06	0.186E 06	0.204E 06	0.161E 06	0.149E 06	0.117E 06	0.131E 06	0.112E 06	0.162E 06
TA182	0.201E 06	0.153E 06	0.182E 06	0.230E 06	0.244E 06	0.210E 06	0.173E 06	0.162E 06	0.180E 06	0.136E 06	0.204E 06
W185	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W187	0.256E 05	0.994E 04	0.155E 05	0.337E 05	0.318E 05	0.260E 05	0.283E 05	0.158E 05	0.277E 05	0.163E 05	0.260E 05
AU195M	0.275E 05	0.165E 05	0.175E 05	0.465E 05	0.375E 05	0.241E 05	0.384E 05	0.242E 05	0.289E 05	0.172E 05	0.301E 05
AU195	0.105E 05	0.713E 04	0.553E 04	0.234E 05	0.175E 05	0.719E 04	0.109E 05	0.766E 04	0.126E 05	0.251E 04	0.123E 05
AU198	0.618E 05	0.228E 05	0.378E 05	0.756E 05	0.756E 05	0.651E 05	0.686E 05	0.378E 05	0.650E 05	0.411E 05	0.618E 05
AU199	0.133E 05	0.797E 04	0.842E 04	0.227E 05	0.181E 05	0.115E 05	0.183E 05	0.116E 05	0.141E 05	0.817E 04	0.146E 05
HG197	0.786E 04	0.560E 04	0.403E 04	0.176E 05	0.135E 05	0.539E 04	0.811E 04	0.596E 04	0.902E 04	0.158E 04	0.921E 04
HG203	0.333E 05	0.199E 05	0.214E 05	0.557E 05	0.444E 05	0.295E 05	0.471E 05	0.295E 05	0.349E 05	0.215E 05	0.364E 05
TL204	0.127E 03	0.909E 02	0.647E 02	0.287E 03	0.218E 03	0.863E 02	0.130E 03	0.957E 02	0.146E 03	0.240E 02	0.149E 03
TL208	0.516E 06	0.475E 06	0.498E 06	0.555E 06	0.631E 06	0.371E 06	0.329E 06	0.493E 06	0.490E 06	0.396E 06	0.516E 06
TL210	0.832E 00	0.597E 00	0.425E 00	0.188E 01	0.134E 01	0.567E 00	0.848E 00	0.629E 00	0.959E 00	0.158E 00	0.974E 00
PB204M	0.305E 06	0.174E 06	0.285E 06	0.341E 06	0.390E 06	0.308E 06	0.286E 06	0.203E 06	0.242E 06	0.214E 06	0.305E 06
PB210	0.248E 03	0.159E 03	0.115E 03	0.515E 03	0.878E 03	0.153E 03	0.254E 03	0.165E 03	0.253E 03	0.414E 02	0.300E 03
PB212	0.201E 05	0.121E 05	0.126E 05	0.349E 05	0.274E 05	0.172E 05	0.273E 05	0.173E 05	0.216E 05	0.120E 05	0.221E 05
PB214	0.338E 05	0.157E 05	0.211E 05	0.481E 05	0.434E 05	0.330E 05	0.408E 05	0.240E 05	0.357E 05	0.216E 05	0.352E 05
BI210	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI212	0.170E 05	0.102E 05	0.129E 05	0.196E 05	0.205E 05	0.182E 05	0.163E 05	0.125E 05	0.167E 05	0.115E 05	0.171E 05
BI214	0.243E 06	0.192E 06	0.211E 06	0.266E 06	0.286E 06	0.242E 06	0.196E 06	0.206E 06	0.232E 06	0.171E 06	0.243E 06
PO214	0.161E 02	0.988E 01	0.161E 02	0.177E 02	0.208E 02	0.161E 02	0.146E 02	0.109E 02	0.120E 02	0.114E 02	0.161E 02

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
PO218	0.133E 02	0.817E 01	0.133E 02	0.146E 02	0.172E 02	0.133E 02	0.120E 02	0.903E 01	0.989E 01	0.946E 01	0.133E 02
RN220	0.547E 02	0.200E 02	0.334E 02	0.668E 02	0.668E 02	0.578E 02	0.608E 02	0.334E 02	0.577E 02	0.365E 02	0.547E 02
RN222	0.596E 02	0.218E 02	0.364E 02	0.727E 02	0.727E 02	0.629E 02	0.662E 02	0.364E 02	0.628E 02	0.397E 02	0.596E 02
RA224	0.141E 04	0.834E 03	0.912E 03	0.235E 04	0.188E 04	0.125E 04	0.200E 04	0.125E 04	0.149E 04	0.924E 03	0.154E 04
RA226	0.943E 03	0.552E 03	0.606E 03	0.158E 04	0.126E 04	0.826E 03	0.132E 04	0.819E 03	0.101E 04	0.609E 03	0.103E 04
RA228	0.241E 04	0.934E 03	0.325E 03	0.399E 04	0.591E 04	0.886E 03	0.359E 04	0.138E 04	0.276E 04	0.335E 03	0.261E 04
AC228	0.112E 06	0.746E 05	0.996E 05	0.131E 06	0.139E 06	0.114E 06	0.103E 06	0.836E 05	0.979E 05	0.763E 05	0.113E 06
TH228	0.338E 03	0.170E 03	0.199E 03	0.625E 03	0.660E 03	0.246E 03	0.401E 03	0.225E 03	0.408E 03	0.173E 03	0.386E 03
TH230	0.636E 02	0.320E 02	0.277E 02	0.112E 03	0.272E 03	0.351E 02	0.666E 02	0.357E 02	0.550E 02	0.152E 02	0.755E 02
TH231	0.224E 04	0.994E 03	0.112E 04	0.421E 04	0.546E 04	0.134E 04	0.254E 04	0.122E 04	0.274E 04	0.859E 03	0.259E 04
TH232	0.300E 02	0.110E 02	0.883E 01	0.435E 02	0.217E 03	0.105E 02	0.283E 02	0.105E 02	0.159E 02	0.260E 01	0.370E 02
TH234	0.950E 03	0.479E 03	0.561E 03	0.196E 04	0.140E 04	0.656E 03	0.102E 04	0.577E 03	0.131E 04	0.426E 03	0.110E 04
PA233	0.277E 05	0.154E 05	0.176E 05	0.470E 05	0.375E 05	0.239E 05	0.370E 05	0.226E 05	0.307E 05	0.172E 05	0.304E 05
PA234M	0.139E 04	0.835E 03	0.135E 04	0.159E 04	0.180E 04	0.137E 04	0.128E 04	0.935E 03	0.108E 04	0.967E 03	0.140E 04
PA234	0.469E 06	0.419E 06	0.461E 06	0.519E 06	0.581E 06	0.362E 06	0.324E 06	0.433E 06	0.428E 06	0.352E 06	0.472E 06
U232	0.578E 02	0.207E 02	0.211E 02	0.889E 02	0.334E 03	0.237E 02	0.589E 02	0.215E 02	0.427E 02	0.112E 02	0.696E 02
U233	0.120E 03	0.630E 02	0.678E 02	0.200E 03	0.306E 03	0.890E 02	0.154E 03	0.870E 02	0.120E 03	0.612E 02	0.136E 03
U234	0.433E 02	0.140E 02	0.141E 02	0.619E 02	0.285E 03	0.154E 02	0.439E 02	0.139E 02	0.270E 02	0.661E 01	0.525E 02
U235	0.207E 05	0.118E 05	0.131E 05	0.357E 05	0.289E 05	0.175E 05	0.282E 05	0.172E 05	0.229E 05	0.128E 05	0.229E 05
U236	0.265E 02	0.516E 01	0.522E 01	0.282E 02	0.246E 03	0.481E 01	0.263E 02	0.391E 01	0.686E 01	0.916E 00	0.328E 02
U237	0.187E 05	0.105E 05	0.112E 05	0.354E 05	0.282E 05	0.144E 05	0.228E 05	0.139E 05	0.224E 05	0.953E 04	0.212E 05
U238	0.270E 02	0.614E 01	0.685E 01	0.322E 02	0.222E 03	0.677E 01	0.271E 02	0.550E 01	0.113E 02	0.275E 01	0.331E 02
U240	0.171E 03	0.663E 02	0.535E 02	0.258E 03	0.111E 04	0.625E 02	0.172E 03	0.636E 02	0.101E 03	0.157E 02	0.208E 03
NP237	0.114E 05	0.597E 04	0.695E 04	0.218E 05	0.157E 05	0.864E 04	0.137E 05	0.796E 04	0.146E 05	0.607E 04	0.129E 05
NP238	0.810E 05	0.496E 05	0.810E 05	0.888E 05	0.105E 06	0.810E 05	0.732E 05	0.549E 05	0.601E 05	0.575E 05	0.810E 05
NP239	0.183E 05	0.102E 05	0.115E 05	0.329E 05	0.256E 05	0.149E 05	0.237E 05	0.143E 05	0.214E 05	0.107E 05	0.204E 05

TABLE 3-7 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (WATER IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
NP240M	0.503E 05	0.269E 05	0.367E 05	0.592E 05	0.612E 05	0.532E 05	0.507E 05	0.351E 05	0.498E 05	0.340E 05	0.505E 05
PU236	0.367E 02	0.664E 01	0.765E 01	0.388E 02	0.327E 03	0.669E 01	0.377E 02	0.508E 01	0.108E 02	0.206E 01	0.449E 02
PU238	0.281E 02	0.391E 01	0.479E 01	0.266E 02	0.280E 03	0.380E 01	0.278E 02	0.243E 01	0.517E 01	0.808E 00	0.349E 02
PU239	0.124E 02	0.245E 01	0.230E 01	0.135E 02	0.110E 03	0.232E 01	0.129E 02	0.211E 01	0.398E 01	0.541E 00	0.152E 02
PU240	0.248E 02	0.379E 01	0.449E 01	0.243E 02	0.241E 03	0.375E 01	0.246E 02	0.257E 01	0.532E 01	0.911E 00	0.307E 02
PU241	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU242	0.235E 02	0.319E 01	0.379E 01	0.218E 02	0.238E 03	0.293E 01	0.232E 02	0.186E 01	0.372E 01	0.402E 00	0.292E 02
PU244	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AM241	0.258E 04	0.179E 04	0.127E 04	0.571E 04	0.484E 04	0.170E 04	0.265E 04	0.189E 04	0.291E 04	0.479E 03	0.302E 04
AM242	0.181E 04	0.850E 03	0.104E 04	0.361E 04	0.309E 04	0.120E 04	0.197E 04	0.103E 04	0.243E 04	0.809E 03	0.209E 04
AM243	0.567E 04	0.405E 04	0.288E 04	0.128E 05	0.935E 04	0.384E 04	0.578E 04	0.427E 04	0.651E 04	0.107E 04	0.664E 04
CM242	0.267E 02	0.340E 01	0.425E 01	0.244E 02	0.273E 03	0.319E 01	0.265E 02	0.188E 01	0.403E 01	0.490E 00	0.333E 02
CM243	0.175E 05	0.965E 04	0.109E 05	0.315E 05	0.244E 05	0.142E 05	0.225E 05	0.136E 05	0.206E 05	0.102E 05	0.195E 05
CM244	0.811E 03	0.511E 03	0.435E 03	0.176E 04	0.134E 04	0.550E 03	0.843E 03	0.561E 03	0.995E 03	0.232E 03	0.947E 03
CF252	0.847E 05	0.574E 05	0.668E 05	0.101E 06	0.100E 06	0.867E 05	0.811E 05	0.714E 05	0.894E 05	0.580E 05	0.857E 05

TABLE 3-8

PHOTON DEPTH DOSE RATE FACTORS TO VARIOUS ORGANS (mrem/yr per μCi/ml)[a]

IMMERSION IN CONTAMINATED AIR

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
H3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE7	0.278E 09	0.358E 09	0.259E 09	0.278E 09	0.259E 09	0.318E 09	0.298E 09	0.338E 09	0.437E 09	0.459E 09	0.418E 09
C11	0.577E 10	0.742E 10	0.536E 10	0.577E 10	0.536E 10	0.659E 10	0.618E 10	0.701E 10	0.905E 10	0.951E 10	0.866E 10
C14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N13	0.577E 10	0.742E 10	0.536E 10	0.577E 10	0.536E 10	0.659E 10	0.619E 10	0.701E 10	0.906E 10	0.951E 10	0.866E 10
O15	0.578E 10	0.743E 10	0.537E 10	0.578E 10	0.537E 10	0.660E 10	0.619E 10	0.702E 10	0.907E 10	0.952E 10	0.867E 10
F18	0.559E 10	0.719E 10	0.520E 10	0.559E 10	0.520E 10	0.639E 10	0.600E 10	0.679E 10	0.878E 10	0.922E 10	0.839E 10
NA22	0.149E 11	0.164E 11	0.129E 11	0.158E 11	0.138E 11	0.133E 11	0.143E 11	0.163E 11	0.188E 11	0.197E 11	0.180E 11
NA24	0.247E 11	0.291E 11	0.246E 11	0.358E 11	0.266E 11	0.235E 11	0.274E 11	0.300E 11	0.314E 11	0.333E 11	0.296E 11
MG28	0.939E 10	0.948E 10	0.789E 10	0.101E 11	0.833E 10	0.787E 10	0.865E 10	0.980E 10	0.110E 11	0.115E 11	0.104E 11
AL28	0.135E 11	0.135E 11	0.112E 11	0.148E 11	0.125E 11	0.102E 11	0.122E 11	0.138E 11	0.148E 11	0.155E 11	0.141E 11
P32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL36	0.319E-04	0.449E 03	0.349E 00	0.609E 00	0.727E 02	0.259E 00	0.189E 01	0.179E 03	0.349E 03	0.429E 03	0.269E 03
CL38	0.903E 10	0.106E 11	0.891E 10	0.129E 11	0.967E 10	0.850E 10	0.993E 10	0.109E 11	0.114E 11	0.121E 11	0.108E 11
A37	0.188E-02	0.265E 05	0.206E 02	0.359E 02	0.429E 04	0.153E 02	0.112E 03	0.106E 05	0.206E 05	0.253E 05	0.159E 05
A39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K40	0.118E 10	0.118E 10	0.981E 09	0.130E 10	0.110E 10	0.895E 09	0.107E 10	0.121E 10	0.130E 10	0.136E 10	0.124E 10
K42	0.208E 10	0.208E 10	0.173E 10	0.229E 10	0.193E 10	0.158E 10	0.188E 10	0.214E 10	0.229E 10	0.239E 10	0.219E 10
K43	0.557E 10	0.711E 10	0.517E 10	0.557E 10	0.515E 10	0.635E 10	0.596E 10	0.675E 10	0.872E 10	0.916E 10	0.833E 10
CA45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CA47	0.791E 10	0.794E 10	0.659E 10	0.863E 10	0.725E 10	0.616E 10	0.718E 10	0.815E 10	0.881E 10	0.922E 10	0.840E 10
CA49	0.450E 11	0.166E 11	0.237E 11	0.280E 11	0.215E 11	0.205E 11	0.237E 11	0.237E 11	0.237E 11	0.259E 11	0.216E 11
SC46	0.125E 11	0.116E 11	0.107E 11	0.125E 11	0.892E 10	0.129E 11	0.116E 11	0.129E 11	0.152E 11	0.161E 11	0.138E 11

[a]Contributions of radioactive daughter products are not included.

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
SC47	0.528E 09	0.536E 09	0.578E 09	0.595E 09	0.454E 09	0.595E 09	0.627E 09	0.726E 09	0.124E 10	0.132E 10	0.115E 10
SC49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CR51	0.150E 09	0.152E 09	0.164E 09	0.169E 09	0.129E 09	0.169E 09	0.178E 09	0.206E 09	0.352E 09	0.374E 09	0.327E 09
MN52M	0.167E 11	0.182E 11	0.144E 11	0.178E 11	0.155E 11	0.147E 11	0.160E 11	0.181E 11	0.209E 11	0.218E 11	0.199E 11
MN52	0.227E 11	0.238E 11	0.195E 11	0.239E 11	0.199E 11	0.208E 11	0.215E 11	0.243E 11	0.281E 11	0.295E 11	0.265E 11
MN54	0.519E 10	0.482E 10	0.445E 10	0.519E 10	0.371E 10	0.538E 10	0.482E 10	0.538E 10	0.630E 10	0.667E 10	0.575E 10
FE52	0.400E 10	0.495E 10	0.384E 10	0.410E 10	0.367E 10	0.456E 10	0.438E 10	0.498E 10	0.685E 10	0.722E 10	0.650E 10
FE55	0.106E-01	0.149E 06	0.116E 03	0.202E 03	0.242E 05	0.861E 02	0.629E 03	0.596E 05	0.116E 06	0.143E 06	0.895E 05
FE59	0.818E 10	0.791E 10	0.690E 10	0.860E 10	0.676E 10	0.727E 10	0.749E 10	0.844E 10	0.947E 10	0.956E 10	0.884E 10
CO56	0.270E 11	0.239E 11	0.217E 11	0.280E 11	0.217E 11	0.220E 11	0.236E 11	0.259E 11	0.284E 11	0.300E 11	0.265E 11
CO57	0.636E 09	0.601E 09	0.598E 09	0.586E 09	0.485E 09	0.676E 09	0.688E 09	0.777E 09	0.165E 10	0.178E 10	0.152E 10
CO58	0.598E 10	0.587E 10	0.518E 10	0.598E 10	0.447E 10	0.627E 10	0.567E 10	0.635E 10	0.756E 10	0.799E 10	0.696E 10
CO60	0.174E 11	0.169E 11	0.146E 11	0.184E 11	0.146E 11	0.152E 11	0.159E 11	0.179E 11	0.199E 11	0.209E 11	0.186E 11
NI56	0.107E 11	0.105E 11	0.947E 10	0.110E 11	0.841E 10	0.108E 11	0.103E 11	0.116E 11	0.145E 11	0.154E 11	0.134E 11
NI63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CU64	0.113E 10	0.143E 10	0.104E 10	0.113E 10	0.105E 10	0.127E 10	0.120E 10	0.136E 10	0.174E 10	0.183E 10	0.167E 10
ZN65	0.359E 10	0.336E 10	0.308E 10	0.359E 10	0.258E 10	0.373E 10	0.335E 10	0.373E 10	0.439E 10	0.465E 10	0.401E 10
ZN69M	0.235E 10	0.303E 10	0.219E 10	0.235E 10	0.219E 10	0.269E 10	0.252E 10	0.286E 10	0.370E 10	0.388E 10	0.353E 10
ZN69	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA67	0.909E 09	0.956E 09	0.928E 09	0.955E 09	0.771E 09	0.101E 10	0.103E 10	0.118E 10	0.202E 10	0.216E 10	0.188E 10
GA68	0.538E 10	0.682E 10	0.498E 10	0.539E 10	0.495E 10	0.611E 10	0.573E 10	0.649E 10	0.834E 10	0.876E 10	0.796E 10
GE77	0.548E 10	0.613E 10	0.520E 10	0.581E 10	0.478E 10	0.592E 10	0.580E 10	0.658E 10	0.892E 10	0.942E 10	0.837E 10
AS76	0.265E 10	0.317E 10	0.240E 10	0.279E 10	0.248E 10	0.272E 10	0.272E 10	0.308E 10	0.376E 10	0.395E 10	0.359E 10
AS77	0.401E 08	0.440E 08	0.415E 08	0.432E 08	0.352E 08	0.452E 08	0.460E 08	0.529E 08	0.846E 08	0.858E 08	0.790E 08
SE75	0.329E 10	0.336E 10	0.309E 10	0.354E 10	0.290E 10	0.313E 10	0.341E 10	0.389E 10	0.576E 10	0.610E 10	0.539E 10
SE77M	0.389E 09	0.395E 09	0.426E 09	0.438E 09	0.335E 09	0.438E 09	0.462E 09	0.535E 09	0.913E 09	0.972E 09	0.847E 09

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
BR80M	0.191E 08	0.239E 08	0.103E 08	0.143E 08	0.767E 07	0.327E 08	0.220E 08	0.300E 08	0.965E 08	0.111E 09	0.808E 08
BR80	0.478E 09	0.612E 09	0.443E 09	0.478E 09	0.444E 09	0.543E 09	0.511E 09	0.579E 09	0.746E 09	0.784E 09	0.713E 09
BR82	0.170E 11	0.179E 11	0.148E 11	0.175E 11	0.142E 11	0.168E 11	0.164E 11	0.185E 11	0.219E 11	0.230E 11	0.205E 11
BR83	0.417E 08	0.546E 08	0.388E 08	0.417E 08	0.394E 08	0.477E 08	0.447E 08	0.513E 08	0.674E 08	0.711E 08	0.641E 08
BR84	0.157E 11	0.113E 11	0.115E 11	0.149E 11	0.110E 11	0.114E 11	0.123E 11	0.131E 11	0.140E 11	0.150E 11	0.129E 11
KR79	0.129E 10	0.156E 10	0.123E 10	0.132E 10	0.116E 10	0.145E 10	0.139E 10	0.158E 10	0.215E 10	0.227E 10	0.204E 10
KR83M	0.434E 05	0.221E 06	0.285E 05	0.324E 05	0.558E 06	0.911E 05	0.690E 05	0.320E 06	0.147E 07	0.175E 07	0.118E 07
KR85M	0.740E 09	0.751E 09	0.810E 09	0.833E 09	0.636E 09	0.833E 09	0.879E 09	0.102E 10	0.174E 10	0.185E 10	0.161E 10
KR85	0.116E 08	0.150E 08	0.108E 08	0.116E 08	0.108E 08	0.133E 08	0.125E 08	0.141E 08	0.183E 08	0.192E 08	0.175E 08
KR87	0.453E 10	0.530E 10	0.441E 10	0.597E 10	0.452E 10	0.465E 10	0.495E 10	0.542E 10	0.607E 10	0.643E 10	0.569E 10
KR88	0.111E 11	0.134E 11	0.116E 11	0.169E 11	0.121E 11	0.115E 11	0.130E 11	0.141E 11	0.152E 11	0.162E 11	0.142E 11
RB84	0.533E 10	0.542E 10	0.468E 10	0.539E 10	0.411E 10	0.566E 10	0.515E 10	0.577E 10	0.693E 10	0.732E 10	0.640E 10
RB86	0.589E 09	0.547E 09	0.505E 09	0.589E 09	0.421E 09	0.610E 09	0.547E 09	0.610E 09	0.716E 09	0.758E 09	0.652E 09
RB88	0.397E 10	0.446E 10	0.394E 10	0.569E 10	0.401E 10	0.399E 10	0.439E 10	0.474E 10	0.502E 10	0.535E 10	0.466E 10
RB89	0.156E 11	0.159E 11	0.139E 11	0.184E 11	0.139E 11	0.143E 11	0.152E 11	0.168E 11	0.185E 11	0.195E 11	0.172E 11
RB90	0.310E 11	0.141E 11	0.179E 11	0.214E 11	0.162E 11	0.166E 11	0.183E 11	0.187E 11	0.194E 11	0.210E 11	0.177E 11
SR85	0.289E 10	0.371E 10	0.268E 10	0.289E 10	0.269E 10	0.330E 10	0.310E 10	0.351E 10	0.454E 10	0.477E 10	0.434E 10
SR87M	0.186E 10	0.240E 10	0.173E 10	0.186E 10	0.173E 10	0.213E 10	0.200E 10	0.226E 10	0.293E 10	0.307E 10	0.280E 10
SR89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR91	0.457E 10	0.492E 10	0.402E 10	0.465E 10	0.380E 10	0.471E 10	0.448E 10	0.504E 10	0.608E 10	0.641E 10	0.570E 10
SR92	0.948E 10	0.951E 10	0.788E 10	0.104E 11	0.878E 10	0.722E 10	0.859E 10	0.975E 10	0.105E 11	0.110E 11	0.100E 11
SR93	0.918E 10	0.999E 10	0.816E 10	0.939E 10	0.776E 10	0.946E 10	0.909E 10	0.103E 11	0.126E 11	0.133E 11	0.119E 11
Y87	0.263E 10	0.338E 10	0.244E 10	0.263E 10	0.244E 10	0.300E 10	0.282E 10	0.319E 10	0.413E 10	0.434E 10	0.395E 10
Y88	0.148E 11	0.174E 11	0.152E 11	0.216E 11	0.151E 11	0.159E 11	0.169E 11	0.184E 11	0.198E 11	0.211E 11	0.183E 11
Y90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
Y91M	0.295E 10	0.380E 10	0.274E 10	0.295E 10	0.274E 10	0.337E 10	0.317E 10	0.359E 10	0.463E 10	0.487E 10	0.443E 10
Y91	0.183E 08	0.183E 08	0.152E 08	0.201E 08	0.170E 08	0.139E 08	0.166E 08	0.188E 08	0.201E 08	0.210E 08	0.192E 08
Y92	0.160E 10	0.159E 10	0.138E 10	0.168E 10	0.130E 10	0.154E 10	0.151E 10	0.169E 10	0.195E 10	0.205E 10	0.181E 10
Y93	0.409E 09	0.458E 09	0.415E 09	0.535E 09	0.391E 09	0.436E 09	0.460E 09	0.510E 09	0.641E 09	0.681E 09	0.595E 09
ZR95	0.434E 10	0.466E 10	0.385E 10	0.434E 10	0.348E 10	0.468E 10	0.428E 10	0.481E 10	0.590E 10	0.622E 10	0.550E 10
ZR97	0.114E 10	0.122E 10	0.101E 10	0.122E 10	0.995E 09	0.111E 10	0.112E 10	0.126E 10	0.149E 10	0.157E 10	0.140E 10
NB95M	0.270E 09	0.274E 09	0.295E 09	0.304E 09	0.232E 09	0.304E 09	0.320E 09	0.371E 09	0.632E 09	0.673E 09	0.587E 09
NB95	0.475E 10	0.441E 10	0.407E 10	0.475E 10	0.339E 10	0.492E 10	0.441E 10	0.492E 10	0.577E 10	0.611E 10	0.526E 10
NB97M	0.413E 10	0.531E 10	0.384E 10	0.413E 10	0.384E 10	0.472E 10	0.443E 10	0.502E 10	0.648E 10	0.681E 10	0.620E 10
NB97	0.378E 10	0.482E 10	0.350E 10	0.378E 10	0.349E 10	0.429E 10	0.403E 10	0.457E 10	0.588E 10	0.618E 10	0.562E 10
MO99	0.914E 09	0.107E 10	0.841E 09	0.921E 09	0.793E 09	0.102E 10	0.952E 09	0.108E 10	0.140E 10	0.148E 10	0.132E 10
TC99M	0.656E 09	0.616E 09	0.616E 09	0.603E 09	0.498E 09	0.696E 09	0.709E 09	0.800E 09	0.171E 10	0.184E 10	0.158E 10
TC99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RU103	0.273E 10	0.351E 10	0.253E 10	0.273E 10	0.253E 10	0.312E 10	0.292E 10	0.331E 10	0.429E 10	0.450E 10	0.410E 10
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH103M	0.128E 06	0.414E 06	0.856E 05	0.148E 06	0.333E 06	0.885E 06	0.313E 06	0.491E 06	0.315E 07	0.373E 07	0.257E 07
RH105	0.369E 09	0.375E 09	0.403E 09	0.415E 09	0.317E 09	0.415E 09	0.438E 09	0.507E 09	0.865E 09	0.920E 09	0.802E 09
RH106	0.106E 10	0.134E 10	0.982E 09	0.107E 10	0.974E 09	0.120E 10	0.113E 10	0.128E 10	0.165E 10	0.173E 10	0.157E 10
PD103	0.722E 07	0.959E 07	0.671E 07	0.739E 07	0.634E 07	0.933E 07	0.880E 07	0.105E 08	0.265E 08	0.285E 08	0.227E 08
AG110M	0.173E 11	0.183E 11	0.151E 11	0.178E 11	0.146E 11	0.171E 11	0.167E 11	0.188E 11	0.223E 11	0.235E 11	0.210E 11
AG111	0.145E 09	0.147E 09	0.158E 09	0.162E 09	0.124E 09	0.163E 09	0.172E 09	0.199E 09	0.339E 09	0.361E 09	0.315E 09
CD111M	0.196E 10	0.193E 10	0.202E 10	0.205E 10	0.161E 10	0.216E 10	0.225E 10	0.258E 10	0.481E 10	0.514E 10	0.445E 10
CD113M	0.161E 07	0.164E 07	0.175E 07	0.181E 07	0.138E 07	0.183E 07	0.192E 07	0.222E 07	0.387E 07	0.413E 07	0.358E 07
CD115M	0.219E 09	0.213E 09	0.186E 09	0.228E 09	0.177E 09	0.202E 09	0.202E 09	0.227E 09	0.258E 09	0.272E 09	0.240E 09
IN113M	0.143E 10	0.183E 10	0.133E 10	0.143E 10	0.133E 10	0.163E 10	0.153E 10	0.173E 10	0.224E 10	0.235E 10	0.214E 10
IN114M	0.397E 09	0.474E 09	0.392E 09	0.415E 09	0.359E 09	0.456E 09	0.443E 09	0.508E 09	0.754E 09	0.799E 09	0.708E 09

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
IN114	0.171E 08	0.178E 08	0.144E 08	0.185E 08	0.158E 08	0.140E 08	0.159E 08	0.180E 08	0.207E 08	0.217E 08	0.196E 08
IN115M	0.628E 09	0.640E 09	0.685E 09	0.706E 09	0.540E 09	0.712E 09	0.746E 09	0.865E 09	0.149E 10	0.159E 10	0.138E 10
SN113	0.244E 08	0.288E 08	0.262E 08	0.277E 08	0.246E 08	0.385E 08	0.315E 08	0.382E 08	0.994E 08	0.111E 09	0.870E 08
SN119M	0.659E 07	0.886E 07	0.356E 07	0.510E 07	0.343E 07	0.137E 08	0.817E 07	0.112E 08	0.416E 08	0.482E 08	0.347E 08
SN123	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SN125	0.189E 10	0.188E 10	0.170E 10	0.209E 10	0.151E 10	0.196E 10	0.185E 10	0.206E 10	0.238E 10	0.252E 10	0.218E 10
SB122	0.234E 10	0.298E 10	0.217E 10	0.234E 10	0.216E 10	0.267E 10	0.250E 10	0.283E 10	0.365E 10	0.383E 10	0.348E 10
SB124	0.121E 11	0.135E 11	0.107E 11	0.132E 11	0.114E 11	0.111E 11	0.119E 11	0.134E 11	0.155E 11	0.163E 11	0.148E 11
SB125	0.241E 10	0.307E 10	0.224E 10	0.241E 10	0.222E 10	0.277E 10	0.259E 10	0.295E 10	0.394E 10	0.415E 10	0.374E 10
SB127	0.381E 10	0.456E 10	0.350E 10	0.383E 10	0.336E 10	0.425E 10	0.398E 10	0.450E 10	0.579E 10	0.609E 10	0.548E 10
TE123M	0.647E 09	0.660E 09	0.697E 09	0.721E 09	0.547E 09	0.739E 09	0.767E 09	0.893E 09	0.156E 10	0.167E 10	0.144E 10
TE125M	0.460E 08	0.551E 08	0.250E 08	0.346E 08	0.176E 08	0.781E 08	0.528E 08	0.708E 08	0.226E 09	0.259E 09	0.190E 09
TE127M	0.115E 08	0.138E 08	0.622E 07	0.861E 07	0.436E 07	0.196E 08	0.132E 08	0.177E 08	0.566E 08	0.650E 08	0.475E 08
TE127	0.226E 08	0.288E 08	0.212E 08	0.227E 08	0.209E 08	0.259E 08	0.244E 08	0.277E 08	0.366E 08	0.385E 08	0.349E 08
TE129M	0.180E 09	0.227E 09	0.162E 09	0.177E 09	0.159E 09	0.210E 09	0.192E 09	0.220E 09	0.313E 09	0.334E 09	0.293E 09
TE129	0.358E 09	0.429E 09	0.328E 09	0.359E 09	0.313E 09	0.404E 09	0.376E 09	0.427E 09	0.570E 09	0.603E 09	0.536E 09
TE131M	0.856E 10	0.839E 10	0.758E 10	0.906E 10	0.674E 10	0.866E 10	0.828E 10	0.927E 10	0.112E 11	0.119E 11	0.104E 11
TE131	0.240E 10	0.251E 10	0.215E 10	0.236E 10	0.192E 10	0.256E 10	0.242E 10	0.273E 10	0.396E 10	0.421E 10	0.368E 10
TE132	0.961E 09	0.981E 09	0.104E 10	0.108E 10	0.824E 09	0.109E 10	0.114E 10	0.132E 10	0.231E 10	0.245E 10	0.213E 10
I123	0.724E 09	0.758E 09	0.763E 09	0.795E 09	0.611E 09	0.834E 09	0.851E 09	0.990E 09	0.173E 10	0.185E 10	0.159E 10
I124	0.662E 10	0.787E 10	0.600E 10	0.714E 10	0.623E 10	0.670E 10	0.680E 10	0.768E 10	0.933E 10	0.981E 10	0.889E 10
I125	0.521E 08	0.630E 08	0.276E 08	0.388E 08	0.192E 08	0.898E 08	0.600E 08	0.809E 08	0.261E 09	0.299E 09	0.219E 09
I126	0.241E 10	0.307E 10	0.223E 10	0.241E 10	0.222E 10	0.274E 10	0.257E 10	0.292E 10	0.380E 10	0.400E 10	0.362E 10
I129	0.312E 08	0.377E 08	0.165E 08	0.233E 08	0.115E 08	0.538E 08	0.360E 08	0.485E 08	0.156E 09	0.179E 09	0.131E 09
I130	0.116E 11	0.145E 11	0.107E 11	0.115E 11	0.105E 11	0.131E 11	0.123E 11	0.139E 11	0.181E 11	0.190E 11	0.172E 11
I131	0.212E 10	0.270E 10	0.198E 10	0.213E 10	0.196E 10	0.242E 10	0.228E 10	0.259E 10	0.341E 10	0.358E 10	0.325E 10

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
I132	0.136E 11	0.149E 11	0.121E 11	0.139E 11	0.114E 11	0.143E 11	0.135E 11	0.152E 11	0.186E 11	0.196E 11	0.174E 11
I133	0.397E 10	0.474E 10	0.359E 10	0.403E 10	0.357E 10	0.426E 10	0.408E 10	0.462E 10	0.577E 10	0.606E 10	0.548E 10
I134	0.150E 11	0.146E 11	0.129E 11	0.152E 11	0.114E 11	0.152E 11	0.141E 11	0.158E 11	0.185E 11	0.196E 11	0.171E 11
I135	0.122E 11	0.120E 11	0.103E 11	0.130E 11	0.105E 11	0.104E 11	0.112E 11	0.126E 11	0.139E 11	0.146E 11	0.131E 11
I136	0.191E 11	0.195E 11	0.169E 11	0.232E 11	0.181E 11	0.160E 11	0.185E 11	0.204E 11	0.219E 11	0.231E 11	0.206E 11
XE131M	0.357E 08	0.403E 08	0.272E 08	0.322E 08	0.204E 08	0.528E 08	0.417E 08	0.529E 08	0.140E 09	0.157E 09	0.120E 09
XE133M	0.131E 09	0.137E 09	0.131E 09	0.139E 09	0.102E 09	0.160E 09	0.155E 09	0.184E 09	0.365E 09	0.398E 09	0.329E 09
XE133	0.175E 09	0.170E 09	0.157E 09	0.158E 09	0.125E 09	0.198E 09	0.191E 09	0.220E 09	0.502E 09	0.548E 09	0.455E 09
XE135M	0.241E 10	0.309E 10	0.224E 10	0.241E 10	0.223E 10	0.275E 10	0.258E 10	0.293E 10	0.380E 10	0.399E 10	0.363E 10
XE135	0.117E 10	0.121E 10	0.126E 10	0.131E 10	0.101E 10	0.132E 10	0.138E 10	0.159E 10	0.267E 10	0.284E 10	0.248E 10
XE137	0.105E 10	0.129E 10	0.972E 09	0.111E 10	0.982E 09	0.114E 10	0.111E 10	0.125E 10	0.155E 10	0.163E 10	0.148E 10
XE138	0.468E 10	0.534E 10	0.455E 10	0.603E 10	0.470E 10	0.453E 10	0.506E 10	0.564E 10	0.672E 10	0.711E 10	0.632E 10
CS134	0.931E 10	0.101E 11	0.827E 10	0.935E 10	0.760E 10	0.998E 10	0.922E 10	0.104E 11	0.127E 11	0.134E 11	0.119E 11
CS135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS136	0.131E 11	0.124E 11	0.115E 11	0.134E 11	0.991E 10	0.132E 11	0.124E 11	0.140E 11	0.171E 11	0.181E 11	0.157E 11
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS138	0.142E 11	0.152E 11	0.128E 11	0.172E 11	0.135E 11	0.126E 11	0.141E 11	0.157E 11	0.171E 11	0.180E 11	0.161E 11
CS139	0.156E 10	0.156E 10	0.134E 10	0.182E 10	0.144E 10	0.126E 10	0.147E 10	0.162E 10	0.173E 10	0.183E 10	0.164E 10
BA133	0.182E 10	0.220E 10	0.173E 10	0.184E 10	0.162E 10	0.209E 10	0.199E 10	0.228E 10	0.343E 10	0.365E 10	0.322E 10
BA137M	0.317E 10	0.407E 10	0.294E 10	0.317E 10	0.294E 10	0.362E 10	0.340E 10	0.385E 10	0.499E 10	0.524E 10	0.476E 10
BA139	0.267E 09	0.271E 09	0.277E 09	0.299E 09	0.232E 09	0.282E 09	0.302E 09	0.349E 09	0.565E 09	0.601E 09	0.525E 09
BA140	0.106E 10	0.133E 10	0.999E 09	0.107E 10	0.971E 09	0.121E 10	0.115E 10	0.130E 10	0.177E 10	0.186E 10	0.168E 10
LA140	0.160E 11	0.164E 11	0.137E 11	0.176E 11	0.145E 11	0.136E 11	0.150E 11	0.170E 11	0.191E 11	0.200E 11	0.181E 11
CE141	0.384E 09	0.363E 09	0.358E 09	0.352E 09	0.289E 09	0.413E 09	0.416E 09	0.472E 09	0.102E 10	0.110E 10	0.938E 09
CE143	0.154E 10	0.165E 10	0.150E 10	0.162E 10	0.128E 10	0.172E 10	0.167E 10	0.192E 10	0.295E 10	0.314E 10	0.272E 10
CE144	0.876E 08	0.837E 08	0.805E 08	0.798E 08	0.649E 08	0.959E 08	0.951E 08	0.108E 09	0.240E 09	0.260E 09	0.219E 09

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
PR143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PR144	0.172E 09	0.214E 09	0.172E 09	0.232E 09	0.181E 09	0.180E 09	0.194E 09	0.214E 09	0.241E 09	0.255E 09	0.228E 09
ND147	0.707E 09	0.849E 09	0.659E 09	0.698E 09	0.620E 09	0.809E 09	0.768E 09	0.877E 09	0.138E 10	0.147E 10	0.129E 10
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM148M	0.114E 11	0.138E 11	0.105E 11	0.114E 11	0.101E 11	0.128E 11	0.119E 11	0.135E 11	0.173E 11	0.182E 11	0.164E 11
PM148	0.431E 10	0.450E 10	0.368E 10	0.457E 10	0.383E 10	0.381E 10	0.406E 10	0.459E 10	0.523E 10	0.548E 10	0.495E 10
SM151	0.819E 03	0.443E 04	0.586E 03	0.106E 04	0.292E 04	0.702E 04	0.235E 04	0.424E 04	0.262E 05	0.312E 05	0.213E 05
EU154	0.841E 10	0.850E 10	0.722E 10	0.877E 10	0.708E 10	0.779E 10	0.794E 10	0.896E 10	0.107E 11	0.113E 11	0.100E 11
EU155	0.309E 09	0.304E 09	0.290E 09	0.288E 09	0.238E 09	0.337E 09	0.340E 09	0.388E 09	0.671E 09	0.535E 09	0.791E 09
EU156	0.847E 10	0.913E 10	0.789E 10	0.104E 11	0.773E 10	0.844E 10	0.871E 10	0.964E 10	0.108E 11	0.115E 11	0.101E 11
GD162	0.238E 10	0.306E 10	0.221E 10	0.238E 10	0.221E 10	0.273E 10	0.256E 10	0.290E 10	0.375E 10	0.394E 10	0.359E 10
TB160	0.675E 10	0.642E 10	0.588E 10	0.691E 10	0.512E 10	0.677E 10	0.639E 10	0.718E 10	0.881E 10	0.932E 10	0.809E 10
TA182	0.859E 10	0.835E 10	0.733E 10	0.902E 10	0.707E 10	0.781E 10	0.800E 10	0.903E 10	0.109E 11	0.115E 11	0.101E 11
W185	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W187	0.936E 09	0.118E 10	0.872E 09	0.932E 09	0.857E 09	0.107E 10	0.101E 10	0.115E 10	0.161E 10	0.170E 10	0.152E 10
AU195M	0.905E 09	0.934E 09	0.581E 09	0.101E 10	0.777E 09	0.103E 10	0.108E 10	0.125E 10	0.222E 10	0.237E 10	0.205E 10
AU195	0.255E 09	0.369E 09	0.275E 09	0.297E 09	0.247E 09	0.377E 09	0.362E 09	0.435E 09	0.119E 10	0.129E 10	0.102E 10
AU198	0.228E 10	0.293E 10	0.212E 10	0.228E 10	0.212E 10	0.261E 10	0.245E 10	0.277E 10	0.360E 10	0.378E 10	0.343E 10
AU199	0.437E 09	0.452E 09	0.471E 09	0.487E 09	0.374E 09	0.498E 09	0.520E 09	0.604E 09	0.109E 10	0.116E 10	0.100E 10
HG197	0.206E 09	0.275E 09	0.193E 09	0.213E 09	0.177E 09	0.275E 09	0.262E 09	0.318E 09	0.908E 09	0.979E 09	0.767E 09
HG203	0.111E 10	0.113E 10	0.121E 10	0.124E 10	0.950E 09	0.125E 10	0.132E 10	0.153E 10	0.266E 10	0.283E 10	0.245E 10
TL204	0.329E 07	0.444E 07	0.307E 07	0.341E 07	0.284E 07	0.443E 07	0.420E 07	0.511E 07	0.148E 08	0.159E 08	0.125E 08
TL208	0.179E 11	0.230E 11	0.192E 11	0.276E 11	0.200E 11	0.197E 11	0.217E 11	0.235E 11	0.257E 11	0.274E 11	0.241E 11
TL210	0.217E 05	0.291E 05	0.202E 05	0.224E 05	0.187E 05	0.291E 05	0.276E 05	0.336E 05	0.972E 05	0.105E 06	0.819E 05
PB204M	0.128E 11	0.125E 11	0.111E 11	0.128E 11	0.953E 10	0.134E 11	0.121E 11	0.136E 11	0.162E 11	0.171E 11	0.149E 11
PB210	0.569E 07	0.786E 07	0.531E 07	0.589E 07	0.534E 07	0.767E 07	0.727E 07	0.905E 07	0.265E 08	0.288E 08	0.223E 08

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
PB212	0.658E 09	0.685E 09	0.705E 09	0.728E 09	0.562E 09	0.751E 09	0.783E 09	0.910E 09	0.168E 10	0.179E 10	0.154E 10
PB214	0.120E 10	0.142E 10	0.117E 10	0.124E 10	0.107E 10	0.136E 10	0.133E 10	0.152E 10	0.230E 10	0.244E 10	0.215E 10
BI210	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI212	0.687E 09	0.765E 09	0.605E 09	0.712E 09	0.610E 09	0.674E 09	0.676E 09	0.765E 09	0.924E 09	0.971E 09	0.875E 09
BI214	0.984E 10	0.107E 11	0.886E 10	0.114E 11	0.916E 10	0.917E 10	0.982E 10	0.110E 11	0.124E 11	0.131E 11	0.117E 11
PO214	0.692E 06	0.643E 06	0.593E 06	0.692E 06	0.494E 06	0.717E 06	0.643E 06	0.717E 06	0.840E 06	0.890E 06	0.766E 06
PO218	0.572E 06	0.532E 06	0.491E 06	0.572E 06	0.409E 06	0.593E 06	0.532E 06	0.593E 06	0.695E 06	0.736E 06	0.634E 06
RN220	0.202E 07	0.260E 07	0.188E 07	0.202E 07	0.188E 07	0.231E 07	0.217E 07	0.246E 07	0.318E 07	0.333E 07	0.304E 07
RN222	0.220E 07	0.283E 07	0.205E 07	0.220E 07	0.205E 07	0.252E 07	0.236E 07	0.267E 07	0.346E 07	0.363E 07	0.330E 07
RA224	0.475E 08	0.480E 08	0.516E 08	0.530E 08	0.406E 08	0.533E 08	0.562E 08	0.650E 08	0.112E 09	0.119E 09	0.104E 09
RA226	0.318E 08	0.321E 08	0.344E 08	0.352E 08	0.271E 08	0.356E 08	0.375E 08	0.433E 08	0.752E 08	0.801E 08	0.698E 08
RA228	0.407E 08	0.491E 08	0.215E 08	0.303E 08	0.150E 08	0.702E 08	0.469E 08	0.632E 08	0.204E 09	0.234E 09	0.171E 09
AC228	0.467E 10	0.460E 10	0.406E 10	0.481E 10	0.372E 10	0.456E 10	0.445E 10	0.501E 10	0.619E 10	0.654E 10	0.573E 10
TH228	0.115E 08	0.112E 08	0.114E 08	0.114E 08	0.946E 07	0.125E 08	0.129E 08	0.148E 08	0.298E 08	0.320E 08	0.274E 08
TH230	0.137E 07	0.169E 07	0.133E 07	0.142E 07	0.143E 07	0.171E 07	0.168E 07	0.210E 07	0.563E 07	0.613E 07	0.483E 07
TH231	0.691E 08	0.677E 08	0.635E 08	0.634E 08	0.545E 08	0.777E 08	0.758E 08	0.881E 08	0.203E 09	0.221E 09	0.183E 09
TH232	0.358E 06	0.537E 06	0.337E 06	0.371E 06	0.580E 06	0.491E 06	0.467E 06	0.672E 06	0.222E 07	0.247E 07	0.185E 07
TH234	0.346E 08	0.333E 08	0.325E 08	0.320E 08	0.266E 08	0.372E 08	0.377E 08	0.429E 08	0.940E 08	0.101E 09	0.860E 08
PA233	0.951E 09	0.971E 09	0.998E 09	0.102E 10	0.804E 09	0.106E 10	0.110E 10	0.127E 10	0.223E 10	0.238E 10	0.207E 10
PA234M	0.588E 08	0.550E 08	0.508E 08	0.587E 08	0.424E 08	0.611E 08	0.552E 08	0.617E 08	0.755E 08	0.801E 08	0.690E 08
PA234	0.172E 11	0.200E 11	0.175E 11	0.242E 11	0.174E 11	0.182E 11	0.195E 11	0.213E 11	0.242E 11	0.257E 11	0.225E 11
U232	0.104E 07	0.121E 07	0.975E 06	0.998E 06	0.121E 07	0.127E 07	0.122E 07	0.157E 07	0.440E 07	0.487E 07	0.381E 07
U233	0.354E 07	0.367E 07	0.371E 07	0.380E 07	0.318E 07	0.403E 07	0.416E 07	0.490E 07	0.965E 07	0.104E 08	0.877E 07
U234	0.639E 06	0.790E 06	0.599E 06	0.619E 06	0.856E 06	0.813E 06	0.764E 06	0.103E 07	0.309E 07	0.344E 07	0.264E 07
U235	0.702E 09	0.702E 09	0.745E 09	0.760E 09	0.590E 09	0.783E 09	0.818E 09	0.944E 09	0.170E 10	0.181E 10	0.157E 10
U236	0.128E 06	0.248E 06	0.121E 06	0.134E 06	0.431E 06	0.228E 06	0.184E 06	0.348E 06	0.143E 07	0.165E 07	0.117E 07

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
U237	0.630E 09	0.642E 09	0.632E 09	0.643E 09	0.517E 09	0.706E 09	0.723E 09	0.835E 09	0.171E 10	0.183E 10	0.155E 10
U238	0.258E 06	0.347E 06	0.243E 06	0.249E 06	0.488E 06	0.349E 06	0.315E 06	0.477E 06	0.160E 07	0.182E 07	0.135E 07
U240	0.216E 07	0.322E 07	0.202E 07	0.224E 07	0.317E 07	0.314E 07	0.284E 07	0.397E 07	0.132E 08	0.147E 08	0.110E 08
NP237	0.408E 09	0.394E 09	0.403E 09	0.402E 09	0.323E 09	0.443E 09	0.455E 09	0.520E 09	0.104E 10	0.111E 10	0.958E 09
NP238	0.348E 10	0.323E 10	0.298E 10	0.348E 10	0.248E 10	0.360E 10	0.323E 10	0.360E 10	0.422E 10	0.447E 10	0.385E 10
NP239	0.634E 09	0.627E 09	0.655E 09	0.663E 09	0.522E 09	0.699E 09	0.727E 09	0.836E 09	0.156E 10	0.167E 10	0.145E 10
NP240M	0.198E 10	0.227E 10	0.178E 10	0.203E 10	0.176E 10	0.204E 10	0.200E 10	0.226E 10	0.280E 10	0.295E 10	0.266E 10
PU236	0.211E 06	0.348E 06	0.198E 06	0.209E 06	0.592E 06	0.353E 06	0.281E 06	0.496E 06	0.195E 07	0.225E 07	0.162E 07
PU238	0.905E 05	0.197E 06	0.861E 05	0.914E 05	0.445E 06	0.177E 06	0.133E 06	0.302E 06	0.134E 07	0.156E 07	0.109E 07
PU239	0.691E 05	0.121E 06	0.576E 05	0.661E 05	0.190E 06	0.123E 06	0.938E 05	0.171E 06	0.683E 06	0.789E 06	0.561E 06
PU240	0.993E 05	0.193E 06	0.942E 05	0.996E 05	0.399E 06	0.178E 06	0.140E 06	0.289E 06	0.122E 07	0.142E 07	0.100E 07
PU241	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU242	0.575E 05	0.152E 06	0.549E 05	0.608E 05	0.365E 06	0.132E 06	0.937E 05	0.236E 06	0.110E 07	0.129E 07	0.893E 06
PU244	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AM241	0.652E 08	0.877E 08	0.605E 08	0.672E 08	0.568E 08	0.880E 08	0.830E 08	0.101E 09	0.294E 09	0.318E 09	0.248E 09
AM242	0.641E 08	0.608E 08	0.602E 08	0.590E 08	0.457E 08	0.689E 08	0.696E 08	0.790E 08	0.172E 09	0.186E 09	0.158E 09
AM243	0.147E 09	0.198E 09	0.137E 09	0.152E 09	0.127E 09	0.198E 09	0.187E 09	0.228E 09	0.660E 09	0.712E 09	0.556E 09
CM242	0.621E 05	0.165E 06	0.594E 05	0.644E 05	0.415E 06	0.144E 06	0.101E 06	0.262E 06	0.123E 07	0.144E 07	0.997E 06
CM243	0.607E 09	0.599E 09	0.626E 09	0.632E 09	0.499E 09	0.668E 09	0.695E 09	0.798E 09	0.150E 10	0.160E 10	0.139E 10
CM244	0.241E 08	0.281E 08	0.225E 08	0.237E 08	0.198E 08	0.294E 08	0.286E 08	0.339E 08	0.886E 08	0.956E 08	0.768E 08
CF252	0.347E 10	0.368E 10	0.306E 10	0.367E 10	0.310E 10	0.321E 10	0.340E 10	0.383E 10	0.474E 10	0.500E 10	0.449E 10

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
H3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE7	0.358E 09	0.131E 09	0.218E 09	0.437E 09	0.437E 09	0.378E 09	0.398E 09	0.218E 09	0.377E 09	0.239E 09	0.358E 09
C11	0.742E 10	0.272E 10	0.453E 10	0.905E 10	0.905E 10	0.783E 10	0.824E 10	0.453E 10	0.781E 10	0.494E 10	0.742E 10
C14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N13	0.742E 10	0.272E 10	0.453E 10	0.906E 10	0.906E 10	0.784E 10	0.824E 10	0.453E 10	0.782E 10	0.495E 10	0.742E 10
O15	0.743E 10	0.272E 10	0.453E 10	0.907E 10	0.907E 10	0.784E 10	0.825E 10	0.453E 10	0.783E 10	0.495E 10	0.743E 10
F18	0.719E 10	0.263E 10	0.439E 10	0.878E 10	0.878E 10	0.759E 10	0.799E 10	0.439E 10	0.757E 10	0.479E 10	0.719E 10
NA22	0.171E 11	0.121E 11	0.131E 11	0.191E 11	0.195E 11	0.189E 11	0.152E 11	0.138E 11	0.175E 11	0.116E 11	0.171E 11
NA24	0.312E 11	0.318E 11	0.307E 11	0.324E 11	0.366E 11	0.252E 11	0.185E 11	0.315E 11	0.299E 11	0.236E 11	0.312E 11
MG28	0.103E 11	0.850E 10	0.888E 10	0.112E 11	0.119E 11	0.114E 11	0.844E 10	0.886E 10	0.994E 10	0.704E 10	0.104E 11
AL28	0.145E 11	0.135E 11	0.125E 11	0.152E 11	0.158E 11	0.164E 11	0.108E 11	0.135E 11	0.145E 11	0.986E 10	0.145E 11
P32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL36	0.735E 03	0.948E 02	0.130E 03	0.329E 03	0.409E 05	0.449E 03	0.159E 04	0.269E-01	0.907E 02	0.179E-01	0.219E 04
CL38	0.113E 11	0.115E 11	0.111E 11	0.118E 11	0.133E 11	0.933E 10	0.681E 10	0.114E 11	0.109E 11	0.852E 10	0.113E 11
A37	0.434E 05	0.559E 04	0.764E 04	0.194E 05	0.241E 07	0.265E 05	0.940E 05	0.159E 01	0.535E 04	0.106E 01	0.129E 06
A39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K40	0.127E 10	0.118E 10	0.110E 10	0.133E 10	0.139E 10	0.144E 10	0.952E 09	0.118E 10	0.127E 10	0.866E 09	0.127E 10
K42	0.224E 10	0.209E 10	0.193E 10	0.235E 10	0.245E 10	0.253E 10	0.168E 10	0.209E 10	0.224E 10	0.153E 10	0.224E 10
K43	0.714E 10	0.266E 10	0.441E 10	0.872E 10	0.873E 10	0.753E 10	0.792E 10	0.438E 10	0.748E 10	0.477E 10	0.714E 10
CA45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CA47	0.854E 10	0.770E 10	0.736E 10	0.902E 10	0.944E 10	0.963E 10	0.655E 10	0.778E 10	0.845E 10	0.583E 10	0.854E 10
CA49	0.259E 11	0.259E 11	0.450E 11	0.259E 11	0.280E 11	0.237E 11	0.155E 11	0.431E 11	0.450E 11	0.198E 11	0.259E 11
SC46	0.138E 11	0.848E 10	0.138E 11	0.152E 11	0.178E 11	0.138E 11	0.125E 11	0.937E 10	0.103E 11	0.982E 10	0.138E 11
SC47	0.751E 09	0.446E 09	0.486E 09	0.124E 10	0.991E 09	0.669E 09	0.107E 10	0.669E 09	0.784E 09	0.496E 09	0.818E 09
SC49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CR51	0.214E 09	0.127E 09	0.138E 09	0.352E 09	0.291E 09	0.190E 09	0.304E 09	0.190E 09	0.223E 09	0.141E 09	0.233E 09
MN52M	0.190E 11	0.138E 11	0.147E 11	0.212E 11	0.217E 11	0.211E 11	0.168E 11	0.155E 11	0.194E 11	0.129E 11	0.190E 11
MN52	0.257E 11	0.181E 11	0.213E 11	0.284E 11	0.302E 11	0.278E 11	0.227E 11	0.202E 11	0.244E 11	0.176E 11	0.257E 11
MN54	0.575E 10	0.352E 10	0.575E 10	0.630E 10	0.743E 10	0.575E 10	0.519E 10	0.389E 10	0.426E 10	0.408E 10	0.575E 10

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
FE52	0.525E 10	0.216E 10	0.324E 10	0.685E 10	0.652E 10	0.537E 10	0.616E 10	0.350E 10	0.552E 10	0.349E 10	0.534E 10
FE55	0.244E 06	0.315E 05	0.431E 05	0.109E 06	0.136E 08	0.149E 06	0.530E 06	0.895E 01	0.302E 05	0.596E 01	0.729E 06
FE59	0.892E 10	0.694E 10	0.827E 10	0.959E 10	0.106E 11	0.954E 10	0.737E 10	0.723E 10	0.783E 10	0.620E 10	0.892E 10
CO56	0.274E 11	0.232E 11	0.284E 11	0.291E 11	0.322E 11	0.266E 11	0.205E 11	0.265E 11	0.281E 11	0.197E 11	0.274E 11
CO57	0.804E 09	0.394E 09	0.484E 09	0.165E 10	0.111E 10	0.565E 09	0.868E 09	0.484E 09	0.113E 10	0.384E 09	0.931E 09
CO58	0.677E 10	0.390E 10	0.633E 10	0.756E 10	0.866E 10	0.684E 10	0.634E 10	0.453E 10	0.539E 10	0.476E 10	0.677E 10
CO60	0.189E 11	0.150E 11	0.174E 11	0.202E 11	0.222E 11	0.204E 11	0.154E 11	0.156E 11	0.168E 11	0.131E 11	0.189E 11
NI56	0.123E 11	0.781E 10	0.109E 11	0.146E 11	0.155E 11	0.125E 11	0.120E 11	0.913E 10	0.106E 11	0.856E 10	0.125E 11
NI63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CU64	0.144E 10	0.564E 09	0.895E 09	0.174E 10	0.176E 10	0.152E 10	0.157E 10	0.899E 09	0.151E 10	0.960E 09	0.144E 10
ZN65	0.399E 10	0.242E 10	0.395E 10	0.439E 10	0.517E 10	0.400E 10	0.363E 10	0.270E 10	0.299E 10	0.283E 10	0.399E 10
ZN69M	0.303E 10	0.111E 10	0.185E 10	0.370E 10	0.370E 10	0.320E 10	0.336E 10	0.185E 10	0.319E 10	0.202E 10	0.303E 10
ZN69	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA67	0.123E 10	0.650E 09	0.781E 09	0.202E 10	0.164E 10	0.109E 10	0.158E 10	0.949E 09	0.138E 10	0.766E 09	0.134E 10
GA68	0.687E 10	0.261E 10	0.432E 10	0.834E 10	0.841E 10	0.723E 10	0.755E 10	0.423E 10	0.714E 10	0.459E 10	0.687E 10
GE77	0.692E 10	0.375E 10	0.506E 10	0.894E 10	0.866E 10	0.687E 10	0.766E 10	0.510E 10	0.680E 10	0.470E 10	0.709E 10
AS76	0.325E 10	0.176E 10	0.227E 10	0.379E 10	0.386E 10	0.343E 10	0.322E 10	0.231E 10	0.335E 10	0.220E 10	0.325E 10
AS77	0.550E 08	0.288E 08	0.349E 08	0.846E 08	0.710E 08	0.514E 08	0.727E 08	0.439E 08	0.583E 08	0.361E 08	0.586E 08
SE75	0.406E 10	0.281E 10	0.293E 10	0.580E 10	0.501E 10	0.396E 10	0.441E 10	0.342E 10	0.436E 10	0.261E 10	0.428E 10
SE77M	0.554E 09	0.329E 09	0.358E 09	0.913E 09	0.754E 09	0.493E 09	0.790E 09	0.493E 09	0.578E 09	0.365E 09	0.604E 09
BR80M	0.554E 08	0.211E 08	0.778E 07	0.898E 08	0.211E 09	0.206E 08	0.825E 08	0.305E 08	0.611E 08	0.744E 07	0.627E 08
BR80	0.613E 09	0.229E 09	0.376E 09	0.747E 09	0.750E 09	0.648E 09	0.678E 09	0.377E 09	0.645E 09	0.408E 09	0.613E 09
BR82	0.196E 11	0.121E 11	0.164E 11	0.220E 11	0.238E 11	0.206E 11	0.182E 11	0.142E 11	0.178E 11	0.135E 11	0.196E 11
BR83	0.566E 08	0.199E 08	0.332E 08	0.673E 08	0.166E 09	0.576E 08	0.642E 08	0.328E 08	0.567E 08	0.357E 08	0.600E 08
BR84	0.139E 11	0.125E 11	0.174E 11	0.146E 11	0.165E 11	0.121E 11	0.942E 10	0.160E 11	0.163E 11	0.105E 11	0.139E 11
KR79	0.167E 10	0.728E 09	0.108E 10	0.215E 10	0.212E 10	0.170E 10	0.191E 10	0.112E 10	0.172E 10	0.111E 10	0.170E 10

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
KR83M	0.173E 07	0.161E 06	0.203E 06	0.139E 07	0.241E 08	0.213E 06	0.172E 07	0.765E 05	0.154E 06	0.163E 05	0.237E 07
KR85M	0.105E 10	0.625E 09	0.680E 09	0.174E 10	0.140E 10	0.937E 09	0.150E 10	0.937E 09	0.110E 10	0.694E 09	0.115E 10
KR85	0.150E 08	0.548E 07	0.913E 07	0.183E 08	0.183E 08	0.158E 08	0.166E 08	0.913E 07	0.158E 08	0.997E 07	0.150E 08
KR87	0.568E 10	0.468E 10	0.530E 10	0.619E 10	0.689E 10	0.471E 10	0.415E 10	0.514E 10	0.553E 10	0.422E 10	0.568E 10
KR88	0.147E 11	0.146E 11	0.148E 11	0.156E 11	0.178E 11	0.107E 11	0.892E 10	0.146E 11	0.136E 11	0.113E 11	0.147E 11
RB84	0.615E 10	0.343E 10	0.554E 10	0.693E 10	0.786E 10	0.619E 10	0.584E 10	0.410E 10	0.507E 10	0.430E 10	0.615E 10
RB86	0.652E 09	0.400E 09	0.652E 09	0.716E 09	0.842E 09	0.652E 09	0.589E 09	0.442E 09	0.484E 09	0.463E 09	0.652E 09
RB88	0.495E 10	0.484E 10	0.529E 10	0.517E 10	0.605E 10	0.357E 10	0.293E 10	0.499E 10	0.464E 10	0.384E 10	0.495E 10
RB89	0.177E 11	0.152E 11	0.173E 11	0.189E 11	0.212E 11	0.166E 11	0.130E 11	0.160E 11	0.164E 11	0.129E 11	0.177E 11
RB90	0.203E 11	0.188E 11	0.217E 11	0.207E 11	0.229E 11	0.187E 11	0.133E 11	0.293E 11	0.306E 11	0.153E 11	0.203E 11
SR85	0.372E 10	0.136E 10	0.227E 10	0.454E 10	0.461E 10	0.392E 10	0.413E 10	0.227E 10	0.391E 10	0.247E 10	0.372E 10
SR87M	0.240E 10	0.878E 09	0.146E 10	0.293E 10	0.293E 10	0.253E 10	0.266E 10	0.146E 10	0.252E 10	0.160E 10	0.240E 10
SR89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR91	0.535E 10	0.298E 10	0.437E 10	0.610E 10	0.659E 10	0.558E 10	0.517E 10	0.368E 10	0.487E 10	0.368E 10	0.535E 10
SR92	0.102E 11	0.942E 10	0.877E 10	0.108E 11	0.112E 11	0.116E 11	0.774E 10	0.947E 10	0.102E 11	0.696E 10	0.102E 11
SR93	0.109E 11	0.606E 10	0.861E 10	0.127E 11	0.133E 11	0.113E 11	0.108E 11	0.761E 10	0.101E 11	0.743E 10	0.109E 11
Y87	0.338E 10	0.124E 10	0.206E 10	0.413E 10	0.422E 10	0.357E 10	0.376E 10	0.206E 10	0.356E 10	0.225E 10	0.339E 10
Y88	0.192E 11	0.179E 11	0.199E 11	0.202E 11	0.239E 11	0.142E 11	0.121E 11	0.180E 11	0.168E 11	0.148E 11	0.192E 11
Y90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y91M	0.380E 10	0.139E 10	0.232E 10	0.463E 10	0.464E 10	0.401E 10	0.422E 10	0.232E 10	0.400E 10	0.253E 10	0.380E 10
Y91	0.197E 08	0.183E 08	0.170E 08	0.206E 08	0.215E 08	0.224E 08	0.147E 08	0.183E 08	0.197E 08	0.134E 08	0.197E 08
Y92	0.180E 10	0.125E 10	0.165E 10	0.196E 10	0.219E 10	0.186E 10	0.156E 10	0.136E 10	0.154E 10	0.126E 10	0.180E 10
Y93	0.533E 09	0.426E 09	0.480E 09	0.649E 09	0.668E 09	0.441E 09	0.468E 09	0.478E 09	0.495E 09	0.388E 09	0.545E 09
ZR95	0.512E 10	0.257E 10	0.423E 10	0.590E 10	0.645E 10	0.525E 10	0.510E 10	0.332E 10	0.451E 10	0.354E 10	0.512E 10
ZR97	0.133E 10	0.881E 09	0.110E 10	0.150E 10	0.160E 10	0.138E 10	0.121E 10	0.101E 10	0.125E 10	0.916E 09	0.133E 10

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
NB95M	0.384E 09	0.228E 09	0.248E 09	0.632E 09	0.506E 09	0.342E 09	0.546E 09	0.342E 09	0.400E 09	0.253E 09	0.417E 09
NB95	0.526E 10	0.322E 10	0.526E 10	0.577E 10	0.679E 10	0.526E 10	0.475E 10	0.356E 10	0.390E 10	0.373E 10	0.526E 10
NB97M	0.531E 10	0.194E 10	0.324E 10	0.648E 10	0.648E 10	0.561E 10	0.590E 10	0.324E 10	0.559E 10	0.354E 10	0.531E 10
NB97	0.483E 10	0.181E 10	0.300E 10	0.588E 10	0.590E 10	0.510E 10	0.534E 10	0.297E 10	0.506E 10	0.323E 10	0.483E 10
MO99	0.114E 10	0.504E 09	0.805E 09	0.140E 10	0.144E 10	0.117E 10	0.124E 10	0.738E 09	0.112E 10	0.770E 09	0.115E 10
TC99M	0.829E 09	0.407E 09	0.499E 09	0.171E 10	0.111E 10	0.578E 09	0.895E 09	0.498E 09	0.117E 10	0.393E 09	0.960E 09
TC99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RU103	0.351E 10	0.129E 10	0.214E 10	0.429E 10	0.430E 10	0.370E 10	0.390E 10	0.214E 10	0.370E 10	0.234E 10	0.351E 10
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH103M	0.275E 07	0.467E 06	0.606E 06	0.293E 07	0.156E 08	0.291E 06	0.421E 07	0.257E 06	0.114E 07	0.383E 05	0.302E 07
RH105	0.525E 09	0.311E 09	0.339E 09	0.864E 09	0.693E 09	0.467E 09	0.747E 09	0.467E 09	0.547E 09	0.346E 09	0.571E 09
RH106	0.135E 10	0.526E 09	0.856E 09	0.165E 10	0.165E 10	0.142E 10	0.148E 10	0.838E 09	0.141E 10	0.902E 09	0.135E 10
PD103	0.121E 08	0.775E 07	0.641E 07	0.247E 08	0.186E 08	0.921E 07	0.127E 08	0.878E 07	0.137E 08	0.354E 07	0.138E 08
AG110M	0.200E 11	0.123E 11	0.166E 11	0.225E 11	0.242E 11	0.211E 11	0.186E 11	0.144E 11	0.183E 11	0.137E 11	0.200E 11
AG111	0.205E 09	0.122E 09	0.133E 09	0.339E 09	0.272E 09	0.183E 09	0.292E 09	0.182E 09	0.215E 09	0.135E 09	0.224E 09
CD111M	0.266E 10	0.148E 10	0.168E 10	0.481E 10	0.353E 10	0.218E 10	0.345E 10	0.208E 10	0.315E 10	0.157E 10	0.297E 10
CD113M	0.236E 07	0.137E 07	0.149E 07	0.386E 07	0.341E 07	0.204E 07	0.338E 07	0.204E 07	0.243E 07	0.150E 07	0.257E 07
CD115M	0.241E 09	0.176E 09	0.223E 09	0.261E 09	0.291E 09	0.255E 09	0.205E 09	0.187E 09	0.207E 09	0.168E 09	0.241E 09
IN113M	0.183E 10	0.672E 09	0.112E 10	0.224E 10	0.224E 10	0.194E 10	0.204E 10	0.112E 10	0.193E 10	0.122E 10	0.183E 10
IN114M	0.545E 09	0.243E 09	0.332E 09	0.752E 09	0.743E 09	0.527E 09	0.676E 09	0.383E 09	0.565E 09	0.351E 09	0.564E 09
IN114	0.194E 08	0.160E 08	0.156E 08	0.210E 08	0.240E 08	0.211E 08	0.162E 08	0.167E 08	0.193E 08	0.127E 08	0.195E 08
IN115M	0.968E 09	0.532E 09	0.578E 09	0.149E 10	0.126E 10	0.795E 09	0.129E 10	0.796E 09	0.940E 09	0.587E 09	0.988E 09
SN113	0.729E 08	0.259E 08	0.301E 08	0.962E 08	0.259E 09	0.328E 08	0.108E 09	0.322E 08	0.499E 08	0.219E 08	0.791E 08
SN119M	0.268E 08	0.833E 07	0.445E 07	0.388E 08	0.964E 08	0.738E 07	0.403E 08	0.108E 08	0.237E 08	0.254E 07	0.292E 08
SN123	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SN125	0.218E 10	0.152E 10	0.216E 10	0.239E 10	0.277E 10	0.205E 10	0.184E 10	0.165E 10	0.174E 10	0.158E 10	0.219E 10

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
SB122	0.300E 10	0.113E 10	0.187E 10	0.365E 10	0.367E 10	0.316E 10	0.331E 10	0.184E 10	0.313E 10	0.200E 10	0.300E 10
SB124	0.141E 11	0.101E 11	0.110E 11	0.158E 11	0.163E 11	0.151E 11	0.124E 11	0.114E 11	0.143E 11	0.966E 10	0.141E 11
SB125	0.315E 10	0.118E 10	0.189E 10	0.393E 10	0.396E 10	0.325E 10	0.356E 10	0.195E 10	0.333E 10	0.205E 10	0.317E 10
SB127	0.477E 10	0.203E 10	0.327E 10	0.579E 10	0.590E 10	0.495E 10	0.515E 10	0.304E 10	0.474E 10	0.321E 10	0.478E 10
TE123M	0.945E 09	0.550E 09	0.585E 09	0.156E 10	0.131E 10	0.815E 09	0.135E 10	0.825E 09	0.991E 09	0.597E 09	0.103E 10
TE125M	0.127E 09	0.493E 08	0.181E 08	0.211E 09	0.315E 09	0.474E 08	0.188E 09	0.724E 08	0.146E 09	0.183E 08	0.138E 09
TE127M	0.318E 08	0.124E 08	0.450E 07	0.527E 08	0.807E 08	0.119E 08	0.473E 08	0.181E 08	0.365E 08	0.456E 07	0.346E 08
TE127	0.293E 08	0.111E 08	0.179E 08	0.366E 08	0.361E 08	0.306E 08	0.331E 08	0.183E 08	0.309E 08	0.194E 08	0.295E 08
TE129M	0.244E 09	0.929E 08	0.140E 09	0.310E 09	0.335E 09	0.238E 09	0.279E 09	0.149E 09	0.257E 09	0.148E 09	0.247E 09
TE129	0.459E 09	0.196E 09	0.305E 09	0.568E 09	0.592E 09	0.465E 09	0.507E 09	0.293E 09	0.460E 09	0.300E 09	0.463E 09
TE131M	0.983E 10	0.657E 10	0.918E 10	0.113E 11	0.124E 11	0.966E 10	0.896E 10	0.734E 10	0.820E 10	0.690E 10	0.992E 10
TE131	0.288E 10	0.147E 10	0.219E 10	0.396E 10	0.368E 10	0.274E 10	0.294E 10	0.187E 10	0.294E 10	0.183E 10	0.299E 10
TE132	0.137E 10	0.816E 09	0.880E 09	0.230E 10	0.182E 10	0.121E 10	0.193E 10	0.121E 10	0.145E 10	0.882E 09	0.150E 10
I123	0.106E 10	0.595E 09	0.640E 09	0.172E 10	0.150E 10	0.915E 09	0.150E 10	0.896E 09	0.112E 10	0.656E 09	0.115E 10
I124	0.811E 10	0.475E 10	0.581E 10	0.940E 10	0.968E 10	0.845E 10	0.780E 10	0.598E 10	0.833E 10	0.550E 10	0.812E 10
I125	0.147E 09	0.568E 08	0.198E 08	0.243E 09	0.367E 09	0.540E 08	0.219E 09	0.837E 08	0.168E 09	0.204E 08	0.159E 09
I126	0.311E 10	0.118E 10	0.191E 10	0.380E 10	0.385E 10	0.325E 10	0.344E 10	0.191E 10	0.326E 10	0.205E 10	0.311E 10
I129	0.879E 08	0.340E 08	0.119E 08	0.145E 09	0.220E 09	0.323E 08	0.131E 09	0.502E 08	0.101E 09	0.122E 08	0.954E 08
I130	0.147E 11	0.566E 10	0.934E 10	0.181E 11	0.181E 11	0.154E 11	0.161E 11	0.904E 10	0.153E 11	0.978E 10	0.148E 11
I131	0.274E 10	0.103E 10	0.167E 10	0.341E 10	0.337E 10	0.287E 10	0.308E 10	0.170E 10	0.289E 10	0.182E 10	0.275E 10
I132	0.162E 11	0.876E 10	0.130E 11	0.186E 11	0.201E 11	0.167E 11	0.158E 11	0.110E 11	0.149E 11	0.111E 11	0.162E 11
I133	0.489E 10	0.229E 10	0.338E 10	0.578E 10	0.593E 10	0.518E 10	0.508E 10	0.322E 10	0.492E 10	0.329E 10	0.489E 10
I134	0.168E 11	0.104E 11	0.158E 11	0.186E 11	0.212E 11	0.171E 11	0.153E 11	0.117E 11	0.136E 11	0.118E 11	0.168E 11
I135	0.133E 11	0.109E 11	0.120E 11	0.142E 11	0.154E 11	0.145E 11	0.107E 11	0.112E 11	0.122E 11	0.917E 10	0.133E 11
I136	0.214E 11	0.204E 11	0.209E 11	0.225E 11	0.246E 11	0.199E 11	0.145E 11	0.214E 11	0.218E 11	0.156E 11	0.214E 11
XE131M	0.801E 08	0.353E 08	0.215E 08	0.132E 09	0.177E 09	0.404E 08	0.118E 09	0.524E 08	0.895E 08	0.220E 08	0.870E 08

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
XE133M	0.217E 09	0.116E 09	0.109E 09	0.358E 09	0.359E 09	0.161E 09	0.313E 09	0.173E 09	0.232E 09	0.111E 09	0.236E 09
XE133	0.251E 09	0.118E 09	0.126E 09	0.495E 09	0.398E 09	0.157E 09	0.293E 09	0.150E 09	0.339E 09	0.101E 09	0.286E 09
XE135M	0.310E 10	0.114E 10	0.189E 10	0.380E 10	0.381E 10	0.327E 10	0.345E 10	0.189E 10	0.327E 10	0.206E 10	0.310E 10
XE135	0.165E 10	0.954E 09	0.106E 10	0.267E 10	0.218E 10	0.149E 10	0.232E 10	0.144E 10	0.173E 10	0.109E 10	0.179E 10
XE137	0.132E 10	0.655E 09	0.914E 09	0.156E 10	0.160E 10	0.136E 10	0.134E 10	0.902E 09	0.135E 10	0.897E 09	0.132E 10
XE138	0.589E 10	0.502E 10	0.508E 10	0.684E 10	0.708E 10	0.528E 10	0.477E 10	0.543E 10	0.583E 10	0.421E 10	0.597E 10
CS134	0.110E 11	0.559E 10	0.894E 10	0.127E 11	0.138E 11	0.114E 11	0.110E 11	0.722E 10	0.990E 10	0.759E 10	0.110E 11
CS135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS136	0.149E 11	0.966E 10	0.140E 11	0.171E 11	0.189E 11	0.149E 11	0.140E 11	0.109E 11	0.120E 11	0.104E 11	0.150E 11
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS138	0.164E 11	0.146E 11	0.151E 11	0.175E 11	0.191E 11	0.159E 11	0.119E 11	0.151E 11	0.158E 11	0.118E 11	0.164E 11
CS139	0.170E 10	0.161E 10	0.164E 10	0.178E 10	0.193E 10	0.165E 10	0.117E 10	0.170E 10	0.176E 10	0.122E 10	0.170E 10
BA133	0.245E 10	0.103E 10	0.145E 10	0.341E 10	0.322E 10	0.236E 10	0.289E 10	0.161E 10	0.266E 10	0.152E 10	0.253E 10
BA137M	0.408E 10	0.149E 10	0.249E 10	0.498E 10	0.499E 10	0.430E 10	0.454E 10	0.249E 10	0.430E 10	0.272E 10	0.408E 10
BA139	0.364E 09	0.234E 09	0.245E 09	0.566E 09	0.473E 09	0.335E 09	0.480E 09	0.325E 09	0.378E 09	0.239E 09	0.391E 09
BA140	0.138E 10	0.544E 09	0.842E 09	0.177E 10	0.173E 10	0.142E 10	0.159E 10	0.889E 09	0.146E 10	0.912E 09	0.140E 10
LA140	0.178E 11	0.148E 11	0.153E 11	0.194E 11	0.204E 11	0.193E 11	0.145E 11	0.155E 11	0.173E 11	0.123E 11	0.179E 11
CE141	0.497E 09	0.242E 09	0.289E 09	0.102E 10	0.689E 09	0.340E 09	0.545E 09	0.299E 09	0.696E 09	0.229E 09	0.574E 09
CE143	0.204E 10	0.110E 10	0.143E 10	0.293E 10	0.273E 10	0.191E 10	0.249E 10	0.155E 10	0.201E 10	0.131E 10	0.214E 10
CE144	0.118E 09	0.568E 08	0.650E 08	0.238E 09	0.172E 09	0.780E 08	0.132E 09	0.706E 08	0.162E 09	0.515E 08	0.135E 09
PR143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PR144	0.224E 09	0.181E 09	0.195E 09	0.246E 09	0.268E 09	0.191E 09	0.168E 09	0.197E 09	0.220E 09	0.164E 09	0.224E 09
ND147	0.946E 09	0.391E 09	0.552E 09	0.137E 10	0.125E 10	0.884E 09	0.108E 10	0.595E 09	0.106E 10	0.561E 09	0.986E 09
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM148M	0.143E 11	0.596E 10	0.974E 10	0.173E 11	0.177E 11	0.149E 11	0.155E 11	0.900E 10	0.143E 11	0.962E 10	0.143E 11
PM148	0.483E 10	0.360E 10	0.402E 10	0.530E 10	0.560E 10	0.528E 10	0.415E 10	0.393E 10	0.466E 10	0.330E 10	0.483E 10

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
SM151	0.245E 05	0.392E 04	0.537E 04	0.244E 05	0.243E 06	0.343E 04	0.388E 05	0.176E 04	0.906E 04	0.222E 03	0.307E 05
EU154	0.947E 10	0.671E 10	0.815E 10	0.108E 11	0.114E 11	0.997E 10	0.835E 10	0.736E 10	0.880E 10	0.643E 10	0.954E 10
EU155	0.409E 09	0.216E 09	0.240E 09	0.858E 09	0.569E 09	0.285E 09	0.438E 09	0.257E 09	0.561E 09	0.176E 09	0.475E 09
EU156	0.101E 11	0.821E 10	0.971E 10	0.110E 11	0.124E 11	0.919E 10	0.770E 10	0.861E 10	0.899E 10	0.739E 10	0.102E 11
GD162	0.307E 10	0.113E 10	0.187E 10	0.375E 10	0.376E 10	0.323E 10	0.341E 10	0.187E 10	0.324E 10	0.204E 10	0.307E 10
TB160	0.763E 10	0.499E 10	0.717E 10	0.883E 10	0.967E 10	0.767E 10	0.711E 10	0.558E 10	0.623E 10	0.530E 10	0.771E 10
TA182	0.957E 10	0.728E 10	0.864E 10	0.109E 11	0.116E 11	0.100E 11	0.822E 10	0.770E 10	0.857E 10	0.648E 10	0.967E 10
W185	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W187	0.122E 10	0.472E 09	0.737E 09	0.160E 10	0.151E 10	0.124E 10	0.135E 10	0.750E 09	0.131E 10	0.774E 09	0.124E 10
AU195M	0.131E 10	0.785E 09	0.832E 09	0.221E 10	0.178E 10	0.114E 10	0.182E 10	0.115E 10	0.137E 10	0.819E 09	0.143E 10
AU195	0.501E 09	0.339E 09	0.263E 09	0.111E 10	0.834E 09	0.342E 09	0.516E 09	0.364E 09	0.598E 09	0.119E 09	0.586E 09
AU198	0.294E 10	0.108E 10	0.180E 10	0.359E 10	0.359E 10	0.310E 10	0.326E 10	0.180E 10	0.309E 10	0.195E 10	0.294E 10
AU199	0.631E 09	0.379E 09	0.400E 09	0.108E 10	0.861E 09	0.547E 09	0.872E 09	0.549E 09	0.671E 09	0.388E 09	0.693E 09
HG197	0.374E 09	0.266E 09	0.192E 09	0.838E 09	0.640E 09	0.256E 09	0.386E 09	0.283E 09	0.429E 09	0.751E 08	0.438E 09
HG203	0.158E 10	0.947E 09	0.102E 10	0.265E 10	0.211E 10	0.140E 10	0.224E 10	0.140E 10	0.166E 10	0.102E 10	0.173E 10
TL204	0.603E 07	0.432E 07	0.307E 07	0.136E 08	0.104E 08	0.410E 07	0.616E 07	0.455E 07	0.694E 07	0.114E 07	0.708E 07
TL208	0.245E 11	0.226E 11	0.237E 11	0.264E 11	0.300E 11	0.176E 11	0.156E 11	0.234E 11	0.233E 11	0.188E 11	0.245E 11
TL210	0.396E 05	0.284E 05	0.202E 05	0.895E 05	0.635E 05	0.269E 05	0.403E 05	0.299E 05	0.456E 05	0.749E 04	0.463E 05
PB204M	0.145E 11	0.827E 10	0.135E 11	0.162E 11	0.185E 11	0.146E 11	0.136E 11	0.965E 10	0.115E 11	0.102E 11	0.145E 11
PB210	0.118E 08	0.756E 07	0.547E 07	0.245E 08	0.417E 08	0.727E 07	0.121E 08	0.786E 07	0.120E 08	0.197E 07	0.143E 08
PB212	0.954E 09	0.574E 09	0.600E 09	0.166E 10	0.130E 10	0.817E 09	0.130E 10	0.821E 09	0.102E 10	0.570E 09	0.105E 10
PB214	0.161E 10	0.746E 09	0.100E 10	0.229E 10	0.206E 10	0.157E 10	0.194E 10	0.114E 10	0.170E 10	0.103E 10	0.167E 10
BI210	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI212	0.809E 09	0.486E 09	0.615E 09	0.930E 09	0.973E 09	0.865E 09	0.775E 09	0.593E 09	0.795E 09	0.548E 09	0.811E 09
BI214	0.115E 11	0.913E 10	0.100E 11	0.126E 11	0.136E 11	0.115E 11	0.929E 10	0.980E 10	0.110E 11	0.814E 10	0.116E 11
PO214	0.766E 06	0.470E 06	0.766E 06	0.840E 06	0.989E 06	0.766E 06	0.692E 06	0.519E 06	0.568E 06	0.544E 06	0.766E 06

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
PO218	0.634E 06	0.388E 06	0.634E 06	0.695E 06	0.818E 06	0.634E 06	0.572E 06	0.429E 06	0.470E 06	0.450E 06	0.634E 06
RN220	0.260E 07	0.953E 06	0.159E 07	0.318E 07	0.318E 07	0.275E 07	0.289E 07	0.159E 07	0.274E 07	0.173E 07	0.260E 07
RN222	0.283E 07	0.104E 07	0.173E 07	0.346E 07	0.346E 07	0.299E 07	0.314E 07	0.173E 07	0.298E 07	0.189E 07	0.283E 07
RA224	0.672E 08	0.397E 08	0.433E 08	0.112E 09	0.891E 08	0.594E 08	0.950E 08	0.592E 08	0.710E 08	0.439E 08	0.733E 08
RA226	0.448E 08	0.263E 08	0.288E 08	0.752E 08	0.600E 08	0.393E 08	0.627E 08	0.389E 08	0.479E 08	0.289E 08	0.490E 08
RA228	0.115E 09	0.444E 08	0.154E 08	0.190E 09	0.281E 09	0.421E 08	0.171E 09	0.654E 08	0.131E 09	0.159E 08	0.124E 09
AC228	0.531E 10	0.355E 10	0.473E 10	0.621E 10	0.659E 10	0.542E 10	0.490E 10	0.398E 10	0.465E 10	0.363E 10	0.537E 10
TH228	0.161E 08	0.807E 07	0.947E 07	0.297E 08	0.314E 08	0.117E 08	0.190E 08	0.107E 08	0.194E 08	0.821E 07	0.184E 08
TH230	0.302E 07	0.152E 07	0.132E 07	0.531E 07	0.129E 08	0.167E 07	0.317E 07	0.170E 07	0.261E 07	0.723E 06	0.359E 07
TH231	0.107E 09	0.473E 08	0.532E 08	0.200E 09	0.260E 09	0.635E 08	0.121E 09	0.580E 08	0.130E 09	0.408E 08	0.123E 09
TH232	0.143E 07	0.521E 06	0.420E 06	0.207E 07	0.103E 08	0.500E 06	0.135E 07	0.499E 06	0.757E 06	0.124E 06	0.176E 07
TH234	0.452E 08	0.228E 08	0.266E 08	0.933E 08	0.663E 08	0.312E 08	0.485E 08	0.274E 08	0.622E 08	0.203E 08	0.524E 08
PA233	0.132E 10	0.734E 09	0.834E 09	0.223E 10	0.178E 10	0.114E 10	0.176E 10	0.107E 10	0.146E 10	0.820E 09	0.144E 10
PA234M	0.659E 08	0.397E 08	0.640E 08	0.755E 08	0.857E 08	0.649E 08	0.606E 08	0.445E 08	0.513E 08	0.459E 08	0.664E 08
PA234	0.223E 11	0.199E 11	0.219E 11	0.247E 11	0.276E 11	0.172E 11	0.154E 11	0.206E 11	0.203E 11	0.167E 11	0.225E 11
U232	0.275E 07	0.983E 06	0.100E 07	0.422E 07	0.159E 08	0.113E 07	0.280E 07	0.102E 07	0.203E 07	0.532E 06	0.331E 07
U233	0.572E 07	0.299E 07	0.322E 07	0.952E 07	0.145E 08	0.423E 07	0.732E 07	0.413E 07	0.569E 07	0.291E 07	0.645E 07
U234	0.206E 07	0.664E 06	0.669E 06	0.294E 07	0.136E 08	0.734E 06	0.209E 07	0.661E 06	0.128E 07	0.314E 06	0.249E 07
U235	0.985E 09	0.561E 09	0.624E 09	0.169E 10	0.137E 10	0.833E 09	0.134E 10	0.815E 09	0.109E 10	0.608E 09	0.109E 10
U236	0.126E 07	0.245E 06	0.248E 06	0.134E 07	0.117E 08	0.228E 06	0.125E 07	0.186E 06	0.326E 06	0.435E 05	0.156E 07
U237	0.890E 09	0.499E 09	0.534E 09	0.168E 10	0.134E 10	0.687E 09	0.109E 10	0.659E 09	0.106E 10	0.453E 09	0.101E 10
U238	0.128E 07	0.292E 06	0.326E 06	0.153E 07	0.105E 08	0.322E 06	0.129E 07	0.261E 06	0.539E 06	0.131E 06	0.157E 07
U240	0.815E 07	0.315E 07	0.254E 07	0.123E 08	0.526E 08	0.297E 07	0.817E 07	0.302E 07	0.479E 07	0.745E 06	0.988E 07
NP237	0.541E 09	0.284E 09	0.330E 09	0.104E 10	0.745E 09	0.410E 09	0.651E 09	0.378E 09	0.692E 09	0.288E 09	0.614E 09
NP238	0.385E 10	0.236E 10	0.385E 10	0.422E 10	0.497E 10	0.385E 10	0.348E 10	0.261E 10	0.286E 10	0.273E 10	0.385E 10
NP239	0.870E 09	0.483E 09	0.545E 09	0.156E 10	0.121E 10	0.709E 09	0.113E 10	0.680E 09	0.102E 10	0.510E 09	0.970E 09

TABLE 3-8 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (AIR IMMERSION)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
NP240M	0.239E 10	0.128E 10	0.174E 10	0.282E 10	0.291E 10	0.253E 10	0.241E 10	0.167E 10	0.237E 10	0.162E 10	0.240E 10
PU236	0.174E 07	0.316E 06	0.363E 06	0.185E 07	0.156E 08	0.318E 06	0.179E 07	0.241E 06	0.515E 06	0.980E 05	0.214E 07
PU238	0.134E 07	0.186E 06	0.228E 06	0.126E 07	0.133E 08	0.181E 06	0.132E 07	0.116E 06	0.246E 06	0.384E 05	0.166E 07
PU239	0.590E 06	0.117E 06	0.110E 06	0.641E 06	0.521E 07	0.110E 06	0.611E 06	0.100E 06	0.189E 06	0.257E 05	0.722E 06
PU240	0.118E 07	0.180E 06	0.214E 06	0.116E 07	0.115E 08	0.178E 06	0.117E 07	0.122E 06	0.253E 06	0.433E 05	0.146E 07
PU241	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU242	0.112E 07	0.151E 06	0.180E 06	0.104E 07	0.113E 08	0.139E 06	0.110E 07	0.883E 05	0.177E 06	0.191E 05	0.139E 07
PU244	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AM241	0.123E 09	0.851E 08	0.606E 08	0.272E 09	0.230E 09	0.809E 08	0.126E 09	0.900E 08	0.138E 09	0.227E 08	0.144E 09
AM242	0.858E 08	0.404E 08	0.496E 08	0.172E 09	0.147E 09	0.568E 08	0.935E 08	0.489E 08	0.115E 09	0.384E 08	0.994E 08
AM243	0.270E 09	0.193E 09	0.137E 09	0.608E 09	0.445E 09	0.183E 09	0.275E 09	0.203E 09	0.309E 09	0.508E 08	0.316E 09
CM242	0.127E 07	0.161E 06	0.202E 06	0.116E 07	0.130E 08	0.151E 06	0.126E 07	0.893E 05	0.192E 06	0.233E 05	0.158E 07
CM243	0.830E 09	0.459E 09	0.520E 09	0.150E 10	0.116E 10	0.674E 09	0.107E 10	0.644E 09	0.977E 09	0.485E 09	0.927E 09
CM244	0.386E 08	0.243E 08	0.207E 08	0.838E 08	0.637E 08	0.261E 08	0.401E 08	0.267E 08	0.473E 08	0.110E 08	0.450E 08
CF252	0.402E 10	0.273E 10	0.318E 10	0.481E 10	0.476E 10	0.412E 10	0.385E 10	0.339E 10	0.425E 10	0.276E 10	0.407E 10

TABLE 3-9

PHOTON DEPTH DOSE RATE FACTORS TO VARIOUS ORGANS (mrem/yr per μCi/cm^2)[a]

EXPOSURE TO CONTAMINATED GROUND SURFACE[b]

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
H3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE7	0.495E 05	0.636E 05	0.460E 05	0.495E 05	0.460E 05	0.565E 05	0.530E 05	0.601E 05	0.777E 05	0.815E 05	0.742E 05
C11	0.103E 07	0.132E 07	0.953E 06	0.103E 07	0.953E 06	0.117E 07	0.110E 07	0.125E 07	0.161E 07	0.169E 07	0.154E 07
C14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N13	0.103E 07	0.132E 07	0.954E 06	0.103E 07	0.954E 06	0.117E 07	0.110E 07	0.125E 07	0.161E 07	0.169E 07	0.154E 07
O15	0.103E 07	0.132E 07	0.955E 06	0.103E 07	0.955E 06	0.117E 07	0.110E 07	0.125E 07	0.161E 07	0.169E 07	0.154E 07
F18	0.994E 06	0.128E 07	0.924E 06	0.994E 06	0.924E 06	0.114E 07	0.107E 07	0.121E 07	0.156E 07	0.164E 07	0.149E 07
NA22	0.252E 07	0.277E 07	0.217E 07	0.267E 07	0.233E 07	0.224E 07	0.242E 07	0.275E 07	0.318E 07	0.333E 07	0.304E 07
NA24	0.359E 07	0.422E 07	0.357E 07	0.521E 07	0.386E 07	0.341E 07	0.398E 07	0.436E 07	0.457E 07	0.484E 07	0.430E 07
MG28	0.163E 07	0.164E 07	0.137E 07	0.175E 07	0.144E 07	0.136E 07	0.150E 07	0.170E 07	0.190E 07	0.200E 07	0.180E 07
AL26	0.204E 07	0.204E 07	0.169E 07	0.224E 07	0.189E 07	0.154E 07	0.184E 07	0.209E 07	0.224E 07	0.234E 07	0.214E 07
P32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL36	0.810E-07	0.114E 01	0.887E-03	0.155E-02	0.185E 00	0.659E-03	0.481E-02	0.456E 00	0.887E 00	0.109E 01	0.685E 00
CL38	0.134E 07	0.157E 07	0.132E 07	0.192E 07	0.143E 07	0.126E 07	0.147E 07	0.162E 07	0.170E 07	0.180E 07	0.160E 07
A37	0.478E-05	0.674E 02	0.524E-01	0.913E-01	0.109E 02	0.389E-01	0.284E 00	0.269E 02	0.524E 02	0.644E 02	0.404E 02
A39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K40	0.188E 06	0.188E 06	0.156E 06	0.207E 06	0.175E 06	0.143E 06	0.170E 06	0.193E 06	0.207E 06	0.216E 06	0.198E 06
K42	0.327E 06	0.328E 06	0.272E 06	0.360E 06	0.303E 06	0.248E 06	0.296E 06	0.336E 06	0.360E 06	0.376E 06	0.344E 06
K43	0.985E 06	0.126E 07	0.915E 06	0.985E 06	0.910E 06	0.112E 07	0.105E 07	0.119E 07	0.154E 07	0.162E 07	0.147E 07
CA45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CA47	0.129E 07	0.130E 07	0.107E 07	0.141E 07	0.118E 07	0.100E 07	0.117E 07	0.133E 07	0.144E 07	0.150E 07	0.137E 07
CA49	0.600E 07	0.222E 07	0.316E 07	0.374E 07	0.287E 07	0.273E 07	0.316E 07	0.316E 07	0.316E 07	0.345E 07	0.288E 07
SC46	0.211E 07	0.196E 07	0.181E 07	0.211E 07	0.151E 07	0.218E 07	0.196E 07	0.218E 07	0.256E 07	0.271E 07	0.233E 07

[a]Contributions of radioactive daughter products are not included.

[b]Point receptor located 1 m above the surface.

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
SC47	0.832E 05	0.845E 05	0.910E 05	0.937E 05	0.715E 05	0.937E 05	0.988E 05	0.114E 06	0.195E 06	0.208E 06	0.181E 06
SC49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CR51	0.378E 05	0.384E 05	0.414E 05	0.426E 05	0.325E 05	0.426E 05	0.449E 05	0.521E 05	0.888E 05	0.945E 05	0.824E 05
MN52M	0.278E 07	0.304E 07	0.239E 07	0.296E 07	0.257E 07	0.245E 07	0.266E 07	0.302E 07	0.347E 07	0.364E 07	0.332E 07
MN52	0.381E 07	0.399E 07	0.327E 07	0.400E 07	0.333E 07	0.348E 07	0.361E 07	0.408E 07	0.471E 07	0.494E 07	0.445E 07
MN54	0.918E 06	0.852E 06	0.787E 06	0.918E 06	0.655E 06	0.950E 06	0.852E 06	0.950E 06	0.111E 07	0.118E 07	0.102E 07
FE52	0.705E 06	0.872E 06	0.677E 06	0.722E 06	0.646E 06	0.804E 06	0.771E 06	0.878E 06	0.121E 07	0.127E 07	0.115E 07
FE55	0.269E-04	0.380E 03	0.295E 00	0.515E 00	0.615E 02	0.219E 00	0.160E 01	0.152E 03	0.295E 03	0.363E 03	0.228E 03
FE59	0.135E 07	0.130E 07	0.114E 07	0.142E 07	0.111E 07	0.120E 07	0.123E 07	0.139E 07	0.156E 07	0.164E 07	0.146E 07
CO56	0.429E 07	0.380E 07	0.345E 07	0.444E 07	0.344E 07	0.349E 07	0.375E 07	0.412E 07	0.451E 07	0.477E 07	0.421E 07
CO57	0.153E 06	0.145E 06	0.144E 06	0.141E 06	0.117E 06	0.162E 06	0.165E 06	0.187E 06	0.397E 06	0.428E 06	0.366E 06
CO58	0.107E 07	0.105E 07	0.924E 06	0.107E 07	0.757E 06	0.112E 07	0.101E 07	0.113E 07	0.135E 07	0.142E 07	0.124E 07
CO60	0.283E 07	0.275E 07	0.238E 07	0.299E 07	0.237E 07	0.247E 07	0.259E 07	0.292E 07	0.325E 07	0.341E 07	0.304E 07
NI56	0.185E 07	0.182E 07	0.164E 07	0.191E 07	0.146E 07	0.187E 07	0.179E 07	0.202E 07	0.252E 07	0.266E 07	0.233E 07
NI63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CU64	0.214E 06	0.272E 06	0.198E 06	0.215E 06	0.199E 06	0.240E 06	0.228E 06	0.258E 06	0.331E 06	0.347E 06	0.316E 06
ZN65	0.640E 06	0.599E 06	0.550E 06	0.640E 06	0.460E 06	0.664E 06	0.596E 06	0.665E 06	0.782E 06	0.828E 06	0.714E 06
ZN69M	0.421E 06	0.542E 06	0.391E 06	0.421E 06	0.391E 06	0.481E 06	0.452E 06	0.512E 06	0.661E 06	0.694E 06	0.632E 06
ZN69	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA67	0.200E 06	0.210E 06	0.204E 06	0.210E 06	0.170E 06	0.223E 06	0.227E 06	0.260E 06	0.446E 06	0.475E 06	0.415E 06
GA68	0.958E 06	0.122E 07	0.888E 06	0.961E 06	0.882E 06	0.109E 07	0.102E 07	0.116E 07	0.149E 07	0.156E 07	0.142E 07
GE77	0.936E 06	0.105E 07	0.888E 06	0.992E 06	0.816E 06	0.101E 07	0.990E 06	0.112E 07	0.152E 07	0.161E 07	0.143E 07
AS76	0.457E 06	0.548E 06	0.414E 06	0.482E 06	0.428E 06	0.469E 06	0.470E 06	0.531E 06	0.650E 06	0.682E 06	0.620E 06
AS77	0.681E 04	0.747E 04	0.705E 04	0.734E 04	0.557E 04	0.768E 04	0.781E 04	0.898E 04	0.144E 05	0.152E 05	0.134E 05
SE75	0.631E 06	0.645E 06	0.593E 06	0.679E 06	0.557E 06	0.601E 06	0.653E 06	0.747E 06	0.110E 07	0.117E 07	0.103E 07
SE77M	0.912E 05	0.927E 05	0.598E 05	0.103E 06	0.784E 05	0.103E 06	0.108E 06	0.126E 06	0.214E 06	0.228E 06	0.199E 06

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
BR80M	0.231E 05	0.289E 05	0.124E 05	0.173E 05	0.928E 04	0.396E 05	0.267E 05	0.363E 05	0.117E 06	0.134E 06	0.978E 05
BR80	0.898E 05	0.115E 06	0.833E 05	0.900E 05	0.835E 05	0.102E 06	0.961E 05	0.109E 06	0.140E 06	0.147E 06	0.134E 06
BR82	0.291E 07	0.306E 07	0.254E 07	0.300E 07	0.244E 07	0.288E 07	0.281E 07	0.316E 07	0.374E 07	0.394E 07	0.351E 07
BR83	0.668E 05	0.876E 05	0.621E 05	0.668E 05	0.632E 05	0.764E 05	0.717E 05	0.822E 05	0.108E 06	0.114E 06	0.103E 06
BR84	0.235E 07	0.169E 07	0.172E 07	0.222E 07	0.164E 07	0.171E 07	0.184E 07	0.196E 07	0.209E 07	0.224E 07	0.193E 07
KR79	0.307E 06	0.370E 06	0.291E 06	0.314E 06	0.277E 06	0.344E 06	0.330E 06	0.376E 06	0.511E 06	0.539E 06	0.484E 06
KR83M	0.107E 03	0.543E 03	0.702E 02	0.798E 02	0.137E 04	0.224E 03	0.170E 03	0.787E 03	0.361E 04	0.431E 04	0.290E 04
KR85M	0.128E 06	0.130E 06	0.140E 06	0.144E 06	0.110E 06	0.144E 06	0.152E 06	0.176E 06	0.300E 06	0.319E 06	0.278E 06
KR85	0.207E 04	0.266E 04	0.192E 04	0.207E 04	0.192E 04	0.236E 04	0.222E 04	0.251E 04	0.325E 04	0.341E 04	0.310E 04
KR87	0.701E 06	0.820E 06	0.682E 06	0.923E 06	0.699E 06	0.719E 06	0.766E 06	0.840E 06	0.939E 06	0.956E 06	0.882E 06
KR88	0.164E 07	0.199E 07	0.172E 07	0.250E 07	0.179E 07	0.170E 07	0.152E 07	0.209E 07	0.225E 07	0.240E 07	0.210E 07
RB84	0.100E 07	0.102E 07	0.880E 06	0.101E 07	0.773E 06	0.106E 07	0.969E 06	0.108E 07	0.130E 07	0.138E 07	0.120E 07
RB86	0.986E 05	0.916E 05	0.845E 05	0.986E 05	0.705E 05	0.102E 06	0.916E 05	0.102E 06	0.120E 06	0.127E 06	0.109E 06
RB88	0.605E 06	0.681E 06	0.602E 06	0.868E 06	0.612E 06	0.609E 06	0.670E 06	0.723E 06	0.766E 06	0.817E 06	0.711E 06
RB89	0.246E 07	0.251E 07	0.219E 07	0.289E 07	0.219E 07	0.225E 07	0.240E 07	0.266E 07	0.291E 07	0.308E 07	0.272E 07
RB90	0.426E 07	0.194E 07	0.246E 07	0.294E 07	0.222E 07	0.228E 07	0.251E 07	0.257E 07	0.266E 07	0.288E 07	0.243E 07
SR85	0.612E 06	0.787E 06	0.569E 06	0.612E 06	0.570E 06	0.700E 06	0.657E 06	0.744E 06	0.962E 06	0.101E 07	0.920E 06
SR87M	0.330E 06	0.424E 06	0.306E 06	0.330E 06	0.306E 06	0.377E 06	0.354E 06	0.401E 06	0.518E 06	0.544E 06	0.495E 06
SR89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR91	0.779E 06	0.838E 06	0.686E 06	0.792E 06	0.647E 06	0.803E 06	0.763E 06	0.859E 06	0.104E 07	0.109E 07	0.972E 06
SR92	0.152E 07	0.153E 07	0.127E 07	0.167E 07	0.141E 07	0.116E 07	0.138E 07	0.157E 07	0.169E 07	0.176E 07	0.161E 07
SR93	0.158E 07	0.172E 07	0.140E 07	0.162E 07	0.133E 07	0.163E 07	0.156E 07	0.177E 07	0.217E 07	0.229E 07	0.204E 07
Y87	0.584E 06	0.751E 06	0.543E 06	0.584E 06	0.544E 06	0.668E 06	0.626E 06	0.710E 06	0.918E 06	0.965E 06	0.878E 06
Y88	0.242E 07	0.285E 07	0.248E 07	0.353E 07	0.247E 07	0.260E 07	0.277E 07	0.301E 07	0.324E 07	0.345E 07	0.300E 07
Y90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
Y91M	0.530E 06	0.681E 06	0.493E 06	0.530E 06	0.493E 06	0.606E 06	0.568E 06	0.644E 06	0.832E 06	0.874E 06	0.795E 06
Y91	0.301E 04	0.301E 04	0.249E 04	0.330E 04	0.278E 04	0.227E 04	0.271E 04	0.308E 04	0.330E 04	0.345E 04	0.315E 04
Y92	0.269E 06	0.268E 06	0.232E 06	0.283E 06	0.219E 06	0.259E 06	0.254E 06	0.285E 06	0.327E 06	0.345E 06	0.305E 06
Y93	0.661E 05	0.740E 05	0.671E 05	0.865E 05	0.632E 05	0.705E 05	0.743E 05	0.825E 05	0.104E 06	0.110E 06	0.963E 05
ZR95	0.760E 06	0.818E 06	0.674E 06	0.760E 06	0.610E 06	0.821E 06	0.751E 06	0.844E 06	0.103E 07	0.109E 07	0.965E 06
ZR97	0.193E 06	0.206E 06	0.170E 06	0.205E 06	0.168E 06	0.187E 06	0.188E 06	0.212E 06	0.251E 06	0.264E 06	0.236E 06
NB95M	0.453E 05	0.460E 05	0.495E 05	0.510E 05	0.389E 05	0.510E 05	0.538E 05	0.623E 05	0.106E 06	0.113E 06	0.986E 05
NB95	0.830E 06	0.770E 06	0.711E 06	0.830E 06	0.593E 06	0.859E 06	0.770E 06	0.859E 06	0.101E 07	0.107E 07	0.918E 06
NB97M	0.724E 06	0.931E 06	0.673E 06	0.724E 06	0.673E 06	0.827E 06	0.776E 06	0.880E 06	0.114E 07	0.119E 07	0.109E 07
NB97	0.666E 06	0.849E 06	0.617E 06	0.666E 06	0.615E 06	0.757E 06	0.710E 06	0.805E 06	0.104E 07	0.109E 07	0.990E 06
MO99	0.176E 06	0.207E 06	0.162E 06	0.177E 06	0.153E 06	0.196E 06	0.183E 06	0.207E 06	0.270E 06	0.284E 06	0.254E 06
TC99M	0.111E 06	0.105E 06	0.105E 06	0.102E 06	0.847E 05	0.118E 06	0.120E 06	0.136E 06	0.291E 06	0.313E 06	0.268E 06
TC99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RU103	0.498E 06	0.640E 06	0.463E 06	0.498E 06	0.463E 06	0.569E 06	0.534E 06	0.605E 06	0.783E 06	0.822E 06	0.749E 06
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH103M	0.178E 03	0.576E 03	0.119E 03	0.205E 03	0.463E 03	0.123E 04	0.435E 03	0.683E 03	0.438E 04	0.518E 04	0.357E 04
RH105	0.648E 05	0.658E 05	0.708E 05	0.729E 05	0.557E 05	0.729E 05	0.769E 05	0.891E 05	0.152E 06	0.162E 06	0.141E 06
RH106	0.188E 06	0.236E 06	0.173E 06	0.188E 06	0.172E 06	0.212E 06	0.199E 06	0.226E 06	0.291E 06	0.306E 06	0.277E 06
PD103	0.144E 04	0.191E 04	0.134E 04	0.147E 04	0.126E 04	0.186E 04	0.175E 04	0.210E 04	0.528E 04	0.568E 04	0.452E 04
AG110M	0.296E 07	0.312E 07	0.257E 07	0.304E 07	0.248E 07	0.292E 07	0.285E 07	0.321E 07	0.381E 07	0.401E 07	0.357E 07
AG111	0.255E 05	0.259E 05	0.279E 05	0.287E 05	0.219E 05	0.287E 05	0.303E 05	0.351E 05	0.599E 05	0.637E 05	0.556E 05
CD111M	0.322E 06	0.317E 06	0.332E 06	0.335E 06	0.264E 06	0.354E 06	0.368E 06	0.422E 06	0.789E 06	0.844E 06	0.730E 06
CD113M	0.445E 03	0.454E 03	0.485E 03	0.500E 03	0.382E 03	0.507E 03	0.529E 03	0.614E 03	0.107E 04	0.114E 04	0.988E 03
CD115M	0.367E 05	0.357E 05	0.312E 05	0.362E 05	0.298E 05	0.339E 05	0.339E 05	0.381E 05	0.434E 05	0.457E 05	0.404E 05
IN113M	0.253E 06	0.325E 06	0.235E 06	0.253E 06	0.235E 06	0.289E 06	0.271E 06	0.307E 06	0.397E 06	0.417E 06	0.379E 06
IN114M	0.101E 06	0.121E 06	0.998E 05	0.106E 06	0.915E 05	0.116E 06	0.113E 06	0.129E 06	0.192E 06	0.204E 06	0.180E 06

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
IN114	0.475E 04	0.495E 04	0.399E 04	0.515E 04	0.440E 04	0.390E 04	0.441E 04	0.502E 04	0.575E 04	0.605E 04	0.546E 04
IN115M	0.141E 06	0.144E 06	0.154E 06	0.159E 06	0.121E 06	0.160E 06	0.168E 06	0.195E 06	0.335E 06	0.357E 06	0.311E 06
SN113	0.197E 05	0.232E 05	0.211E 05	[illegible]	0.198E 05	0.310E 05	0.254E 05	0.308E 05	0.801E 05	0.897E 05	0.701E 05
SN119M	0.636E 04	0.85[illegible] 04	[illegible]	0.492E 04	0.331E 04	0.132E 05	0.788E 04	0.108E 05	0.402E 05	0.465E 05	0.334E 05
SN123	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SN125	0.313E 06	0.311E 06	0.281E 06	0.346E 06	0.250E 06	0.324E 06	0.307E 06	0.341E 06	0.394E 06	0.417E 06	0.361E 06
SB122	0.418E 06	0.531E 06	0.387E 06	0.418E 06	0.385E 06	0.476E 06	0.446E 06	0.505E 06	0.650E 06	0.683E 06	0.621E 06
SB124	0.198E 07	0.221E 07	0.174E 07	0.216E 07	0.186E 07	0.181E 07	0.194E 07	0.220E 07	0.254E 07	0.266E 07	0.242E 07
SB125	0.491E 06	0.626E 06	0.456E 06	0.491E 06	0.451E 06	0.564E 06	0.528E 06	0.600E 06	0.802E 06	0.846E 06	0.763E 06
SB127	0.673E 06	0.806E 06	0.618E 06	0.676E 06	0.593E 06	0.751E 06	0.702E 06	0.794E 06	0.102E 07	0.108E 07	0.968E 06
TE123M	0.139E 06	0.142E 06	0.150E 06	0.155E 06	0.117E 06	0.159E 06	0.165E 06	0.192E 06	0.336E 06	0.359E 06	0.310E 06
TE125M	0.325E 05	0.389E 05	0.177E 05	0.244E 05	0.124E 05	0.552E 05	0.373E 05	0.500E 05	0.159E 06	0.183E 06	0.134E 06
TE127M	0.875E 04	0.105E 05	0.474E 04	0.657E 04	0.333E 04	0.149E 05	0.101E 05	0.135E 05	0.431E 05	0.495E 05	0.362E 05
TE127	0.407E 04	0.518E 04	0.381E 04	0.409E 04	0.377E 04	0.465E 04	0.439E 04	0.498E 04	0.659E 04	0.693E 04	0.628E 04
TE129M	0.529E 05	0.668E 05	0.478E 05	0.522E 05	0.470E 05	0.618E 05	0.566E 05	0.648E 05	0.922E 05	0.983E 05	0.863E 05
TE129	0.800E 05	0.957E 05	0.732E 05	0.802E 05	0.698E 05	0.901E 05	0.839E 05	0.952E 05	0.127E 06	0.135E 06	0.120E 06
TE131M	0.147E 07	0.144E 07	0.130E 07	0.155E 07	0.115E 07	0.148E 07	0.142E 07	0.159E 07	0.192E 07	0.204E 07	0.177E 07
TE131	0.413E 06	0.434E 06	0.372E 06	0.408E 06	0.332E 06	0.441E 06	0.418E 06	0.470E 06	0.683E 06	0.726E 06	0.635E 06
TE132	0.162E 06	0.165E 06	0.176E 06	0.181E 06	0.139E 06	0.183E 06	0.192E 06	0.223E 06	0.388E 06	0.414E 06	0.359E 06
I123	0.175E 06	0.184E 06	0.185E 06	0.192E 06	0.148E 06	0.202E 06	0.206E 06	0.240E 06	0.419E 06	0.449E 06	0.386E 06
I124	0.117E 07	0.139E 07	0.106E 07	0.126E 07	0.110E 07	0.118E 07	0.120E 07	0.135E 07	0.165E 07	0.173E 07	0.157E 07
I125	0.369E 05	0.446E 05	0.195E 05	0.275E 05	0.136E 05	0.637E 05	0.425E 05	0.573E 05	0.185E 06	0.212E 06	0.155E 06
I126	0.462E 06	0.588E 06	0.427E 06	0.462E 06	0.426E 06	0.525E 06	0.493E 06	0.559E 06	0.728E 06	0.766E 06	0.694E 06
I129	0.188E 05	0.227E 05	0.992E 04	0.140E 05	0.690E 04	0.323E 05	0.216E 05	0.291E 05	0.938E 05	0.108E 06	0.787E 05
I130	0.202E 07	0.253E 07	0.187E 07	0.202E 07	0.184E 07	0.229E 07	0.215E 07	0.243E 07	0.317E 07	0.333E 07	0.302E 07
I131	0.377E 06	0.480E 06	0.353E 06	0.379E 06	0.349E 06	0.431E 06	0.406E 06	0.461E 06	0.606E 06	0.637E 06	0.578E 06

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
I132	0.241E 07	0.265E 07	0.214E 07	0.247E 07	0.202E 07	0.253E 07	0.239E 07	0.269E 07	0.329E 07	0.346E 07	0.308E 07
I133	0.696E 06	0.831E 06	0.630E 06	0.706E 06	0.626E 06	0.746E 06	0.715E 06	0.809E 06	0.101E 07	0.106E 07	0.960E 06
I134	0.255E 07	0.248E 07	0.220E 07	0.258E 07	0.194E 07	0.259E 07	0.240E 07	0.269E 07	0.316E 07	0.334E 07	0.291E 07
I135	0.198E 07	0.194E 07	0.166E 07	0.211E 07	0.170E 07	0.168E 07	0.181E 07	0.204E 07	0.226E 07	0.237E 07	0.212E 07
I136	0.293E 07	0.299E 07	0.258E 07	0.355E 07	0.276E 07	0.245E 07	0.283E 07	0.313E 07	0.334E 07	0.353E 07	0.316E 07
XE131M	0.200E 05	0.226E 05	0.152E 05	0.180E 05	0.114E 05	0.295E 05	0.233E 05	0.296E 05	0.781E 05	0.880E 05	0.672E 05
XE133M	0.479E 05	0.502E 05	0.479E 05	0.509E 05	0.373E 05	0.587E 05	0.566E 05	0.673E 05	0.134E 06	0.146E 06	0.120E 06
XE133	0.512E 05	0.497E 05	0.458E 05	0.461E 05	0.367E 05	0.581E 05	0.558E 05	0.644E 05	0.147E 06	0.160E 06	0.133E 06
XE135M	0.439E 06	0.564E 06	0.407E 06	0.438E 06	0.407E 06	0.502E 06	0.470E 06	0.533E 06	0.692E 06	0.727E 06	0.661E 06
XE135	0.202E 06	0.210E 06	0.218E 06	0.225E 06	0.175E 06	0.228E 06	0.238E 06	0.275E 06	0.462E 06	0.491E 06	0.429E 06
XE137	0.181E 06	0.223E 06	0.168E 06	0.192E 06	0.169E 06	0.196E 06	0.191E 06	0.215E 06	0.267E 06	0.281E 06	0.255E 06
XE138	0.812E 06	0.927E 06	0.790E 06	0.105E 07	0.815E 06	0.787E 06	0.879E 06	0.980E 06	0.117E 07	0.123E 07	0.110E 07
CS134	0.163E 07	0.177E 07	0.145E 07	0.164E 07	0.133E 07	0.175E 07	0.162E 07	0.182E 07	0.223E 07	0.235E 07	0.208E 07
CS135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS136	0.224E 07	0.212E 07	0.196E 07	0.229E 07	0.169E 07	0.226E 07	0.213E 07	0.239E 07	0.292E 07	0.309E 07	0.268E 07
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS138	0.222E 07	0.238E 07	0.200E 07	0.269E 07	0.212E 07	0.198E 07	0.221E 07	0.246E 07	0.268E 07	0.283E 07	0.253E 07
CS139	0.240E 06	0.240E 06	0.206E 06	0.280E 06	0.222E 06	0.194E 06	0.226E 06	0.250E 06	0.267E 06	0.281E 06	0.252E 06
BA133	0.384E 06	0.465E 06	0.365E 06	0.388E 06	0.342E 06	0.441E 06	0.421E 06	0.481E 06	0.725E 06	0.771E 06	0.680E 06
BA137M	0.564E 06	0.725E 06	0.524E 06	0.564E 06	0.524E 06	0.645E 06	0.604E 06	0.685E 06	0.887E 06	0.931E 06	0.847E 06
BA139	0.449E 05	0.455E 05	0.466E 05	0.502E 05	0.391E 05	0.475E 05	0.508E 05	0.587E 05	0.950E 05	0.101E 06	0.883E 05
BA140	0.209E 06	0.263E 06	0.198E 06	0.212E 06	0.192E 06	0.239E 06	0.227E 06	0.258E 06	0.350E 06	0.369E 06	0.333E 06
LA140	0.257E 07	0.264E 07	0.220E 07	0.282E 07	0.233E 07	0.218E 07	0.241E 07	0.273E 07	0.306E 07	0.321E 07	0.290E 07
CE141	0.685E 05	0.647E 05	0.637E 05	0.627E 05	0.515E 05	0.735E 05	0.741E 05	0.840E 05	0.182E 06	0.196E 06	0.167E 06
CE143	0.259E 06	0.320E 06	0.291E 06	0.314E 06	0.248E 06	0.334E 06	0.325E 06	0.373E 06	0.574E 06	0.611E 06	0.530E 06
CE144	0.182E 05	0.174E 05	0.167E 05	0.166E 05	0.135E 05	0.199E 05	0.198E 05	0.226E 05	0.498E 05	0.540E 05	0.455E 05

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
PR143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PR144	0.271E 05	0.336E 05	0.270E 05	0.365E 05	0.284E 05	0.283E 05	0.305E 05	0.337E 05	0.380E 05	0.402E 05	0.359E 05
ND147	0.140E 06	0.169E 06	0.131E 06	0.139E 06	0.123E 06	0.161E 06	0.153E 06	0.174E 06	0.274E 06	0.292E 06	0.256E 06
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM148M	0.201E 07	0.242E 07	0.184E 07	0.201E 07	0.178E 07	0.225E 07	0.210E 07	0.238E 07	0.305E 07	0.321E 07	0.289E 07
PM148	0.715E 06	0.746E 06	0.610E 06	0.758E 06	0.634E 06	0.632E 06	0.672E 06	0.761E 06	0.866E 06	0.909E 06	0.821E 06
SM151	0.154E 01	0.831E 01	0.110E 01	0.198E 01	0.548E 01	0.132E 02	0.441E 01	0.796E 01	0.493E 02	0.585E 02	0.400E 02
EU154	0.142E 07	0.144E 07	0.122E 07	0.148E 07	0.119E 07	0.132E 07	0.134E 07	0.151E 07	0.181E 07	0.191E 07	0.169E 07
EU155	0.587E 05	0.579E 05	0.551E 05	0.547E 05	0.453E 05	0.642E 05	0.648E 05	0.739E 05	0.166E 06	0.179E 06	0.150E 06
EU156	0.136E 07	0.146E 07	0.126E 07	0.166E 07	0.124E 07	0.135E 07	0.140E 07	0.155E 07	0.173E 07	0.184E 07	0.161E 07
GD162	0.431E 06	0.554E 06	0.400E 06	0.431E 06	0.400E 06	0.493E 06	0.462E 06	0.524E 06	0.679E 06	0.713E 06	0.648E 06
TB160	0.115E 07	0.110E 07	0.101E 07	0.118E 07	0.876E 06	0.116E 07	0.109E 07	0.123E 07	0.151E 07	0.159E 07	0.138E 07
TA182	0.145E 07	0.141E 07	0.124E 07	0.152E 07	0.119E 07	0.132E 07	0.135E 07	0.152E 07	0.184E 07	0.194E 07	0.170E 07
W185	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W187	0.164E 06	0.206E 06	0.152E 06	0.163E 06	0.150E 06	0.187E 06	0.177E 06	0.200E 06	0.282E 06	0.297E 06	0.266E 06
AU195M	0.196E 06	0.202E 06	0.212E 06	0.219E 06	0.168E 06	0.222E 06	0.233E 06	0.271E 06	0.481E 06	0.512E 06	0.442E 06
AU195	0.941E 05	0.118E 06	0.879E 05	0.948E 05	0.789E 05	0.120E 06	0.116E 06	0.139E 06	0.381E 06	0.411E 06	0.326E 06
AU198	0.406E 06	0.522E 06	0.377E 06	0.406E 06	0.377E 06	0.464E 06	0.435E 06	0.494E 06	0.640E 06	0.672E 06	0.611E 06
AU199	0.858E 05	0.887E 05	0.925E 05	0.955E 05	0.735E 05	0.976E 05	0.102E 06	0.119E 06	0.214E 06	0.228E 06	0.196E 06
HG197	0.661E 05	0.885E 05	0.620E 05	0.687E 05	0.570E 05	0.885E 05	0.842E 05	0.102E 06	0.292E 06	0.315E 06	0.247E 06
HG203	0.196E 06	0.201E 06	0.214E 06	0.220E 06	0.168E 06	0.222E 06	0.233E 06	0.270E 06	0.471E 06	0.501E 06	0.435E 06
TL204	0.105E 04	0.141E 04	0.975E 03	0.108E 04	0.902E 03	0.141E 04	0.133E 04	0.162E 04	0.469E 04	0.506E 04	0.396E 04
TL208	0.265E 07	0.341E 07	0.283E 07	0.407E 07	0.296E 07	0.292E 07	0.320E 07	0.348E 07	0.380E 07	0.404E 07	0.356E 07
TL210	0.357E 01	0.481E 01	0.333E 01	0.370E 01	0.308E 01	0.481E 01	0.456E 01	0.554E 01	0.160E 02	0.173E 02	0.135E 02
PB204M	0.220E 07	0.216E 07	0.191E 07	0.220E 07	0.164E 07	0.231E 07	0.209E 07	0.234E 07	0.279E 07	0.295E 07	0.257E 07
PB210	0.906E 04	0.125E 05	0.845E 04	0.938E 04	0.850E 04	0.122E 05	0.116E 05	0.144E 05	0.423E 05	0.458E 05	0.356E 05

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
PB212	0.126E 06	0.131E 06	0.135E 06	0.139E 06	0.107E 06	0.143E 06	0.149E 06	0.174E 06	0.321E 06	0.342E 06	0.293E 06
PB214	0.226E 06	0.269E 06	0.221E 06	0.235E 06	0.203E 06	0.258E 06	0.251E 06	0.288E 06	0.435E 06	0.460E 06	0.406E 06
BI210	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI212	0.129E 06	0.143E 06	0.113E 06	0.134E 06	0.114E 06	0.126E 06	0.127E 06	0.144E 06	0.173E 06	0.182E 06	0.164E 06
BI214	0.158E 07	0.172E 07	0.142E 07	0.184E 07	0.147E 07	0.147E 07	0.158E 07	0.176E 07	0.199E 07	0.210E 07	0.188E 07
PO214	0.120E 03	0.112E 03	0.103E 03	0.120E 03	0.860E 02	0.125E 03	0.112E 03	0.125E 03	0.146E 03	0.155E 03	0.133E 03
PO218	0.991E 02	0.920E 02	0.850E 02	0.991E 02	0.708E 02	0.103E 03	0.920E 02	0.103E 03	0.120E 03	0.127E 03	0.110E 03
RN220	0.359E 03	0.462E 03	0.334E 03	0.359E 03	0.334E 03	0.411E 03	0.385E 03	0.437E 03	0.564E 03	0.593E 03	0.540E 03
RN222	0.392E 03	0.503E 03	0.364E 03	0.392E 03	0.364E 03	0.447E 03	0.420E 03	0.476E 03	0.615E 03	0.645E 03	0.588E 03
RA224	0.851E 04	0.861E 04	0.925E 04	0.951E 04	0.728E 04	0.955E 04	0.101E 05	0.116E 05	0.200E 05	0.213E 05	0.186E 05
RA226	0.614E 04	0.619E 04	0.663E 04	0.680E 04	0.523E 04	0.687E 04	0.723E 04	0.836E 04	0.145E 05	0.155E 05	0.135E 05
RA228	0.217E 05	0.262E 05	0.115E 05	0.162E 05	0.799E 04	0.375E 05	0.250E 05	0.337E 05	0.109E 06	0.125E 06	0.912E 05
AC228	0.785E 06	0.773E 06	0.683E 06	0.809E 06	0.627E 06	0.767E 06	0.748E 06	0.842E 06	0.104E 07	0.110E 07	0.964E 06
TH228	0.104E 05	0.101E 05	0.103E 05	0.103E 05	0.855E 04	0.113E 05	0.116E 05	0.134E 05	0.269E 05	0.289E 05	0.248E 05
TH230	0.234E 04	0.288E 04	0.227E 04	0.241E 04	0.244E 04	0.292E 04	0.286E 04	0.359E 04	0.959E 04	0.105E 05	0.824E 04
TH231	0.723E 05	0.709E 05	0.665E 05	0.664E 05	0.571E 05	0.814E 05	0.793E 05	0.923E 05	0.212E 06	0.231E 06	0.192E 06
TH232	0.729E 03	0.109E 04	0.685E 03	0.754E 03	0.118E 04	0.999E 03	0.949E 03	0.137E 04	0.452E 04	0.503E 04	0.376E 04
TH234	0.109E 05	0.105E 05	0.103E 05	0.101E 05	0.843E 04	0.118E 05	0.119E 05	0.136E 05	0.298E 05	0.321E 05	0.272E 05
PA233	0.213E 06	0.218E 06	0.224E 06	0.229E 06	0.180E 06	0.238E 06	0.247E 06	0.284E 06	0.500E 06	0.534E 06	0.464E 06
PA234M	0.110E 05	0.102E 05	0.946E 04	0.109E 05	0.790E 04	0.114E 05	0.103E 05	0.115E 05	0.141E 05	0.149E 05	0.129E 05
PA234	0.284E 07	0.330E 07	0.288E 07	0.400E 07	0.286E 07	0.300E 07	0.321E 07	0.352E 07	0.399E 07	0.424E 07	0.370E 07
U232	0.192E 04	0.224E 04	0.180E 04	0.185E 04	0.225E 04	0.234E 04	0.225E 04	0.290E 04	0.815E 04	0.902E 04	0.705E 04
U233	0.429E 04	0.445E 04	0.450E 04	0.461E 04	0.386E 04	0.488E 04	0.504E 04	0.593E 04	0.117E 05	0.126E 05	0.106E 05
U234	0.122E 04	0.151E 04	0.115E 04	0.119E 04	0.164E 04	0.156E 04	0.146E 04	0.197E 04	0.591E 04	0.659E 04	0.505E 04
U235	0.184E 06	0.184E 06	0.195E 06	0.199E 06	0.155E 06	0.205E 06	0.215E 06	0.247E 06	0.445E 06	0.475E 06	0.412E 06
U236	0.263E 03	0.510E 03	0.248E 03	0.275E 03	0.885E 03	0.468E 03	0.378E 03	0.715E 03	0.294E 04	0.339E 04	0.240E 04

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	BLADDER	STOMACH	SMALL INTESTINE	UPPER LARGE INTESTINE	LOWER LARGE INTESTINE	KIDNEYS	LIVER	LUNGS	MARROW	YELLOW MARROW	RED MARROW
U237	0.231E 06	0.235E 06	0.232E 06	0.236E 06	0.189E 06	0.259E 06	0.265E 06	0.306E 06	0.625E 06	0.671E 06	0.569E 06
U238	0.520E 03	0.700E 03	0.490E 03	0.502E 03	0.985E 03	0.703E 03	0.635E 03	0.962E 03	0.323E 04	0.367E 04	0.273E 04
U240	0.373E 04	0.556E 04	0.349E 04	0.367E 04	0.547E 04	0.541E 04	0.490E 04	0.684E 04	0.228E 05	0.253E 05	0.189E 05
NP237	0.887E 05	0.857E 05	0.875E 05	0.874E 05	0.702E 05	0.963E 05	0.990E 05	0.113E 06	0.226E 06	0.242E 06	0.208E 06
NP238	0.590E 06	0.548E 06	0.506E 06	0.590E 06	0.421E 06	0.611E 06	0.548E 06	0.611E 06	0.716E 06	0.759E 06	0.653E 06
NP239	0.163E 06	0.161E 06	0.168E 06	0.170E 06	0.134E 06	0.179E 06	0.187E 06	0.215E 06	0.402E 06	0.430E 06	0.371E 06
NP240M	0.364E 06	0.417E 06	0.326E 06	0.374E 06	0.323E 06	0.375E 06	0.367E 06	0.416E 06	0.515E 06	0.541E 06	0.488E 06
PU236	0.403E 03	0.665E 03	0.379E 03	0.399E 03	0.113E 04	0.673E 03	0.537E 03	0.947E 03	0.372E 04	0.430E 04	0.309E 04
PU238	0.177E 03	0.385E 03	0.169E 03	0.179E 03	0.871E 03	0.346E 03	0.260E 03	0.592E 03	0.262E 04	0.306E 04	0.214E 04
PU239	0.131E 03	0.231E 03	0.109E 03	0.126E 03	0.360E 03	0.233E 03	0.178E 03	0.324E 03	0.130E 04	0.150E 04	0.107E 04
PU240	0.194E 03	0.377E 03	0.184E 03	0.194E 03	0.779E 03	0.347E 03	0.272E 03	0.564E 03	0.238E 04	0.277E 04	0.196E 04
PU241	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU242	0.113E 03	0.299E 03	0.108E 03	0.119E 03	0.716E 03	0.259E 03	0.184E 03	0.463E 03	0.216E 04	0.253E 04	0.175E 04
PU244	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AM241	0.341E 05	0.458E 05	0.316E 05	0.351E 05	0.296E 05	0.459E 05	0.433E 05	0.530E 05	0.154E 06	0.166E 06	0.130E 06
AM242	0.367E 05	0.348E 05	0.345E 05	0.338E 05	0.284E 05	0.394E 05	0.398E 05	0.452E 05	0.584E 05	0.106E 06	0.904E 05
AM243	0.309E 05	0.416E 05	0.288E 05	0.320E 05	0.267E 05	0.416E 05	0.394E 05	0.479E 05	0.139E 06	0.150E 06	0.117E 06
CM242	0.114E 03	0.302E 03	0.109E 03	0.118E 03	0.758E 03	0.263E 03	0.184E 03	0.479E 03	0.225E 04	0.264E 04	0.182E 04
CM243	0.155E 06	0.153E 06	0.160E 06	0.161E 06	0.127E 06	0.170E 06	0.177E 06	0.204E 06	0.382E 06	0.409E 06	0.353E 06
CM244	0.965E 04	0.113E 05	0.903E 04	0.950E 04	0.796E 04	0.118E 05	0.115E 05	0.136E 05	0.355E 05	0.383E 05	0.308E 05
CF252	0.573E 06	0.609E 06	0.506E 06	0.607E 06	0.512E 06	0.530E 06	0.562E 06	0.633E 06	0.783E 06	0.826E 06	0.742E 06

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
H3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BE7	0.636E 05	0.233E 05	0.388E 05	0.777E 05	0.777E 05	0.672E 05	0.707E 05	0.388E 05	0.670E 05	0.424E 05	0.636E 05
C11	0.132E 07	0.483E 06	0.805E 06	0.161E 07	0.161E 07	0.139E 07	0.147E 07	0.805E 06	0.139E 07	0.879E 06	0.132E 07
C14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N13	0.132E 07	0.483E 06	0.806E 06	0.161E 07	0.161E 07	0.139E 07	0.147E 07	0.806E 06	0.139E 07	0.880E 06	0.132E 07
O15	0.132E 07	0.484E 06	0.806E 06	0.161E 07	0.161E 07	0.139E 07	0.147E 07	0.806E 06	0.139E 07	0.881E 06	0.132E 07
F18	0.128E 07	0.468E 06	0.781E 06	0.156E 07	0.156E 07	0.135E 07	0.142E 07	0.781E 06	0.135E 07	0.852E 06	0.128E 07
NA22	0.289E 07	0.205E 07	0.221E 07	0.322E 07	0.330E 07	0.319E 07	0.258E 07	0.233E 07	0.295E 07	0.195E 07	0.289E 07
NA24	0.453E 07	0.462E 07	0.446E 07	0.471E 07	0.532E 07	0.366E 07	0.269E 07	0.457E 07	0.434E 07	0.342E 07	0.453E 07
MG28	0.179E 07	0.147E 07	0.154E 07	0.193E 07	0.207E 07	0.197E 07	0.146E 07	0.154E 07	0.172E 07	0.122E 07	0.180E 07
AL28	0.219E 07	0.204E 07	0.189E 07	0.230E 07	0.239E 07	0.249E 07	0.164E 07	0.204E 07	0.219E 07	0.149E 07	0.219E 07
P32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CL36	0.187E 01	0.241E 00	0.329E 00	0.836E 00	0.104E 03	0.114E 01	0.405E 01	0.685E-04	0.231E 00	0.456E-04	0.558E 01
CL38	0.168E 07	0.171E 07	0.164E 07	0.175E 07	0.197E 07	0.138E 07	0.101E 07	0.169E 07	0.161E 07	0.126E 07	0.168E 07
A37	0.110E 03	0.142E 02	0.194E 02	0.493E 02	0.613E 04	0.674E 02	0.239E 03	0.404E-02	0.136E 02	0.269E-02	0.329E 03
A39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K40	0.202E 06	0.188E 06	0.175E 06	0.212E 06	0.221E 06	0.230E 06	0.152E 06	0.188E 06	0.202E 06	0.138E 06	0.202E 06
K42	0.352E 06	0.328E 06	0.304E 06	0.369E 06	0.385E 06	0.398E 06	0.264E 06	0.328E 06	0.352E 06	0.240E 06	0.352E 06
K43	0.126E 07	0.470E 06	0.781E 06	0.154E 07	0.154E 07	0.133E 07	0.140E 07	0.775E 06	0.132E 07	0.843E 06	0.126E 07
CA45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CA47	0.139E 07	0.126E 07	0.120E 07	0.147E 07	0.154E 07	0.157E 07	0.107E 07	0.127E 07	0.138E 07	0.951E 06	0.139E 07
CA49	0.345E 07	0.345E 07	0.600E 07	0.345E 07	0.374E 07	0.316E 07	0.207E 07	0.574E 07	0.600E 07	0.264E 07	0.345E 07
SC46	0.233E 07	0.143E 07	0.233E 07	0.256E 07	0.301E 07	0.233E 07	0.211E 07	0.158E 07	0.173E 07	0.166E 07	0.233E 07
SC47	0.118E 06	0.703E 05	0.765E 05	0.195E 06	0.156E 06	0.105E 06	0.169E 06	0.105E 06	0.124E 06	0.781E 05	0.129E 06
SC49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CR51	0.539E 05	0.320E 05	0.348E 05	0.888E 05	0.734E 05	0.480E 05	0.768E 05	0.479E 05	0.562E 05	0.355E 05	0.587E 05
MN52M	0.317E 07	0.230E 07	0.244E 07	0.353E 07	0.361E 07	0.351E 07	0.280E 07	0.258E 07	0.323E 07	0.214E 07	0.317E 07
MN52	0.430E 07	0.304E 07	0.357E 07	0.476E 07	0.506E 07	0.466E 07	0.380E 07	0.338E 07	0.410E 07	0.295E 07	0.431E 07
MN54	0.102E 07	0.623E 06	0.102E 07	0.111E 07	0.131E 07	0.102E 07	0.918E 06	0.688E 06	0.754E 06	0.721E 06	0.102E 07

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
FE52	0.925E 06	0.381E 06	0.571E 06	0.121E 07	0.115E 07	0.946E 06	0.109E 07	0.616E 06	0.972E 06	0.615E 06	0.941E 06
FE55	0.622E 03	0.801E 02	0.109E 03	0.278E 03	0.345E 05	0.380E 03	0.135E 04	0.228E-01	0.767E 02	0.152E-01	0.185E 04
FE59	0.147E 07	0.114E 07	0.136E 07	0.158E 07	0.174E 07	0.157E 07	0.121E 07	0.119E 07	0.129E 07	0.102E 07	0.147E 07
CO56	0.435E 07	0.369E 07	0.451E 07	0.463E 07	0.511E 07	0.423E 07	0.326E 07	0.421E 07	0.447E 07	0.314E 07	0.435E 07
CO57	0.193E 06	0.947E 05	0.116E 06	0.397E 06	0.267E 06	0.136E 06	0.209E 06	0.116E 06	0.272E 06	0.923E 05	0.224E 06
CO58	0.121E 07	0.695E 06	0.113E 07	0.135E 07	0.154E 07	0.122E 07	0.113E 07	0.807E 06	0.961E 06	0.848E 06	0.121E 07
CO60	0.308E 07	0.245E 07	0.284E 07	0.329E 07	0.362E 07	0.332E 07	0.251E 07	0.254E 07	0.274E 07	0.214E 07	0.308E 07
NI56	0.214E 07	0.135E 07	0.190E 07	0.253E 07	0.269E 07	0.216E 07	0.209E 07	0.158E 07	0.184E 07	0.148E 07	0.217E 07
NI63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CU64	0.273E 06	0.107E 06	0.170E 06	0.331E 06	0.334E 06	0.289E 06	0.299E 06	0.171E 06	0.287E 06	0.182E 06	0.273E 06
ZN65	0.711E 06	0.431E 06	0.704E 06	0.782E 06	0.921E 06	0.712E 06	0.646E 06	0.481E 06	0.533E 06	0.504E 06	0.711E 06
ZN69M	0.542E 06	0.198E 06	0.331E 06	0.661E 06	0.662E 06	0.572E 06	0.602E 06	0.331E 06	0.571E 06	0.361E 06	0.542E 06
ZN69	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA67	0.271E 06	0.143E 06	0.172E 06	0.446E 06	0.361E 06	0.239E 06	0.348E 06	0.209E 06	0.303E 06	0.168E 06	0.294E 06
GA68	0.122E 07	0.465E 06	0.770E 06	0.149E 07	0.150E 07	0.129E 07	0.135E 07	0.753E 06	0.127E 07	0.819E 06	0.122E 07
GE77	0.118E 07	0.640E 06	0.863E 06	0.153E 07	0.148E 07	0.117E 07	0.131E 07	0.871E 06	0.116E 07	0.802E 06	0.121E 07
AS76	0.560E 06	0.305E 06	0.391E 06	0.654E 06	0.666E 06	0.593E 06	0.555E 06	0.399E 06	0.578E 06	0.379E 06	0.560E 06
AS77	0.934E 04	0.489E 04	0.593E 04	0.144E 05	0.121E 05	0.872E 04	0.123E 05	0.746E 04	0.990E 04	0.613E 04	0.995E 04
SE75	0.778E 06	0.539E 06	0.562E 06	0.111E 07	0.961E 06	0.760E 06	0.845E 06	0.657E 06	0.836E 06	0.501E 06	0.821E 06
SE77M	0.130E 06	0.770E 05	0.839E 05	0.214E 06	0.177E 06	0.116E 06	0.185E 06	0.116E 06	0.135E 06	0.856E 05	0.142E 06
BR80M	0.671E 05	0.255E 05	0.942E 04	0.109E 06	0.255E 06	0.250E 05	0.959E 05	0.370E 05	0.739E 05	0.900E 04	0.759E 05
BR80	0.115E 06	0.431E 05	0.707E 05	0.140E 06	0.141E 06	0.122E 06	0.127E 06	0.708E 05	0.121E 06	0.768E 05	0.115E 06
BR82	0.335E 07	0.207E 07	0.281E 07	0.377E 07	0.407E 07	0.353E 07	0.311E 07	0.242E 07	0.305E 07	0.230E 07	0.335E 07
BR83	0.908E 05	0.320E 05	0.531E 05	0.108E 06	0.267E 06	0.924E 05	0.103E 06	0.525E 05	0.909E 05	0.573E 05	0.962E 05
BR84	0.208E 07	0.187E 07	0.259E 07	0.218E 07	0.246E 07	0.180E 07	0.141E 07	0.238E 07	0.243E 07	0.156E 07	0.208E 07
KR79	0.397E 06	0.173E 06	0.257E 06	0.511E 06	0.504E 06	0.405E 06	0.455E 06	0.266E 06	0.408E 06	0.264E 06	0.404E 06

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
KR83M	0.426E 04	0.396E 03	0.500E 03	0.342E 04	0.593E 05	0.525E 03	0.425E 04	0.188E 03	0.378E 03	0.401E 02	0.584E 04
KR85M	0.182E 06	0.108E 06	0.118E 06	0.300E 06	0.241E 06	0.162E 06	0.259E 06	0.162E 06	0.190E 06	0.120E 06	0.198E 06
KR85	0.266E 04	0.974E 03	0.162E 04	0.325E 04	0.325E 04	0.281E 04	0.296E 04	0.162E 04	0.280E 04	0.177E 04	0.266E 04
KR87	0.879E 06	0.724E 06	0.821E 06	0.959E 06	0.107E 07	0.729E 06	0.643E 06	0.795E 06	0.656E 06	0.653E 06	0.879E 06
KR88	0.217E 07	0.216E 07	0.219E 07	0.232E 07	0.264E 07	0.159E 07	0.132E 07	0.217E 07	0.202E 07	0.167E 07	0.218E 07
RB84	0.116E 07	0.645E 06	0.104E 07	0.130E 07	0.148E 07	0.116E 07	0.110E 07	0.771E 06	0.553E 06	0.809E 06	0.116E 07
RB86	0.109E 06	0.669E 05	0.109E 06	0.120E 06	0.141E 06	0.109E 06	0.986E 05	0.740E 05	0.810E 05	0.775E 05	0.109E 06
RB88	0.755E 06	0.738E 06	0.808E 06	0.789E 06	0.924E 06	0.545E 06	0.447E 06	0.761E 06	0.708E 06	0.586E 06	0.755E 06
RB89	0.279E 07	0.239E 07	0.273E 07	0.297E 07	0.334E 07	0.262E 07	0.205E 07	0.252E 07	0.259E 07	0.203E 07	0.279E 07
RB90	0.279E 07	0.258E 07	0.435E 07	0.284E 07	0.315E 07	0.257E 07	0.183E 07	0.402E 07	0.421E 07	0.211E 07	0.279E 07
SR85	0.789E 06	0.288E 06	0.481E 06	0.962E 06	0.977E 06	0.832E 06	0.876E 06	0.481E 06	0.830E 06	0.525E 06	0.789E 06
SR87M	0.424E 06	0.155E 06	0.259E 06	0.518E 06	0.518E 06	0.448E 06	0.471E 06	0.259E 06	0.447E 06	0.283E 06	0.424E 06
SR89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR91	0.911E 06	0.508E 06	0.744E 06	0.104E 07	0.112E 07	0.951E 06	0.881E 06	0.627E 06	0.830E 06	0.627E 06	0.911E 06
SR92	0.164E 07	0.151E 07	0.141E 07	0.173E 07	0.180E 07	0.186E 07	0.124E 07	0.152E 07	0.164E 07	0.112E 07	0.164E 07
SR93	0.187E 07	0.104E 07	0.148E 07	0.218E 07	0.230E 07	0.195E 07	0.185E 07	0.131E 07	0.175E 07	0.128E 07	0.188E 07
Y87	0.753E 06	0.275E 06	0.459E 06	0.918E 06	0.938E 06	0.793E 06	0.836E 06	0.459E 06	0.791E 06	0.501E 06	0.753E 06
Y88	0.315E 07	0.293E 07	0.326E 07	0.331E 07	0.391E 07	0.233E 07	0.197E 07	0.295E 07	0.275E 07	0.242E 07	0.315E 07
Y90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y91M	0.682E 06	0.250E 06	0.416E 06	0.832E 06	0.833E 06	0.720E 06	0.757E 06	0.416E 06	0.718E 06	0.454E 06	0.682E 06
Y91	0.322E 04	0.301E 04	0.278E 04	0.338E 04	0.352E 04	0.366E 04	0.242E 04	0.301E 04	0.322E 04	0.220E 04	0.322E 04
Y92	0.302E 06	0.210E 06	0.277E 06	0.330E 06	0.369E 06	0.312E 06	0.262E 06	0.229E 06	0.259E 06	0.211E 06	0.302E 06
Y93	0.861E 05	0.689E 05	0.776E 05	0.105E 06	0.108E 06	0.714E 05	0.757E 05	0.773E 05	0.801E 05	0.628E 05	0.881E 05
ZR95	0.898E 06	0.451E 06	0.741E 06	0.103E 07	0.113E 07	0.920E 06	0.894E 06	0.581E 06	0.791E 06	0.620E 06	0.898E 06
ZR97	0.224E 06	0.149E 06	0.186E 06	0.253E 06	0.269E 06	0.233E 06	0.204E 06	0.171E 06	0.211E 06	0.155E 06	0.225E 06

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
NB95M	0.644E 05	0.382E 05	0.416E 05	0.106E 06	0.850E 05	0.574E 05	0.918E 05	0.574E 05	0.672E 05	0.425E 05	0.701E 05
NB95	0.918E 06	0.563E 06	0.918E 06	0.101E 07	0.119E 07	0.918E 06	0.830E 06	0.622E 06	0.681E 06	0.652E 06	0.918E 06
NB97M	0.931E 06	0.341E 06	0.568E 06	0.114E 07	0.114E 07	0.983E 06	0.103E 07	0.568E 06	0.981E 06	0.621E 06	0.931E 06
NB97	0.852E 06	0.320E 06	0.528E 06	0.104E 07	0.104E 07	0.899E 06	0.941E 06	0.523E 06	0.892E 06	0.569E 06	0.852E 06
MO99	0.220E 06	0.971E 05	0.155E 06	0.270E 06	0.277E 06	0.226E 06	0.239E 06	0.142E 06	0.215E 06	0.148E 06	0.222E 06
TC99M	0.141E 06	0.692E 05	0.848E 05	0.291E 06	0.190E 06	0.982E 05	0.152E 06	0.847E 05	0.199E 06	0.669E 05	0.163E 06
TC99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RU103	0.641E 06	0.235E 06	0.391E 06	0.783E 06	0.785E 06	0.676E 06	0.713E 06	0.391E 06	0.675E 06	0.427E 06	0.641E 06
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RH103M	0.382E 04	0.649E 03	0.842E 03	0.407E 04	0.216E 05	0.404E 03	0.585E 04	0.358E 03	0.159E 04	0.533E 02	0.419E 04
RH105	0.921E 05	0.546E 05	0.595E 05	0.152E 06	0.122E 06	0.821E 05	0.131E 06	0.820E 05	0.961E 05	0.608E 05	0.100E 06
RH106	0.239E 06	0.930E 05	0.151E 06	0.291E 06	0.292E 06	0.251E 06	0.261E 06	0.148E 06	0.249E 06	0.159E 06	0.239E 06
PD103	0.242E 04	0.154E 04	0.128E 04	0.492E 04	0.371E 04	0.183E 04	0.253E 04	0.175E 04	0.274E 04	0.706E 03	0.274E 04
AG110M	0.340E 07	0.209E 07	0.283E 07	0.383E 07	0.413E 07	0.359E 07	0.317E 07	0.246E 07	0.312E 07	0.234E 07	0.340E 07
AG111	0.363E 05	0.215E 05	0.234E 05	0.599E 05	0.479E 05	0.322E 05	0.516E 05	0.322E 05	0.379E 05	0.239E 05	0.395E 05
CD111M	0.437E 06	0.243E 06	0.275E 06	0.789E 06	0.578E 06	0.357E 06	0.566E 06	0.342E 06	0.516E 06	0.258E 06	0.487E 06
CD113M	0.653E 03	0.378E 03	0.411E 03	0.107E 04	0.943E 03	0.563E 03	0.933E 03	0.565E 03	0.670E 03	0.415E 03	0.710E 03
CD115M	0.404E 05	0.296E 05	0.374E 05	0.438E 05	0.488E 05	0.427E 05	0.344E 05	0.314E 05	0.348E 05	0.281E 05	0.404E 05
IN113M	0.325E 06	0.119E 06	0.198E 06	0.397E 06	0.397E 06	0.343E 06	0.361E 06	0.198E 06	0.342E 06	0.217E 06	0.325E 06
IN114M	0.139E 06	0.619E 05	0.847E 05	0.192E 06	0.189E 06	0.134E 06	0.172E 06	0.975E 05	0.144E 06	0.894E 05	0.144E 06
IN114	0.540E 04	0.445E 04	0.433E 04	0.585E 04	0.669E 04	0.588E 04	0.450E 04	0.464E 04	0.537E 04	0.354E 04	0.542E 04
IN115M	0.204E 06	0.120E 06	0.130E 06	0.335E 06	0.282E 06	0.179E 06	0.291E 06	0.179E 06	0.211E 06	0.132E 06	0.222E 06
SN113	0.588E 05	0.209E 05	0.243E 05	0.775E 05	0.209E 06	0.264E 05	0.871E 05	0.260E 05	0.402E 05	0.177E 05	0.638E 05
SN119M	0.258E 05	0.803E 04	0.429E 04	0.374E 05	0.930E 05	0.712E 04	0.389E 05	0.104E 05	0.229E 05	0.245E 04	0.281E 05
SN123	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SN125	0.362E 06	0.252E 06	0.357E 06	0.396E 06	0.459E 06	0.340E 06	0.304E 06	0.273E 06	0.288E 06	0.261E 06	0.362E 06

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
SB122	0.534E 06	0.201E 06	0.334E 06	0.650E 06	0.654E 06	0.563E 06	0.590E 06	0.328E 06	0.557E 06	0.357E 06	0.535E 06
SB124	0.231E 07	0.165E 07	0.180E 07	0.258E 07	0.267E 07	0.247E 07	0.203E 07	0.187E 07	0.234E 07	0.158E 07	0.231E 07
SB125	0.642E 06	0.240E 06	0.384E 06	0.800E 06	0.807E 06	0.662E 06	0.725E 06	0.396E 06	0.678E 06	0.418E 06	0.645E 06
SB127	0.842E 06	0.359E 06	0.578E 06	0.102E 07	0.104E 07	0.875E 06	0.910E 06	0.536E 06	0.838E 06	0.567E 06	0.845E 06
TE123M	0.203E 06	0.118E 06	0.126E 06	0.334E 06	0.281E 06	0.175E 06	0.290E 06	0.177E 06	0.213E 06	0.128E 06	0.221E 06
TE125M	0.856E 05	0.348E 05	0.128E 05	0.149E 06	0.223E 06	0.335E 05	0.133E 06	0.511E 05	0.103E 06	0.130E 05	0.973E 05
TE127M	0.243E 05	0.942E 04	0.343E 04	0.402E 05	0.616E 05	0.904E 04	0.360E 05	0.138E 05	0.278E 05	0.348E 04	0.264E 05
TE127	0.527E 04	0.200E 04	0.322E 04	0.658E 04	0.649E 04	0.551E 04	0.595E 04	0.330E 04	0.556E 04	0.350E 04	0.530E 04
TE129M	0.720E 05	0.274E 05	0.413E 05	0.912E 05	0.987E 05	0.701E 05	0.824E 05	0.439E 05	0.757E 05	0.438E 05	0.727E 05
TE129	0.102E 06	0.436E 05	0.680E 05	0.127E 06	0.132E 06	0.104E 06	0.113E 06	0.653E 05	0.103E 06	0.670E 05	0.103E 06
TE131M	0.168E 07	0.112E 07	0.157E 07	0.193E 07	0.213E 07	0.165E 07	0.153E 07	0.126E 07	0.140E 07	0.118E 07	0.170E 07
TE131	0.498E 06	0.254E 06	0.375E 06	0.683E 06	0.635E 06	0.472E 06	0.507E 06	0.322E 06	0.508E 06	0.316E 06	0.517E 06
TE132	0.231E 06	0.138E 06	0.148E 06	0.387E 06	0.307E 06	0.204E 06	0.325E 06	0.204E 06	0.244E 06	0.149E 06	0.252E 06
I123	0.258E 06	0.144E 06	0.155E 06	0.416E 06	0.363E 06	0.222E 06	0.362E 06	0.217E 06	0.271E 06	0.159E 06	0.279E 06
I124	0.143E 07	0.838E 06	0.103E 07	0.166E 07	0.171E 07	0.149E 07	0.138E 07	0.106E 07	0.147E 07	0.969E 06	0.143E 07
I125	0.104E 06	0.403E 05	0.140E 05	0.172E 06	0.260E 06	0.383E 05	0.155E 06	0.593E 05	0.119E 06	0.144E 05	0.113E 06
I126	0.595E 06	0.225E 06	0.365E 06	0.727E 06	0.736E 06	0.623E 06	0.659E 06	0.366E 06	0.624E 06	0.393E 06	0.596E 06
I129	0.528E 05	0.204E 05	0.712E 04	0.873E 05	0.132E 06	0.194E 05	0.788E 05	0.301E 05	0.604E 05	0.734E 04	0.573E 05
I130	0.257E 07	0.991E 06	0.164E 07	0.317E 07	0.316E 07	0.269E 07	0.282E 07	0.158E 07	0.268E 07	0.171E 07	0.258E 07
I131	0.487E 06	0.183E 06	0.298E 06	0.606E 06	0.598E 06	0.510E 06	0.548E 06	0.303E 06	0.514E 06	0.324E 06	0.489E 06
I132	0.286E 07	0.155E 07	0.229E 07	0.330E 07	0.355E 07	0.295E 07	0.280E 07	0.195E 07	0.264E 07	0.196E 07	0.286E 07
I133	0.856E 06	0.402E 06	0.592E 06	0.101E 07	0.104E 07	0.907E 06	0.889E 06	0.565E 06	0.863E 06	0.577E 06	0.856E 06
I134	0.286E 07	0.178E 07	0.269E 07	0.317E 07	0.361E 07	0.292E 07	0.260E 07	0.200E 07	0.231E 07	0.201E 07	0.286E 07
I135	0.215E 07	0.177E 07	0.194E 07	0.230E 07	0.249E 07	0.235E 07	0.173E 07	0.182E 07	0.198E 07	0.149E 07	0.215E 07
I136	0.327E 07	0.312E 07	0.319E 07	0.345E 07	0.376E 07	0.305E 07	0.221E 07	0.328E 07	0.334E 07	0.238E 07	0.327E 07
XE131M	0.448E 05	0.198E 05	0.120E 05	0.740E 05	0.988E 05	0.226E 05	0.660E 05	0.293E 05	0.500E 05	0.123E 05	0.487E 05

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
XE133M	0.793E 05	0.424E 05	0.397E 05	0.131E 06	0.132E 06	0.589E 05	0.114E 06	0.634E 05	0.850E 05	0.406E 05	0.863E 05
XE133	0.733E 05	0.345E 05	0.368E 05	0.145E 06	0.116E 06	0.461E 05	0.857E 05	0.438E 05	0.992E 05	0.296E 05	0.838E 05
XE135M	0.565E 06	0.207E 06	0.344E 06	0.692E 06	0.694E 06	0.595E 06	0.629E 06	0.345E 06	0.596E 06	0.375E 06	0.566E 06
XE135	0.286E 06	0.165E 06	0.184E 06	0.462E 06	0.376E 06	0.257E 06	0.400E 06	0.248E 06	0.298E 06	0.188E 06	0.309E 06
XE137	0.227E 06	0.113E 06	0.157E 06	0.269E 06	0.275E 06	0.235E 06	0.231E 06	0.155E 06	0.233E 06	0.155E 06	0.227E 06
XE138	0.102E 07	0.871E 06	0.883E 06	0.119E 07	0.123E 07	0.917E 06	0.829E 06	0.944E 06	0.101E 07	0.732E 06	0.104E 07
CS134	0.193E 07	0.980E 06	0.157E 07	0.223E 07	0.241E 07	0.199E 07	0.192E 07	0.126E 07	0.173E 07	0.133E 07	0.193E 07
CS135	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS136	0.254E 07	0.165E 07	0.239E 07	0.293E 07	0.322E 07	0.255E 07	0.239E 07	0.186E 07	0.205E 07	0.177E 07	0.256E 07
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS138	0.258E 07	0.229E 07	0.237E 07	0.274E 07	0.299E 07	0.249E 07	0.187E 07	0.236E 07	0.248E 07	0.185E 07	0.258E 07
CS139	0.262E 06	0.248E 06	0.253E 06	0.275E 06	0.297E 06	0.254E 06	0.180E 06	0.262E 06	0.271E 06	0.188E 06	0.262E 06
BA133	0.517E 06	0.218E 06	0.306E 06	0.721E 06	0.680E 06	0.498E 06	0.611E 06	0.341E 06	0.561E 06	0.321E 06	0.535E 06
BA137M	0.726E 06	0.266E 06	0.442E 06	0.887E 06	0.888E 06	0.765E 06	0.807E 06	0.443E 06	0.765E 06	0.483E 06	0.726E 06
BA139	0.612E 05	0.394E 05	0.412E 05	0.952E 05	0.796E 05	0.564E 05	0.808E 05	0.546E 05	0.636E 05	0.401E 05	0.658E 05
BA140	0.274E 06	0.108E 06	0.167E 06	0.350E 06	0.343E 06	0.281E 06	0.316E 06	0.176E 06	0.289E 06	0.180E 06	0.277E 06
LA140	0.287E 07	0.238E 07	0.246E 07	0.312E 07	0.328E 07	0.310E 07	0.233E 07	0.249E 07	0.277E 07	0.197E 07	0.287E 07
CE141	0.885E 05	0.431E 05	0.515E 05	0.181E 06	0.123E 06	0.605E 05	0.971E 05	0.532E 05	0.124E 06	0.408E 05	0.102E 06
CE143	0.398E 06	0.214E 06	0.278E 06	0.570E 06	0.531E 06	0.371E 06	0.483E 06	0.301E 06	0.391E 06	0.255E 06	0.417E 06
CE144	0.244E 05	0.118E 05	0.135E 05	0.495E 05	0.357E 05	0.162E 05	0.274E 05	0.147E 05	0.338E 05	0.107E 05	0.281E 05
PR143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PR144	0.352E 05	0.284E 05	0.307E 05	0.387E 05	0.422E 05	0.301E 05	0.265E 05	0.311E 05	0.347E 05	0.258E 05	0.352E 05
ND147	0.188E 06	0.776E 05	0.110E 06	0.272E 06	0.249E 06	0.176E 06	0.215E 06	0.118E 06	0.211E 06	0.111E 06	0.196E 06
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM148M	0.252E 07	0.105E 07	0.171E 07	0.305E 07	0.311E 07	0.262E 07	0.272E 07	0.158E 07	0.251E 07	0.169E 07	0.252E 07
PM148	0.801E 06	0.598E 06	0.666E 06	0.879E 06	0.928E 06	0.876E 06	0.689E 06	0.651E 06	0.773E 06	0.548E 06	0.801E 06

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
SM151	0.460E 02	0.736E 01	0.101E 02	0.459E 02	0.456E 03	0.645E 01	0.730E 02	0.330E 01	0.170E 02	0.418E 00	0.578E 02
EU154	0.160E 07	0.113E 07	0.138E 07	0.183E 07	0.192E 07	0.168E 07	0.141E 07	0.124E 07	0.149E 07	0.109E 07	0.161E 07
EU155	0.779E 05	0.411E 05	0.458E 05	0.163E 06	0.108E 06	0.542E 05	0.833E 05	0.488E 05	0.107E 06	0.335E 05	0.904E 05
EU156	0.163E 07	0.132E 07	0.156E 07	0.176E 07	0.199E 07	0.147E 07	0.123E 07	0.138E 07	0.144E 07	0.118E 07	0.163E 07
GD162	0.555E 06	0.203E 06	0.338E 06	0.679E 06	0.680E 06	0.585E 06	0.617E 06	0.339E 06	0.585E 06	0.369E 06	0.555E 06
TB160	0.130E 07	0.852E 06	0.122E 07	0.151E 07	0.165E 07	0.131E 07	0.121E 07	0.953E 06	0.107E 07	0.906E 06	0.132E 07
TA182	0.162E 07	0.123E 07	0.146E 07	0.185E 07	0.196E 07	0.169E 07	0.139E 07	0.130E 07	0.145E 07	0.109E 07	0.163E 07
W185	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W187	0.212E 06	0.826E 05	0.129E 06	0.260E 06	0.264E 06	0.216E 06	0.235E 06	0.131E 06	0.230E 06	0.135E 06	0.216E 06
AU195M	0.282E 06	0.170E 06	0.180E 06	0.477E 06	0.385E 06	0.247E 06	0.394E 06	0.248E 06	0.297E 06	0.177E 06	0.309E 06
AU195	0.160E 06	0.108E 06	0.840E 05	0.356E 06	0.266E 06	0.109E 06	0.165E 06	0.116E 06	0.191E 06	0.381E 05	0.187E 06
AU198	0.522E 06	0.193E 06	0.320E 06	0.640E 06	0.639E 06	0.551E 06	0.580E 06	0.319E 06	0.550E 06	0.347E 06	0.523E 06
AU199	0.124E 06	0.743E 05	0.785E 05	0.212E 06	0.169E 06	0.107E 06	0.171E 06	0.108E 06	0.132E 06	0.762E 05	0.136E 06
HG197	0.120E 06	0.857E 05	0.617E 05	0.270E 06	0.206E 06	0.824E 05	0.124E 06	0.911E 05	0.138E 06	0.242E 05	0.141E 06
HG203	0.281E 06	0.168E 06	0.180E 06	0.469E 06	0.374E 06	0.248E 06	0.396E 06	0.249E 06	0.294E 06	0.181E 06	0.306E 06
TL204	0.191E 04	0.137E 04	0.976E 03	0.433E 04	0.329E 04	0.130E 04	0.196E 04	0.144E 04	0.220E 04	0.362E 03	0.225E 04
TL208	0.362E 07	0.334E 07	0.350E 07	0.390E 07	0.443E 07	0.261E 07	0.231E 07	0.347E 07	0.344E 07	0.278E 07	0.363E 07
TL210	0.652E 01	0.468E 01	0.333E 01	0.148E 02	0.105E 02	0.444E 01	0.665E 01	0.493E 01	0.752E 01	0.124E 01	0.763E 01
PB204M	0.250E 07	0.143E 07	0.233E 07	0.279E 07	0.319E 07	0.252E 07	0.234E 07	0.166E 07	0.198E 07	0.175E 07	0.250E 07
PB210	0.187E 05	0.120E 05	0.871E 04	0.390E 05	0.665E 05	0.116E 05	0.192E 05	0.125E 05	0.191E 05	0.313E 04	0.227E 05
PB212	0.182E 06	0.110E 06	0.115E 06	0.317E 06	0.249E 06	0.156E 06	0.248E 06	0.157E 06	0.196E 06	0.109E 06	0.201E 06
PB214	0.304E 06	0.141E 06	0.189E 06	0.432E 06	0.389E 06	0.296E 06	0.366E 06	0.216E 06	0.320E 06	0.194E 06	0.316E 06
BI210	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BI212	0.152E 06	0.912E 05	0.115E 06	0.175E 06	0.183E 06	0.162E 06	0.145E 06	0.111E 06	0.149E 06	0.103E 06	0.152E 06
BI214	0.185E 07	0.147E 07	0.161E 07	0.203E 07	0.218E 07	0.185E 07	0.149E 07	0.157E 07	0.177E 07	0.131E 07	0.185E 07
PO214	0.133E 03	0.817E 02	0.133E 03	0.146E 03	0.172E 03	0.133E 03	0.120E 03	0.903E 02	0.990E 02	0.946E 02	0.133E 03

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
PO218	0.110E 03	0.673E 02	0.110E 03	0.120E 03	0.142E 03	0.110E 03	0.991E 02	0.743E 02	0.814E 02	0.779E 02	0.110E 03
RN220	0.462E 03	0.169E 03	0.282E 03	0.564E 03	0.564E 03	0.488E 03	0.514E 03	0.282E 03	0.487E 03	0.308E 03	0.462E 03
RN222	0.503E 03	0.184E 03	0.307E 03	0.615E 03	0.615E 03	0.532E 03	0.559E 03	0.307E 03	0.530E 03	0.336E 03	0.503E 03
RA224	0.120E 05	0.711E 04	0.777E 04	0.200E 05	0.160E 05	0.106E 05	0.170E 05	0.106E 05	0.127E 05	0.787E 04	0.131E 05
RA226	0.865E 04	0.507E 04	0.556E 04	0.145E 05	0.116E 05	0.758E 04	0.121E 05	0.752E 04	0.925E 04	0.559E 04	0.947E 04
RA228	0.612E 05	0.237E 05	0.825E 04	0.101E 06	0.150E 06	0.225E 05	0.912E 05	0.349E 05	0.700E 05	0.850E 04	0.663E 05
AC228	0.893E 06	0.597E 06	0.796E 06	0.104E 07	0.111E 07	0.912E 06	0.824E 06	0.669E 06	0.783E 06	0.610E 06	0.904E 06
TH228	0.145E 05	0.729E 04	0.856E 04	0.269E 05	0.283E 05	0.106E 05	0.172E 05	0.967E 04	0.175E 05	0.742E 04	0.166E 05
TH230	0.516E 04	0.260E 04	0.224E 04	0.906E 04	0.220E 05	0.285E 04	0.540E 04	0.289E 04	0.446E 04	0.123E 04	0.612E 04
TH231	0.112E 06	0.495E 05	0.557E 05	0.209E 06	0.272E 06	0.665E 05	0.126E 06	0.607E 05	0.136E 06	0.428E 05	0.129E 06
TH232	0.290E 04	0.106E 04	0.854E 03	0.420E 04	0.210E 05	0.102E 04	0.274E 04	0.101E 04	0.154E 04	0.252E 03	0.357E 04
TH234	0.143E 05	0.721E 04	0.844E 04	0.296E 05	0.210E 05	0.987E 04	0.153E 05	0.868E 04	0.157E 05	0.642E 04	0.166E 05
PA233	0.295E 06	0.165E 06	0.187E 06	0.500E 06	0.399E 06	0.255E 06	0.394E 06	0.240E 06	0.327E 06	0.184E 06	0.324E 06
PA234M	0.123E 05	0.740E 04	0.119E 05	0.141E 05	0.160E 05	0.121E 05	0.113E 05	0.828E 04	0.956E 04	0.856E 04	0.124E 05
PA234	0.367E 07	0.329E 07	0.361E 07	0.407E 07	0.455E 07	0.283E 07	0.253E 07	0.339E 07	0.335E 07	0.276E 07	0.370E 07
U232	0.508E 04	0.182E 04	0.186E 04	0.781E 04	0.294E 05	0.209E 04	0.518E 04	0.189E 04	0.375E 04	0.983E 03	0.612E 04
U233	0.693E 04	0.362E 04	0.390E 04	0.115E 05	0.176E 05	0.512E 04	0.887E 04	0.501E 04	0.689E 04	0.352E 04	0.781E 04
U234	0.394E 04	0.127E 04	0.128E 04	0.563E 04	0.260E 05	0.140E 04	0.400E 04	0.127E 04	0.246E 04	0.602E 03	0.478E 04
U235	0.258E 06	0.147E 06	0.164E 06	0.444E 06	0.360E 06	0.218E 06	0.351E 06	0.214E 06	0.285E 06	0.160E 06	0.285E 06
U236	0.259E 04	0.504E 03	0.510E 03	0.275E 04	0.240E 05	0.469E 03	0.257E 04	0.382E 03	0.670E 03	0.895E 02	0.321E 04
U237	0.326E 06	0.183E 06	0.196E 06	0.616E 06	0.492E 06	0.252E 06	0.398E 06	0.242E 06	0.390E 06	0.166E 06	0.369E 06
U238	0.259E 04	0.589E 03	0.656E 03	0.308E 04	0.213E 05	0.649E 03	0.260E 04	0.527E 03	0.109E 04	0.263E 03	0.317E 04
U240	0.141E 05	0.543E 04	0.439E 04	0.211E 05	0.907E 05	0.512E 04	0.141E 05	0.522E 04	0.825E 04	0.129E 04	0.170E 05
NP237	0.118E 06	0.617E 05	0.718E 05	0.225E 06	0.162E 06	0.892E 05	0.141E 06	0.822E 05	0.150E 06	0.627E 05	0.133E 06
NP238	0.653E 06	0.400E 06	0.653E 06	0.716E 06	0.843E 06	0.653E 06	0.590E 06	0.443E 06	0.485E 06	0.464E 06	0.653E 06
NP239	0.223E 06	0.124E 06	0.140E 06	0.401E 06	0.312E 06	0.182E 06	0.290E 06	0.175E 06	0.261E 06	0.131E 06	0.249E 06

TABLE 3-9 (continued)

PHOTON DOSE RATE TO VARIOUS ORGANS (ABOVE CONTAMINATED GROUND SURFACE)-CONTINUED

NUCLIDE	MUSCLE	OVARIES	PANCREAS	SKELETON	SKIN	SPLEEN	TESTES	THYMUS	THYROID	UTERUS	TOTAL BODY
NP240M	0.439E 06	0.235E 06	0.321E 06	0.517E 06	0.534E 06	0.465E 06	0.443E 06	0.307E 06	0.435E 06	0.297E 06	0.441E 06
PU236	0.333E 04	0.603E 03	0.694E 03	0.353E 04	0.297E 05	0.607E 03	0.342E 04	0.461E 03	0.984E 03	0.187E 03	0.408E 04
PU238	0.261E 04	0.364E 03	0.446E 03	0.247E 04	0.261E 05	0.354E 03	0.259E 04	0.226E 03	0.481E 03	0.752E 02	0.325E 04
PU239	0.112E 04	0.221E 03	0.208E 03	0.122E 04	0.990E 04	0.210E 03	0.116E 04	0.190E 03	0.359E 03	0.488E 02	0.137E 04
PU240	0.230E 04	0.352E 03	0.417E 03	0.225E 04	0.224E 05	0.347E 03	0.228E 04	0.239E 03	0.493E 03	0.844E 02	0.285E 04
PU241	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU242	0.219E 04	0.297E 03	0.354E 03	0.203E 04	0.222E 05	0.274E 03	0.217E 04	0.173E 03	0.347E 03	0.375E 02	0.272E 04
PU244	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AM241	0.641E 05	0.444E 05	0.316E 05	0.142E 06	0.120E 06	0.422E 05	0.657E 05	0.470E 05	0.721E 05	0.119E 05	0.750E 05
AM242	0.491E 05	0.231E 05	0.284E 05	0.982E 05	0.841E 05	0.325E 05	0.535E 05	0.280E 05	0.660E 05	0.220E 05	0.569E 05
AM243	0.567E 05	0.405E 05	0.288E 05	0.128E 06	0.935E 05	0.384E 05	0.578E 05	0.427E 05	0.650E 05	0.107E 05	0.664E 05
CM242	0.232E 04	0.295E 03	0.369E 03	0.212E 04	0.237E 05	0.277E 03	0.230E 04	0.163E 03	0.351E 03	0.426E 02	0.289E 04
CM243	0.212E 06	0.117E 06	0.133E 06	0.382E 06	0.295E 06	0.172E 06	0.273E 06	0.164E 06	0.249E 06	0.124E 06	0.236E 06
CM244	0.155E 05	0.974E 04	0.830E 04	0.336E 05	0.255E 05	0.105E 05	0.161E 05	0.107E 05	0.190E 05	0.441E 04	0.181E 05
CF252	0.665E 06	0.451E 06	0.525E 06	0.794E 06	0.786E 06	0.681E 06	0.637E 06	0.561E 06	0.702E 06	0.455E 06	0.673E 06

TABLE 3-10

EXREM III SOLUTION OF EXAMPLE 4

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TOTAL NO. OF RADIONUCLIDES =   3
TOTAL NO. OF PATHWAYS      =   2
TOTAL NO. OF RELEASES      =   1
TOTAL NO. OF LOCATIONS     =   1


ESTIMATE DOSES FOR SUBMERSION IN WATER.

ESTIMATE DOSES FOR SUBMERSION IN AIR.

ESTIMATE DOSES FOR EXPOSURE TO A SURFACE.

HEIGHT ABOVE GROUND SURFACE.
    NO.  HEIGHT
          (CM)
     1   100.000

TIME OF EACH RELEASE.
    NO.     RELEASE   CLOUD TIME
          TIME (HRS)    (HRS)
     1          0.0        1.0

RADIONUCLIDE IDENTIFICATION.
   INDEX  ATOMIC  NAME      DECAY CONSTANT     NO. BETA-  POSITRON    NUMBER  CONVERSION/AUGER
          NUMBER              (1/HRS)         PARTICLES  PARTICLES   PHOTONS   ELECTRONS
     46     38    SR91      7.31000E-02          5          0          5          0
     47     39    Y91M      8.36700E-01          0          0          6          8
     48     39    Y91       5.10200E-04          2          0          1          0

YIELD.
   INDEX  RADIONUCLIDE  NUMBER OF    QUANTITY
                        RELEASE    (MICROCURIES)
     46   SR91              1       1.00000E 00
     47   Y91M              1       0.0
     48   Y91               1       0.0

LOCATION CORRECTION FACTOR.
  FOR ALL RADIONUCLIDES AND FOR ALL RELEASES.
   LOCATION   SUBMERSION  SUBMERSION   EXPOSURE
    NUMBER     IN WATER     IN AIR    TO SURFACE
               (1/CC)      (1/CC)     (1/SQ CM)
       1      1.0000E-02  1.0000E 00  1.0000E 00
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TABLE 3-10 (continued)

ENERGY AND INTENSITY FOR EACH BETA PARTICLE.

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)
46	SR91	1	0.6100	0.07000
		2	1.0900	0.33000
		3	1.3700	0.29000
		4	2.0300	0.04000
		5	2.6700	0.27000
48	Y91	1	0.3400	0.00200
		2	1.5450	0.99800

ENERGY AND INTENSITY FOR EACH POSITRON.

INDEX	RADIONUCLIDE	NO.	MAXIMUM ENERGY (MEV)	INTENSITY (FRACTION)

ENERGY AND INTENSITY FOR EACH ELECTRON.

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
47	Y91M	1	0.5340	0.04483
		2	0.5488	0.00615
		3	1.5507	0.00205
		4	0.0127	0.00908
		5	0.0146	0.00308
		6	0.0164	0.00035
		7	0.0016	0.05243
		8	0.0003	0.11740

ENERGY AND INTENSITY FOR EACH PHOTON.

INDEX	RADIONUCLIDE	NO.	ENERGY (MEV)	INTENSITY (FRACTION)
46	SR91	1	0.6450	0.14000
		2	0.7480	0.29000
		3	0.9300	0.03000
		4	1.0250	0.30000
		5	1.4130	0.07000
47	Y91M	1	0.5510	0.94696
		2	0.0150	0.01842
		3	0.0149	0.00921
		4	0.0167	0.00413
		5	0.0170	0.00057
		6	0.0019	0.00259
48	Y91	1	1.2100	0.00200

RADIONUCLIDE PATHWAYS.

PATHWAY	POSITION	INDEX	FRACTION
1	1	46	0.5900
	2	47	1.0000
	3	48	1.0000
2	1	46	0.4100
	2	1048	1.0000

TABLE 3-10 (continued)

LISTING OF RADIONUCLIDES FOR SUBMERSION DOSE RATES IN CONTAMINATED WATER

LOCATION NUMBER = 1
TIME AFTER RELEASE 1 = 0.0 HOURS.

	ELECTRON DOSE RATE			PHOTON DOSE RATE			TOTAL DOSE RATE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR
1	46	SR91	0.585E 05	46	SR91	0.139E 06	46	SR91	0.197E 06
2	47	Y91M	0.0	47	Y91M	0.0	47	Y91M	0.0
3	48	Y91	0.0	48	Y91	0.0	48	Y91	0.0
TOTAL			0.585E 05			0.139E 06			0.197E 06

LISTING OF RADIONUCLIDES FOR SUBMERSION DOSE RATES IN CONTAMINATED AIR

LOCATION NUMBER = 1
TIME AFTER RELEASE 1 = 0.0 HOURS.

	ELECTRON DOSE RATE			PHOTON DOSE RATE			TOTAL DOSE RATE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR
1	46	SR91	0.556E 10	46	SR91	0.659E 10	46	SR91	0.122E 11
2	47	Y91M	0.0	47	Y91M	0.0	47	Y91M	0.0
3	48	Y91	0.0	48	Y91	0.0	48	Y91	0.0
TOTAL			0.556E 10			0.659E 10			0.122E 11

LISTING OF RADIONUCLIDES FOR DOSE RATES ABOVE A CONTAMINATED GROUND SURFACE

LOCATION NUMBER = 1
HEIGHT = 100.000 CM.
TIME AFTER RELEASE 1 = 0.0 HOURS.

	ELECTRON DOSE RATE			PHOTON DOSE RATE			TOTAL DOSE RATE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR
1	46	SR91	0.132E 08	46	SR91	0.112E 07	46	SR91	0.143E 08
2	47	Y91M	0.0	47	Y91M	0.0	47	Y91M	0.0
3	48	Y91	0.0	48	Y91	0.0	48	Y91	0.0
TOTAL			0.132E 08			0.112E 07			0.143E 08

TABLE 3-10 (continued)

LISTING OF RADIONUCLIDES FOR SUBMERSION DOSE RATES IN CONTAMINATED WATER

LOCATION NUMBER = 1
TIME AFTER RELEASE 1 = 1.00000E 00 HOURS.

	ELECTRON DOSE RATE			PHOTON DOSE RATE			TOTAL DOSE RATE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR
1	46	SR91	0.544E 05	46	SR91	0.129E 06	46	SR91	0.183E 06
2	47	Y91M	0.923E 03	47	Y91M	0.313E 05	47	Y91M	0.322E 05
3	48	Y91	0.163E 02	48	Y91	0.134E 00	48	Y91	0.165E 02
TOTAL			0.553E 05			0.160E 06			0.215E 06

LISTING OF RADIONUCLIDES FOR SUBMERSION DOSE RATES IN CONTAMINATED AIR

LOCATION NUMBER = 1
TIME AFTER RELEASE 1 = 1.00000E 00 HOURS.

	ELECTRON DOSE RATE			PHOTON DOSE RATE			TOTAL DOSE RATE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR
1	46	SR91	0.0	46	SR91	0.0	46	SR91	0.0
2	47	Y91M	0.0	47	Y91M	0.0	47	Y91M	0.0
3	48	Y91	0.0	48	Y91	0.0	48	Y91	0.0
TOTAL			0.0			0.0			0.0

LISTING OF RADIONUCLIDES FOR DOSE RATES ABOVE A CONTAMINATED GROUND SURFACE

LOCATION NUMBER = 1
HEIGHT = 100.000 CM.
TIME AFTER RELEASE 1 = 1.00000E 00 HOURS.

	ELECTRON DOSE RATE			PHOTON DOSE RATE			TOTAL DOSE RATE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR	NUCLIDE LABEL	NUCLIDE NAME	DOSE RATE MILLIREMS/YR
1	46	SR91	0.122E 08	46	SR91	0.104E 07	46	SR91	0.133E 08
2	47	Y91M	0.357E 05	47	Y91M	0.267E 06	47	Y91M	0.303E 06
3	48	Y91	0.440E 04	48	Y91	0.104E 01	48	Y91	0.441E 04
TOTAL			0.123E 08			0.131E 07			0.136E 08

TABLE 3-10 (continued)

LISTING OF RADIONUCLIDES FOR ACCUMULATED SUBMERSION DOSES IN CONTAMINATED WATER

LOCATION NUMBER = 1
INTEGRATION PERIOD -- 0.0 TO 1.00000E 00 HOURS.

	ELECTRON DOSE			PHOTON DOSE			TOTAL DOSE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE MILLIREMS	NUCLIDE LABEL	NUCLIDE NAME	DOSE MILLIREMS	NUCLIDE LABEL	NUCLIDE NAME	DOSE MILLIREMS
1	46	SR91	0.644E 01	46	SR91	0.153E 02	46	SR91	0.217E 02
2	47	Y91M	0.609E-01	47	Y91M	0.207E 01	47	Y91M	0.213E 01
3	48	Y91	0.855E-03	48	Y91	0.702E-05	48	Y91	0.862E-03
TOTAL			0.651E 01			0.173E 02			0.238E 02

LISTING OF RADIONUCLIDES FOR ACCUMULATED SUBMERSION DOSES IN CONTAMINATED AIR

LOCATION NUMBER = 1
INTEGRATION PERIOD -- 0.0 TO 1.00000E 00 HOURS.

	ELECTRON DOSE			PHOTON DOSE			TOTAL DOSE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE MILLIREMS	NUCLIDE LABEL	NUCLIDE NAME	DOSE MILLIREMS	NUCLIDE LABEL	NUCLIDE NAME	DOSE MILLIREMS
1	46	SR91	0.613E 06	46	SR91	0.725E 06	46	SR91	0.134E 07
2	47	Y91M	0.579E 04	47	Y91M	0.982E 05	47	Y91M	0.104E 06
3	48	Y91	0.813E 02	48	Y91	0.333E 00	48	Y91	0.816E 02
TOTAL			0.618E 06			0.823E 06			0.144E 07

LISTING OF RADIONUCLIDES FOR ACCUMULATED DOSES ABOVE A CONTAMINATED GROUND SURFACE

LOCATION NUMBER = 1
HEIGHT = 100.000 CM.
INTEGRATION PERIOD -- 0.0 TO 1.00000E 00 HOURS.

	ELECTRON DOSE			PHOTON DOSE			TOTAL DOSE		
NO.	NUCLIDE LABEL	NUCLIDE NAME	DOSE MILLIREMS	NUCLIDE LABEL	NUCLIDE NAME	DOSE MILLIREMS	NUCLIDE LABEL	NUCLIDE NAME	DOSE MILLIREMS
1	46	SR91	0.145E 04	46	SR91	0.124E 03	46	SR91	0.157E 04
2	47	Y91M	0.236E 01	47	Y91M	0.176E 02	47	Y91M	0.200E 02
3	48	Y91	0.231E 00	48	Y91	0.547E-04	48	Y91	0.231E 00
TOTAL			0.145E 04			0.141E 03			0.159E 04

TABLE 3-11 BIORA2 ESTIMATES OF WATER IMMERSION DOSE TO ALL BIOTA (millirads/year)

RADIO-NUCLIDES	MICRO-CURIE/ML	BETA + GAMMA	GAMMA
H-3	1.0E+00	5.8E+04	0.0E+00
C-14	1.0E+00	5.1E+05	0.0E+00
NA-22	1.0E+00	4.3E+07	4.1E+07
NA-24	1.0E+00	8.2E+07	7.7E+07
P-32	1.0E+00	6.5E+06	0.0E+00
S-35	1.0E+00	5.3E+05	0.0E+00
SC-46	1.0E+00	3.9E+07	3.8E+07
CR-51	1.0E+00	6.5E+05	6.1E+05
MN-54	1.0E+00	1.6E+07	1.6E+07
FE-55	1.0E+00	6.8E+04	2.9E+04
FE-59	1.0E+00	2.4E+07	2.2E+07
CO-57	1.0E+00	2.5E+06	2.3E+06
CO-58	1.0E+00	1.9E+07	1.8E+07
CO-60	1.0E+00	4.8E+07	4.7E+07
NI-63	1.0E+00	2.0E+05	0.0E+00
CU-64	1.0E+00	4.9E+06	3.7E+06
ZN-65	1.0E+00	1.1E+07	1.1E+07
ZN-69M	1.0E+00	1.1E+07	7.8E+06
BR-80M	1.0E+00	9.4E+06	2.0E+06
BR-82	1.0E+00	5.2E+07	5.0E+07
BR-83	1.0E+00	2.3E+06	4.0E+05
BR-84	1.0E+00	4.6E+07	3.5E+07
RB-86	1.0E+00	7.9E+06	1.8E+06
RB-88	1.0E+00	3.2E+07	1.3E+07
RB-89	1.0E+00	5.5E+07	4.5E+07
SR-89	1.0E+00	5.2E+06	0.0E+00
SR-90	1.0E+00	1.0E+07	0.0E+00
SR-91	1.0E+00	3.1E+07	2.0E+07
Y-90	1.0E+00	8.5E+06	0.0E+00
Y-91	1.0E+00	5.6E+06	4.5E+04
Y-93	1.0E+00	1.2E+07	1.4E+06
ZR-95	1.0E+00	3.0E+07	2.8E+07
ZR-97	1.0E+00	4.0E+07	2.9E+07
NB-95	1.0E+00	1.5E+07	1.4E+07
MO-99	1.0E+00	9.1E+06	5.1E+06
TC-99	1.0E+00	9.0E+05	0.0E+00
RU-103	1.0E+00	1.0E+07	9.1E+06
RU-106	1.0E+00	1.7E+07	3.5E+06
RH-105	1.0E+00	3.0E+06	1.5E+06
AG-110M	1.0E+00	5.2E+07	5.1E+07
SN-125	1.0E+00	2.4E+07	1.4E+07
SB-122	1.0E+00	1.3E+07	7.7E+06
SB-124	1.0E+00	3.8E+07	3.4E+07
SB-125	1.0E+00	9.9E+06	8.5E+06
SB-127	1.0E+00	1.8E+07	1.3E+07
TE-125M	1.0E+00	1.6E+06	6.6E+05
TE-127	1.0E+00	2.3E+06	7.6E+04
TE-127M	1.0E+00	6.6E+06	2.4E+05
TE-129	1.0E+00	8.8E+06	1.2E+06
TE-129M	1.0E+00	8.7E+06	1.5E+06
TE-131M	1.0E+00	4.0E+07	3.5E+07
TE-132	1.0E+00	5.2E+07	4.6E+07
I-129	1.0E+00	1.0E+06	4.6E+05
I-130	1.0E+00	4.1E+07	3.8E+07
I-131	1.0E+00	9.1E+06	7.1E+06
I-132	1.0E+00	4.7E+07	4.2E+07
I-133	1.0E+00	1.9E+07	1.3E+07
I-134	1.0E+00	5.1E+07	4.5E+07
I-135	1.0E+00	4.6E+07	3.9E+07

TABLE 3-11 (continued)

WATER IMMERSION DOSE TO ALL BIOTA,MRADS/YR

RADIO-NUCLIDES	MICRO-CURIE/ML	BETA + GAMMA	GAMMA
CS-134	1.0E+00	3.1E+07	2.9E+07
CS-136	1.0E+00	4.1E+07	4.0E+07
CS-137	1.0E+00	1.2E+07	9.9E+06
CS-138	1.0E+00	5.0E+07	4.0E+07
BA-140	1.0E+00	5.5E+07	4.7E+07
LA-140	1.0E+00	4.8E+07	4.3E+07
CE-141	1.0E+00	3.2E+06	1.5E+06
CE-143	1.0E+00	1.3E+07	5.7E+06
CE-144	1.0E+00	1.3E+07	9.3E+05
PR-143	1.0E+00	3.1E+06	0.0E+00
ND-147	1.0E+00	5.9E+06	2.6E+06
PM-147	1.0E+00	6.6E+05	0.0E+00
EU-154	1.0E+00	2.7E+07	2.4E+07
EU-155	1.0E+00	1.9E+06	1.2E+06
TA-182	1.0E+00	2.6E+07	2.4E+07
W-185	1.0E+00	1.3E+06	0.0E+00
W-187	1.0E+00	5.6E+06	3.2E+06
PB-210	1.0E+00	4.2E+06	8.8E+04
BI-210	1.0E+00	3.8E+06	0.0E+00
PO-210	1.0E+00	0.0E+00	0.0E+00
RA-226	1.0E+00	2.5E+05	1.3E+05
TH-228	1.0E+00	8.0E+07	6.8E+07
TH-230	1.0E+00	1.7E+05	2.8E+04
TH-231	1.0E+00	2.1E+06	5.5E+05
TH-234	1.0E+00	7.4E+07	5.8E+07
PA-234	1.0E+00	6.5E+07	5.8E+07
U-232	1.0E+00	7.4E+07	6.3E+07
U-233	1.0E+00	9.6E+04	3.1E+04
U-234	1.0E+00	1.6E+05	2.9E+04
U-235	1.0E+00	5.4E+06	3.4E+06
U-236	1.0E+00	1.3E+05	2.5E+04
U-237	1.0E+00	4.7E+06	2.8E+06
U-238	1.0E+00	7.4E+07	5.8E+07
NP-237	1.0E+00	7.6E+06	5.3E+06
NP-239	1.0E+00	5.1E+06	2.6E+06
PU-236	1.0E+00	1.6E+07	1.4E+07
PU-238	1.0E+00	1.3E+05	2.8E+04
PU-239	1.0E+00	8.3E+04	1.1E+04
PU-240	1.0E+00	1.2E+05	2.4E+04
PU-241	1.0E+00	7.6E+04	1.4E+04
PU-242	1.0E+00	1.1E+05	2.4E+04
AM-241	1.0E+00	7.9E+05	4.8E+05
AM-243	1.0E+00	1.1E+06	9.4E+05
CM-242	1.0E+00	1.5E+05	3.3E+04
CM-244	1.0E+00	1.8E+05	1.3E+05

4 Estimation of Internal Radiation Dose

4.1 Dose to Man

Intake of a radionuclide into the body results in internal exposure of man that may be quantified in terms of the dose commitment. Even though the duration of the intake episode may be brief, the resulting deposition of radioactivity in a specified organ continues to deliver a dose to that organ at a rate which is proportional, at any given time, to the activity which remains in the organ at that time. This residual burden is diminished continuously by radioactive decay of the nuclide and by the action of the organ's metabolic processes. If either of these removal mechanisms is rapid, the exposed individual receives the total dose commitment within a short time period; for example, a single intake of ^{131}I delivers its total dose commitment to the total body in less than one year. In some cases, however, biological removal of a long-lived radionuclide is slow, and the dose commitment may be delivered over the lifetime of the exposed individual. Such is the case with the retention of ^{239}Pu in bone, and the dose commitment is limited by the lifetime of the individual.

The term "dose commitment," as it is used in this report, is associated with a specified intake of a radionuclide and is defined to mean the total dose to a reference organ, resulting from that intake, which will accrue during the remaining lifetime of the individual. This definition is intended to include the contribution of any radioactive daughters which are formed in the body as the parent nuclide decays. The exposed individual is assumed to be an adult

(20 years of age) at time of intake who will live to an age of 70 years. Thus "dose commitment" in this discussion and accompanying tables is to be interpreted as "50-year dose commitment."

Our general definition of dose commitment also allows the possibility that the reference organ may be irradiated not only by its own burden of radioactivity, but also, in some instances, by radiation from the burdens of other source organs; such cross radiation, however, has only recently come under intensive investigation and is not calculated in this report. Snyder et al.[1] discuss the methodology and give dosimetric information for 60 radionuclides and a variety of source-target organ combinations.

The total dose commitment to an organ resulting from the intake of a radionuclide is resolved into two components corresponding to the inhalation and ingestion exposure modes, respectively. Dose conversion factors have been computed and tabulated for each of these exposure modes, for 259 radionuclides, and for 11 reference organs (Tables 4-2 and 4-3). In this discussion, the term "dose conversion factor" means the dose commitment to an organ that will result from a single intake of 1 μCi of a radionuclide via a specified exposure mode. The calculation of these dose conversion factors was done with the INREM code (Sec. 4.1.1 and Ref. 2), which is based on models used by the International Commission on Radiological Protection (ICRP) in calculating the maximum permissible body burdens and maximum permissible concentrations presented in Table I of ICRP Publication 2 (Ref. 3). The basic parameter values used to implement the models are those found in Tables 5, 8, 9, 10, 11, and 12 of that document. Retention of the radionuclides in the reference

tissue is assumed to be described by a single exponential function. Uniform distribution of the radionuclides throughout the tissue is assumed for all reference tissues except for the gastrointestinal tract. In the case of the G. I. tract, uniform distribution in the contents of the tract segment is assumed, and it is further assumed that the dose (other than alpha dose) to the tract wall is, on the average, only half of the dose to the contents. For alpha particles in the G. I. tract it is assumed that the dose to the walls is only 1% of one-half of the dose to the segment contents.

The dynamics of the ICRP Publication 2 lung model are described in Ref. 3, Table 10, for soluble and insoluble particulate forms of a radionuclide. For insoluble materials in the lungs the biological half-time (T_b) is taken to be 120 days for all radionuclides except plutonium and thorium, in which case T_b = 1 year and T_b = 4 years, respectively. The more recently developed ICRP Task Group Lung Model[4] represents a more detailed approach to the dosimetry of the lung. This model has been computerized and is currently being incorporated into the methodology.

It has been desirable from time to time to alter the INREM parameter values used for some specific radionuclides as better information became available. In those cases where data from a source other than ICRP Publication 2 have been used, an asterisk has been affixed to the radionuclide name (e.g., H-3* in Tables 4-2 and 4-3). Most of the changes have been based on information presented in more recent ICRP Publications (ICRP-6, -10, and -10A).[5,6,7] The actual change(s) made for a specific radionuclide can only be determined by comparison of the parameters contained in ICRP-2 with those listed in Table 4-1 (Sec. 4.1.1.2).

The internal dose conversion factors for inhalation of ^3H-bearing air have been increased by 75% to account for absorption of the radionuclide through the skin.[8]

The single-compartment retention models of ICRP Publication 2 have been supplemented in ICRP Publication 10[6] with (1) parallel multiple compartment models with first-order (exponential) removal and (2) power function models. In the first case, each compartment requires two parameters for its representation, while a power function with two parameters can often be fitted to metabolic data for which two or more exponential compartments would be needed. The INDOS codes were developed to provide a conversational implementation of these models via-time sharing; these codes are discussed in Sec. 4.1.2.

The calculation of dose commitments to internal organs resulting from the inhalation of a radioactive noble gas requires models that are not incorporated in the INREM and INDOS codes. Such exposures have generally been handled on a case-by-case basis, under the assumption that noble gases and their daughter products are insoluble, and thus the lung is the critical tissue. Inasmuch as this portion of our methodology is still under development and review, no internal-dose conversion factors for noble gases are given in this report.

General Equations. If q(t) denotes the activity burden (μCi) of a radionuclide in an organ at time t (days), the resulting absorbed dose rate to the organ is

$$\dot{D}(t) = \frac{51.2\ \varepsilon(t)\ q(t)}{m(t)} \quad \text{(rem/day)} \qquad (4\text{-}1)$$

where

$$51.2 = \frac{3.2 \times 10^9 \left(\frac{\text{dis/day}}{\mu\text{Ci}}\right) \times 1.6 \times 10^{-6}\left(\frac{\text{erg}}{\text{MeV}}\right)}{100(\text{erg/g tissue/rad})};$$

$\varepsilon(t)$ = the effective absorbed energy (MeV/dis) at time t;

$m(t)$ = mass (g) of the organ at time t;

t = time (days).

The effective absorbed energy for a single radionuclide is defined in ICRP methodology as the sum

$$\varepsilon = \sum_j E_j \, (QF)_j \, n_j \quad ,$$

where j indexes the various decay processes (γ, β^-, β^+, α, internal conversion, electron capture, and α-recoil), and where

E_j = total energy (MeV) from the j-th radiation type absorbed by the organ per disintegration;

QF_j = quality factor for the j-th radiation type; $QF_j = 1$ for β^-, β^+, γ, and X radiation and conversion electrons (= 1.7 if the maximum energy $\leq$ 0.03 MeV for β^-, β^+, or e^-)*; and $QF_j = 10$ for α particles and 20 for recoil atoms;

n_j = relative damage factor for nuclides deposited in the bone; its values are discussed in detail in Ref. 3, Sec. IV.2, basic rule (b). The factor n_j may be taken as unity for organs other than bone.

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*According to "Progress Report from ICRP," Health Phys. 17, 389 (1969), the Commission has recommended that this exception be dropped and that QF be taken as unity for all β^-, β^+, e^-, γ, and X-radiations, and for conversion electrons. In the INREM data base, the effective absorbed energy for tritium (Table 4-1C) is consistent with this more recent recommendation, but this parameter has not been adjusted for other radionuclides.

Reference 3 provides approximate formulas for computing the energies E_j from decay-scheme and biological data, and further discussion of these quantities will be limited to the remark that for the β^+, γ, and internal conversion and electron capture processes, the calculation of the absorbed energy E_j is based on the concept of an effective radius x (cm) of the organ; in essence, the E_j are computed with the assumption of a point source of activity at the center of a sphere of tissue with radius x, and photon absorption is assumed to be exponential with absorption coefficient σ = total absorption coefficient minus the component for Compton scattering. An alternative approach to dosimetry, which avoids the concept of an effective radius, has been set forth in several of the Society for Nuclear Medicine's Medical Internal Radiation Dose Committee (MIRD) pamphlets, which are issued as supplements to the Journal of Nuclear Medicine. Loevinger and Berman[9] give a general formulation of this approach. All internal dose estimates in the present report, however, are based on the foregoing ICRP formulation.

For Eq. (4-1), we may derive the dose commitment to the organ:

$$D(T) = \frac{51.2\ \varepsilon}{m} \int_0^T q(t)\ dt \quad \text{(rem)}, \qquad (4\text{-}2)$$

where T = 18250 days (50 years). The mass m of the organ has been taken as a constant in view of the earlier assumption that the reference individual is an adult during the dose integration period. The integral

$$\tilde{q}(T) = \int_0^T q(t)\ dt \quad (\mu\text{Ci-day}) \qquad (4\text{-}3)$$

is often called the residence of the nuclide in the reference organ. Its calculation requires the use of a metabolic model of the radionuclide in the organ to predict values of q(t).

When the radionuclide produces radioactive daughters, the situation is somewhat more complicated. If the species of the chain are indexed with i = 1, 2, ..., N, where i = 1 corresponds to the parent nuclide, one may write

$$D_i(T) = \frac{51.2\ \varepsilon_i\ \tilde{q}_i(T)}{m}\ \text{(rem)}, \qquad (4\text{-}4)$$

where

$D_i(T)$ = contribution of the i-th species to the dose commitment to the reference organ;

ε_i = effective absorbed energy (MeV) per disintegration of the i-th species in the organ;

$\tilde{q}_i(T)$ = residence of the i-th species in the reference organ (μCi-day).

The total dose commitment to the organ from the parent + daughters is

$$D(T) = \sum_{i=1}^{N} D_i(T)\ . \qquad (4\text{-}5)$$

The residences $\tilde{q}_i(T)$ in Eq. (4-4) must be computed as in Eq. (4-3) from the respective time-varying burdens of activity $q_i(t)$ in the organ; in general, the latter must be obtained by solving a system of differential equations which govern the dynamics of physical decay and buildup and biological removal from the organ's compartments. If the organ is modeled

by a single compartment with biological removal given by first-order kinetics, the system of differential equations has the form

$$dq_1/dt = -(\lambda_1^R + \lambda_1^b)\, q_1 + U_1(t)$$

$$dq_i/dt = -(\lambda_i^R + \lambda_i^b)\, q_i + \lambda_i^R \sum_{j=1}^{i-1} F_{ij}\, q_j + U_i(t),\ i = 2, \ldots, N, \tag{4-6}$$

where

λ_i^R = radioactive decay rate constant (day^{-1}) of the i-th species = $(\ln 2)/T_i^R$, where T_i^R is the radioactive half-life (days) of the i-th species;

λ_i^b = biological removal rate constant (day^{-1}) of the i-th species in the reference organ;

F_{ij} = branching fraction from the j-th species to the i-th, where j is less than i;

$U_i(t)$ = uptake rate to the reference organ (μCi/day) at time t;

t = time (days).

The term "uptake" has been used to mean that quantity of activity which is deposited in the reference organ. If $I_a(t)$ and $I_w(t)$ represent the intake rates (μCi/day) via inhalation and ingestion, respectively, of the parent nuclide, the usual uptake model is

$$U_1(t) = f_a I_a(t) + f_w I_w(t) \quad (\mu Ci/day),$$

where f_a and f_w are organ specific uptake fractions for that nuclide in the corresponding exposure modes. Such uptake fractions are given in Tables 4-1D and 4-1E.

Calculation of the dose commitment resulting from the uptake of a radionuclide and the formation of its daughter products is often simplified by adjusting the effective absorbed energy factor of the parent nuclide to include the approximate contribution of daughters. The procedure is indicated by the following considerations. If Eq. (4-4) is substituted into Eq. (4-5), we may write

$$D(T) = \frac{51.2}{m} \left[\sum_{i=1}^{N} \varepsilon_i \, \tilde{q}_i(T)/\tilde{q}_1(T) \right] \tilde{q}_1(T) \quad , \qquad (4\text{-}7)$$

where the bracketed quantity may be interpreted, by comparison with Eq. (4-2), as an effective absorbed energy factor for the parent which corrects for the contribution of the daughters. If this factor is computed for a single intake of only the parent nuclide at time zero, then it may be used as an approximation with other intake histories, where only the residence of the parent nuclide is computed. Effective absorbed energies used in the INREM and INDOS codes and displayed in Table 4-1C are of this composite character when radioactive daughters are formed. This device is of limited applicability, however, and should be used only with an awareness of its foundations. In ICRP Publication 2[3], the ratio $\tilde{q}_i(T)/\tilde{q}_1(T)$ is denoted by F_i, which appears in the most general expression for the effective absorbed energy:

$$\varepsilon = \sum_i \varepsilon_i F_i = \sum_i \sum_j E_{ij} F_i (QF)_{ij} n_{ij} \, , \qquad (4\text{-}8)$$

where i ranges over species in the chain and j over radiation types. We may abbreviate this expression as

$$\varepsilon = \Sigma\, E\, F\, (QF)\, n\ . \qquad (4\text{-}9)$$

(The symbol F in Eqs. (4-8) and (4-9) should not be confused with the notation for branching fractions employed in Eq. (4-6).)

The dosimetry of the lungs and G. I. tract require adaptations of the methods discussed heretofore, and these are set forth in the context of the INREM code in Sec. 4.1.1.1. The INDOS codes do not model the lungs and G. I. tract.

4.1.1 The INREM Computer Code

INREM is a Fortran IV computer code which estimates the doses to various human body organs following inhalation or ingestion, or both, of one or more radionuclides. Individuals from a population for which such dose estimates are to be computed may be described by parameters which are either age independent or age dependent. The dose models implemented in INREM are based on those described in Publication 2 of the ICRP.[3] First written in 1968, INREM has subsequently undergone a number of modifications, and an updated report has recently been issued.[2] The revised code is available from the Radiation Shielding Information Center, Oak Ridge National Laboratory, P. O. Box X, Oak Ridge, Tennessee 37830.

The following sections specify the models used in INREM. The data and output of two sample problems are included in Sec. 4.1.1.3. Tables 4-1 to 4-3 contain input parameters and dosimetric information for 259 radioisotopes and eleven organs which have been used with INREM for internal dose estimates.

4.1.1.1 Models

The models used to calculate the accumulated radiation dose to the body organs were adapted from models presented in Ref. 3. There are three basic models to consider: one for the gastrointestinal (G. I.) tract, one for the lungs, and one which is applied to all other organs. These models are given in the next two sections.

4.1.1.1.1 All Organs Except the G. I. Tract and Lungs

The rate of change of the burden q of a radionuclide in an organ satisfied the differential equation

$$\frac{dq}{dt} = If - \lambda q \ (\mu Ci/day), \qquad (4\text{-}10)$$

where

I = daily intake rate (μCi/day);

f = fraction of I deposited in the organ;

λ = effective elimination constant (day $^{-1}$).

Equation (4-10) is equivalent to the first equation of system (4-6) with $q = q_1$, $\lambda = \lambda_1^R + \lambda_1^b$, and $If = U_1$. It is a modification of Eq. (5) of Ref. 3 and may be applied to the i-th radionuclide in the k-th organ for an individual born at time t_b and therefore of age $x = t - t_b$ at time t. Modification of our notations to show dependence on i, k, and $t - t_b$ leads to the following revision of Eq. (4-10):

$$\frac{dq_{ik}}{dt} + \lambda_{ik}(t - t_b)\, q_{ik} = I_i(t - t_b, t)\, f_{ik}(t - t_b) \ (\mu Ci/day). \qquad (4\text{-}11)$$

Note that I_i is written as a function of both age, $t - t_b$, and time, t. The age-dependent counterpart of Eq. (4-1) is

$$\frac{dD_{ik}}{dt} = \frac{51.2\ q_{ik}(t)\ \varepsilon_{ik}(t - t_b)}{m_k(t - t_b)} \quad \text{(rem/day)}, \qquad (4\text{-}12)$$

where the constant 51.2 was defined after Eq. (4-1) and the quantities D_{ik}, $q_{ik}(t)$, $\varepsilon_{ik}(t - t_b)$, and $m_k(t - t_b)$ are counterparts of variables in that equation. Solving Eqs. (4-11) and (4-12) leads to

$$D_{ik}(t_1, t_2, t_b) = 51.2\int_{t_1}^{t_2} \left\{ I_i(t - t_b, t)\ f_{ik}(t - t_b) \int_t^{t_2} \frac{\varepsilon_{ik}(s - t_b)}{m_k(s - t_b)} \exp\left[-\int_{t-t_b}^{s-t_b} \lambda_{ik}(r)\ dr\right] ds \right\} dt \text{ (rem)}, \qquad (4\text{-}13)$$

which is the basic equation programmed in the INREM code for cumulative dose to all organs except the G. I. tract and lungs. In the case of an age-dependent simulation, the parameters f_{ik}, ε_{ik}, m_k, λ_{ik}, and I_i depend explicitly on the age $x = t - t_b$ of the individual. INREM requires that these quantities be represented as step functions, i. e., that the age scale can be divided into n intervals

$$[y_1,y_2),[y_2,y_3),\ldots,[y_{n-1},y_n),[y_n,y_{n+1}),$$

so that the above parameters are constant in each age group.

4.1.1.1.2 G. I. Tract

For dosimetry purposes, the G. I. tract is divided into four connected segments (stomach, small intestine, upper large intestine, and lower large intestine); this model[3] requires that a different equation be written to estimate the dose to each section as a result of the passage of radioactive material. The equations must consider the time required for the intake to reach the critical segment, the time required for the segment to empty, the mass of the segment plus its contents, and the fraction of the ingested radioactivity which is absorbed by the blood. An alternative way of estimating the dose to the G. I. tract from any intake is to relate the intake to dose received from intake at the $(MPC)_a$ or $(MPC)_w$. The advantage of this approach is that it utilizes the MPC for the critical segment, which already has built into it all of the factors mentioned above, and only one equation is required.

If the maximum permissible dose rate is 0.3 rem/wk, then we can write

$$\frac{0.3/7}{A_j\ (MPC)_{ij\alpha}} = \frac{\text{rem}}{\mu\text{Ci}}\ , \qquad (4\text{-}14)$$

where

A_j = intake (cm^3/day) of air (j=1) or water (j=2);

$(MPC)_{ij\alpha}$ = the maximum permissible concentration ($\mu Ci/cm^3$) of the i-th radionuclide in air (j=1) or water (j=2), where the i-th radionuclide is soluble (α=1) or insoluble (α=2).

The dose from any single intake can be computed by direct substitution into Eq. (4-14) and by assuming that the simple proportion holds. Rewriting Eq. (4-14) and substituting the incremental single intake $I_i \Delta t$ for μCi in the denominator gives the incremental dose equation

$$\Delta D_{ij\alpha} = \frac{(0.3/7)\ I_i \Delta t}{A_j (MPC)_{ij\alpha}} \quad \text{(rem)}. \qquad (4\text{-}15)$$

As it stands, this equation applies only to a reference man for whom MPC data are available and must be multiplied by a modifying factor, $h(\ell)$, to make it age dependent. The incremental dose to the G. I. tract of an individual in the ℓ-th age group is given by

$$\Delta D_{ij\alpha} = \frac{(0.3/7)\ h(\ell)\ I_i \Delta t}{A_j (MPC)_{ij\alpha}} \quad \text{(rem)} \qquad (4\text{-}16)$$

for an incremental single intake. As written in Eq. (4-16), $h(\ell)$ is the product of three modifying internal dose variables found in Eq. (14) of Ref. 1, and which are expressed in direct or inverse ratio to their respective reference man values. Other variables, such as residence time of food in the critical segment, could also be included, but no body of age-dependent data is available for these parameters. Thus,

$$h(\ell) = m_{kn}/m_{k\ell} \cdot \varepsilon_{i\ell\alpha}/\varepsilon_{in\alpha} \cdot f_{i\ell j\alpha}/f_{inj\alpha} \ , \qquad (4\text{-}17)$$

where

$m_{k\ell}$ = mass (g) of the critical segment k of the GI tract of an individual in the ℓ-th age group;

$\varepsilon_{i\ell\alpha}$ = effective absorbed energy (MeV) of the i-th radionuclide of type α in the critical segment of the GI tract of an individual in the ℓ-th age group;

$f_{i\ell j\alpha}$ = fraction of the intake from inhalation (j=1) or ingestion (j=2) of the i-th radionuclide of type α reaching the critical segment of the GI tract of an individual in the ℓ-th age group;

n = index for the reference man.

If we assume a continuous intake of I_i μCi/day as a function of age and time, the cumulative dose model can be written from Eq. (4-16) in integral form, after substitution of the age-dependent correction factors (4-17) for $h(\ell)$:

$$D_{ij\alpha}(t_1,t_2,t_b) = \frac{0.3/7}{A_{jn}(MPC)_{ij\alpha}} \int_{t_1}^{t_2} I_i(t-t_b,t)\, P_k(t-t_b)\, Q_{i\alpha}(t-t_b)\, R_{ij\alpha}(t-t_b)\, dt \quad . \tag{4-18}$$

where

$$P_k(t-t_b) = m_{kn}/m_{k\ell} \quad ,$$

$$Q_{i\alpha}(t-t_b) = \varepsilon_{i\ell\alpha}/\varepsilon_{in\alpha} \quad ,$$

$$R_{ij\alpha}(t-t_b) = f_{i\ell j\alpha}/f_{inj\alpha} \quad ,$$

and

$t-t_b$ is the age of the individual as defined previously.

Equation (4-18) is the basis of estimation of dose to the G. I. tract in INREM.

Since the publication of Ref. 3 in 1959, other models for the dosimetry of the G. I. tract have appeared. The work of Dolphin and Eve[10] should be mentioned in this regard; their model has been computerized and is being included in the methodology, but it is not being added to the present INREM code.

4.1.1.1.3 The Lungs

INREM implements the model from Table 10 of Ref. 3 for particulate matter in the respiratory tract. Inhaled particulates are dichotomized as soluble and insoluble. In either case, 25% of inhaled matter is exhaled, 50% is deposited in the upper respiratory passages and swallowed, and the remaining 25% is initially deposited in the lower respiratory passages. If the material is soluble, the latter fraction is assumed to be absorbed into the blood at a rate derived from a biological half-time supplied by the user.[a] For insoluble matter the residual 25% is divided equally into two compartments: the material in one of these compartments has a biological residence time of 24 hours and the cleared contents are swallowed; the remaining 12.5% stays in the lungs with a biological half-time of 120 days, except isotopes of plutonium and thorium, in which cases the half-times are one year and four years, respectively. Once the activity q(t) in the lungs is predicted in this fashion, the dose commitment is estimated from the integration of Eq. (4-1).

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[a]This assumption is used only for estimating the dose to the lungs. Uptake to other reference organs via this compartment is assumed to be immediate.

The foregoing lung model does not depend on the particle-size distribution or precise solubility information. The more recent Task Group Lung Model[4] does take into account the median particle size and recognizes three solubility classes. The newer model has been computerized and is being added to the methodology, but it will not be added to the present INREM code.

4.1.1.2 Tables

The radionuclide-specific parameters for each of the 259 radionuclides for which internal dose estimates were made were taken primarily from ICRP Publication 2 (Ref. 3) and are listed in Table 4-1. These parameters were used in calculating 50-year dose commitments from inhalation or ingestion of 1.0 μCi of each radionuclide (Tables 4-2 and 4-3, respectively). All dose-conversion factors listed include dose contributions from radioactive progeny, computed as indicated in Eq. (4-7) and surrounding text. Assumed masses (g) of the organs were as follows[3]:

Reference Organ	Mass (g)
Total Body	7×10^4
Bone	7×10^3
Muscle	3×10^4
Thyroid	20
Liver	1.7×10^3
Kidneys	300
Spleen	150

Reference Organ	Mass (g)
Testes	40
Ovaries	8
Lungs	1×10^3

For the computation of MPC values which INREM uses to calculate the dose to the critical segment of the G. I. tract, the reference individual was assumed to breathe 2×10^7 ml of air and ingest 2.2×10^3 ml of water per day. These parameters were derived from Table 9 of Ref. 3.

In some cases, sources other than ICRP Publication 2 were used to supply one or more of the parameters associated with a nuclide. In such cases, an asterisk appears beside the name of the nuclide.

4.1.1.3 INREM Sample Problems

The following are two sample problems solved by using the INREM code and data files. The first example (Tables 4-4 thru 4-7) demonstrates the input and output of the INREM code as it calculates 50-year dose commitments from ingestion of ^{131}I and ^{137}Cs. The second representative problem (Table 4-8) shows how the dose-conversion factors for inhalation or ingestion may be utilized to hand-calculate similar types of dose estimates.

First Sample Problem. This problem is taken from Ref. 2. In it we use INREM to estimate the dose commitment to total body and to the thyroid gland resulting from the ingestion of the radionuclides ^{131}I and ^{137}Cs by an individual born at the time of the reference event.

Two cases will be computed: in the first, the intake is limited to a period of one year after the reference event, and in the second, the intake is assumed to continue for a period of 50 years after the reference event. In each case, the interval of integration extends from the time of the reference event (time zero) to 50 years afterward.

Data are hypothesized to describe the individual in six age groups: 0-1, 1-5, 5-10, 10-15, 15-20, and 20-70 years. These data are exhibited in Tables 4-4, 4-5 and 4-6. One example of the use of INREM is shown in Table 4-7, where the 50-year dose commitment for ingestion of ^{131}I and ^{137}Cs are shown. The dashes in Table 4-6 indicate that data for ^{137}Cs in the thyroid gland are unavailable. The corresponding fields in the input data cards are left blank, and the message NO DATA appears in the output (see Table 4-7). Note that the zero values of the intake functions for ^{131}I shown in Table 4-5 have been replaced by 1.E-15; this substitution of small positive values is necessary because of the logarithmic interpolation which is used for times after 60 days.

Second Sample Problem. This problem assumes a release of ^{60}Co into the environment which results in steady-state concentrations of 10^{-10} $\mu Ci/cm^3$ in water and 10^{-15} $\mu Ci/cm^3$ in air in the vicinity of an exposed individual. A deposition velocity of 10^{-2} m/sec is assumed. Assume that this individual eats 20 g of fish per day taken from the local water supply and drinks 1.2 liters per day of the same water. Also assume that his food crops, milk, and beef are produced in the local vicinity, and use TERMOD factors (Table (2-8)) to predict transfer through these three pathways. On the basis of this information,

use INREM dose conversion factors to estimate the annual total-body dose commitment (mrem/yr of exposure to this reference individual from ^{60}Co through (a) inhalation, (b) ingestion of water, (c) ingestion of fish, (d) ingestion of above-surface crops, (e) drinking milk, and (f) eating beef.

The calculations for this problem are shown in Table 4-8.

4.1.2 The INDOS Computer Codes

The INDOS codes[11] compute the dose to an internal organ which results from the uptake of a radionuclide by that organ. These codes are different from INREM in the following principal respects: (1) They are written for conversational interaction in a time-sharing environment, while INREM must be executed in batch mode. (2) They implement models set forth in ICRP Publications 10[6] and 10A,[7] whereas INREM is based on ICRP Publication 2 models. (3) They are restricted to a succession of single intakes at specified times or a continuous intake at a constant rate throughout the dose integration period; INREM accepts an arbitrary intake rate function, which is defined by a table in the input data. (4) The INDOS codes do not model the lungs or G. I. tract.

Three INDOS codes were written. INDOS1 requires the user to supply all necessary physical and biological data; INDOS2 and INDOS3 read such information from an on-line data base. INDOS1 and INDOS2 print tables of dose rate and dose vs time, while INDOS3 punches this information into cards to provide machine-readable data for subsequent calculations.

The present implementation of the INDOS codes operates on the DEC-System 10 in time-sharing mode. The source language is FORTRAN IV, but there are system-dependent features; no alternate versions are contemplated at this time.

The two intake modes are inhalation and ingestion. The intake may be specified in either of the following ways:

a. Discrete intakes. At specified times $0 \leq t_1 < t_2 < \ldots < t_J$, amounts $a_1, a_2, \ldots, a_J$, respectively, of the radionuclide are deposited in the reference organ. The t_j are measured in days and the a_j are measured in microcuries, where $j = 1, \ldots, J$.

b. Continuous intake at a constant rate. The uptake rate is specified as c μCi/day.

With each of the two intake modes (inhalation and ingestion) there is associated a fraction f of each unit intake which will be deposited in the reference organ. These fractions are, respectively, f_a and f_w, and they are specific to the nuclide and the reference organ (see tables 4-1D and 4-1E).

The INDOS models are of two types, which we shall designate as exponential and power function. In the former case, an organ is modeled by one or several parallel compartments, each of which is subject to radioactive decay and first-order biological removal. The partitioning of the total uptake among these compartments is specified by a set of fractional coefficients K_ν ($\nu = 1, \ldots, M$, where M is the number of compartments). In most cases, the K sum to unity, but provision has

has been made for an additional compartment whose burden is not subject to biological processes. In the event that the sum of the K_ν is less than one, the model places the remaining fraction

$$1 - \sum_{\nu=1}^{M} K_\nu$$

of the uptake into a "non-excretory" compartment, whose burden is diminished only by radioactive decay. The residence $\tilde{q}(t)$ (μCi-days) in the organ, calculated from the exponential model, is given by the following equations:

a. Discrete intakes

$$\tilde{q}(t) = \sum_{j=1}^{J} a_j \left\{ \frac{1}{\lambda_r} \left[1 - \sum_{\nu=1}^{M} K_\nu \right] \left[1 - e^{-\lambda_r (t-t_j)} \right] + \sum_{\nu=1}^{M} \frac{K_\nu}{\lambda_r + \beta_\nu} \left[1 - e^{-(\lambda_r + \beta_\nu)(t-t_j)} \right] \right\} \qquad (4\text{-}19)$$

b. Continuous intake at a constant rate

$$\tilde{q}(t) = c \left\{ \left[\frac{1}{\lambda_r} \left(1 - \sum_{\nu=1}^{M} K_\nu \right) + \sum_{\nu=1}^{M} \frac{K_\nu}{\lambda_r + \beta_\nu} \right] t - \frac{1}{\lambda_r^2} \left(1 - \sum_{\nu=1}^{M} K_\nu \right) \left(1 - e^{-\lambda_r t} \right) - \sum_{\nu=1}^{M} \frac{K_\nu}{(\lambda_r + \beta_\nu)^2} \left[1 - e^{-(\lambda_r + \beta_\nu)t} \right] \right\} \qquad (4\text{-}20)$$

where

$\tilde{q}(t)$ = radionuclide residence in the reference organ (μCi-days);

J = number of discrete intakes;

a_j = uptake of activity from the j-th exposure (μCi);

t_j = time of j-th exposure (days);

λ_r = radioactive decay rate constant (day^{-1}) = $(\ln 2)/T_r$, where T_r = radioactive half-life of the nuclide (days);

β_ν = biological removal rate constant for the ν-th compartment of the reference organ (day^{-1});

K_ν = fraction of the reference organ's initial burden in the ν-th compartment;

c = uptake rate (μCi/day) to the reference organ;

t = time (days).

If I_j denotes the j-th discrete intake into the body (μCi), the uptake a_j to the reference organ is assumed to be given by fI_j, where $f = f_a$ or f_w, according as the exposure mode is inhalation or ingestion. Similarly, if I denotes a constant intake rate (μCi/day), the corresponding uptake rate c if given by fI.

The power function model assumes that the burden q(t) (μCi) of activity in the organ at time t satisfies the differential equation

$$dq/dt = -\lambda_r q - \left[n/(x + t)\right] q + U(t), \qquad (4\text{-}21)$$

where n (dimensionless; $0 < n < 1$) and x (days) are parameters used to fit the model to experimental data; U(t) is the uptake rate to the reference organ (μCi/day) at time t. Such a model as (4-21) can often provide a fit that is more economical in terms of the number of parameters than an

exponential model with multiple compartments. The most common situation for which the power function model is useful is the retention of long-lived radionuclides in bone. The following equations indicate the implementation of the power function by the INDOS codes:

a. Discrete intakes

$$\tilde{q}(t) = \sum_{j=1}^{J} a_j \left\{ \frac{1}{\lambda_r} (1 - Ax^{-n}) \left[1 - e^{-\lambda_r (t-t_j)} \right] + A \int_0^{t-t_j} e^{-\lambda_r u} (u + x)^{-n} du \right\} \tag{4-22}$$

b. Continuous intake at a constant rate

$$\tilde{q}(t) = c \left\{ \frac{1}{\lambda_r} (1 - Ax^{-n}) \left[t - \frac{1}{\lambda_r} (1 - e^{-\lambda_r t}) \right] + A \left[t + x - \frac{1 - n}{\lambda_r} \right] \int_0^t e^{-\lambda_r u} (u + x)^{-n} du - \frac{A}{\lambda_r} \left[x^{-n+1} - e^{-\lambda_r t} (t + x)^{-n+1} \right] \right\} \tag{4-23}$$

where

A = a parameter which partitions the uptake between the power function compartment and a "non-excretory" compartment; Ax^{-n} is the fraction assigned to the former compartment.

Other quantities in Eqs. (4-22) and (4-23) have been defined previously. The integrals appearing in these equations are computed numerically by a subroutine.

The INDOS codes also permit a mixed model consisting of one exponential and one power function compartment with the partitioning of the uptake given by a fraction K, so that the residence is

$$\tilde{q}(t) = K\,\tilde{q}_e(t) + (1 - K)\,\tilde{q}_p(t), \qquad (4\text{-}24)$$

where $\tilde{q}_e(t)$ is given by Eq. (4-19) or (4-20) with M = 1, and $\tilde{q}_p(t)$ is defined by Eq. (4-22) or (4-23).

The dose is calculated from the residence $\tilde{q}$ as was indicated in Eqs. (4-2) and (4-3). Any contribution from radioactive progeny must be included in the effective absorbed energy ε, as was shown in Eq. (4-7) and surrounding text.

4.1.2.2 Tables

Tables 4-9 and 4-10 list dose-conversion factors (estimates of 50-year dose commitment following intake of 1 μCi) for the inhalation and ingestion exposure modes, respectively. The radionuclides shown are those discussed in Appendix C of ICRP Publication 10.[6]

4.1.2.3 INDOS2 Sample Problem

Table 4-11 displays the dialogue between INDOS2 and the user in a sample run. Nuclides are referenced by a set of indices which are consistent with those used by INREM (Table 4-1A). The present data

base consists of the radionuclides shown in Tables 4-9 and 4-10. The sample problem shows calculations for ^{131}I and ^{226}Ra.

4.2 Internal Dose to Biota

Aquatic biota living in the vicinity of nuclear facilities can be exposed to radioactivity released in liquid effluents. These organisms can receive a radiation dose from internal emitters assimilated from food and absorbed from water.

The following sections discuss methods for estimating this internal dose to fresh-water and marine biota. Some of the capabilities of the BIORAD computer code are described, and tables of bioaccumulation factors and dose rate factors for fresh-water and marine biota are given (Tables 4-12A, 4-12B, 4-13A, and 4-13B).

4.2.1 Bioaccumulation Factors

Some aquatic organisms concentrate radionuclides in their tissues to levels higher than the respective concentrations in the ambient water. For a given organism and radionuclide, a bioaccumulation factor is defined as follows:

$$C = \frac{\mu Ci \text{ per g of biota}}{\mu Ci \text{ per ml of water}} ,$$

where all concentrations are presumed to be in steady state. Bioaccumulation factors are not physical constants, but are biologically and environmentally influenced parameters that vary with the physiochemical nature of particular sites, changes in food habits of biota and their prey, biological elimination, occasional ingestion of sediments, homeostatic

control of element concentration in tissues, and possibly other factors.[12,13,14] Bioaccumulation factors for fresh-water plants, invertebrates, fish and for marine algae, mollusks and crustaceans, and fish have been derived from several sources, which are indicated in footnotes to Tables 4-12A and 4-12B. Bioaccumulation factors for a muskrat were calculated in the following way. The steady-state body burden B (μCi) of a radionuclide which results from the intake of I μCi/day is

$$B = If_w/\lambda \quad ,$$

where f_w is the uptake fraction associated with ingestion, and λ is the effective decay rate constant ($days^{-1}$) for the radionuclide in the total body. It is assumed that the muskrat ingests one-tenth of its body weight per day in aquatic plants. Thus, corresponding to 1 μCi/ml concentration in the water, the intake rate per unit body weight is

$$I/m = (1\ \mu Ci/ml) \times (C^{plants}\ \frac{\mu Ci/g}{\mu Ci/ml}) \times (0.1\ g/g\ tissue)$$

$$= 0.1\ C^{plants}\ \mu Ci/g \ ,$$

where C^{plants} is the bioaccumulation factor for fresh-water aquatic plants. Thus the body burden per unit mass per unit activity concentration in the water is

$$B/m = If_w/\lambda m = 0.1\ C^{plants}\ f_w/\lambda \ .$$

Substitution of 1.44 T_e (days) for $1/\lambda$ gives

$$C^{muskrat} = 0.144\ C^{plants}\ T_e\ f_w\ ,$$

where T_e is the effective half-time of the nuclide in the total body. Values of f_w and T_e were taken from ICRP Publication 2,[3] except that T_e was not allowed to exceed 100 days for the muskrat. The same procedure was employed for marine waterfowl and shore birds, except that algae were substituted for the diet. Hence

$$C^{waterfowl} = 0.144\ C^{algae}\ T_e\ f_w\ .$$

4.2.2 Dose Calculations

The internal dose rate $\dot{D}_i$ (mrad/yr) from the i-th radionuclide to an aquatic organism at steady state with the concentration W_i μCi/ml in the water is

$$\dot{D}_i = (1.87 \times 10^7)\ W_i\ C_i^b\ E_i \quad \text{(mrad/yr)} \qquad (4\text{-}25)$$

where

$1.87 \times 10^7 = \dfrac{\text{g-mrad}}{(\mu\text{Ci-yr})(\text{MeV/dis})}$;

C_i^b = bioaccumulation factor for the organism (ml of H_2O per g of tissue);

E_i = the effective absorbed energy of the i-th radionuclide in the organism (MeV/dis).

In calculating the internal dose to biota, effective absorbed energies E_i corresponding to an effective radius of 30 cm have been used (cf. Sec. 4-1) for generic evaluations. In almost all cases the effective radius of aquatic organisms is less than 30 cm; therefore, the use of energies corresponding to this large radius overestimate the dose from gamma photons and X-rays. When the actual size of an organism is known, the effective absorbed energy corresponding to that size should be used in the calculation of internal dose. For the muskrat, an effective radius of 10 cm was chosen.

4.2.3 The BIORAD Computer Code

BIORAD is a conversational code written in BASIC and designed for use through remote terminal access to the DEC System 10. The user inputs a concentration of the selected radionuclide in water or in sediment ($\mu Ci/cm^3$), and BIORAD estimates internal and external radiation doses to aquatic plants, invertebrates, fish, and terrestrial animals dependent on aquatic food supplies. The BIORAD data base is contained in a set of on-line files in the computer's disk storage. The program permits the addition of new nuclides and changes of parameter values by the user.

For estimating the internal dose rates to biota corresponding to a steady-state concentration W_i ($\mu Ci/ml$) of the i-th radionuclide in the water, BIORAD uses Eq. (4-25). References 15 and 16 describe the methodology on which BIORAD is based.

Tables 4-12A and 4-12B list the bioaccumulation factors in the present BIORAD data base. The code was used to calculate the internal dose rate factors given in Tables 4-13A and 4-13B.

A sample run of the BIORAD code is shown in Table 4-14.

References

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TABLES FOR CHAPTER 4

TABLE 4-1A

INREM DATA BASE

RADIOACTIVE HALF-LIVES

NAME	HALF-LIFE (DAYS)
H-3*	0.45000E 04
BE-7	0.53600E 02
C-14	0.20000E 07
F-18	0.78000E-01
NA-22	0.95000E 03
NA-24	0.63000E 00
SI-31	0.11000E 00
P-32	0.14300E 02
S-35	0.87100E 02
CL-36	0.12000E 09
CL-38	0.26000E-01
K-42	0.52000E 00
CA-45	0.16400E 03
CA-47	0.49000E 01
SC-46	0.83900E 02
SC-47	0.34300E 01
SC-48	0.18300E 01
V-48	0.16100E 02
CR-51	0.27800E 02
MN-52	0.55500E 01
MN-54	0.30000E 03
MN-56	0.11000E 00
FE-55	0.11000E 04
FE-59	0.45100E 02
CO-57	0.27000E 03
CO-58M	0.38000E 00
CO-58	0.72000E 02
CO-60	0.19000E 04
NI-59	0.29000E 08
NI-63	0.29000E 05
NI-65	0.11000E 00
CU-64	0.53000E 00
ZN-65	0.24500E 03
ZN-69M	0.57500E 00
ZN-69	0.39600E-01
GA-72	0.59000E 00
GE-71	0.12000E 02
AS-73	0.76000E 02
AS-74	0.17500E 02
AS-76	0.11000E 01
AS-77	0.16200E 01
SE-75	0.20000E 00
BR-80M*	0.18200E 00
BR-82	0.14700E 01
BR-83*	0.10000E 00
BR-84*	0.22000E-01
RB-86	0.18700E 02
RB-87	0.18000E 14
RB-88*	0.12400E-01
RB-89*	0.22100E-02
SR-85M	0.49000E-01
SR-85	0.65000E 02

NAME	HALF-LIFE (DAYS)
SR-89	0.50500E 02
SR-90*	0.10000E 05
SR-91	0.40000E 00
SR-92	0.11000E 00
Y-90	0.26800E 01
Y-91M	0.35000E-01
Y-91	0.58000E 02
Y-92	0.15000E 00
Y-93	0.42000E 00
ZR-93	0.40000E 09
ZR-95	0.63300E 02
ZR-97	0.71000E 00
NB-93M	0.37000E 04
NB-95M*	0.37500E 01
NB-95	0.35000E 02
NB-97	0.51000E-01
MO-99	0.27900E 01
TC-96M	0.36000E-01
TC-96	0.43000E 01
TC-97M	0.92000E 02
TC-97	0.37000E 07
TC-99M	0.25200E 00
TC-99	0.77000E 08
RU-97	0.28800E 01
RU-103	0.41000E 02
RU-105	0.19000E 00
RU-106	0.36500E 03
RH-103M	0.38000E-01
RH-105	0.15200E 01
PD-103	0.17000E 02
PD-109	0.57000E 00
AG-105	0.40000E 02
AG-110M	0.25500E 03
AG-111	0.75000E 01
CD-109	0.47500E 03
CD-115M	0.43000E 02
CD-115	0.22000E 01
IN-113M	0.73000E-01
IN-114M	0.49000E 02
IN-115M	0.19000E 00
IN-115	0.22000E 18
SN-113	0.11200E 03
SN-119M*	0.25000E 03
SN-123*	0.12500E 03
SN-125	0.95000E 01
SB-122	0.28000E 01
SB-124	0.60400E 02
SB-125	0.87600E 03
TE-125M	0.58000E 02
TE-127M	0.10500E 03
TE-127	0.39000E 00
TE-129M	0.33000E 02

NAME	HALF-LIFE (DAYS)
TE-129	0.51000E-01
TE-131M	0.12500E 01
TE-132	0.32000E 01
I-126*	0.13300E 02
I-129*	0.62000E 10
I-130*	0.51200E 00
I-131*	0.80500E 01
I-132*	0.97000E-01
I-133*	0.87000E 00
I-134*	0.36000E-01
I-135*	0.28000E 00
CS-131	0.97000E 01
CS-134M	0.12000E 00
CS-134	0.84000E 03
CS-135	0.11000E 10
CS-136	0.13000E 02
CS-137	0.11000E 05
CS-138*	0.22400E-01
BA-131	0.11600E 02
BA-140	0.12800E 02
LA-140	0.16800E 01
CE-141	0.32000E 02
CE-143	0.13300E 01
CE-144	0.29000E 03
PR-142	0.80000E 00
PR-143	0.13700E 02
ND-144	0.73000E 18
ND-147	0.11300E 02
ND-149	0.83000E-01
PM-147	0.92000E 03
PM-148M*	0.42000E 02
PM-148*	0.54000E 01
PM-149	0.22000E 01
SM-147	0.48000E 14
SM-151	0.37000E 05
SM-153	0.19600E 01
EU-152M	0.39000E 00
EU-152	0.47000E 04
EU-154	0.58400E 04
EU-155	0.62100E 03
GD-153	0.24200E 03
GD-159	0.75000E 00
TB-160	0.72100E 02
DY-165	0.97000E-01
DY-166	0.34000E 01
HO-166	0.11000E 01
ER-169	0.94000E 01
ER-171	0.31000E 00
TM-170	0.12700E 03
YB-175	0.41000E 01
LU-177	0.68000E 01
HF-181	0.46000E 02

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-1A (continued)

NAME	HALF-LIFE (DAYS)
TA-182	0.11200E 03
W-181	0.14000E 03
W-185	0.74000E 02
W-187	0.10000E 01
W-188*	0.69400E 02
RE-183	0.73000E 02
RE-186	0.37900E 01
RE-187	0.18000E 14
RE-188	0.71000E 00
OS-185	0.95000E 02
OS-191M	0.58000E 00
OS-191	0.16000E 02
OS-193	0.13000E 01
IR-190	0.12000E 02
IR-192	0.74500E 02
IR-194	0.72500E 00
PT-191	0.30000E 01
PT-193M	0.34000E 01
PT-193	0.18000E 06
PT-197M	0.50000E-01
PT-197	0.75000E 00
AU-196	0.56000E 01
AU-198	0.27000E 01
AU-199	0.31500E 01
HG-197M	0.10000E 01
HG-197	0.27000E 01
HG-203	0.45800E 02
TL-200	0.11300E 01
TL-201	0.30000E 01
TL-202	0.12000E 02
TL-204	0.11000E 04
PB-203	0.21700E 01
PB-204M*	0.47000E-01
PB-210	0.71000E 04
PB-212	0.44000E 00
BI-206	0.64000E 01
BI-207	0.29000E 04
BI-210	0.50100E 01
BI-212	0.42000E-01
PO-210	0.13840E 03
AT-211	0.30000E 00
RA-223	0.11400E 02
RA-224	0.36400E 01
RA-226	0.58500E 06
RA-228	0.24000E 04
AC-227	0.80000E 04
AC-228	0.26000E 00
TH-227	0.18400E 02
TH-228	0.69700E 03
TH-230	0.29200E 08
TH-231	0.10700E 01
TH-232	0.51000E 13
TH-234	0.24100E 02
PA-230	0.17700E 02
PA-231	0.11860E 08
PA-233	0.27400E 02
PA-234*	0.28100E 00
U-230	0.20800E 02
U-232	0.26300E 05
U-233	0.59100E 08
U-234	0.90200E 08
U-235	0.25900E 12
U-236	0.87000E 10
U-237	0.67500E 01
U-238	0.16400E 13
NP-237	0.78100E 09
NP-239	0.23300E 01
PU-236	0.10400E 04
PU-238	0.33000E 05
PU-239	0.89000E 07
PU-240	0.24000E 07
PU-241	0.48000E 04
PU-242	0.13800E 09
PU-243	0.20800E 00
PU-244	0.28000E 11
AM-241	0.16700E 06
AM-242M	0.56000E 05
AM-242	0.66700E 00
AM-243	0.29000E 07
AM-244	0.18100E-01
CM-242	0.16250E 03
CM-243	0.11700E 05
CM-244	0.64240E 04
CM-245	0.73000E 07
CM-246	0.24000E 07
CM-247	0.33000E 11
CM-248	0.17000E 09
CM-249	0.44000E-01
BK-249	0.29000E 03
BK-250	0.13400E 00
CF-249	0.17000E 06
CF-250	0.37000E 04
CF-251	0.29000E 06
CF-252	0.80300E 03
CF-253	0.18000E 02
CF-254	0.56000E 02
ES-253	0.20000E 02
ES-254M	0.16000E 01
ES-254	0.48000E 03
ES-255	0.30000E 02
FM-254	0.13500E 00
FM-255	0.89600E 00
FM-256	0.11100E 00

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-1B
INREM DATA BASE
EFFECTIVE HALF-LIVES[a]

EFFECTIVE HALF-LIFE (DAYS).

ORGAN NAME / NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
H-3	1.000E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Be-7	4.100E 01	4.800E 01	0.0	0.0	4.500E 01	3.700E 01	4.900E 01	0.0	0.0	0.0
C-14	1.000E 01	4.000E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F-18	7.800E-02	7.800E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Na-22	1.100E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Na-24	6.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Si-31	1.100E-01	0.0	0.0	0.0	0.0	0.0	0.0	1.100E-01	1.100E-01	1.100E-01
P-32	1.350E 01	1.410E 01	0.0	0.0	8.000E 00	0.0	0.0	0.0	0.0	0.0
S-35	4.430E 01	7.610E 01	0.0	0.0	0.0	0.0	0.0	7.640E 01	0.0	0.0
Cl-36	2.900E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cl-38	2.600E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K-42	5.200E-01	0.0	5.200E-01	0.0	5.200E-01	0.0	5.200E-01	0.0	0.0	0.0
Ca-45	1.620E 02	1.620E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca-47	4.900E 00	4.900E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sc-46	2.200E 01	2.400E 01	0.0	0.0	2.500E 01	4.000E 01	0.0	0.0	0.0	0.0
Sc-47	3.100E 00	3.100E 00	0.0	0.0	3.100E 00	3.300E 00	0.0	0.0	0.0	0.0
Sc-48	1.700E 00	1.700E 00	0.0	0.0	1.700E 00	1.800E 00	0.0	0.0	0.0	0.0
V-48	1.160E 01	1.440E 01	0.0	0.0	1.310E 01	1.320E 01	1.370E 01	0.0	0.0	0.0
Cr-51	2.660E 01	0.0	0.0	2.660E 01	0.0	2.660E 01	0.0	0.0	0.0	2.660E 01
Mn-52	4.200E 00	0.0	0.0	0.0	4.500E 00	3.100E 00	0.0	0.0	0.0	0.0
Mn-54	1.620E 01	0.0	0.0	0.0	2.300E 01	0.0	0.0	0.0	0.0	0.0
Mn-56	1.100E-01	0.0	0.0	0.0	1.100E-01	0.0	0.0	0.0	0.0	0.0
Fe-55	4.630E 02	6.650E 02	0.0	0.0	3.680E 02	0.0	3.880E 02	0.0	0.0	8.190E 02
Fe-59	4.270E 01	0.0	0.0	0.0	4.170E 01	0.0	4.190E 01	0.0	0.0	4.450E 01

[a]Zero entries mean "no data."

TABLE 4-1B (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Co-57	9.200E 00	0.0	0.0	0.0	9.200E 00	9.200E 00	9.200E 00	0.0	0.0	0.0
Co-58M	3.700E-01	0.0	0.0	0.0	3.700E-01	3.700E-01	3.700E-01	0.0	0.0	0.0
Co-58	8.400E 00	0.0	0.0	0.0	8.400E 00	8.400E 00	8.400E 00	0.0	0.0	0.0
Co-60	9.500E 00	0.0	0.0	0.0	9.500E 00	9.500E 00	9.500E 00	0.0	0.0	0.0
Ni-59	6.670E 02	8.000E 02	0.0	0.0	5.000E 02	0.0	0.0	0.0	0.0	0.0
Ni-63	6.520E 02	7.790E 02	0.0	0.0	4.920E 02	0.0	0.0	0.0	0.0	0.0
Ni-65	1.100E-01	1.100E-01	0.0	0.0	1.100E-01	0.0	0.0	0.0	0.0	0.0
Cu-64	5.300E-01	0.0	0.0	0.0	5.300E-01	5.100E-01	4.200E-01	0.0	0.0	0.0
Zn-65	1.940E 02	2.060E 02	2.180E 02	0.0	6.600E 01	9.300E 01	0.0	1.280E 02	7.400E 01	0.0
Zn-69M	5.800E-01	5.800E-01	5.800E-01	0.0	5.800E-01	5.800E-01	0.0	5.800E-01	5.800E-01	0.0
Zn-69	3.600E-02	3.600E-02	3.600E-02	0.0	3.600E-02	3.600E-02	0.0	3.600E-02	3.600E-02	0.0
Ga-72	5.400E-01	5.600E-01	0.0	0.0	5.300E-01	5.500E-01	5.400E-01	0.0	0.0	0.0
Ge-71	9.200E-01	0.0	0.0	0.0	4.600E 00	6.000E 00	0.0	0.0	0.0	0.0
As-73	6.000E 01	0.0	0.0	0.0	6.700E 01	6.700E 01	0.0	0.0	0.0	0.0
As-74	1.650E 01	0.0	0.0	0.0	1.700E 01	1.700E 01	0.0	0.0	0.0	0.0
As-76	1.100E 00	0.0	0.0	0.0	1.100E 00	1.100E 00	0.0	0.0	0.0	0.0
As-77	1.600E 00	0.0	0.0	0.0	1.600E 00	1.600E 00	0.0	0.0	0.0	0.0
Se-75	1.010E 01	0.0	0.0	0.0	2.000E 01	1.010E 01	1.600E 01	0.0	0.0	0.0
Br-80M	1.780E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Br-82	1.300E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Br-83	9.900E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Br-84	2.200E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rb-86	1.320E 01	0.0	1.510E 01	0.0	1.440E 01	0.0	1.320E 01	0.0	0.0	0.0
Rb-87	4.500E 01	0.0	8.000E 01	0.0	6.300E 01	0.0	4.500E 01	0.0	0.0	0.0
Rb-88	1.240E-02	0.0	1.240E-02	0.0	1.240E-02	0.0	1.240E-02	0.0	0.0	0.0
Rb-89	2.200E-03	0.0	2.200E-03	0.0	2.200E-03	0.0	2.200E-03	0.0	0.0	0.0
Sr-85M	4.900E-02	4.900E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-1B (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Sr-85	6.470E 01	6.480E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-89	5.030E 01	5.040E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-90	2.865E 03	2.865E 03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-91	4.000E-01	4.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-92	1.100E-01	1.100E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-90	2.680E 00	2.680E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-91M	3.500E-02	3.500E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-91	5.800E 01	5.800E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-92	1.500E-01	1.500E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-93	4.200E-01	4.200E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zr-93	4.500E 02	1.000E 03	0.0	0.0	3.200E 02	9.000E 02	9.000E 02	0.0	0.0	0.0
Zr-95	5.550E 01	5.950E 01	0.0	0.0	5.300E 01	5.900E 01	5.900E 01	0.0	0.0	0.0
Zr-97	7.100E-01	7.100E-01	0.0	0.0	7.100E-01	7.100E-01	7.100E-01	0.0	0.0	0.0
Nb-93M	6.300E 02	7.870E 02	0.0	0.0	6.880E 02	6.400E 02	7.560E 02	0.0	0.0	0.0
Nn-95M	3.730E 00	3.740E 00	0.0	0.0	3.730E 00	3.730E 00	3.610E 00	0.0	0.0	0.0
Nb-95	3.350E 01	3.380E 01	0.0	0.0	3.360E 01	3.350E 01	3.380E 01	0.0	0.0	0.0
Nb-97	5.100E-02	5.100E-02	0.0	0.0	5.100E-02	5.100E-02	5.100E-02	0.0	0.0	0.0
Mo-99	1.800E 00	0.0	0.0	0.0	2.660E 00	1.500E 00	0.0	0.0	0.0	0.0
Tc-96M	3.600E-02	3.600E-02	0.0	0.0	3.600E-02	3.600E-02	0.0	0.0	0.0	3.600E-02
Tc-96	8.000E-01	3.700E 00	0.0	0.0	3.800E 00	3.500E 00	0.0	0.0	0.0	2.300E 00
Tc-97M	9.900E-01	2.000E 01	0.0	0.0	2.300E 01	1.600E 01	0.0	0.0	0.0	4.700E 00
Tc-97	1.000E 00	2.500E 01	0.0	0.0	3.000E 01	2.000E 01	0.0	0.0	0.0	5.000E 00
Tc-99M	2.000E-01	2.500E-01	0.0	0.0	2.500E-01	2.500E-01	0.0	0.0	0.0	2.400E-01
Tc-99	1.000E 00	2.500E 01	0.0	0.0	3.000E 01	2.000E 01	0.0	0.0	0.0	5.000E 00
Ru-97	2.000E 00	2.400E 00	0.0	0.0	0.0	1.300E 00	0.0	0.0	0.0	0.0
Ru-103	6.200E 00	1.200E 01	0.0	0.0	0.0	2.400E 00	0.0	0.0	0.0	0.0
Ru-105	1.900E-01	1.900E-01	0.0	0.0	0.0	1.800E-01	0.0	0.0	0.0	0.0
Ru-106	7.200E 00	1.500E 01	0.0	0.0	0.0	2.480E 00	0.0	0.0	0.0	0.0

TABLE 4-1B (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Rh-103M	3.800E-02	3.800E-02	0.0	0.0	3.800E-02	3.800E-02	3.800E-02	0.0	0.0	0.0
Rh-105	1.330E 00	1.390E 00	0.0	0.0	1.400E 00	1.440E 00	1.420E 00	0.0	0.0	0.0
Pd-103	3.900E 00	0.0	0.0	0.0	9.000E 00	1.100E 01	8.000E 00	0.0	0.0	0.0
Pd-109	5.100E-01	0.0	0.0	0.0	5.500E-01	5.600E-01	5.500E-01	0.0	0.0	0.0
Ag-105	4.400E 00	1.700E 01	0.0	0.0	1.100E 01	8.000E 00	0.0	0.0	0.0	0.0
Ag-110M	4.900E 00	2.700E 01	0.0	0.0	1.420E 01	1.000E 01	0.0	0.0	0.0	0.0
Ag-111	3.000E 00	6.000E 00	0.0	0.0	5.000E 00	4.000E 00	0.0	0.0	0.0	0.0
Cd-109	1.400E 02	0.0	0.0	0.0	1.400E 02	1.840E 02	0.0	0.0	0.0	0.0
Cd-115M	3.500E 01	0.0	0.0	0.0	3.500E 01	3.800E 01	0.0	0.0	0.0	0.0
Cd-115	2.200E 00	0.0	0.0	0.0	2.200E 00	2.200E 00	0.0	0.0	0.0	0.0
In-113M	7.300E-02	7.300E-02	0.0	7.300E-02	7.300E-02	7.300E-02	7.300E-02	0.0	0.0	0.0
In-114M	2.400E 01	2.600E 01	0.0	7.200E 00	2.600E 01	2.700E 01	2.400E 01	0.0	0.0	0.0
In-115M	1.900E-01	1.900E-01	0.0	1.900E-01	1.900E-01	1.900E-01	1.900E-01	0.0	0.0	0.0
In-115	4.800E 01	5.700E 01	0.0	8.400E 00	5.800E 01	6.000E 01	4.800E 01	0.0	0.0	0.0
Sn-113	2.700E 01	5.300E 01	0.0	4.300E 01	4.300E 01	0.0	0.0	0.0	0.0	0.0
Sn-119M	3.070E 01	7.140E 01	0.0	5.460E 01	5.460E 01	0.0	0.0	0.0	0.0	0.0
Sn-123	2.730E 01	5.550E 01	0.0	4.490E 01	4.490E 01	0.0	0.0	0.0	0.0	0.0
Sn-125	7.500E 00	8.700E 00	0.0	8.400E 00	8.400E 00	0.0	0.0	0.0	0.0	0.0
Sb-122	2.600E 00	2.700E 00	0.0	1.600E 00	2.600E 00	0.0	0.0	0.0	0.0	2.700E 00
Sb-124	2.300E 01	3.800E 01	0.0	3.800E 00	2.300E-01	0.0	0.0	0.0	0.0	3.800E 01
Sb-125	3.600E 01	9.000E 01	0.0	4.000E 00	3.600E 01	0.0	0.0	0.0	0.0	9.000E 01
Te-125M	1.200E 01	2.000E 01	0.0	7.800E 00	2.000E 01	2.000E 01	2.000E 01	2.000E 01	0.0	0.0
Te-127M	1.300E 01	2.300E 01	0.0	8.300E 00	2.300E 01	2.300E 01	2.300E 01	2.300E 01	0.0	0.0
Te-127	3.800E-01	3.900E-01	0.0	3.700E-01	3.900E-01	3.900E-01	3.900E-01	3.900E-01	0.0	0.0
Te-129M	1.000E 01	1.600E 01	0.0	7.100E 00	1.600E 01	1.600E 01	1.600E 01	1.600E 01	0.0	0.0
Te-129	5.100E-02	5.100E-02	0.0	5.100E-02	5.100E-02	5.100E-02	5.100E-02	5.100E-02	0.0	0.0
Te-131M	1.150E 00	1.200E 00	0.0	1.100E 00	1.200E 00	1.200E 00	1.200E 00	1.200E 00	0.0	0.0
Te-132	2.600E 00	2.900E 00	0.0	2.400E 00	2.900E 00	2.900E 00	2.900E 00	2.900E 00	0.0	0.0

TABLE 4-1B (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
I-126	1.210E 01	0.0	0.0	1.170E 01	0.0	0.0	0.0	0.0	0.0	0.0
I-129	1.000E 02	0.0	0.0	1.000E 02	0.0	0.0	0.0	0.0	0.0	0.0
I-130	5.150E-01	0.0	0.0	5.150E-01	4.810E-01	0.0	0.0	4.810E-01	0.0	0.0
I-131	7.600E 00	0.0	0.0	7.450E 00	0.0	0.0	0.0	0.0	0.0	0.0
I-132	9.700E-02	0.0	0.0	9.690E-02	0.0	0.0	0.0	0.0	0.0	0.0
I-133	8.700E-01	0.0	0.0	8.620E-01	0.0	0.0	0.0	0.0	0.0	0.0
I-134	3.600E-02	0.0	0.0	3.600E-02	0.0	0.0	0.0	0.0	0.0	0.0
I-135	2.800E-01	0.0	0.0	2.790E-01	0.0	0.0	0.0	0.0	0.0	0.0
Cs-131	8.750E 00	9.300E 00	9.300E 00	0.0	9.000E 00	8.000E 00	9.100E 00	0.0	0.0	9.300E 00
Cs-134M	1.300E-01	1.300E-01	1.300E-01	0.0	1.300E-01	1.300E-01	1.300E-01	0.0	0.0	1.300E-01
Cs-134	6.500E 01	1.200E 02	1.200E 02	0.0	8.100E 01	4.000E 01	8.800E 01	0.0	0.0	1.200E 02
Cs-135	7.000E 01	1.400E 02	1.400E 02	0.0	9.000E 01	4.200E 01	9.800E 01	0.0	0.0	1.400E 02
Cs-136	1.100E 01	1.190E 01	1.190E 01	0.0	1.140E 01	1.000E 01	1.150E 01	0.0	0.0	1.190E 01
Cs-137	7.000E 01	1.380E 02	1.380E 02	0.0	8.900E 01	4.200E 01	9.700E 01	0.0	0.0	1.380E 02
Cs-138	2.300E-02	2.300E-02	2.300E-02	0.0	2.300E-02	2.300E-02	2.300E-02	0.0	0.0	2.300E-02
Ba-131	9.800E 00	9.800E 00	1.150E 01	0.0	1.150E 01	4.900E 00	6.100E 00	4.100E 00	3.400E 00	1.160E 01
Ba-140	1.070E 01	1.070E 01	1.270E 01	0.0	1.260E 01	5.100E 00	6.400E 00	0.0	0.0	1.280E 01
La-140	1.680E 00	1.680E 00	0.0	0.0	1.680E 00	0.0	0.0	0.0	0.0	0.0
Ce-141	3.000E 01	3.100E 01	0.0	0.0	2.900E 01	3.000E 01	0.0	0.0	0.0	0.0
Ce-143	1.330E 00	1.330E 00	0.0	0.0	1.320E 00	1.330E 00	0.0	0.0	0.0	0.0
Ce-144	1.910E 02	2.430E 02	0.0	0.0	1.460E 02	1.910E 02	0.0	0.0	0.0	0.0
Pr-142	8.000E-01	8.000E-01	0.0	0.0	8.000E-01	8.000E-01	0.0	0.0	0.0	0.0
Pr-143	1.350E 01	1.360E 01	0.0	0.0	1.320E 01	1.350E 01	0.0	0.0	0.0	0.0
Nd-144	6.560E 02	1.500E 03	0.0	0.0	1.310E 02	6.560E 02	0.0	0.0	0.0	0.0
Nd-147	1.110E 01	1.120E 01	0.0	0.0	1.000E 01	1.110E 01	0.0	0.0	0.0	0.0
Nd-149	8.300E-02	8.300E-02	0.0	0.0	8.300E-02	8.300E-02	0.0	0.0	0.0	0.0
Pm-147	3.830E 02	5.700E 02	0.0	0.0	3.830E 02	3.830E 02	0.0	0.0	0.0	0.0
Pm-148M	3.950E 01	4.080E 01	0.0	0.0	3.950E 01	3.950E 01	0.0	0.0	0.0	0.0

TABLE 4-1B (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Pm-148	5.350E 00	5.380E 00	0.0	0.0	5.350E 00	5.350E 00	0.0	0.0	0.0	0.0
Pm-149	2.200E 00	2.200E 00	0.0	0.0	2.200E 00	2.200E 00	0.0	0.0	0.0	0.0
Sm-147	6.560E 02	1.500E 03	0.0	0.0	1.870E 02	6.560E 02	0.0	0.0	0.0	0.0
Sm-151	6.450E 02	1.442E 03	0.0	0.0	1.860E 02	6.450E 02	0.0	0.0	0.0	0.0
Sm-153	1.950E 00	1.960E 00	0.0	0.0	1.940E 00	1.950E 00	0.0	0.0	0.0	0.0
Eu-152M	3.800E-01	3.800E-01	0.0	0.0	3.800E-01	3.800E-01	0.0	0.0	0.0	0.0
Eu-152	5.590E 02	1.137E 03	0.0	0.0	1.240E 02	1.125E 03	0.0	0.0	0.0	0.0
Eu-154	5.720E 02	1.192E 03	0.0	0.0	1.240E 02	1.180E 03	0.0	0.0	0.0	0.0
Eu-155	3.140E 02	4.390E 02	0.0	0.0	1.050E 02	4.380E 02	0.0	0.0	0.0	0.0
Gd-153	1.650E 02	1.910E 02	0.0	0.0	1.560E 02	0.0	0.0	0.0	0.0	0.0
Gd-159	7.500E-01	7.500E-01	0.0	0.0	7.500E-01	0.0	0.0	0.0	0.0	0.0
Tb-160	6.600E 01	6.800E 01	0.0	0.0	0.0	6.600E 01	0.0	0.0	0.0	0.0
Dy-165	9.700E-02	9.700E-02	0.0	0.0	9.700E-02	0.0	0.0	0.0	0.0	0.0
Dy-166	3.400E 00	3.400E 00	0.0	0.0	3.400E 00	0.0	0.0	0.0	0.0	0.0
Ho-166	1.100E 00	1.100E 00	0.0	0.0	1.100E 00	1.100E 00	0.0	0.0	0.0	0.0
Er-169	9.300E 00	9.300E 00	0.0	0.0	9.200E 00	9.300E 00	0.0	0.0	0.0	0.0
Er-171	3.100E-01	3.100E 01	0.0	0.0	3.100E-01	3.100E-01	0.0	0.0	0.0	0.0
Tm-170	1.070E 02	1.130E 02	0.0	0.0	0.0	9.200E 01	0.0	0.0	0.0	0.0
Yb-175	4.100E 00	4.100E 00	0.0	0.0	0.0	4.100E 00	0.0	0.0	0.0	0.0
Lu-177	6.700E 00	6.750E 00	0.0	0.0	0.0	6.700E 00	0.0	0.0	0.0	0.0
Hf-181	4.300E 01	4.300E 01	0.0	0.0	4.300E 01	4.300E 01	4.100E 01	0.0	0.0	0.0
Ta-182	7.600E 01	8.200E 01	0.0	0.0	8.800E 01	8.800E 01	7.600E 01	0.0	0.0	0.0
W-181	1.000E 00	8.500E 00	0.0	0.0	3.900E 00	0.0	0.0	0.0	0.0	0.0
W-185	1.000E 00	8.000E 00	0.0	0.0	3.800E 00	0.0	0.0	0.0	0.0	0.0
W-187	5.000E-01	9.000E-01	0.0	0.0	8.000E-01	0.0	0.0	0.0	0.0	0.0
W-188	1.000E 00	8.000E 00	0.0	0.0	3.800E 00	0.0	0.0	0.0	0.0	0.0
Re-183	6.400E 00	3.300E 00	0.0	2.900E 00	1.170E 01	0.0	0.0	0.0	0.0	0.0
Re-186	2.500E 00	1.820E 00	0.0	1.700E 00	2.980E 00	0.0	0.0	0.0	0.0	0.0

TABLE 4-1B (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Re-187	7.000E 00	3.500E 00	0.0	3.000E 00	1.400E 01	0.0	0.0	0.0	0.0	0.0
Re-188	6.400E-01	5.900E-01	0.0	5.700E-01	6.800E-01	0.0	0.0	0.0	0.0	0.0
Os-185	2.000E 00	0.0	0.0	0.0	5.200E 00	4.800E 00	0.0	0.0	0.0	0.0
Os-191M	4.500E-01	0.0	0.0	0.0	5.200E-01	5.200E-01	0.0	0.0	0.0	0.0
Os-191	1.800E 00	0.0	0.0	0.0	4.100E 00	3.800E 00	0.0	0.0	0.0	0.0
Os-193	8.000E-01	0.0	0.0	0.0	1.000E 00	1.000E 00	0.0	0.0	0.0	0.0
Ir-190	7.500E 00	0.0	0.0	0.0	8.300E 00	9.700E 00	9.700E 00	0.0	0.0	0.0
Ir-192	1.580E 01	0.0	0.0	0.0	2.000E 01	3.000E 01	3.000E 01	0.0	0.0	0.0
Ir-194	7.600E-01	0.0	0.0	0.0	7.700E-01	7.800E-01	7.800E-01	0.0	0.0	0.0
Pt-191	2.700E 00	0.0	0.0	0.0	2.600E 00	2.900E 00	2.900E 00	0.0	0.0	0.0
Pt-193M	3.000E 00	0.0	0.0	0.0	3.200E 00	3.200E 00	3.200E 00	0.0	0.0	0.0
Pt-193	2.400E 01	0.0	0.0	0.0	2.000E 01	6.000E 01	6.000E 01	0.0	0.0	0.0
Pt-197M	5.600E-02	0.0	0.0	0.0	5.600E-02	5.600E-02	5.600E-02	0.0	0.0	0.0
Pt-197	7.300E-01	0.0	0.0	0.0	7.200E-01	7.400E-01	7.400E-01	0.0	0.0	0.0
Au-196	5.400E 00	0.0	0.0	0.0	5.500E 00	5.500E 00	5.500E 00	0.0	0.0	0.0
Au-198	2.600E 00	0.0	0.0	0.0	2.700E 00	2.700E 00	2.700E 00	0.0	0.0	0.0
Au-199	3.100E 00	0.0	0.0	0.0	3.100E 00	3.100E 00	3.100E 00	0.0	0.0	0.0
Hg-197M	9.100E-01	0.0	0.0	0.0	9.300E-01	9.400E-01	9.000E-01	0.0	0.0	0.0
Hg-197	2.100E 00	0.0	0.0	0.0	2.300E 00	2.300E 00	2.100E 00	0.0	0.0	0.0
Hg-203	8.200E 00	0.0	0.0	0.0	1.040E 01	1.100E 01	8.200E 00	0.0	0.0	0.0
Tl-200	9.200E-01	9.700E-01	9.000E-01	3.000E 06	9.200E-01	9.700E-01	0.0	0.0	0.0	9.500E-01
Tl-201	1.900E 00	2.100E 00	1.900E 00	0.0	1.900E 00	2.100E 00	0.0	0.0	0.0	2.000E 00
Tl-202	3.500E 00	4.400E 00	3.800E 00	0.0	3.500E 00	4.400E 00	0.0	0.0	0.0	4.000E 00
Tl-204	5.000E 00	7.000E 00	5.500E 00	0.0	5.000E 00	7.000E 00	0.0	0.0	0.0	6.000E 00
Pb-203	2.170E 00	2.170E 00	0.0	0.0	2.170E 00	2.160E 00	0.0	0.0	0.0	0.0
Pb-204M	4.700E-02	4.700E-02	0.0	0.0	4.700E-02	4.700E-02	0.0	0.0	0.0	0.0
Pb-210	1.200E 03	2.400E 03	0.0	0.0	1.500E 03	4.940E 02	0.0	0.0	0.0	0.0
Pb-212	4.400E-01	4.400E-01	0.0	0.0	4.400E-01	4.400E-01	0.0	0.0	0.0	0.0

TABLE 4-1B (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Bi-206	2.800E 00	4.300E 00	0.0	0.0	4.500E 00	3.100E 00	3.900E 00	0.0	0.0	0.0
Bi-207	5.000E 00	1.320E 01	0.0	0.0	1.490E 01	6.000E 00	1.000E 01	0.0	0.0	0.0
Bi-210	2.500E 00	3.600E 00	0.0	0.0	3.800E 00	3.000E 00	3.000E 00	0.0	0.0	0.0
Bi-212	4.200E-02	4.200E-02	0.0	0.0	4.200E-02	4.200E-02	4.200E-02	0.0	0.0	0.0
Po-210	2.500E 01	2.000E 01	0.0	0.0	3.200E 01	4.600E 01	4.200E 01	0.0	0.0	0.0
At-211	3.000E-01	0.0	0.0	3.000E-01	0.0	0.0	3.000E-01	0.0	3.000E-01	0.0
Ra-223	5.900E 00	1.170E 01	0.0	0.0	5.400E 00	5.400E 00	0.0	0.0	0.0	0.0
Ra-224	2.300E 00	3.640E 00	0.0	0.0	2.700E 00	2.700E 00	0.0	0.0	0.0	0.0
Ra-226	9.000E 02	1.600E 04	0.0	0.0	1.000E 01	1.000E 01	0.0	0.0	0.0	0.0
Ra-228	2.300E 02	2.100E 03	0.0	0.0	1.000E 01	1.000E 01	0.0	0.0	0.0	0.0
Ac-227	6.000E 03	7.200E 03	0.0	0.0	1.900E 03	6.000E 03	0.0	0.0	0.0	0.0
Ac-228	2.600E-01	2.600E-01	0.0	0.0	2.600E-01	2.600E-01	0.0	0.0	0.0	0.0
Th-227	1.840E 01	1.840E 01	0.0	0.0	1.840E 01	1.840E 01	0.0	0.0	0.0	0.0
Th-228	6.910E 02	6.930E 02	0.0	0.0	6.910E 02	6.780E 02	0.0	0.0	0.0	0.0
Th-230	5.700E 04	7.300E 04	0.0	0.0	5.700E 04	2.200E 04	0.0	0.0	0.0	0.0
Th-231	1.070E 00	1.070E 00	0.0	0.0	1.070E 00	1.070E 00	0.0	0.0	0.0	0.0
Th-232	5.700E 04	7.300E 04	0.0	0.0	5.700E 04	2.200E 04	0.0	0.0	0.0	0.0
Th-234	2.410E 01	2.410E 01	0.0	0.0	2.410E 01	2.410E 01	0.0	0.0	0.0	0.0
Pa-230	1.770E 01	1.770E 01	0.0	0.0	1.770E 01	1.770E 01	0.0	0.0	0.0	0.0
Pa-231	4.100E 04	7.300E 04	0.0	0.0	5.800E 04	5.100E 04	0.0	0.0	0.0	0.0
Pa-233	2.740E 01	2.740E 01	0.0	0.0	2.740E 01	2.740E 01	0.0	0.0	0.0	0.0
Pa-234	2.800E-01	2.800E-01	0.0	0.0	2.800E-01	2.800E-01	0.0	0.0	0.0	0.0
U-230	1.720E 01	1.950E 01	0.0	0.0	0.0	8.700E 00	0.0	0.0	0.0	0.0
U-232	1.000E 02	3.000E 02	0.0	0.0	0.0	1.500E 01	0.0	0.0	0.0	0.0
U-233	1.000E 02	3.000E 02	0.0	0.0	0.0	1.500E 01	0.0	0.0	0.0	0.0
U-234	1.000E 02	3.000E 02	0.0	0.0	0.0	1.500E 01	0.0	0.0	0.0	0.0
U-235	1.000E 02	3.000E 02	0.0	0.0	0.0	1.500E 01	0.0	0.0	0.0	0.0
U-236	1.000E 02	3.000E 02	0.0	0.0	0.0	1.500E 01	0.0	0.0	0.0	0.0

TABLE 4-1B (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
U-237	6.320E 00	6.620E 00	0.0	0.0	0.0	4.660E 00	0.0	0.0	0.0	0.0
U-238	1.000E 02	3.000E 02	0.0	0.0	0.0	1.500E 01	0.0	0.0	0.0	0.0
Np-237	3.900E 04	7.300E 04	0.0	0.0	5.400E 04	6.400E 04	0.0	0.0	0.0	0.0
Np-239	2.330E 00	2.330E 00	0.0	0.0	2.330E 00	2.330E 00	0.0	0.0	0.0	0.0
Pu-236	1.024E 03	1.025E 03	0.0	0.0	1.005E 03	1.007E 03	0.0	0.0	0.0	0.0
Pu-238	2.200E 04	2.300E 04	0.0	0.0	1.600E 04	1.600E 04	0.0	0.0	0.0	0.0
Pu-239	6.400E 04	7.200E 04	0.0	0.0	3.000E 04	3.200E 04	0.0	0.0	0.0	0.0
Pu-240	6.300E 04	7.100E 04	0.0	0.0	3.000E 04	3.200E 04	0.0	0.0	0.0	0.0
Pu-241	4.500E 03	4.500E 03	0.0	0.0	4.100E 03	4.200E 03	0.0	0.0	0.0	0.0
Pu-242	6.500E 04	7.300E 04	0.0	0.0	3.000E 04	3.200E 04	0.0	0.0	0.0	0.0
Pu-243	2.080E-01	2.080E-01	0.0	0.0	2.080E-01	2.080E-01	0.0	0.0	0.0	0.0
Pu-244	6.500E 04	7.300E 04	0.0	0.0	3.000E 04	3.200E 04	0.0	0.0	0.0	0.0
Am-241	1.800E 04	5.100E 04	0.0	0.0	3.400E 03	2.300E 04	0.0	0.0	0.0	0.0
Am-242M	1.500E 04	3.200E 04	0.0	0.0	3.300E 03	1.800E 04	0.0	0.0	0.0	0.0
Am-242	6.670E-01	6.670E-01	0.0	0.0	6.670E-01	6.670E-01	0.0	0.0	0.0	0.0
Am-243	2.000E 04	7.100E 04	0.0	0.0	3.500E 03	2.700E 04	0.0	0.0	0.0	0.0
Am-244	1.810E-02	1.810E-02	0.0	0.0	1.800E-02	1.800E-02	0.0	0.0	0.0	0.0
Cm-242	1.614E 02	1.621E 02	0.0	0.0	1.543E 02	1.614E 02	0.0	0.0	0.0	0.0
Cm-243	8.400E 03	1.100E 04	0.0	0.0	2.500E 03	8.400E 03	0.0	0.0	0.0	0.0
Cm-244	5.200E 03	6.100E 03	0.0	0.0	2.100E 03	5.200E 03	0.0	0.0	0.0	0.0
Cm-245	2.400E 04	7.200E 04	0.0	0.0	3.000E 03	2.400E 04	0.0	0.0	0.0	0.0
Cm-246	2.400E 04	7.100E 04	0.0	0.0	3.000E 03	2.400E 04	0.0	0.0	0.0	0.0
Cm-247	2.400E 04	7.300E 04	0.0	0.0	3.000E 03	2.400E 04	0.0	0.0	0.0	0.0
Cm-248	2.400E 04	7.300E 04	0.0	0.0	3.000E 03	2.400E 04	0.0	0.0	0.0	0.0
Cm-249	4.400E-02	4.400E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bk-249	2.890E 02	2.890E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bk-250	1.340E-01	1.340E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-249	4.700E 04	5.100E 04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-1B (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Cf-250	3.500E 03	3.500E 03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-251	5.300E 04	5.800E 04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-252	7.930E 02	7.940E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-253	1.800E 01	1.800E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-254	5.600E 01	5.600E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-253	2.000E 01	2.000E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-254M	1.600E 00	1.600E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-254	4.760E 02	4.770E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-255	3.000E 01	3.000E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fm-254	1.350E-01	1.350E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fm-255	8.960E-01	8.960E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fm-256	1.110E-01	1.110E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-1C
INREM DATA BASE
EFFECTIVE ABSORBED ENERGIES[a]

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS (S)	LUNGS (I)
NUCLIDE											
H-3	5.880E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Be-7	3.500E-02	8.500E-03	0.0	0.0	1.600E-02	1.200E-02	1.200E-02	0.0	0.0	0.0	1.600E-02
C-14	5.400E-02	2.700E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.400E-02
F-18	8.900E-01	1.400E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.400E-01
Na-22	1.600E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.600E-01
Na-24	2.700E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.500E 00
Si-31	5.900E-01	0.0	0.0	0.0	0.0	0.0	0.0	5.900E-01	5.900E-01	5.900E-01	5.500E-01
P-32	6.900E-01	3.500E 00	0.0	0.0	6.900E-01	0.0	0.0	0.0	0.0	0.0	6.600E-01
S-35	5.600E-02	2.800E-01	0.0	0.0	0.0	0.0	0.0	5.600E-02	0.0	0.0	5.600E-02
Cl-36	2.600E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.600E-01
Cl-38	2.300E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.900E 00
K-42	1.600E 00	0.0	1.600E 00	0.0	1.500E 00	0.0	1.500E 00	0.0	0.0	0.0	1.500E 00
Ca-45	8.600E-02	4.300E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.600E-02
Ca-47	1.400E 00	2.600E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.100E-01
Sc-46	1.300E 00	9.000E-01	0.0	0.0	6.400E-01	5.000E-01	0.0	0.0	0.0	0.0	6.400E-01
Sc-47	2.600E-01	8.900E-01	0.0	0.0	2.100E-01	2.000E-01	0.0	0.0	0.0	0.0	2.100E-01
Sc-48	2.200E 00	1.600E 00	0.0	0.0	1.100E 00	8.500E-01	0.0	0.0	0.0	0.0	1.100E 00
V-48	1.900E 00	1.200E 00	0.0	0.0	9.000E-01	7.000E-01	7.000E-01	0.0	0.0	0.0	9.600E-01
Cr-51	2.500E-02	0.0	0.0	8.400E-03	0.0	1.200E-02	0.0	0.0	0.0	1.400E-02	1.400E-02
Mn-52	2.100E 00	0.0	0.0	0.0	9.600E-01	0.0	0.0	0.0	0.0	0.0	2.100E 00
Mn-54	5.100E-01	0.0	0.0	0.0	2.300E-01	0.0	0.0	0.0	0.0	0.0	2.300E-01
Mn-56	1.900E 00	0.0	0.0	0.0	1.300E 00	0.0	0.0	0.0	0.0	0.0	1.300E 00
Fe-55	6.500E-03	6.500E-03	0.0	0.0	6.500E-03	0.0	6.500E-03	0.0	0.0	6.500E-03	6.500E-03
Fe-59	8.100E-01	0.0	0.0	0.0	4.200E-01	0.0	3.400E-01	0.0	0.0	4.200E-01	4.200E-01
Co-57	9.000E-02	0.0	0.0	0.0	5.300E-02	4.500E-02	4.500E-02	0.0	0.0	0.0	5.300E-02
Co-58M	9.900E-02	0.0	0.0	0.0	5.900E-02	4.800E-02	4.800E-02	0.0	0.0	0.0	2.600E-01
Co-58	6.100E-01	0.0	0.0	0.0	2.900E-01	2.200E-01	2.200E-01	0.0	0.0	0.0	6.100E-01

[a]Zero entries mean "no data."

TABLE 4-1C (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS (S)	LUNGS (I)
NUCLIDE											
Co-60	1.500E 00	0.0	0.0	0.0	7.200E-01	5.600E-01	5.600E-01	0.0	0.0	0.0	7.200E-01
Ni-59	7.700E-03	7.700E-03	0.0	0.0	7.700E-03	0.0	0.0	0.0	0.0	0.0	7.700E-03
Ni-63	2.100E-02	1.100E-01	0.0	0.0	2.100E-02	0.0	0.0	0.0	0.0	0.0	2.100E-02
Ni-65	1.400E 00	5.300E 00	0.0	0.0	1.200E 00	0.0	0.0	0.0	0.0	0.0	1.200E 00
Cu-64	2.500E-01	0.0	0.0	0.0	1.900E-01	1.700E-01	1.700E-01	0.0	0.0	0.0	1.900E-01
Zn-65	3.200E-01	9.400E-02	3.200E-01	0.0	1.500E-01	1.100E-01	0.0	5.600E-02	5.600E-02	0.0	1.500E-01
Zn-69M	6.400E-01	2.100E 00	6.400E-01	0.0	5.000E-01	4.700E-01	0.0	4.300E-01	4.300E-01	0.0	5.000E-01
Zn-69	3.700E-01	1.900E 00	3.700E-01	0.0	3.700E-01	3.700E-01	0.0	3.700E-01	3.700E-01	0.0	3.700E-01
Ga-72	1.800E 00	2.600E 00	0.0	0.0	1.100E 00	8.900E-01	8.900E-01	0.0	0.0	0.0	1.100E 00
Ge-71	1.000E-02	0.0	0.0	0.0	1.000E-02	1.000E-02	0.0	0.0	0.0	0.0	1.000E-02
As-73	6.100E-02	0.0	0.0	0.0	4.100E-02	3.600E-02	0.0	0.0	0.0	0.0	4.100E-02
As-74	5.600E-01	0.0	0.0	0.0	3.800E-01	3.400E-01	0.0	0.0	0.0	0.0	3.800E-01
As-76	1.300E 00	0.0	0.0	0.0	1.100E 00	1.100E 00	0.0	0.0	0.0	0.0	1.100E 00
As-77	2.400E-01	0.0	0.0	0.0	2.400E-01	2.400E-01	0.0	0.0	0.0	0.0	2.400E-01
Se-75	2.000E-01	0.0	0.0	0.0	9.400E-02	7.200E-02	7.200E-02	0.0	0.0	0.0	9.400E-02
Br-80M	7.400E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.400E-01
Br-82	1.800E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.500E-01
Br-83	3.800E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.700E-01
Br-84	2.320E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.320E 00
Rb-86	7.000E-01	0.0	7.000E-01	0.0	6.600E-01	0.0	6.600E-01	0.0	0.0	0.0	6.600E-01
Rb-87	9.000E-02	0.0	9.000E-02	0.0	9.000E-02	0.0	9.000E-02	0.0	0.0	0.0	9.000E-02
Rb-88	2.750E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.560E 00
Rb-89	1.980E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.200E 00
Sr-85M	4.200E-01	1.200E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.600E-01
Sr-85	3.300E-01	9.100E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.600E-01
Sr-89	5.500E-01	2.800E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.500E-01
Sr-90	1.100E 00	5.500E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.100E 00
Sr-91	2.100E 00	6.200E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.500E 00

TABLE 4-1C (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS (S)	LUNGS (I)
NUCLIDE											
Sr-92	2.600E 00	8.000E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.600E 00
Y-90	8.900E-01	4.400E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.900E-01
Y-91M	9.300E-01	3.000E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.300E-01
Y-91	5.900E-01	2.900E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.900E-01
Y-92	1.600E 00	6.900E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.600E 00
Y-93	1.700E 00	6.500E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.700E 00
Zr-93	2.200E-02	1.000E-01	0.0	0.0	2.200E-02	2.200E-02	2.200E-02	0.0	0.0	0.0	2.200E-01
Zr-95	1.100E 00	1.100E 00	0.0	0.0	5.700E-01	4.600E-01	4.600E-01	0.0	0.0	0.0	5.400E-01
Zr-97	2.100E 00	6.200E 00	0.0	0.0	1.600E 00	1.500E 00	1.500E 00	0.0	0.0	0.0	1.600E 00
Nb-93M	3.800E-02	1.200E-01	0.0	0.0	3.800E-02	3.800E-02	3.800E-02	0.0	0.0	0.0	3.800E-02
Nb-95M	6.500E-01	4.000E-01	0.0	0.0	3.200E-01	2.500E-01	2.500E-01	0.0	0.0	0.0	3.200E-01
Nb-95	5.100E-01	3.700E-01	0.0	0.0	2.600E-01	2.000E-01	2.000E-01	0.0	0.0	0.0	2.600E-01
Nb-97	8.700E-01	2.400E 00	0.0	0.0	6.400E-01	6.000E-01	6.000E-01	0.0	0.0	0.0	6.400E-01
Mo-99	5.400E-01	0.0	0.0	0.0	4.700E-01	4.600E-01	0.0	0.0	0.0	0.0	4.800E-01
Tc-96M	3.000E-01	3.900E-01	0.0	0.0	6.000E-01	4.200E-01	0.0	0.0	0.0	3.800E-01	6.600E-01
Tc-96	1.400E 00	3.500E-01	0.0	0.0	6.400E-01	4.700E-01	0.0	0.0	0.0	6.400E-01	6.400E-01
Tc-97M	9.000E-02	3.700E-01	0.0	0.0	9.000E-02	9.000E-02	0.0	0.0	0.0	9.000E-02	9.000E-02
Tc-97	2.000E-02	1.900E-02	0.0	0.0	2.000E-02	2.000E-02	0.0	0.0	0.0	2.000E-02	2.000E-02
Tc-99M	8.000E-02	2.000E-02	0.0	0.0	3.500E-02	2.600E-02	0.0	0.0	0.0	3.500E-02	3.500E-02
Tc-99	9.400E-02	4.700E-01	0.0	0.0	9.400E-02	9.400E-02	0.0	0.0	0.0	9.400E-02	9.400E-02
Ru-97	1.500E-01	1.300E-01	0.0	0.0	0.0	7.700E-02	0.0	0.0	0.0	0.0	1.300E-01
Ru-103	4.400E-01	6.200E-01	0.0	0.0	0.0	2.200E-01	0.0	0.0	0.0	0.0	2.700E-01
Ru-105	1.200E 00	3.500E 00	0.0	0.0	0.0	8.400E-01	0.0	0.0	0.0	0.0	9.100E-01
Ru-106	1.400E 00	6.500E 00	0.0	0.0	0.0	1.300E 00	0.0	0.0	0.0	0.0	1.400E 00
Rh-103M	5.500E-02	1.900E-01	0.0	0.0	5.500E-02	5.400E-02	5.400E-02	0.0	0.0	0.0	5.500E-02
Rh-105	2.000E-01	9.500E-01	0.0	0.0	1.900E-01	1.900E-01	1.900E-01	0.0	0.0	0.0	1.900E-01
Pd-103	6.400E-02	0.0	0.0	0.0	6.300E-02	6.100E-02	6.100E-02	0.0	0.0	0.0	6.300E-02
Pd-109	4.200E-01	0.0	0.0	0.0	4.200E-01	4.200E-01	4.200E-01	0.0	0.0	0.0	4.200E-01

TABLE 4-1C (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS (S)	LUNGS (I)
NUCLIDE											
Ag-105	6.300E-01	1.600E-01	0.0	0.0	2.900E-01	2.200E-01	0.0	0.0	0.0	0.0	2.900E-01
Ag-110M	1.700E 00	1.100E 00	0.0	0.0	8.400E-01	6.500E-01	0.0	0.0	0.0	0.0	8.400E-01
Ag-111	4.000E-01	1.800E 00	0.0	0.0	3.800E-01	3.700E-01	0.0	0.0	0.0	0.0	3.800E-01
Cd-109	1.100E-01	0.0	0.0	0.0	1.000E-01	9.800E-02	0.0	0.0	0.0	0.0	1.000E-01
Cd-115M	6.100E-01	0.0	0.0	0.0	6.100E-01	6.100E-01	0.0	0.0	0.0	0.0	6.100E-01
Cd-115	7.100E-01	0.0	0.0	0.0	5.800E-01	5.600E-01	0.0	0.0	0.0	0.0	5.800E-01
In-113M	2.900E-01	6.800E-01	0.0	1.600E-01	2.100E-01	1.900E-01	1.900E-01	0.0	0.0	0.0	2.100E-01
In-114M	9.700E-01	4.500E 00	0.0	9.200E-01	9.400E-01	9.300E-01	9.300E-01	0.0	0.0	0.0	9.400E-01
In-115M	2.600E-01	7.400E-01	0.0	1.600E-01	2.000E-01	1.900E-01	1.900E-01	0.0	0.0	0.0	2.000E-01
In-115	1.700E-01	8.500E-01	0.0	1.700E-01	1.700E-01	1.700E-01	1.700E-01	0.0	0.0	0.0	1.700E-01
Sn-113	3.200E-01	7.000E-01	0.0	1.600E-01	2.300E-01	0.0	0.0	0.0	0.0	0.0	2.300E-01
Sn-119M	6.100E-02	2.600E-02	0.0	1.700E-02	3.800E-02	0.0	0.0	0.0	0.0	0.0	3.800E-02
Sn-123	5.200E-01	2.600E 00	0.0	5.200E-01	5.200E-01	0.0	0.0	0.0	0.0	0.0	5.200E-01
Sn-125	9.400E-01	4.800E 00	0.0	9.300E-01	9.400E-01	0.0	0.0	0.0	0.0	0.0	9.400E-01
Sb-122	8.200E-01	2.700E 00	0.0	5.900E-01	6.700E-01	0.0	0.0	0.0	0.0	6.700E-01	6.700E-01
Sb-124	1.600E 00	2.300E 00	0.0	5.700E-01	9.200E-01	0.0	0.0	0.0	0.0	9.200E-01	9.200E-01
Sb-125	3.600E-01	6.200E-01	0.0	1.400E-01	2.300E-01	0.0	0.0	0.0	0.0	2.300E-01	2.300E-01
Te-125M	1.500E-01	5.100E-01	0.0	1.100E-01	1.400E-01	1.400E-01	1.400E-01	1.100E-01	0.0	0.0	1.400E-01
Te-127M	3.200E-01	1.500E 00	0.0	3.000E-01	3.200E-01	3.200E-01	3.200E-01	3.100E-01	0.0	0.0	3.200E-01
Te-127	2.400E-01	1.200E 00	0.0	2.400E-01	2.400E-01	2.400E-01	2.400E-01	2.400E-01	0.0	0.0	2.400E-01
Te-129M	1.100E 00	3.200E 00	0.0	6.800E-01	8.300E-01	7.800E-01	7.800E-01	6.900E-01	0.0	0.0	8.300E-01
Te-129	9.800E-01	2.800E 00	0.0	6.000E-01	7.300E-01	6.800E-01	6.800E-01	6.000E-01	0.0	0.0	7.300E-01
Te-131M	1.600E 00	2.600E 00	0.0	6.900E-01	9.700E-01	8.100E-01	8.000E-01	0.0	0.0	0.0	1.000E 00
Te-132	1.900E 00	3.100E 00	0.0	7.400E-01	1.100E 00	9.600E-01	9.600E-01	7.300E-01	0.0	0.0	1.100E 00
I-126	2.300E-01	0.0	0.0	1.600E-01	0.0	0.0	0.0	0.0	0.0	0.0	1.800E-01
I-129	8.900E-02	0.0	0.0	6.800E-02	0.0	0.0	0.0	0.0	0.0	0.0	8.200E-02
I-130	1.630E 00	0.0	0.0	4.900E-01	0.0	0.0	0.0	0.0	0.0	0.0	8.800E-01
I-131	4.400E-01	0.0	0.0	2.300E-01	0.0	0.0	0.0	0.0	0.0	0.0	3.100E-01

TABLE 4-1C (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS (S)	LUNGS (I)
NUCLIDE											
I-132	1.700E 00	0.0	0.0	6.500E-01	0.0	0.0	0.0	0.0	0.0	0.0	1.600E 00
I-133	8.400E-01	0.0	0.0	5.400E-01	0.0	0.0	0.0	0.0	0.0	0.0	6.400E-01
I-134	1.500E 00	0.0	0.0	8.200E-01	0.0	0.0	0.0	0.0	0.0	0.0	1.100E 00
I-135	1.300E 00	0.0	0.0	5.200E-01	0.0	0.0	0.0	0.0	0.0	0.0	7.700E-01
Cs-131	2.900E-02	1.700E-02	2.900E-02	0.0	2.400E-02	2.100E-02	2.100E-02	0.0	0.0	2.400E-02	2.400E-02
Cs-134M	1.900E-01	4.900E-01	2.600E-01	0.0	1.500E-01	1.100E-01	1.300E-01	0.0	0.0	1.700E-01	1.700E-01
Cs-134	1.100E 00	9.900E-01	1.100E 00	0.0	5.700E-01	4.600E-01	4.600E-01	0.0	0.0	5.700E-01	5.700E-01
Cs-135	6.600E-02	3.300E-01	6.600E-02	0.0	6.600E-02	6.600E-02	6.600E-02	0.0	0.0	6.600E-02	6.600E-02
Cs-136	6.500E-01	7.200E-01	6.500E-01	0.0	3.500E-01	2.900E-01	2.900E-01	0.0	0.0	3.500E-01	3.500E-01
Cs-137	5.900E-01	1.400E 00	5.900E-01	0.0	4.100E-01	3.700E-01	3.700E-01	0.0	0.0	4.100E-01	4.100E-01
Cs-138	2.580E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.920E 00
Ba-131	3.800E-01	1.100E-01	3.800E-01	0.0	1.900E-01	1.400E-01	1.400E-01	0.0	0.0	1.900E-01	1.900E-01
Ba-140	2.300E 00	4.200E 00	2.300E 00	0.0	1.400E 00	1.200E 00	1.200E 00	0.0	0.0	1.400E 00	1.400E 00
La-140	1.900E 00	2.700E 00	0.0	0.0	1.100E 00	0.0	0.0	0.0	0.0	0.0	1.100E 00
Ce-141	2.100E-01	8.100E-01	0.0	0.0	1.800E-01	1.800E-01	0.0	0.0	0.0	0.0	1.800E-01
Ce-143	9.700E-01	3.800E 00	0.0	0.0	8.500E-01	8.200E-01	0.0	0.0	0.0	0.0	8.300E-01
Ce-144	1.300E 00	6.300E 00	0.0	0.0	1.300E 00	1.300E 00	0.0	0.0	0.0	0.0	1.300E 00
Pr-142	8.500E-01	3.900E 00	0.0	0.0	8.100E-01	8.100E-01	0.0	0.0	0.0	0.0	8.100E-01
Pr-143	3.200E-01	1.600E 00	0.0	0.0	3.200E-01	3.200E-01	0.0	0.0	0.0	0.0	3.200E-01
Nd-144	2.000E 01	1.000E 02	0.0	0.0	2.000E 01	2.000E 01	0.0	0.0	0.0	0.0	2.000E 01
Nd-147	4.000E-01	1.400E 00	0.0	0.0	3.200E-01	3.100E-01	0.0	0.0	0.0	0.0	3.200E-01
Nd-149	1.100E 00	4.700E 00	0.0	0.0	9.900E-01	9.700E-01	0.0	0.0	0.0	0.0	9.900E-01
Pm-147	6.900E-02	3.500E-01	0.0	0.0	6.900E-02	6.900E-02	0.0	0.0	0.0	0.0	6.900E-02
Pm-148M	1.470E 00	1.300E 00	0.0	0.0	7.600E-01	6.100E-01	0.0	0.0	0.0	0.0	7.600E-01
Pm-148	1.070E 00	3.600E 00	0.0	0.0	8.600E-01	8.200E-01	0.0	0.0	0.0	0.0	8.600E-01
Pm-149	5.400E-01	1.900E 00	0.0	0.0	4.400E-01	4.200E-01	0.0	0.0	0.0	0.0	4.400E-01
Sm-147	2.300E 01	1.150E 02	0.0	0.0	2.300E 01	2.300E 01	0.0	0.0	0.0	0.0	2.300E 01

TABLE 4-1C (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS (S)	LUNGS (I)
NUCLIDE											
Sm-151	4.200E-02	1.300E-01	0.0	0.0	4.200E-02	4.200E-02	0.0	0.0	0.0	0.0	4.200E-02
Sm-153	3.000E-01	1.100E 00	0.0	0.0	2.600E-01	2.500E-01	0.0	0.0	0.0	0.0	2.600E-01
Eu-152M	8.800E-01	2.900E 00	0.0	0.0	7.100E-01	7.100E-01	0.0	0.0	0.0	0.0	7.100E-01
Eu-152	6.600E-01	4.500E-01	0.0	0.0	3.300E-01	2.500E-01	0.0	0.0	0.0	0.0	3.300E-01
Eu-154	1.300E 00	2.700E 00	0.0	0.0	8.600E-01	7.600E-01	0.0	0.0	0.0	0.0	8.600E-01
Eu-155	1.600E-01	2.800E-01	0.0	0.0	9.500E-02	8.300E-02	0.0	0.0	0.0	0.0	9.500E-02
Gd-153	1.700E-01	2.300E-01	0.0	0.0	9.900E-02	0.0	0.0	0.0	0.0	0.0	9.600E-02
Gd-159	3.600E-01	7.500E-01	0.0	0.0	3.300E-01	0.0	0.0	0.0	0.0	0.0	3.300E-01
Tb-160	8.500E-01	1.100E 00	0.0	0.0	0.0	4.000E-01	0.0	0.0	0.0	0.0	4.800E-01
Dy-165	5.100E-01	1.500E 00	0.0	0.0	3.900E-01	0.0	0.0	0.0	0.0	0.0	3.900E-01
Dy-166	7.900E-01	3.900E 00	0.0	0.0	7.800E-01	0.0	0.0	0.0	0.0	0.0	7.500E-01
Ho-166	7.000E-01	3.400E 00	0.0	0.0	6.900E-01	6.900E-01	0.0	0.0	0.0	0.0	6.900E-01
Er-169	3.700E-01	5.800E-01	0.0	0.0	2.200E-01	1.900E-01	0.0	0.0	0.0	0.0	2.200E-01
Er-171	6.500E-01	2.000E 00	0.0	0.0	0.0	4.600E-01	0.0	0.0	0.0	0.0	4.900E-01
Tm-170	3.400E-01	1.700E 00	0.0	0.0	0.0	3.400E-01	0.0	0.0	0.0	0.0	3.400E-01
Yb-175	1.600E-01	7.100E-01	0.0	0.0	0.0	1.500E-01	0.0	0.0	0.0	0.0	1.500E-01
Lu-177	1.700E-01	7.600E-01	0.0	0.0	0.0	1.600E-01	0.0	0.0	0.0	0.0	1.600E-01
Hf-181	5.000E-01	7.400E-01	0.0	0.0	2.900E-01	2.500E-01	2.500E-01	0.0	0.0	0.0	2.900E-01
Ta-182	1.100E 00	1.000E 00	0.0	0.0	5.600E-01	4.500E-01	4.500E-01	0.0	0.0	0.0	5.600E-01
W-181	2.000E-01	4.700E-02	0.0	0.0	8.700E-02	0.0	0.0	0.0	0.0	0.0	8.700E-02
W-185	1.400E-01	6.800E-01	0.0	0.0	1.400E-01	0.0	0.0	0.0	0.0	0.0	1.400E-01
W-187	6.800E-01	1.400E 00	0.0	0.0	4.400E-01	0.0	0.0	0.0	0.0	0.0	4.400E-01
W-188	8.500E-01	3.800E 00	0.0	0.0	8.900E-01	0.0	0.0	0.0	0.0	8.900E-01	8.500E-01
Re-183	2.400E-01	5.500E-02	0.0	3.400E-02	1.000E-01	0.0	0.0	0.0	0.0	0.0	1.000E-01
Re-186	3.800E-01	1.800E 00	0.0	3.600E-01	3.700E-01	0.0	0.0	0.0	0.0	0.0	3.700E-01
Re-187	1.200E-02	6.200E-02	0.0	1.200E-02	1.200E-02	0.0	0.0	0.0	0.0	0.0	1.200E-02
Re-188	9.400E-01	3.900E 00	0.0	8.000E-01	8.500E-01	0.0	0.0	0.0	0.0	0.0	8.600E-01
Os-185	5.100E-01	0.0	0.0	0.0	2.900E-01	2.500E-01	0.0	0.0	0.0	0.0	2.900E-01

TABLE 4-1C (continued)

ORGAN NAME / NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS (S)	LUNGS (I)
Os-191M	6.000E-02	0.0	0.0	0.0	4.900E-02	3.900E-02	0.0	0.0	0.0	0.0	1.300E-01
Os-191	1.600E-01	0.0	0.0	0.0	1.200E-01	1.100E-01	0.0	0.0	0.0	0.0	1.200E-01
Os-193	3.800E-01	0.0	0.0	0.0	3.800E-01	3.800E-01	0.0	0.0	0.0	0.0	3.800E-01
Ir-190	3.700E-01	0.0	0.0	0.0	1.600E-01	1.200E-01	1.200E-01	0.0	0.0	0.0	1.400E-01
Ir-192	1.100E 00	0.0	0.0	0.0	6.000E-01	5.000E-01	5.000E-01	0.0	0.0	0.0	6.000E-01
Ir-194	8.100E-01	0.0	0.0	0.0	8.100E-01	8.100E-01	8.100E-01	0.0	0.0	0.0	8.100E-01
Pt-191	7.000E-01	0.0	0.0	0.0	3.100E-01	2.200E-01	2.200E-01	0.0	0.0	0.0	3.100E-01
Pt-193M	7.500E-02	0.0	0.0	0.0	3.200E-02	2.300E-02	2.300E-02	0.0	0.0	0.0	3.200E-02
Pt-193	4.300E-02	0.0	0.0	0.0	1.900E-02	1.400E-02	1.400E-02	0.0	0.0	0.0	1.900E-02
Pt-197M	5.500E-01	0.0	0.0	0.0	5.100E-01	5.000E-01	5.000E-01	0.0	0.0	0.0	5.200E-01
Pt-197	2.600E-01	0.0	0.0	0.0	2.400E-01	2.300E-01	2.300E-01	0.0	0.0	0.0	2.400E-01
Au-196	4.600E-01	0.0	0.0	0.0	2.100E-01	1.500E-01	1.500E-01	0.0	0.0	0.0	2.100E-01
Au-198	5.800E-01	0.0	0.0	0.0	4.400E-01	4.100E-01	4.100E-01	0.0	0.0	0.0	4.400E-01
Au-199	1.800E-01	0.0	0.0	0.0	1.300E-01	1.200E-01	1.200E-01	0.0	0.0	0.0	1.300E-01
Hg-197M	3.000E-01	0.0	0.0	0.0	1.900E-01	1.800E-01	1.700E-01	0.0	0.0	0.0	2.000E-01
Hg-197	9.700E-02	0.0	0.0	0.0	5.200E-02	4.300E-02	4.300E-02	0.0	0.0	0.0	5.200E-02
Hg-203	2.500E-01	0.0	0.0	0.0	1.700E-01	1.500E-01	1.500E-01	0.0	0.0	0.0	1.700E-01
Tl-200	4.000E-01	9.500E-02	4.000E-01	0.0	1.800E-01	1.300E-01	0.0	0.0	0.0	1.800E-01	1.800E-01
Tl-201	1.700E-01	4.400E-01	1.700E-01	0.0	1.200E-01	1.100E-01	0.0	0.0	0.0	1.200E-01	1.200E-01
Tl-202	3.800E-01	9.400E-01	3.800E-01	0.0	2.700E-01	2.400E-01	0.0	0.0	0.0	2.700E-01	2.700E-01
Tl-204	2.500E-01	1.300E 00	2.500E-01	0.0	2.500E-01	2.500E-01	0.0	0.0	0.0	2.500E-01	2.500E-01
Pb-203	2.200E-01	5.100E-02	0.0	0.0	9.400E-02	6.900E-02	0.0	0.0	0.0	0.0	9.400E-02
Pb-204M	1.340E 00	3.100E-01	0.0	0.0	5.900E-01	4.400E-01	0.0	0.0	0.0	0.0	5.900E-01
Pb-210	5.200E 00	2.900E 01	0.0	0.0	1.000E 01	1.000E 01	0.0	0.0	0.0	0.0	2.500E 01
Pb-212	8.200E 01	4.100E 02	0.0	0.0	8.300E 01	8.100E 01	0.0	0.0	0.0	0.0	8.300E 01
Bi-206	1.800E 00	4.300E-01	0.0	0.0	8.000E-01	5.800E-01	5.800E-01	0.0	0.0	0.0	8.000E-01
Bi-207	1.000E 00	2.400E-01	0.0	0.0	4.500E-01	3.300E-01	3.300E-01	0.0	0.0	0.0	4.500E-01
Bi-210	1.000E 01	4.000E 01	0.0	0.0	1.300E 01	1.900E 01	1.700E 01	0.0	0.0	0.0	2.600E 01

TABLE 4-1C (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS (S)	LUNGS (I)
NUCLIDE											
Bi-212	8.300E 01	4.110E 02	0.0	0.0	8.300E 01	8.200E 01	8.200E 01	0.0	0.0	0.0	8.300E 01
Po-210	5.500E 01	2.800E 02	0.0	0.0	5.500E 01	5.500E 01	5.500E 01	0.0	0.0	0.0	5.500E 01
At-211	6.100E 01	0.0	0.0	6.100E 01	0.0	0.0	6.100E 01	0.0	6.100E 01	0.0	6.100E 01
Ra-223	2.800E 02	2.800E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.800E 02
Ra-224	2.800E 02	2.800E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.800E 02
Ra-226	1.100E 02	1.100E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.100E 02
Ra-228	2.300E 02	1.900E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.600E 02
Ac-227	2.000E 02	1.000E 03	0.0	0.0	6.200E 01	6.200E 01	0.0	0.0	0.0	0.0	2.300E 02
Ac-228	2.300E 02	9.700E 02	0.0	0.0	5.600E 01	5.500E 01	0.0	0.0	0.0	0.0	1.600E 02
Th-227	2.000E 02	9.900E 02	0.0	0.0	6.100E 01	6.100E 01	0.0	0.0	0.0	0.0	2.300E 02
Th-228	2.300E 02	9.700E 02	0.0	0.0	5.600E 01	5.600E 01	0.0	0.0	0.0	0.0	2.400E 02
Th-230	4.800E 01	2.400E 02	0.0	0.0	4.800E 01	4.800E 01	0.0	0.0	0.0	0.0	4.800E 01
Th-231	1.800E-01	5.600E-01	0.0	0.0	1.600E-01	1.400E-01	0.0	0.0	0.0	0.0	1.100E-01
Th-232	6.200E 01	2.700E 02	0.0	0.0	4.100E 01	4.100E 02	0.0	0.0	0.0	0.0	4.600E 01
Th-234	9.100E-01	4.500E 00	0.0	0.0	9.000E-01	9.000E-01	0.0	0.0	0.0	0.0	9.000E-01
Pa-230	5.800E 01	3.201E 02	0.0	0.0	0.0	3.000E 01	0.0	0.0	0.0	0.0	6.600E 01
Pa-231	1.400E 02	7.500E 02	0.0	0.0	6.300E 01	7.900E 01	0.0	0.0	0.0	0.0	5.400E 01
Pa-233	3.200E-01	4.100E-01	0.0	0.0	1.800E-01	1.500E-01	0.0	0.0	0.0	0.0	1.800E-01
Pa-234	1.100E 00	1.200E 00	0.0	0.0	5.900E-01	4.900E-01	0.0	0.0	0.0	0.0	5.900E-01
U-230	3.500E 02	1.800E 03	0.0	0.0	0.0	3.500E 02	0.0	0.0	0.0	0.0	3.800E 02
U-232	2.800E 02	1.200E 03	0.0	0.0	0.0	1.100E 02	0.0	0.0	0.0	0.0	2.100E 02
U-233	5.000E 01	2.500E 02	0.0	0.0	0.0	5.000E 01	0.0	0.0	0.0	0.0	5.000E 01
U-234	4.900E 01	2.400E 02	0.0	0.0	0.0	4.900E 01	0.0	0.0	0.0	0.0	4.900E 01
U-235	4.600E 01	2.300E 02	0.0	0.0	0.0	4.600E 01	0.0	0.0	0.0	0.0	4.600E 01
U-236	4.700E 01	2.300E 02	0.0	0.0	0.0	4.700E 01	0.0	0.0	0.0	0.0	4.700E 01
U-237	1.650E-01	3.900E-01	0.0	0.0	0.0	1.120E-01	0.0	0.0	0.0	0.0	1.210E-01
U-238	4.300E 01	2.200E 02	0.0	0.0	0.0	4.300E 01	0.0	0.0	0.0	0.0	4.300E 01
Np-237	4.900E 01	2.500E 02	0.0	0.0	4.900E 01	4.900E 01	0.0	0.0	0.0	0.0	4.900E 01

TABLE 4-1C (continued)

ORGAN NAME NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS (S)	LUNGS (I)
Np-239	2.900E-01	9.800E-01	0.0	0.0	2.200E-01	2.100E-01	0.0	0.0	0.0	0.0	1.600E-01
Pu-236	3.400E 02	1.500E 03	0.0	0.0	1.700E 02	1.700E 02	0.0	0.0	0.0	0.0	2.700E 02
Pu-238	5.700E 01	2.800E 02	0.0	0.0	5.700E 01	5.700E 01	0.0	0.0	0.0	0.0	5.700E 01
Pu-239	5.300E 01	2.700E 02	0.0	0.0	5.300E 01	5.300E 01	0.0	0.0	0.0	0.0	5.300E 01
Pu-240	5.300E 01	2.700E 02	0.0	0.0	5.300E 01	5.300E 01	0.0	0.0	0.0	0.0	5.300E 01
Pu-241	2.300E 00	1.400E 01	0.0	0.0	1.000E 00	2.500E 00	0.0	0.0	0.0	0.0	5.300E-02
Pu-242	5.100E 01	2.500E 02	0.0	0.0	5.100E 01	5.100E 01	0.0	0.0	0.0	0.0	5.100E 01
Pu-243	3.700E-01	2.000E 00	0.0	0.0	2.500E-01	3.700E-01	0.0	0.0	0.0	0.0	1.600E-01
Pu-244	5.840E 01	2.920E 02	0.0	0.0	0.0	5.840E 01	0.0	0.0	0.0	0.0	5.840E 01
Am-241	5.700E 01	2.800E 02	0.0	0.0	5.700E 01	5.700E 01	0.0	0.0	0.0	0.0	5.700E 01
Am-242M	6.130E 01	3.024E 02	0.0	0.0	5.710E 01	6.050E 01	0.0	0.0	0.0	0.0	2.270E 01
Am-242	6.720E 01	3.360E 02	0.0	0.0	6.300E 01	6.550E 01	0.0	0.0	0.0	0.0	2.270E 01
Am-243	5.400E 01	2.700E 02	0.0	0.0	5.400E 01	5.400E 01	0.0	0.0	0.0	0.0	5.400E 01
Am-244	4.400E 01	2.500E 02	0.0	0.0	2.000E 01	4.400E 01	0.0	0.0	0.0	0.0	1.600E 00
Cm-242	8.000E 01	4.000E 02	0.0	0.0	7.800E 01	7.800E 01	0.0	0.0	0.0	0.0	6.400E 01
Cm-243	6.000E 01	3.000E 02	0.0	0.0	6.000E 01	6.000E 01	0.0	0.0	0.0	0.0	6.000E 01
Cm-244	6.000E 01	3.000E 02	0.0	0.0	6.000E 01	6.000E 01	0.0	0.0	0.0	0.0	6.000E 01
Cm-245	5.600E 01	2.800E 02	0.0	0.0	5.600E 01	5.600E 01	0.0	0.0	0.0	0.0	5.600E 01
Cm-246	5.600E 01	2.800E 02	0.0	0.0	5.600E 01	5.600E 01	0.0	0.0	0.0	0.0	5.600E 01
Cm-247	5.500E 01	2.700E 02	0.0	0.0	5.500E 01	5.500E 01	0.0	0.0	0.0	0.0	5.500E 01
Cm-248	4.533E 02	2.245E 03	0.0	0.0	4.533E 02	4.533E 02	0.0	0.0	0.0	0.0	4.533E 02
Cm-249	5.200E 00	2.700E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.100E-01
Bk-249	3.800E 00	2.000E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.900E-02
Bk-250	5.700E 01	2.900E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.300E 00
Cf-249	6.000E 01	3.000E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.600E 01
Cf-250	6.200E 01	3.100E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.200E 01
Cf-251	5.900E 01	2.900E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.900E 01

TABLE 4-1C (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS (S)	LUNGS (I)
NUCLIDE											
Cf-252	2.100E 02	1.100E 03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.100E 02
Cf-253	7.300E 01	3.700E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.500E 01
Cf-254	3.800E 03	1.890E 04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.800E 03
Es-253	7.300E 01	3.700E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.800E 01
Es-254M	1.300E 02	6.600E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.600E 01
Es-254	1.200E 02	6.200E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.600E 01
Es-255	7.500E 01	3.800E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.300E 01
Fm-254	1.319E 02	6.700E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.800E 01
Fm-255	7.500E 01	3.800E 02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.300E 01
Fm-256	3.600E 03	1.800E 04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.600E 03

TABLE 4-1D
INREM DATA BASE
INHALATION UPTAKE FRACTIONS[a]

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
H-3	1.750E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Be-7	2.500E-01	8.000E-02	0.0	0.0	2.500E-02	7.500E-03	5.000E-04	0.0	0.0	0.0
C-14	7.500E-01	2.000E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F-18	7.500E-01	4.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Na-22	7.500E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Na-24	7.500E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Si-31	6.800E-01	0.0	0.0	0.0	0.0	0.0	0.0	3.400E-04	4.000E-05	7.000E-02
P-32	6.300E-01	3.200E-01	0.0	0.0	4.000E-02	0.0	0.0	0.0	0.0	0.0
S-35	7.500E-01	2.000E-02	0.0	0.0	0.0	0.0	0.0	5.800E-04	0.0	0.0
Cl-36	7.500E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cl-38	7.500E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K-42	7.500E-01	0.0	4.900E-01	0.0	1.500E-02	0.0	3.000E-03	0.0	0.0	0.0
Ca-45	5.500E-01	5.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca-47	5.500E-01	5.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sc-46	2.500E-01	5.000E-02	0.0	0.0	4.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Sc-47	2.500E-01	5.000E-02	0.0	0.0	4.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Sc-48	2.500E-01	5.000E-02	0.0	0.0	4.000E-02	5.000E-03	0.0	0.0	0.0	0.0
V-48	2.600E-01	4.000E-02	0.0	0.0	2.000E-02	1.000E-02	2.600E-03	0.0	0.0	0.0
Cr-51	2.500E-01	0.0	0.0	2.300E-04	0.0	6.800E-04	0.0	0.0	0.0	1.000E-02
Mn-52	3.000E-01	0.0	0.0	0.0	7.000E-02	2.000E-02	0.0	0.0	0.0	0.0
Mn-54	3.000E-01	0.0	0.0	0.0	7.000E-02	0.0	0.0	0.0	0.0	0.0
Mn-56	3.000E-01	0.0	0.0	0.0	7.000E-02	0.0	0.0	0.0	0.0	0.0
Fe-55	3.000E-01	3.000E-02	0.0	0.0	4.000E-02	0.0	6.000E-03	0.0	0.0	6.000E-03
Fe-59	3.000E-01	0.0	0.0	0.0	4.000E-02	0.0	6.000E-03	0.0	0.0	6.000E-03
Co-57	4.000E-01	0.0	0.0	0.0	2.000E-02	8.000E-04	5.600E-04	0.0	0.0	0.0
Co-58M	4.000E-01	0.0	0.0	0.0	2.000E-02	8.000E-04	5.600E-04	0.0	0.0	0.0
Co-58	4.000E-01	0.0	0.0	0.0	2.000E-02	8.000E-04	5.600E-04	0.0	0.0	0.0

[a]Zero entries mean "no data."

TABLE 4-1D (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Co-60	4.000E-01	0.0	0.0	0.0	2.000E-02	8.000E-04	5.600E-04	0.0	0.0	0.0
Ni-59	4.000E-01	2.000E-01	0.0	0.0	3.000E-02	0.0	0.0	0.0	0.0	0.0
Ni-63	4.000E-01	2.000E-01	0.0	0.0	3.000E-02	0.0	0.0	0.0	0.0	0.0
Ni-65	4.000E-01	2.000E-01	0.0	0.0	3.000E-02	0.0	0.0	0.0	0.0	0.0
Cu-64	3.900E-01	0.0	0.0	0.0	3.000E-02	2.000E-02	3.000E-02	0.0	0.0	0.0
Zn-65	3.000E-01	4.000E-03	9.000E-02	0.0	1.100E-01	1.200E-02	0.0	2.700E-04	1.200E-04	0.0
Zn-69M	3.000E-01	4.500E-02	9.000E-02	0.0	1.100E-01	1.200E-02	0.0	2.700E-04	1.200E-04	0.0
Zn-69	3.000E-01	4.500E-02	9.000E-02	0.0	1.100E-01	1.200E-02	0.0	2.700E-04	1.200E-04	0.0
Ga-72	2.500E-01	7.500E-02	0.0	0.0	6.300E-02	5.000E-03	2.500E-03	0.0	0.0	0.0
Ge-71	2.600E-01	0.0	0.0	0.0	5.000E-03	8.000E-03	0.0	0.0	0.0	0.0
As-73	2.700E-01	0.0	0.0	0.0	8.000E-03	2.700E-03	0.0	0.0	0.0	0.0
As-74	2.700E-01	0.0	0.0	0.0	8.000E-03	2.700E-03	0.0	0.0	0.0	0.0
As-76	2.700E-01	0.0	0.0	0.0	8.000E-03	2.700E-03	0.0	0.0	0.0	0.0
As-77	2.700E-01	0.0	0.0	0.0	8.000E-03	2.700E-03	0.0	0.0	0.0	0.0
Se-75	7.000E-01	0.0	0.0	0.0	5.000E-02	3.000E-02	3.500E-03	0.0	0.0	0.0
Br-80M	7.500E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Br-82	7.500E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Br-83	7.500E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Br-84	7.500E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rb-86	7.500E-01	0.0	3.400E-01	0.0	4.000E-02	0.0	3.000E-03	0.0	0.0	0.0
Rb-87	7.500E-01	0.0	3.400E-01	0.0	4.000E-02	0.0	3.000E-03	0.0	0.0	0.0
Rb-88	7.500E-01	0.0	3.400E-01	0.0	4.000E-02	0.0	3.000E-03	0.0	0.0	0.0
Rb-89	7.500E-01	0.0	3.400E-01	0.0	4.000E-02	0.0	3.000E-03	0.0	0.0	0.0
Sr-85M	4.000E-01	2.800E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-85	4.000E-01	2.800E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-89	4.000E-01	2.800E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-90	6.800E-02	6.800E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-91	4.000E-01	2.800E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-1D (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Sr-92	4.000E-01	2.800E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-90	2.500E-01	1.900E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-91M	2.500E-01	1.900E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-91	2.500E-01	1.900E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-92	2.500E-01	1.900E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-93	2.500E-01	1.900E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zr-93	2.500E-01	9.000E-02	0.0	0.0	2.000E-02	5.000E-03	1.500E-03	0.0	0.0	0.0
Zr-95	2.500E-01	9.000E-02	0.0	0.0	2.000E-02	5.000E-03	1.500E-03	0.0	0.0	0.0
Zr-97	2.500E-01	9.000E-02	0.0	0.0	2.000E-02	5.000E-03	1.500E-03	0.0	0.0	0.0
Nb-93M	2.500E-01	1.000E-01	0.0	0.0	2.000E-02	5.000E-03	2.000E-03	0.0	0.0	0.0
Nb-95M	5.200E-01	1.000E-01	0.0	0.0	2.000E-02	5.000E-03	2.000E-03	0.0	0.0	0.0
Nb-95	2.500E-01	1.000E-01	0.0	0.0	2.000E-02	5.000E-03	2.000E-03	0.0	0.0	0.0
Nb-97	2.500E-01	1.000E-01	0.0	0.0	2.000E-02	5.000E-03	2.000E-03	0.0	0.0	0.0
Mo-99	6.500E-01	0.0	0.0	0.0	6.500E-02	5.000E-02	0.0	0.0	0.0	0.0
Tc-96M	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Tc-96	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Tc-97M	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Tc-97	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Tc-99M	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Tc-99	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Ru-97	2.700E-01	2.000E-02	0.0	0.0	0.0	5.000E-02	0.0	0.0	0.0	0.0
Ru-103	2.700E-01	2.000E-02	0.0	0.0	0.0	5.000E-02	0.0	0.0	0.0	0.0
Ru-105	2.700E-01	2.000E-02	0.0	0.0	0.0	5.000E-02	0.0	0.0	0.0	0.0
Ru-106	2.700E-01	2.000E-02	0.0	0.0	0.0	5.000E-02	0.0	0.0	0.0	0.0
Rh-103M	3.500E-01	2.000E-02	0.0	0.0	1.400E-02	1.000E-02	3.500E-03	0.0	0.0	0.0
Rh-105	3.500E-01	2.000E-02	0.0	0.0	1.400E-02	1.000E-02	3.500E-03	0.0	0.0	0.0
Pd-103	3.500E-01	0.0	0.0	0.0	3.000E-02	3.000E-02	3.500E-03	0.0	0.0	0.0
Pd-109	3.500E-01	0.0	0.0	0.0	3.000E-02	3.000E-02	3.500E-03	0.0	0.0	0.0

TABLE 4-1D (continued)

ORGAN NAME / NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
Ag-105	2.600E-01	1.300E-02	0.0	0.0	7.700E-03	5.000E-03	0.0	0.0	0.0	0.0
Ag-110M	2.600E-01	1.300E-02	0.0	0.0	7.700E-03	5.000E-03	0.0	0.0	0.0	0.0
Ag-111	2.600E-01	1.300E-02	0.0	0.0	7.700E-03	5.000E-03	0.0	0.0	0.0	0.0
Cd-109	2.500E-01	0.0	0.0	0.0	1.900E-01	2.500E-02	0.0	0.0	0.0	0.0
Cd-115M	2.500E-01	0.0	0.0	0.0	1.900E-01	2.500E-02	0.0	0.0	0.0	0.0
Cd-115	2.500E-01	0.0	0.0	0.0	1.900E-01	2.500E-02	0.0	0.0	0.0	0.0
In-113M	2.500E-01	4.000E-02	0.0	1.000E-04	4.000E-02	1.000E-02	5.000E-03	0.0	0.0	0.0
In-114M	2.500E-01	4.000E-02	0.0	1.000E-04	4.000E-02	1.000E-02	5.000E-03	0.0	0.0	0.0
In-115M	2.500E-01	4.000E-02	0.0	1.000E-04	4.000E-02	1.000E-02	5.000E-03	0.0	0.0	0.0
In-115	2.500E-01	4.000E-02	0.0	1.000E-04	4.000E-02	1.000E-02	5.000E-03	0.0	0.0	0.0
Sn-113	2.800E-01	8.000E-02	0.0	2.800E-05	2.800E-03	0.0	0.0	0.0	0.0	0.0
Sn-119M	2.800E-01	8.000E-02	0.0	2.800E-05	2.800E-03	0.0	0.0	0.0	0.0	0.0
Sn-123	2.800E-01	8.000E-02	0.0	2.800E-05	2.800E-03	0.0	0.0	0.0	0.0	0.0
Sn-125	2.800E-01	8.000E-02	0.0	2.800E-05	2.800E-03	0.0	0.0	0.0	0.0	0.0
Sb-122	2.700E-01	3.000E-02	0.0	8.000E-06	5.000E-04	0.0	0.0	0.0	0.0	8.000E-03
Sb-124	2.700E-01	3.000E-02	0.0	8.000E-06	5.000E-04	0.0	0.0	0.0	0.0	8.000E-03
Sb-125	2.700E-01	3.000E-02	0.0	8.000E-06	5.000E-04	0.0	0.0	0.0	0.0	8.000E-03
Te-125M	3.800E-01	3.400E-02	0.0	3.800E-04	2.000E-02	3.000E-02	3.800E-03	1.100E-03	0.0	0.0
Te-127M	3.800E-01	3.400E-02	0.0	3.800E-04	2.000E-02	3.000E-02	3.800E-03	1.100E-03	0.0	0.0
Te-127	3.800E-01	3.400E-02	0.0	3.800E-04	2.000E-02	3.000E-02	3.800E-03	1.100E-03	0.0	0.0
Te-129M	3.800E-01	3.400E-02	0.0	3.800E-04	2.000E-02	3.000E-02	3.800E-03	1.100E-03	0.0	0.0
Te-129	3.800E-01	3.400E-02	0.0	3.800E-04	2.000E-02	3.000E-02	3.800E-03	1.100E-03	0.0	0.0
Te-131M	3.800E-01	3.400E-02	0.0	3.800E-04	2.000E-02	3.000E-02	3.800E-03	1.100E-03	0.0	0.0
Te-132	3.800E-01	3.400E-02	0.0	3.800E-04	2.000E-02	3.000E-02	3.800E-03	1.100E-03	0.0	0.0
I-126	7.500E-01	5.300E-02	0.0	2.300E-01	9.000E-02	3.000E-02	3.800E-03	3.800E-03	0.0	0.0
I-129	7.500E-01	0.0	0.0	2.300E-01	0.0	0.0	0.0	0.0	0.0	0.0
I-130	7.500E-01	5.300E-02	0.0	2.300E-01	9.000E-02	3.000E-02	3.800E-03	3.800E-03	0.0	0.0
I-131	7.500E-01	0.0	0.0	2.300E-01	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-1D (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
I-132	7.500E-01	0.0	0.0	2.300E-01	0.0	0.0	0.0	0.0	0.0	0.0
I-133	7.500E-01	0.0	0.0	2.300E-01	0.0	0.0	0.0	0.0	0.0	0.0
I-134	7.500E-01	0.0	0.0	2.300E-01	0.0	0.0	0.0	0.0	0.0	0.0
I-135	7.500E-01	0.0	0.0	2.300E-01	0.0	0.0	0.0	0.0	0.0	0.0
Cs-131	7.500E-01	3.000E-02	3.000E-01	0.0	5.000E-02	7.500E-03	3.800E-03	0.0	0.0	2.300E-03
Cs-134M	7.500E-01	3.000E-02	3.000E-01	0.0	5.000E-02	7.500E-03	3.800E-03	0.0	0.0	2.300E-03
Cs-134	7.500E-01	3.000E-02	3.000E-01	0.0	5.000E-02	7.500E-03	3.800E-03	0.0	0.0	2.300E-03
Cs-135	7.500E-01	3.000E-02	3.000E-01	0.0	5.000E-02	7.500E-03	3.800E-03	0.0	0.0	2.300E-03
Cs-136	7.500E-01	3.000E-02	3.000E-01	0.0	5.000E-02	7.500E-03	3.800E-03	0.0	0.0	2.300E-03
Cs-137	7.500E-01	3.000E-02	3.000E-01	0.0	5.000E-02	7.500E-03	3.800E-03	0.0	0.0	2.300E-03
Cs-138	7.500E-01	3.000E-02	3.000E-01	0.0	5.000E-02	7.500E-03	3.800E-03	0.0	0.0	2.300E-03
Ba-131	2.800E-01	1.900E-01	8.300E-04	0.0	1.700E-04	2.800E-05	1.400E-05	2.800E-04	1.000E-04	5.500E-05
Ba-140	2.800E-01	1.900E-01	8.300E-04	0.0	1.700E-04	2.800E-05	1.400E-05	0.0	0.0	5.500E-05
La-140	2.500E-01	1.000E-01	0.0	0.0	4.000E-02	0.0	0.0	0.0	0.0	0.0
Ce-141	2.500E-01	7.500E-02	0.0	0.0	6.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Ce-143	2.500E-01	7.500E-02	0.0	0.0	6.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Ce-144	2.500E-01	7.500E-02	0.0	0.0	6.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Pr-142	2.500E-01	1.000E-01	0.0	0.0	5.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Pr-143	2.500E-01	1.000E-01	0.0	0.0	5.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Nd-144	2.500E-01	9.000E-02	0.0	0.0	1.300E-01	1.000E-02	0.0	0.0	0.0	0.0
Nd-147	2.500E-01	9.000E-02	0.0	0.0	1.300E-01	1.000E-02	0.0	0.0	0.0	0.0
Nd-149	2.500E-01	9.000E-02	0.0	0.0	1.300E-01	1.000E-02	0.0	0.0	0.0	0.0
Pm-147	2.500E-01	9.000E-02	0.0	0.0	2.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Pm-148M	2.500E-01	9.000E-02	0.0	0.0	2.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Pm-148	2.500E-01	9.000E-02	0.0	0.0	2.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Pm-149	2.500E-01	9.000E-02	0.0	0.0	2.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Sm-147	2.500E-01	9.000E-02	0.0	0.0	9.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Sm-151	2.500E-01	9.000E-02	0.0	0.0	9.000E-02	5.000E-03	0.0	0.0	0.0	0.0

TABLE 4-1D (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Sm-153	2.500E-01	9.000E-02	0.0	0.0	9.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Eu-152M	2.500E-01	9.000E-02	0.0	0.0	6.000E-02	7.500E-03	0.0	0.0	0.0	0.0
Eu-152	2.500E-01	9.000E-02	0.0	0.0	6.000E-02	7.500E-03	0.0	0.0	0.0	0.0
Eu-154	2.500E-01	9.000E-02	0.0	0.0	6.000E-02	7.500E-03	0.0	0.0	0.0	0.0
Eu-155	2.500E-01	9.000E-02	0.0	0.0	6.000E-02	7.500E-03	0.0	0.0	0.0	0.0
Gd-153	2.500E-01	1.500E-01	0.0	0.0	7.500E-03	0.0	0.0	0.0	0.0	0.0
Gd-159	2.500E-01	1.100E-01	0.0	0.0	3.000E-02	0.0	0.0	0.0	0.0	0.0
Tb-160	2.500E-01	1.500E-01	0.0	0.0	0.0	7.500E-03	0.0	0.0	0.0	0.0
Dy-165	2.500E-01	1.500E-01	0.0	0.0	2.000E-02	0.0	0.0	0.0	0.0	0.0
Dy-166	2.500E-01	1.500E-01	0.0	0.0	2.000E-02	0.0	0.0	0.0	0.0	0.0
Ho-166	2.500E-01	1.600E-01	0.0	0.0	2.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Er-169	2.500E-01	1.500E-01	0.0	0.0	7.500E-03	5.000E-03	0.0	0.0	0.0	0.0
Er-171	2.500E-01	1.500E-01	0.0	0.0	7.500E-03	5.000E-03	0.0	0.0	0.0	0.0
Tm-170	2.500E-01	1.600E-01	0.0	0.0	0.0	5.000E-03	0.0	0.0	0.0	0.0
Yb-175	2.500E-01	1.500E-01	0.0	0.0	0.0	1.300E-02	0.0	0.0	0.0	0.0
Lu-177	2.500E-01	1.700E-01	0.0	0.0	0.0	2.500E-03	0.0	0.0	0.0	0.0
Hf-181	2.500E-01	4.000E-02	0.0	0.0	1.100E-01	5.000E-03	3.000E-02	0.0	0.0	0.0
Ta-182	2.500E-01	5.000E-02	0.0	0.0	8.000E-02	7.500E-03	2.500E-03	0.0	0.0	0.0
W-181	3.000E-01	2.000E-02	0.0	0.0	2.000E-02	0.0	0.0	0.0	0.0	0.0
W-185	3.000E-01	2.000E-02	0.0	0.0	2.000E-02	0.0	0.0	0.0	0.0	0.0
W-187	3.000E-01	2.000E-02	0.0	0.0	2.000E-02	0.0	0.0	0.0	0.0	0.0
W-188	3.000E-01	2.000E-02	0.0	0.0	2.000E-02	0.0	0.0	0.0	0.0	0.0
Re-183	5.000E-01	5.000E-03	0.0	3.500E-03	5.000E-03	0.0	0.0	0.0	0.0	0.0
Re-186	5.000E-01	5.000E-03	0.0	3.500E-03	5.000E-03	0.0	0.0	0.0	0.0	0.0
Re-187	5.000E-01	5.000E-03	0.0	3.500E-03	5.000E-03	0.0	0.0	0.0	0.0	0.0
Re-188	5.000E-01	5.000E-03	0.0	3.500E-03	5.000E-03	0.0	0.0	0.0	0.0	0.0
Os-185	3.000E-01	0.0	0.0	0.0	1.000E-02	2.000E-02	0.0	0.0	0.0	0.0
Os-191M	3.000E-01	0.0	0.0	0.0	1.000E-02	2.000E-02	0.0	0.0	0.0	0.0

TABLE 4-1D (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Os-191	3.000E-01	0.0	0.0	0.0	1.000E 00	2.000E-02	0.0	0.0	0.0	0.0
Os-193	3.000E-01	0.0	0.0	0.0	1.000E-02	2.000E-02	0.0	0.0	0.0	0.0
Ir-190	3.000E-01	0.0	0.0	0.0	7.000E-02	1.400E-02	6.000E-03	0.0	0.0	0.0
Ir-192	3.000E-01	0.0	0.0	0.0	7.000E-02	1.400E-02	6.000E-03	0.0	0.0	0.0
Ir-194	3.000E-01	0.0	0.0	0.0	7.000E-02	1.400E-02	6.000E-03	0.0	0.0	0.0
Pt-191	3.000E-01	0.0	0.0	0.0	2.400E-03	3.000E-02	2.400E-03	0.0	0.0	0.0
Pt-193M	3.000E-01	0.0	0.0	0.0	2.400E-03	3.000E-02	2.400E-03	0.0	0.0	0.0
Pt-193	3.000E-01	0.0	0.0	0.0	2.400E-03	3.000E-02	2.400E-03	0.0	0.0	0.0
Pt-197M	3.000E-01	0.0	0.0	0.0	2.400E-03	3.000E-02	2.400E-03	0.0	0.0	0.0
Pt-197	3.000E-01	0.0	0.0	0.0	2.400E-03	3.000E-02	2.400E-03	0.0	0.0	0.0
Au-196	3.000E-01	0.0	0.0	0.0	1.000E-02	9.000E-03	1.500E-03	0.0	0.0	0.0
Au-198	3.000E-01	0.0	0.0	0.0	1.000E-02	9.000E-03	1.500E-03	0.0	0.0	0.0
Au-199	3.000E-01	0.0	0.0	0.0	1.000E-02	9.000E-03	1.500E-03	0.0	0.0	0.0
Hg-197M	6.300E-01	0.0	0.0	0.0	9.000E-02	2.200E-01	1.000E-02	0.0	0.0	0.0
Hg-197	6.300E-01	0.0	0.0	0.0	9.000E-02	2.200E-01	1.000E-02	0.0	0.0	0.0
Hg-203	6.300E-01	0.0	0.0	0.0	9.000E-02	2.200E-01	1.000E-02	0.0	0.0	0.0
Tl-200	4.800E-01	2.600E-02	2.000E-01	6.000E 06	2.000E-02	2.400E-02	0.0	0.0	0.0	2.900E-03
Tl-201	4.800E-01	2.600E-02	2.600E-01	0.0	2.000E-02	2.400E-02	0.0	0.0	0.0	2.900E-03
Tl-202	4.800E-01	2.600E-02	2.600E-01	0.0	2.000E-02	2.400E-02	0.0	0.0	0.0	2.900E-03
Tl-204	4.800E-01	2.600E-02	2.600E-01	0.0	2.000E-02	2.400E-02	0.0	0.0	0.0	2.900E-03
Pb-203	2.900E-01	8.000E-02	0.0	0.0	2.300E-02	4.000E-02	0.0	0.0	0.0	0.0
Pb-204M	2.900E-01	8.000E-02	0.0	0.0	2.300E-02	4.000E-02	0.0	0.0	0.0	0.0
Pb-210	2.900E-01	8.000E-02	0.0	0.0	2.300E-02	4.000E-02	0.0	0.0	0.0	0.0
Pb-212	2.900E-01	8.000E-02	0.0	0.0	2.300E-02	4.000E-02	0.0	0.0	0.0	0.0
Bi-206	2.600E-01	7.700E-03	0.0	0.0	4.000E-02	8.000E-02	2.600E-03	0.0	0.0	0.0
Bi-207	2.600E-01	7.700E-03	0.0	0.0	4.000E-02	8.000E-02	2.600E-03	0.0	0.0	0.0
Bi-210	2.600E-01	7.700E-03	0.0	0.0	4.000E-02	8.000E-02	2.600E-03	0.0	0.0	0.0
Bi-212	2.600E-01	7.700E-03	0.0	0.0	4.000E-02	8.000E-02	2.600E-03	0.0	0.0	0.0

TABLE 4-1D (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Po-210	2.800E-01	3.000E-02	0.0	0.0	5.000E-02	2.000E-02	1.000E-02	0.0	0.0	0.0
At-211	7.500E-01	0.0	0.0	2.300E-02	0.0	0.0	2.000E-02	0.0	1.500E-03	0.0
Ra-223	4.000E-01	2.000E-01	0.0	0.0	1.600E-04	8.000E-04	0.0	0.0	0.0	0.0
Ra-224	4.000E-01	2.000E-01	0.0	0.0	1.600E-04	8.000E-04	0.0	0.0	0.0	0.0
Ra-226	4.000E-01	4.000E-02	0.0	0.0	1.600E-04	8.000E-04	0.0	0.0	0.0	0.0
Ra-228	4.000E-01	4.000E-02	0.0	0.0	1.600E-04	8.000E-04	0.0	0.0	0.0	0.0
Ac-227	2.500E-01	8.000E-02	0.0	0.0	1.300E-01	3.000E-03	0.0	0.0	0.0	0.0
Ac-228	2.500E-01	8.000E-02	0.0	0.0	1.300E-01	3.000E-03	0.0	0.0	0.0	0.0
Th-227	2.500E-01	1.800E-01	0.0	0.0	1.000E-02	1.000E-02	0.0	0.0	0.0	0.0
Th-228	2.500E-01	1.800E-01	0.0	0.0	1.000E-02	1.000E-02	0.0	0.0	0.0	0.0
Th-230	2.500E-01	1.800E-01	0.0	0.0	1.000E-02	1.000E-02	0.0	0.0	0.0	0.0
Th-231	2.500E-01	1.800E-01	0.0	0.0	1.000E-02	1.000E-02	0.0	0.0	0.0	0.0
Th-232	2.500E-01	1.800E-01	0.0	0.0	1.000E-02	1.000E-02	0.0	0.0	0.0	0.0
Th-234	2.500E-01	1.800E-01	0.0	0.0	1.000E-02	1.000E-02	0.0	0.0	0.0	0.0
Pa-230	2.500E-01	1.100E-01	0.0	0.0	1.300E-02	1.000E-02	0.0	0.0	0.0	0.0
Pa-231	2.500E-01	1.100E-01	0.0	0.0	1.300E-02	1.000E-02	0.0	0.0	0.0	0.0
Pa-233	2.500E-01	1.100E-01	0.0	0.0	1.300E-02	1.000E-02	0.0	0.0	0.0	0.0
Pa-234	2.500E-01	1.100E-01	0.0	0.0	1.300E-02	1.000E-02	0.0	0.0	0.0	0.0
U-230	2.500E-01	2.800E-02	0.0	0.0	0.0	2.800E-02	0.0	0.0	0.0	0.0
U-232	2.500E-01	2.800E-02	0.0	0.0	0.0	2.800E-02	0.0	0.0	0.0	0.0
U-233	2.500E-01	2.800E-02	0.0	0.0	0.0	2.800E-02	0.0	0.0	0.0	0.0
U-234	2.600E-01	2.800E-02	0.0	0.0	0.0	2.800E-02	0.0	0.0	0.0	0.0
U-235	2.500E-01	2.800E-02	0.0	0.0	0.0	2.800E-02	0.0	0.0	0.0	0.0
U-236	2.500E-01	2.800E-02	0.0	0.0	0.0	2.800E-02	0.0	0.0	0.0	0.0
U-237	2.600E-01	2.800E-02	0.0	0.0	0.0	2.800E-02	0.0	0.0	0.0	0.0
U-238	2.600E-01	2.800E-02	0.0	0.0	0.0	2.800E-02	0.0	0.0	0.0	0.0
Np-237	2.500E-01	1.100E-01	0.0	0.0	1.300E-02	7.500E-03	0.0	0.0	0.0	0.0
Np-239	2.500E-01	1.100E-01	0.0	0.0	1.300E-02	7.500E-03	0.0	0.0	0.0	0.0

TABLE 4-1D (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Pu-236	2.500E-01	2.000E-01	0.0	0.0	3.800E-02	5.000E-03	0.0	0.0	0.0	0.0
Pu-238	2.500E-01	2.000E-01	0.0	0.0	3.800E-02	5.000E-03	0.0	0.0	0.0	0.0
Pu-239	2.500E-01	2.000E-01	0.0	0.0	3.800E-02	5.000E-03	0.0	0.0	0.0	0.0
Pu-240	2.500E-01	2.000E-01	0.0	0.0	3.800E-02	5.000E-03	0.0	0.0	0.0	0.0
Pu-241	2.500E-01	2.000E-01	0.0	0.0	3.800E-02	5.000E-03	0.0	0.0	0.0	0.0
Pu-242	2.500E-01	2.000E-01	0.0	0.0	3.800E-02	5.000E-03	0.0	0.0	0.0	0.0
Pu-243	2.500E-01	2.000E-01	0.0	0.0	3.800E-02	5.000E-03	0.0	0.0	0.0	0.0
Pu-244	2.500E-01	2.000E-01	0.0	0.0	3.800E-02	5.000E-03	0.0	0.0	0.0	0.0
Am-241	2.500E-01	6.300E-02	0.0	0.0	8.800E-02	7.500E-03	0.0	0.0	0.0	0.0
Am-242M	2.500E-01	6.300E-02	0.0	0.0	8.800E-02	7.500E-03	0.0	0.0	0.0	0.0
Am-242	2.500E-01	6.300E-02	0.0	0.0	8.800E-02	7.500E-03	0.0	0.0	0.0	0.0
Am-243	2.500E-01	6.300E-02	0.0	0.0	8.800E-02	7.500E-03	0.0	0.0	0.0	0.0
Am-244	2.500E-01	6.300E-02	0.0	0.0	8.800E-02	7.500E-03	0.0	0.0	0.0	0.0
Cm-242	2.500E-01	7.500E-02	0.0	0.0	1.000E-01	5.000E-03	0.0	0.0	0.0	0.0
Cm-243	2.500E-01	7.500E-02	0.0	0.0	1.000E-01	5.000E-03	0.0	0.0	0.0	0.0
Cm-244	2.500E-01	7.500E-02	0.0	0.0	1.000E-01	5.000E-03	0.0	0.0	0.0	0.0
Cm-245	2.500E-01	7.500E-02	0.0	0.0	1.000E-01	5.000E-03	0.0	0.0	0.0	0.0
Cm-246	2.500E-01	7.500E-02	0.0	0.0	1.000E-01	5.000E-03	0.0	0.0	0.0	0.0
Cm-247	2.500E-01	7.500E-02	0.0	0.0	1.000E-01	5.000E-03	0.0	0.0	0.0	0.0
Cm-248	2.500E-01	7.500E-02	0.0	0.0	1.000E-01	5.000E-03	0.0	0.0	0.0	0.0
Cm-249	2.500E-01	7.500E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bk-249	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bk-250	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-249	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-250	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-251	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-252	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-253	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-1D (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Cf-254	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-253	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-254M	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-254	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-255	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fm-254	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fm-255	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fm-256	2.500E-01	2.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-1E
INREM DATA BASE
INGESTION UPTAKE FRACTIONS[a]

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
H-3	1.000E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Be-7	2.000E-03	6.400E-04	0.0	0.0	2.000E-04	6.000E-05	4.000E-06	0.0	0.0	0.0
C-14	1.000E 00	2.500E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F-18	1.000E 00	4.000E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Na-22	1.000E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Na-24	1.000E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Si-31	8.500E-01	0.0	0.0	0.0	0.0	0.0	0.0	4.300E-04	5.000E-05	9.000E-02
P-32	7.500E-01	3.750E-01	0.0	0.0	5.000E-02	0.0	0.0	0.0	0.0	0.0
S-35	1.000E 00	3.000E-02	0.0	0.0	0.0	0.0	0.0	1.300E-03	0.0	0.0
Cl-36	1.000E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cl-38	1.000E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K-42	1.000E 00	0.0	6.500E-01	0.0	2.000E-02	0.0	4.000E-03	0.0	0.0	0.0
Ca-45	6.000E-01	5.400E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca-47	6.000E-01	5.400E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sc-46	1.000E-04	2.000E-05	0.0	0.0	1.500E-05	2.000E-06	0.0	0.0	0.0	0.0
Sc-47	1.000E-04	2.000E-05	0.0	0.0	1.500E-05	2.000E-06	0.0	0.0	0.0	0.0
Sc-48	1.000E-04	2.000E-05	0.0	0.0	1.500E-05	2.000E-06	0.0	0.0	0.0	0.0
V-48	2.000E-02	2.800E-03	0.0	0.0	1.200E-03	8.000E-04	2.000E-04	0.0	0.0	0.0
Cr-51	5.000E-03	0.0	0.0	4.500E-06	0.0	1.300E-05	0.0	0.0	0.0	2.000E-04
Mn-52	1.000E-01	0.0	0.0	0.0	2.000E-02	5.000E-03	0.0	0.0	0.0	0.0
Mn-54	1.000E-01	0.0	0.0	0.0	2.000E-02	0.0	0.0	0.0	0.0	0.0
Mn-56	1.000E-01	0.0	0.0	0.0	2.000E-02	0.0	0.0	0.0	0.0	0.0
Fe-55	1.000E-01	1.000E-02	0.0	0.0	1.300E-02	0.0	2.000E-03	0.0	0.0	2.000E-03
Fe-59	1.000E-01	0.0	0.0	0.0	1.300E-02	0.0	2.000E-03	0.0	0.0	2.000E-03
Co-57	3.000E-01	0.0	0.0	0.0	7.000E-03	6.000E-04	4.200E-04	0.0	0.0	0.0
Co-58M	3.000E-01	0.0	0.0	0.0	7.000E-03	6.000E-04	4.200E-04	0.0	0.0	0.0
Co-58	3.000E-01	0.0	0.0	0.0	7.000E-03	6.000E-04	4.200E-04	0.0	0.0	0.0

[a]Zero entries mean "no data."

TABLE 4-1E (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Co-60	3.000E-01	0.0	0.0	0.0	7.000E-03	6.000E-04	4.200E-04	0.0	0.0	0.0
Ni-59	3.000E-01	1.500E-01	0.0	0.0	2.000E-02	0.0	0.0	0.0	0.0	0.0
Ni-63	3.000E-01	1.500E-01	0.0	0.0	2.000E-02	0.0	0.0	0.0	0.0	0.0
Ni-65	3.000E-01	1.500E-01	0.0	0.0	2.000E-02	0.0	0.0	0.0	0.0	0.0
Cu-64	2.800E-01	0.0	0.0	0.0	2.000E-02	1.000E-02	2.000E-02	0.0	0.0	0.0
Zn-65	1.000E-01	1.500E-02	3.000E-02	0.0	3.500E-02	4.000E-03	0.0	9.000E-05	4.000E-05	0.0
Zn-69M	1.000E-01	1.500E-02	3.000E-02	0.0	3.500E-02	4.000E-03	0.0	9.000E-05	4.000E-05	0.0
Zn-69	1.000E-01	1.500E-02	3.000E-02	0.0	3.500E-02	4.000E-03	0.0	9.000E-05	4.000E-05	0.0
Ga-72	1.000E-03	3.000E-04	0.0	0.0	2.500E-04	2.000E-05	1.000E-05	0.0	0.0	0.0
Ge-71	1.000E-02	0.0	0.0	0.0	2.000E-04	3.000E-04	0.0	0.0	0.0	0.0
As-73	3.000E-02	0.0	0.0	0.0	9.000E-04	3.000E-04	0.0	0.0	0.0	0.0
As-74	3.000E-02	0.0	0.0	0.0	9.000E-04	3.000E-04	0.0	0.0	0.0	0.0
As-76	3.000E-02	0.0	0.0	0.0	9.000E-04	3.000E-04	0.0	0.0	0.0	0.0
As-77	3.000E-02	0.0	0.0	0.0	9.000E-04	3.000E-04	0.0	0.0	0.0	0.0
Se-75	9.000E-01	0.0	0.0	0.0	6.000E-02	4.000E-02	4.500E-03	0.0	0.0	0.0
Br-80M	1.000E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Br-82	1.000E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Br-83	1.000E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Br-84	1.000E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rb-86	1.000E 00	0.0	4.500E-01	0.0	5.000E-02	0.0	4.000E-03	0.0	0.0	0.0
Rb-87	1.000E 00	0.0	4.500E-01	0.0	5.000E-02	0.0	4.000E-03	0.0	0.0	0.0
Rb-88	1.000E 00	0.0	4.500E-01	0.0	5.000E-02	0.0	4.000E-03	0.0	0.0	0.0
Rb-89	1.000E 00	0.0	4.500E-01	0.0	5.000E-02	0.0	4.000E-03	0.0	0.0	0.0
Sr-85M	3.000E-01	2.100E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-85	3.000E-01	2.100E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-89	3.000E-01	2.100E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-90	5.100E-02	5.100E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr-91	3.000E-01	2.100E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-1E (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Sr-92	3.000E-01	2.100E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-90	1.000E-04	7.500E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-91M	1.000E-04	7.500E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-91	1.000E-04	7.500E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-92	1.000E-04	7.500E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y-93	1.000E-04	7.500E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zr-93	1.000E-04	3.600E-05	0.0	0.0	7.000E-06	2.000E-06	6.000E-07	0.0	0.0	0.0
Zr-95	1.000E-04	3.600E-05	0.0	0.0	7.000E-06	2.000E-06	6.000E-07	0.0	0.0	0.0
Zr-97	1.000E-04	3.600E-05	0.0	0.0	7.000E-06	2.000E-06	6.000E-07	0.0	0.0	0.0
Nb-93M	1.000E-04	3.800E-05	0.0	0.0	9.000E-06	2.000E-06	8.000E-07	0.0	0.0	0.0
Nb-95M	1.000E-04	3.800E-05	0.0	0.0	9.000E-06	2.000E-06	8.000E-07	0.0	0.0	0.0
Nb-95	1.000E-04	3.800E-05	0.0	0.0	9.000E-06	2.000E-06	8.000E-07	0.0	0.0	0.0
Nb-97	1.000E-04	3.800E-05	0.0	0.0	9.000E-06	2.000E-06	8.000E-07	0.0	0.0	0.0
Mo-99	8.000E-01	0.0	0.0	0.0	8.000E-02	6.000E-02	0.0	0.0	0.0	0.0
Tc-96M	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Tc-96	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Tc-97M	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Tc-97	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Tc-99M	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Tc-99	5.000E-01	1.000E-03	0.0	0.0	1.500E-03	5.000E-03	0.0	0.0	0.0	4.500E-04
Ru-97	3.000E-02	2.400E-03	0.0	0.0	0.0	6.000E-03	0.0	0.0	0.0	0.0
Ru-103	3.000E-02	2.400E-03	0.0	0.0	0.0	6.000E-03	0.0	0.0	0.0	0.0
Ru-105	3.000E-02	2.400E-03	0.0	0.0	0.0	6.000E-03	0.0	0.0	0.0	0.0
Ru-106	3.000E-02	2.400E-03	0.0	0.0	0.0	6.000E-03	0.0	0.0	0.0	0.0
Rh-103M	2.000E-01	1.000E-02	0.0	0.0	8.000E-03	6.000E-03	2.000E-03	0.0	0.0	0.0
Rh-105	2.000E-01	1.000E-02	0.0	0.0	8.000E-03	6.000E-03	2.000E-03	0.0	0.0	0.0
Pd-103	2.000E-01	0.0	0.0	0.0	2.000E-02	2.000E-02	2.000E-03	0.0	0.0	0.0
Pd-109	2.000E-01	0.0	0.0	0.0	2.000E-02	2.000E-02	2.000E-03	0.0	0.0	0.0

TABLE 4-1E (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Ag-105	1.000E-02	5.000E-04	0.0	0.0	3.000E-04	2.000E-04	0.0	0.0	0.0	0.0
Ag-110M	1.000E-02	5.000E-04	0.0	0.0	3.000E-04	2.000E-04	0.0	0.0	0.0	0.0
Ag-111	1.000E-02	5.000E-04	0.0	0.0	3.000E-04	2.000E-04	0.0	0.0	0.0	0.0
Cd-109	2.500E-03	0.0	0.0	0.0	1.900E-03	2.500E-04	0.0	0.0	0.0	0.0
Cd-115M	2.500E-03	0.0	0.0	0.0	1.900E-03	2.500E-04	0.0	0.0	0.0	0.0
Cd-115	2.500E-03	0.0	0.0	0.0	1.900E-03	2.500E-04	0.0	0.0	0.0	0.0
In-113M	2.000E-03	3.400E-04	0.0	8.000E-07	2.800E-04	8.000E-05	4.000E-05	0.0	0.0	0.0
In-114M	2.000E-03	3.400E-04	0.0	8.000E-07	2.800E-04	8.000E-05	4.000E-05	0.0	0.0	0.0
In-115M	2.000E-03	3.400E-04	0.0	8.000E-07	2.800E-04	8.000E-05	4.000E-05	0.0	0.0	0.0
In-115	2.000E-03	3.400E-04	0.0	8.000E-07	2.800E-04	8.000E-05	4.000E-05	0.0	0.0	0.0
Sn-113	5.000E-02	2.000E-02	0.0	5.000E-06	5.000E-04	0.0	0.0	0.0	0.0	0.0
Sn-119M	5.000E-02	2.000E-02	0.0	5.000E-06	5.000E-04	0.0	0.0	0.0	0.0	0.0
Sn-123	5.000E-02	2.000E-02	0.0	5.000E-06	5.000E-04	0.0	0.0	0.0	0.0	0.0
Sn-125	5.000E-02	2.000E-02	0.0	5.000E-06	5.000E-04	0.0	0.0	0.0	0.0	0.0
Sb-122	3.000E-02	3.000E-03	0.0	9.000E-07	6.000E-05	0.0	0.0	0.0	0.0	9.000E-04
Sb-124	3.000E-02	3.000E-03	0.0	9.000E-07	6.000E-05	0.0	0.0	0.0	0.0	9.000E-04
Sb-125	3.000E-02	3.000E-03	0.0	9.000E-07	6.000E-05	0.0	0.0	0.0	0.0	9.000E-04
Te-125M	2.500E-01	2.300E-02	0.0	2.500E-04	1.000E-02	2.000E-02	2.500E-03	7.500E-04	0.0	0.0
Te-127M	2.500E-01	2.300E-02	0.0	2.500E-04	1.000E-02	2.000E-02	2.500E-03	7.500E-04	0.0	0.0
Te-127	2.500E-01	2.300E-02	0.0	2.500E-04	1.000E-02	2.000E-02	2.500E-03	7.500E-04	0.0	0.0
Te-129M	2.500E-01	2.300E-02	0.0	2.500E-04	1.000E-02	2.000E-02	2.500E-03	7.500E-04	0.0	0.0
Te-129	2.500E-01	2.300E-02	0.0	2.500E-04	1.000E-02	2.000E-02	2.500E-03	7.500E-04	0.0	0.0
Te-131M	2.500E-01	2.300E-02	0.0	2.500E-04	1.000E-02	2.000E-02	2.500E-03	7.500E-04	0.0	0.0
Te-132	2.500E-01	2.300E-02	0.0	2.500E-04	1.000E-02	2.000E-02	2.500E-03	7.500E-04	0.0	0.0
I-126	1.000E 00	7.000E-02	0.0	3.000E-01	1.200E-01	4.000E-02	5.000E-03	5.000E-03	0.0	0.0
I-129	1.000E 00	0.0	0.0	3.000E-01	0.0	0.0	0.0	0.0	0.0	0.0
I-130	1.000E 00	7.000E-02	0.0	3.000E-01	1.200E-01	4.000E-02	5.000E-03	5.000E-03	0.0	0.0
I-131	1.000E 00	0.0	0.0	3.000E-01	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-1E (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
I-132	1.000E 00	0.0	0.0	3.000E-01	0.0	0.0	0.0	0.0	0.0	0.0
I-133	1.000E 00	0.0	0.0	3.000E-01	0.0	0.0	0.0	0.0	0.0	0.0
I-134	1.000E 00	0.0	0.0	3.000E-01	0.0	0.0	0.0	0.0	0.0	0.0
I-135	1.000E 00	0.0	0.0	3.000E-01	0.0	0.0	0.0	0.0	0.0	0.0
Cs-131	1.000E 00	4.000E-02	4.000E-01	0.0	7.000E-02	1.000E-02	5.000E-03	0.0	0.0	3.000E-03
Cs-134M	1.000E 00	4.000E-02	4.000E-01	0.0	7.000E-02	1.000E-02	5.000E-03	0.0	0.0	3.000E-03
Cs-134	1.000E 00	4.000E-02	4.000E-01	0.0	7.000E-02	1.000E-02	5.000E-03	0.0	0.0	3.000E-03
Cs-135	1.000E 00	4.000E-02	4.000E-01	0.0	7.000E-02	1.000E-02	5.000E-03	0.0	0.0	3.000E-03
Cs-136	1.000E 00	4.000E-02	4.000E-01	0.0	7.000E-02	1.000E-02	5.000E-03	0.0	0.0	3.000E-03
Cs-137	1.000E 00	4.000E-02	4.000E-01	0.0	7.000E-02	1.000E-02	5.000E-03	0.0	0.0	3.000E-03
Cs-138	1.000E 00	4.000E-02	4.000E-01	0.0	7.000E-02	1.000E-02	5.000E-03	0.0	0.0	3.000E-03
Ba-131	5.000E-02	3.500E-02	1.500E-04	0.0	3.000E-05	5.000E-06	2.500E-06	5.000E-05	2.000E-05	1.000E-05
Ba-140	5.000E-02	3.500E-02	1.500E-04	0.0	3.000E-05	5.000E-06	2.500E-06	0.0	0.0	1.000E-05
La-140	1.000E-04	4.000E-05	0.0	0.0	1.500E-05	0.0	0.0	0.0	0.0	0.0
Ce-141	1.000E-04	3.000E-05	0.0	0.0	2.500E-05	2.000E-06	0.0	0.0	0.0	0.0
Ce-143	1.000E-04	3.000E-05	0.0	0.0	2.500E-05	2.000E-06	0.0	0.0	0.0	0.0
Ce-144	1.000E-04	3.000E-05	0.0	0.0	2.500E-05	2.000E-06	0.0	0.0	0.0	0.0
Pr-142	1.000E-04	4.000E-05	0.0	0.0	2.000E-05	2.000E-06	0.0	0.0	0.0	0.0
Pr-143	1.000E-04	4.000E-05	0.0	0.0	2.000E-05	2.000E-06	0.0	0.0	0.0	0.0
Nd-144	1.000E-04	3.500E-05	0.0	0.0	5.000E-05	5.000E-06	0.0	0.0	0.0	0.0
Nd-147	1.000E-04	3.500E-05	0.0	0.0	5.000E-05	5.000E-06	0.0	0.0	0.0	0.0
Nd-149	1.000E-04	3.500E-05	0.0	0.0	5.000E-05	5.000E-06	0.0	0.0	0.0	0.0
Pm-147	1.000E-04	3.500E-05	0.0	0.0	6.000E-06	2.000E-06	0.0	0.0	0.0	0.0
Pm-148M	1.000E-04	3.500E-05	0.0	0.0	6.000E-06	2.000E-06	0.0	0.0	0.0	0.0
Pm-148	1.000E-04	3.500E-05	0.0	0.0	6.000E-06	2.000E-06	0.0	0.0	0.0	0.0
Pm-149	1.000E-04	3.500E-05	0.0	0.0	6.000E-06	2.000E-06	0.0	0.0	0.0	0.0
Sm-147	1.000E-04	3.500E-05	0.0	0.0	3.500E-05	2.000E-06	0.0	0.0	0.0	0.0
Sm-151	1.000E-04	3.500E-05	0.0	0.0	3.500E-05	2.000E-06	0.0	0.0	0.0	0.0

TABLE 4-1E (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Sm-153	1.000E-04	3.500E-05	0.0	0.0	3.500E-05	2.000E-06	0.0	0.0	0.0	0.0
Eu-152M	1.000E-04	3.600E-05	0.0	0.0	2.500E-05	3.000E-06	0.0	0.0	0.0	0.0
Eu-152	1.000E-04	3.600E-05	0.0	0.0	2.500E-05	3.000E-06	0.0	0.0	0.0	0.0
Eu-154	1.000E-04	3.600E-05	0.0	0.0	2.500E-05	3.000E-06	0.0	0.0	0.0	0.0
Eu-155	1.000E-04	3.600E-05	0.0	0.0	2.500E-05	3.000E-06	0.0	0.0	0.0	0.0
Gd-153	1.000E-04	6.000E-05	0.0	0.0	3.000E-06	0.0	0.0	0.0	0.0	0.0
Gd-159	1.000E-04	4.500E-05	0.0	0.0	1.200E-05	0.0	0.0	0.0	0.0	0.0
Tb-160	1.000E-04	6.000E-05	0.0	0.0	0.0	3.000E-06	0.0	0.0	0.0	0.0
Dy-165	1.000E-04	6.000E-05	0.0	0.0	6.000E-06	0.0	0.0	0.0	0.0	0.0
Dy-166	1.000E-04	6.000E-05	0.0	0.0	6.000E-06	0.0	0.0	0.0	0.0	0.0
Ho-166	1.000E-04	6.400E-05	0.0	0.0	6.000E-06	2.000E-06	0.0	0.0	0.0	0.0
Er-169	1.000E-04	6.000E-05	0.0	0.0	3.000E-06	2.000E-06	0.0	0.0	0.0	0.0
Er-171	1.000E-04	6.000E-05	0.0	0.0	3.000E-06	2.000E-06	0.0	0.0	0.0	0.0
Tm-170	1.000E-04	6.500E-05	0.0	0.0	0.0	2.000E-06	0.0	0.0	0.0	0.0
Yb-175	1.000E-04	5.800E-05	0.0	0.0	0.0	5.000E-06	0.0	0.0	0.0	0.0
Lu-177	1.000E-04	6.800E-05	0.0	0.0	0.0	1.000E-06	0.0	0.0	0.0	0.0
Hf-181	1.000E-04	1.500E-05	0.0	0.0	4.500E-05	2.000E-06	1.300E-05	0.0	0.0	0.0
Ta-182	1.000E-04	2.000E-05	0.0	0.0	3.000E-05	3.000E-06	1.000E-06	0.0	0.0	0.0
W-181	1.000E-01	7.000E-03	0.0	0.0	6.000E-03	0.0	0.0	0.0	0.0	0.0
W-185	1.000E-01	7.000E-03	0.0	0.0	6.000E-03	0.0	0.0	0.0	0.0	0.0
W-187	1.000E-01	7.000E-03	0.0	0.0	6.000E-03	0.0	0.0	0.0	0.0	0.0
W-188	1.000E-01	7.000E-03	0.0	0.0	6.000E-03	0.0	0.0	0.0	0.0	0.0
Re-183	5.000E-01	5.000E-03	0.0	3.500E-03	5.000E-03	0.0	0.0	0.0	0.0	0.0
Re-186	5.000E-01	5.000E-03	0.0	3.500E-03	5.000E-03	0.0	0.0	0.0	0.0	0.0
Re-187	5.000E-01	5.000E-03	0.0	3.500E-03	5.000E-03	0.0	0.0	0.0	0.0	0.0
Re-188	5.000E-01	5.000E-03	0.0	3.500E-03	5.000E-03	0.0	0.0	0.0	0.0	0.0
Os-185	1.000E-01	0.0	0.0	0.0	4.000E-03	5.000E-03	0.0	0.0	0.0	0.0

TABLE 4-1E (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Os-191M	1.000E-01	0.0	0.0	0.0	4.000E-03	5.000E-03	0.0	0.0	0.0	0.0
Os-191	1.000E-01	0.0	0.0	0.0	4.000E-03	5.000E-03	0.0	0.0	0.0	0.0
Os-193	1.000E-01	0.0	0.0	0.0	4.000E-03	5.000E-03	0.0	0.0	0.0	0.0
Ir-190	1.000E-01	0.0	0.0	0.0	2.300E-02	4.500E-03	2.000E-03	0.0	0.0	0.0
Ir-192	1.000E-01	0.0	0.0	0.0	2.300E-02	4.500E-03	2.000E-03	0.0	0.0	0.0
Ir-194	1.000E-01	0.0	0.0	0.0	2.300E-02	4.500E-03	2.000E-03	0.0	0.0	0.0
Pt-191	1.000E-01	0.0	0.0	0.0	8.000E-04	1.000E-02	8.000E-04	0.0	0.0	0.0
Pt-193M	1.000E-01	0.0	0.0	0.0	8.000E-04	1.000E-02	8.000E-04	0.0	0.0	0.0
Pt-193	1.000E-01	0.0	0.0	0.0	8.000E-04	1.000E-02	8.000E-04	0.0	0.0	0.0
Pt-197M	1.000E-01	0.0	0.0	0.0	8.000E-04	1.000E-02	8.000E-04	0.0	0.0	0.0
Pt-197	1.000E-01	0.0	0.0	0.0	8.000E-04	1.000E-02	8.000E-04	0.0	0.0	0.0
Au-196	1.000E-01	0.0	0.0	0.0	4.000E-03	3.000E-03	5.000E-04	0.0	0.0	0.0
Au-198	1.000E-01	0.0	0.0	0.0	4.000E-03	3.000E-03	5.000E-04	0.0	0.0	0.0
Au-199	1.000E-01	0.0	0.0	0.0	4.000E-03	3.000E-03	5.000E-04	0.0	0.0	0.0
Hg-197M	7.500E-01	0.0	0.0	0.0	1.100E-01	2.600E-01	2.000E-02	0.0	0.0	0.0
Hg-197	7.500E-01	0.0	0.0	0.0	1.100E-01	2.600E-01	2.000E-02	0.0	0.0	0.0
Hg-203	7.500E-01	0.0	0.0	0.0	1.100E-01	2.600E-01	2.000E-02	0.0	0.0	0.0
Tl-200	4.500E-01	2.500E-02	2.000E-01	4.000E 06	2.000E-02	2.300E-02	0.0	0.0	0.0	2.700E-03
Tl-201	4.500E-01	2.500E-02	2.400E-01	0.0	2.000E-02	2.300E-02	0.0	0.0	0.0	2.700E-03
Tl-202	4.500E-01	2.500E-02	2.400E-01	0.0	2.000E-02	2.300E-02	0.0	0.0	0.0	2.700E-03
Tl-204	4.500E-01	2.500E-02	2.400E-01	0.0	2.000E-02	2.300E-02	0.0	0.0	0.0	2.700E-03
Pb-203	8.000E-02	2.000E-02	0.0	0.0	6.400E-03	1.000E-02	0.0	0.0	0.0	0.0
Pb-204M	8.000E-02	2.000E-02	0.0	0.0	6.400E-03	1.000E-02	0.0	0.0	0.0	0.0
Pb-210	8.000E-02	2.000E-02	0.0	0.0	6.400E-03	1.000E-02	0.0	0.0	0.0	0.0
Pb-212	8.000E-02	2.000E-02	0.0	0.0	6.400E-03	1.000E-02	0.0	0.0	0.0	0.0
Bi-206	1.000E-02	3.000E-04	0.0	0.0	1.500E-03	3.000E-03	1.000E-04	0.0	0.0	0.0
Bi-207	1.000E-02	3.000E-04	0.0	0.0	1.500E-03	3.000E-03	1.000E-04	0.0	0.0	0.0
Bi-210	1.000E-02	3.000E-04	0.0	0.0	1.500E-03	3.000E-03	1.000E-04	0.0	0.0	0.0

TABLE 4-1E (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Bi-212	1.000E-02	3.000E-04	0.0	0.0	1.500E-03	3.000E-03	1.000E-04	0.0	0.0	0.0
Po-210	6.000E-02	6.000E-03	0.0	0.0	1.000E-02	4.000E-03	2.000E-03	0.0	0.0	0.0
At-211	1.000E 00	0.0	0.0	3.000E-02	0.0	0.0	3.000E-02	0.0	2.000E-03	0.0
Ra-223	3.000E-01	1.500E-01	0.0	0.0	1.200E-04	6.000E-04	0.0	0.0	0.0	0.0
Ra-224	3.000E-01	1.500E-01	0.0	0.0	1.200E-04	6.000E-04	0.0	0.0	0.0	0.0
Ra-226	3.000E-01	3.000E-02	0.0	0.0	1.200E-04	6.000E-04	0.0	0.0	0.0	0.0
Ra-228	3.000E-01	3.000E-02	0.0	0.0	1.200E-04	6.000E-04	0.0	0.0	0.0	0.0
Ac-227	1.000E-04	3.000E-05	0.0	0.0	5.000E-05	1.000E-06	0.0	0.0	0.0	0.0
Ac-228	1.000E-04	3.000E-05	0.0	0.0	5.000E-05	1.000E-06	0.0	0.0	0.0	0.0
Th-227	1.000E-04	7.000E-05	0.0	0.0	5.000E-06	5.000E-06	0.0	0.0	0.0	0.0
Th-228	1.000E-04	7.000E-05	0.0	0.0	5.000E-06	5.000E-06	0.0	0.0	0.0	0.0
Th-230	1.000E-04	7.000E-05	0.0	0.0	5.000E-06	5.000E-06	0.0	0.0	0.0	0.0
Th-231	1.000E-04	7.000E-05	0.0	0.0	5.000E-06	5.000E-06	0.0	0.0	0.0	0.0
Th-232	1.000E-04	7.000E-05	0.0	0.0	5.000E-06	5.000E-06	0.0	0.0	0.0	0.0
Th-234	1.000E-04	7.000E-05	0.0	0.0	5.000E-06	5.000E-06	0.0	0.0	0.0	0.0
Pa-230	1.000E-04	4.500E-05	0.0	0.0	5.000E-06	4.000E-06	0.0	0.0	0.0	0.0
Pa-231	1.000E-04	4.500E-05	0.0	0.0	5.000E-06	4.000E-06	0.0	0.0	0.0	0.0
Pa-233	1.000E-04	4.500E-05	0.0	0.0	5.000E-06	4.000E-06	0.0	0.0	0.0	0.0
Pa-234	1.000E-04	4.500E-05	0.0	0.0	5.000E-06	4.000E-06	0.0	0.0	0.0	0.0
U-230	1.000E-02	1.100E-03	0.0	0.0	0.0	1.100E-03	0.0	0.0	0.0	0.0
U-232	1.000E-02	1.100E-03	0.0	0.0	0.0	1.100E-03	0.0	0.0	0.0	0.0
U-233	1.000E-02	1.100E-03	0.0	0.0	0.0	1.100E-03	0.0	0.0	0.0	0.0
U-234	1.000E-02	1.100E-03	0.0	0.0	0.0	1.100E-03	0.0	0.0	0.0	0.0
U-235	1.000E-02	1.100E-03	0.0	0.0	0.0	1.100E-03	0.0	0.0	0.0	0.0
U-236	1.000E-02	1.100E-03	0.0	0.0	0.0	1.100E-03	0.0	0.0	0.0	0.0
U-237	1.000E-02	1.100E-03	0.0	0.0	0.0	1.100E-03	0.0	0.0	0.0	0.0
U-238	1.000E-02	1.100E-03	0.0	0.0	0.0	1.100E-03	0.0	0.0	0.0	0.0
Np-237	1.000E-04	4.500E-05	0.0	0.0	5.000E-06	3.000E-06	0.0	0.0	0.0	0.0

TABLE 4-1E (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Np-239	1.000E-04	4.500E-05	0.0	0.0	5.000E-06	3.000E-06	0.0	0.0	0.0	0.0
Pu-236	3.000E-05	2.400E-05	0.0	0.0	4.500E-06	6.000E-07	0.0	0.0	0.0	0.0
Pu-238	3.000E-05	2.400E-05	0.0	0.0	4.500E-06	6.000E-07	0.0	0.0	0.0	0.0
Pu-239	3.000E-05	2.400E-05	0.0	0.0	4.500E-06	6.000E-07	0.0	0.0	0.0	0.0
Pu-240	3.000E-05	2.400E-05	0.0	0.0	4.500E-06	6.000E-07	0.0	0.0	0.0	0.0
Pu-241	3.000E-05	2.400E-05	0.0	0.0	4.500E-06	6.000E-07	0.0	0.0	0.0	0.0
Pu-242	3.000E-05	2.400E-05	0.0	0.0	4.500E-06	6.000E-07	0.0	0.0	0.0	0.0
Pu-243	3.000E-05	2.400E-05	0.0	0.0	4.500E-06	6.000E-07	0.0	0.0	0.0	0.0
Pu-244	3.000E-05	2.400E-05	0.0	0.0	4.500E-06	6.000E-07	0.0	0.0	0.0	0.0
Am-241	1.000E-04	2.500E-05	0.0	0.0	3.500E-05	3.000E-06	0.0	0.0	0.0	0.0
Am-242M	1.000E-04	2.500E-05	0.0	0.0	3.500E-05	3.000E-06	0.0	0.0	0.0	0.0
Am-242	1.000E-04	2.500E-05	0.0	0.0	3.500E-05	3.000E-06	0.0	0.0	0.0	0.0
Am-243	1.000E-04	2.500E-05	0.0	0.0	3.500E-06	3.000E-06	0.0	0.0	0.0	0.0
Am-244	1.000E-04	2.500E-05	0.0	0.0	3.500E-05	3.000E-06	0.0	0.0	0.0	0.0
Cm-242	1.000E-04	3.000E-05	0.0	0.0	4.000E-05	2.000E-06	0.0	0.0	0.0	0.0
Cm-243	1.000E-04	3.000E-05	0.0	0.0	4.000E-05	2.000E-06	0.0	0.0	0.0	0.0
Cm-244	1.000E-04	3.000E-05	0.0	0.0	4.000E-06	2.000E-06	0.0	0.0	0.0	0.0
Cm-245	1.000E-04	3.000E-05	0.0	0.0	4.000E-05	2.000E-06	0.0	0.0	0.0	0.0
Cm-246	1.000E-04	3.000E-05	0.0	0.0	4.000E-05	2.000E-06	0.0	0.0	0.0	0.0
Cm-247	1.000E-04	3.000E-05	0.0	0.0	4.000E-05	2.000E-06	0.0	0.0	0.0	0.0
Cm-248	1.000E-04	3.000E-05	0.0	0.0	4.000E-05	2.000E-06	0.0	0.0	0.0	0.0
Cm-249	1.000E-04	3.000E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bk-249	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bk-250	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-249	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-250	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-251	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-1E (continued)

ORGAN NAME	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES	LUNGS
NUCLIDE										
Cf-252	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-253	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cf-254	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-253	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-254M	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-254	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Es-255	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fm-254	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fm-255	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fm-256	3.000E-05	2.400E-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4-1F

INREM DATA BASE

MAXIMUM PERMISSIBLE CONCENTRATIONS IN AIR AND WATER

FOR SOLUBLE AND INSOLUBLE MATERIAL[a]

NUCLIDE	SOLUBLE INHALATION	SOLUBLE INGESTION	INSOLUBLE INHALATION	INSOLUBLE INGESTION
H-3	0.0	0.0	0.0	0.0
Be-7	4.0000E-06	2.0000E-02	3.0000E-06	2.0000E-02
C-14	2.0000E-05	9.0000E-02	4.0000E-07	2.0000E-03
F-18	2.0000E-06	8.0000E-03	9.0000E-07	5.0000E-03
Na-22	7.0000E-07	3.0000E-03	5.0000E-08	3.0000E-04
Na-24	4.0000E-07	2.0000E-03	5.0000E-08	3.0000E-04
Si-31	2.0000E-06	9.0000E-03	3.0000E-07	2.0000E-03
P-32	2.0000E-07	9.0000E-04	4.0000E-08	2.0000E-04
S-35	1.0000E-05	5.0000E-02	5.0000E-07	3.0000E-03
Cl-36	3.0000E-06	1.0000E-02	1.0000E-07	6.0000E-04
Cl-38	1.0000E-07	4.0000E-03	7.0000E-07	4.0000E-03
K-42	7.0000E-07	3.0000E-03	4.0000E-08	2.0000E-04
Ca-45	1.0000E-06	4.0000E-03	3.0000E-07	2.0000E-03
Ca-47	2.0000E-07	8.0000E-04	6.0000E-08	3.0000E-04
Sc-46	8.0000E-08	4.0000E-04	7.0000E-08	4.0000E-04
Sc-47	2.0000E-07	9.0000E-04	2.0000E-07	9.0000E-04
Sc-48	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
V-48	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Cr-51	4.0000E-06	2.0000E-02	3.0000E-06	2.0000E-02
Mn-52	7.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Mn-54	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Mn-56	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Fe-55	6.0000E-06	3.0000E-02	4.0000E-06	2.0000E-02
Fe-59	1.0000E-07	6.0000E-04	9.0000E-08	5.0000E-04
Co-57	1.0000E-06	5.0000E-03	7.0000E-07	4.0000E-03
Co-58M	6.0000E-06	3.0000E-02	4.0000E-06	2.0000E-02
Co-58	3.0000E-07	1.0000E-03	2.0000E-07	9.0000E-04
Co-60	1.0000E-07	5.0000E-04	6.0000E-08	3.0000E-04
Ni-59	6.0000E-06	3.0000E-02	3.0000E-06	2.0000E-02
Ni-63	2.0000E-06	1.0000E-02	1.0000E-06	7.0000E-03
Ni-65	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Cu-64	7.0000E-07	3.0000E-03	4.0000E-07	2.0000E-03
Zn-65	4.0000E-07	2.0000E-03	3.0000E-07	2.0000E-03
Zn-69M	2.0000E-07	7.0000E-04	1.0000E-07	6.0000E-04
Zn-69	4.0000E-06	2.0000E-02	3.0000E-06	2.0000E-02
Ga-72	8.0000E-08	4.0000E-04	6.0000E-08	4.0000E-04
Ge-71	4.0000E-06	2.0000E-02	3.0000E-06	2.0000E-02
As-73	1.0000E-06	5.0000E-03	8.0000E-07	5.0000E-03
As-74	1.0000E-07	5.0000E-04	9.0000E-08	5.0000E-04
As-76	4.0000E-08	2.0000E-04	3.0000E-08	2.0000E-04
As-77	2.0000E-07	8.0000E-04	1.0000E-07	8.0000E-04
Se-75	6.0000E-06	3.0000E-02	5.0000E-07	3.0000E-03
Br-80M	5.0000E-08	0.0	0.0	0.0
Br-82	6.0000E-07	3.0000E-03	6.0000E-08	4.0000E-04
Br-83	0.0	0.0	0.0	0.0
Br-84	0.0	0.0	0.0	0.0
Rb-86	1.0000E-06	5.0000E-03	4.0000E-08	2.0000E-04
Rb-87	8.0000E-06	3.0000E-02	3.0000E-07	2.0000E-03
Rb-88	1.0000E-06	4.0000E-03	8.0000E-07	4.0000E-03
Rb-89	2.0000E-06	1.0000E-02	2.0000E-06	1.0000E-02
Sr-85M	1.0000E-05	7.0000E-02	1.0000E-05	7.0000E-02
Sr-85	5.0000E-07	2.0000E-03	3.0000E-07	2.0000E-03
Sr-89	9.0000E-08	4.0000E-04	5.0000E-08	3.0000E-04
Sr-90	1.0000E-07	5.0000E-04	6.0000E-08	4.0000E-04
Sr-91	2.0000E-07	7.0000E-04	9.0000E-08	5.0000E-04
Sr-92	2.0000E-07	7.0000E-04	1.0000E-07	6.0000E-04
Y-90	4.0000E-08	2.0000E-04	3.0000E-08	2.0000E-04
Y-91M	8.0000E-06	3.0000E-02	6.0000E-06	3.0000E-02
Y-91	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Y-92	1.0000E-07	6.0000E-04	1.0000E-07	6.0000E-04
Y-93	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Zr-93	2.0000E-06	8.0000E-03	1.0000E-06	8.0000E-03
Zr-95	1.0000E-07	6.0000E-04	1.0000E-07	6.0000E-04
Zr-97	4.0000E-08	2.0000E-04	3.0000E-08	2.0000E-04
Nb-93M	9.0000E-07	4.0000E-03	7.0000E-07	4.0000E-03
Nb-95M	1.6000E-07	8.0000E-04	1.6000E-07	8.0000E-04
Nb-95	2.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Nb-97	2.0000E-06	9.0000E-03	2.0000E-06	9.0000E-03
Mo-99	5.0000E-07	2.0000E-03	7.0000E-08	4.0000E-04
Tc-96M	3.0000E-05	1.0000E-01	2.0000E-05	1.0000E-01
Tc-96	2.0000E-07	1.0000E-03	8.0000E-08	5.0000E-04
Tc-97M	8.0000E-07	4.0000E-03	3.0000E-07	2.0000E-03
Tc-97	4.0000E-06	2.0000E-02	1.0000E-06	8.0000E-03
Tc-99M	1.0000E-05	6.0000E-02	5.0000E-06	3.0000E-02
Tc-99	7.0000E-07	3.0000E-03	3.0000E-07	2.0000E-03
Ru-97	8.0000E-07	4.0000E-03	6.0000E-07	3.0000E-03
Ru-103	2.0000E-07	8.0000E-04	1.0000E-07	8.0000E-04
Ru-105	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Ru-106	3.0000E-08	1.0000E-04	2.0000E-08	1.0000E-04
Rh-103M	3.0000E-05	1.0000E-01	2.0000E-05	1.0000E-01
Rh-105	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Pd-103	8.0000E-07	3.0000E-03	5.0000E-07	3.0000E-03
Pd-109	2.0000E-07	9.0000E-04	1.0000E-07	7.0000E-04
Ag-105	2.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Ag-110M	7.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Ag-111	1.0000E-07	4.0000E-04	8.0000E-08	4.0000E-04
Cd-109	4.0000E-07	2.0000E-03	3.0000E-07	2.0000E-03
Cd-115M	6.0000E-08	3.0000E-04	4.0000E-08	3.0000E-04
Cd-115	8.0000E-08	3.0000E-04	6.0000E-08	4.0000E-04
In-113M	3.0000E-06	1.0000E-02	2.0000E-06	1.0000E-02
In-114M	4.0000E-08	2.0000E-04	3.0000E-08	2.0000E-04
In-115M	8.0000E-07	4.0000E-03	6.0000E-07	4.0000E-03
In-115	2.0000E-07	9.0000E-04	2.0000E-07	9.0000E-04
Sn-113	1.3000E-06	6.1000E-03	1.0000E-06	5.8000E-03
Sn-119M	6.7000E-08	3.0000E-04	5.1000E-08	2.9000E-04
Sn-123	2.0000E-07	9.0000E-04	1.0000E-07	8.0000E-04
Sn-125	4.0000E-08	2.0000E-04	3.0000E-08	2.0000E-04
Sb-122	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Sb-124	5.0000E-08	2.0000E-04	4.0000E-08	2.0000E-04
Sb-125	2.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Te-125M	1.0000E-07	2.0000E-03	2.0000E-07	1.0000E-03
Te-127M	2.0000E-07	8.0000E-04	9.0000E-08	5.0000E-04
Te-127	6.0000E-07	3.0000E-03	3.0000E-07	2.0000E-03

[a]Zero entries mean "no data."

TABLE 4-1F (continued)

NUCLIDE	SOLUBLE INHALATION	SOLUBLE INGESTION	INSOLUBLE INHALATION	INSOLUBLE INGESTION
Te-129M	7.0000E-08	3.0000E-04	4.0000E-08	2.0000E-04
Te-129	2.0000E-06	8.0000E-03	1.0000E-06	8.0000E-03
Te-131M	1.0000E-07	6.0000E-04	6.0000E-08	4.0000E-04
Te-132	7.0000E-08	3.0000E-04	4.0000E-08	2.0000E-04
I-126	4.0000E-06	2.0000E-02	2.0000E-07	9.0000E-04
I-129	9.0000E-06	4.0000E-02	4.0000E-07	2.0000E-03
I-130	6.0000E-08	3.0000E-04	0.0	3.0000E-04
I-131	2.0000E-06	1.0000E-02	1.0000E-07	6.0000E-04
I-132	9.0000E-07	4.0000E-03	3.0000E-07	2.0000E-03
I-133	1.0000E-06	6.0000E-03	7.0000E-08	4.0000E-04
I-134	1.0000E-06	6.0000E-03	1.0000E-06	6.0000E-03
I-135	1.0000E-06	5.0000E-03	1.0000E-07	7.0000E-04
Cs-131	4.0000E-05	2.0000E-01	2.0000E-06	9.0000E-03
Cs-134M	1.0000E-05	6.0000E-02	2.0000E-06	1.0000E-02
Cs-134	1.0000E-06	5.0000E-03	7.0000E-08	4.0000E-04
Cs-135	1.0000E-05	5.0000E-02	4.0000E-07	2.0000E-03
Cs-136	2.0000E-06	8.0000E-03	1.0000E-07	6.0000E-04
Cs-137	2.0000E-06	8.0000E-03	8.0000E-08	4.0000E-04
Cs-138	1.0000E-06	4.0000E-03	8.0000E-07	4.0000E-03
Ba-131	4.0000E-07	2.0000E-03	3.0000E-07	2.0000E-03
Ba-140	6.0000E-08	3.0000E-04	4.0000E-08	2.0000E-04
La-140	5.0000E-08	2.0000E-04	4.0000E-08	2.0000E-04
Ce-141	2.0000E-07	9.0000E-04	2.0000E-07	9.0000E-04
Ce-143	9.0000E-08	4.0000E-04	7.0000E-08	4.0000E-04
Ce-144	3.0000E-06	1.0000E-04	2.0000E-08	1.0000E-04
Pr-142	7.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Pr-143	1.0000E-07	5.0000E-04	9.0000E-08	5.0000E-04
Nd-144	2.0000E-07	8.0000E-04	1.0000E-07	8.0000E-04
Nd-147	1.0000E-07	6.0000E-04	1.0000E-07	6.0000E-04
Nd-149	6.0000E-07	3.0000E-03	5.0000E-07	3.0000E-03
Pm-147	5.0000E-07	2.0000E-03	4.0000E-07	2.0000E-03
Pm-148M	6.3000E-08	2.8000E-04	5.0000E-08	2.8000E-04
Pm-148	4.2000E-08	1.9000E-04	3.4000E-08	1.9000E-04
Pm-149	1.0000E-07	4.0000E-04	8.0000E-08	4.0000E-04
Sm-147	2.0000E-07	7.0000E-04	1.0000E-07	7.0000E-04
Sm-151	8.0000E-07	4.0000E-03	7.0000E-07	4.0000E-03
Sm-153	2.0000E-07	8.0000E-04	1.0000E-07	8.0000E-04
Eu-152M	1.0000E-07	6.0000E-04	1.0000E-07	6.0000E-04
Eu-152	2.0000E-07	8.0000E-04	1.0000E-07	8.0000E-04
Eu-154	5.0000E-08	2.0000E-04	4.0000E-08	2.0000E-04
Eu-155	4.0000E-07	2.0000E-03	4.0000E-07	2.0000E-03
Gd-153	5.0000E-07	2.0000E-03	4.0000E-07	2.0000E-03
Gd-159	2.0000E-07	8.0000E-04	1.0000E-07	8.0000E-04
Tb-160	1.0000E-07	4.0000E-04	8.0000E-08	4.0000E-04
Dy-165	9.0000E-07	4.0000E-03	7.0000E-07	4.0000E-03
Dy-166	8.0000E-08	4.0000E-04	7.0000E-08	4.0000E-04
Ho-166	7.0000E-08	3.0000E-04	6.0000E-08	3.0000E-04
Er-169	2.0000E-07	9.0000E-04	2.0000E-07	9.0000E-04
Er-171	2.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Tm-170	1.0000E-07	5.0000E-04	8.0000E-08	5.0000E-04
Yb-175	2.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Lu-177	2.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03

NUCLIDE	SOLUBLE INHALATION	SOLUBLE INGESTION	INSOLUBLE INHALATION	INSOLUBLE INGESTION
Hf-181	2.0000E-07	7.0000E-04	1.0000E-07	7.0000E-04
Ta-182	9.0000E-08	4.0000E-04	7.0000E-08	4.0000E-04
W-181	8.0000E-07	4.0000E-03	6.0000E-07	3.0000E-03
W-185	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
W-187	2.0000E-07	7.0000E-04	1.0000E-07	6.0000E-04
W-188	7.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Re-183	1.0000E-06	6.0000E-03	5.0000E-07	3.0000E-03
Re-186	2.0000E-07	9.0000E-04	8.0000E-08	5.0000E-04
Re-187	6.0000E-06	3.0000E-02	2.0000E-06	2.0000E-02
Re-188	1.0000E-07	6.0000E-04	6.0000E-08	3.0000E-04
Os-185	2.0000E-07	7.0000E-04	1.0000E-07	7.0000E-04
Os-191M	6.0000E-06	3.0000E-02	4.0000E-06	2.0000E-02
Os-191	4.0000E-07	2.0000E-03	3.0000E-07	2.0000E-03
Os-193	1.0000E-07	6.0000E-04	9.0000E-08	5.0000E-04
Ir-190	4.0000E-07	2.0000E-03	3.0000E-07	2.0000E-03
Ir-192	9.0000E-08	4.0000E-04	6.0000E-08	4.0000E-04
Ir-194	8.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Pt-191	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Pt-193M	2.0000E-06	1.0000E-02	2.0000E-06	1.0000E-02
Pt-193	4.0000E-06	2.0000E-02	3.0000E-06	2.0000E-02
Pt-197M	2.0000E-06	1.0000E-02	2.0000E-06	9.0000E-03
Pt-197	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Au-196	4.0000E-07	2.0000E-03	3.0000E-07	1.0000E-03
Au-198	1.0000E-07	5.0000E-04	8.0000E-08	5.0000E-04
Au-199	4.0000E-07	2.0000E-03	3.0000E-07	2.0000E-03
Hg-197M	4.0000E-08	2.0000E-04	3.0000E-08	2.0000E-04
Hg-197	4.0000E-06	2.0000E-02	9.0000E-07	5.0000E-03
Hg-203	1.0000E-06	4.0000E-03	2.0000E-07	1.0000E-03
Tl-200	9.0000E-07	4.0000E-03	4.0000E-07	2.0000E-03
Tl-201	7.0000E-07	3.0000E-03	3.0000E-07	2.0000E-03
Tl-202	3.0000E-07	1.0000E-03	1.0000E-07	7.0000E-04
Tl-204	2.0000E-07	1.0000E-03	1.0000E-07	6.0000E-04
Pb-203	9.0000E-07	4.0000E-03	6.0000E-07	4.0000E-03
Pb-204M	1.0000E-07	4.0000E-04	8.0000E-08	4.0000E-04
Pb-210	4.0000E-07	2.0000E-03	3.0000E-07	2.0000E-03
Pb-212	1.0000E-06	7.0000E-03	3.0000E-07	2.0000E-03
Bi-206	8.0000E-08	4.0000E-04	7.0000E-08	4.0000E-04
Bi-207	1.0000E-07	6.0000E-04	1.0000E-07	6.0000E-04
Bi-210	9.0000E-08	4.0000E-04	7.0000E-08	4.0000E-04
Bi-212	8.0000E-07	4.0000E-03	6.0000E-07	4.0000E-03
Po-210	7.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
At-211	2.0000E-06	7.0000E-03	1.0000E-07	7.0000E-04
Ra-223	1.0000E-08	6.0000E-05	7.0000E-09	4.0000E-05
Ra-224	2.0000E-08	7.0000E-05	9.0000E-09	5.0000E-05
Ra-226	1.0000E-07	5.0000E-04	6.0000E-08	3.0000E-04
Ra-228	8.0000E-08	4.0000E-04	4.0000E-08	3.0000E-04
Ac-227	7.0000E-07	3.0000E-03	5.0000E-07	3.0000E-03
Ac-228	2.0000E-07	9.0000E-04	2.0000E-07	9.0000E-04
Th-227	4.0000E-08	2.0000E-04	3.0000E-08	2.0000E-04
Th-228	3.0000E-08	1.0000E-04	2.0000E-08	1.0000E-04
Th-230	7.0000E-08	3.0000E-04	6.0000E-08	3.0000E-04
Th-231	5.0000E-07	2.0000E-03	4.0000E-07	2.0000E-03

TABLE 4-1F (continued)

NUCLIDE	SOLUBLE INHALATION	SOLUBLE INGESTION	INSOLUBLE INHALATION	INSOLUBLE INGESTION
Th-232	8.0000E-08	4.0000E-04	7.0000E-08	4.0000E-04
Th-234	4.0000E-08	2.0000E-04	3.0000E-08	2.0000E-04
Pa-230	5.0000E-07	2.0000E-03	4.0000E-07	2.0000E-03
Pa-231	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Pa-233	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Pa-234	0.0	0.0	0.0	0.0
U-230	1.0000E-08	5.0000E-05	8.0000E-09	5.0000E-05
U-232	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
U-233	7.0000E-08	3.0000E-04	6.0000E-08	3.0000E-04
U-234	7.0000E-08	3.0000E-04	6.0000E-08	3.0000E-04
U-235	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
U-236	7.0000E-08	3.0000E-04	6.0000E-08	3.0000E-04
U-237	0.0	0.0	0.0	0.0
U-238	8.0000E-08	4.0000E-04	6.0000E-08	4.0000E-04
Np-237	7.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Np-239	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Pu-236	0.0	0.0	0.0	0.0
Pu-238	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Pu-239	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Pu-240	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Pu-241	3.0000E-06	1.0000E-02	2.0000E-06	1.0000E-02
Pu-242	7.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Pu-243	6.0000E-07	3.0000E-03	8.0000E-07	3.0000E-03
Pu-244	2.0000E-08	1.0000E-04	2.0000E-08	1.0000E-04
Am-241	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Am-242M	2.0000E-07	9.0000E-04	2.0000E-07	9.0000E-04
Am-242	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Am-243	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Am-244	1.0000E-05	5.0000E-02	8.0000E-06	5.0000E-02
Cm-242	5.0000E-08	2.0000E-04	4.0000E-08	2.0000E-04
Cm-243	5.0000E-08	2.0000E-04	4.0000E-08	2.0000E-04
Cm-244	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Cm-245	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Cm-246	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Cm-247	5.0000E-08	2.0000E-04	4.0000E-08	2.0000E-04
Cm-248	3.0000E-09	1.0000E-05	2.0000E-09	1.0000E-05
Cm-249	5.0000E-06	2.0000E-02	4.0000E-06	2.0000E-02
Bk-249	1.0000E-06	6.0000E-03	1.0000E-06	6.0000E-03
Bk-250	5.0000E-07	2.0000E-03	4.0000E-07	2.0000E-03
Cf-249	5.0000E-08	2.0000E-04	4.0000E-08	2.0000E-04
Cf-250	6.0000E-08	3.0000E-04	4.0000E-08	3.0000E-04
Cf-251	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Cf-252	2.0000E-08	7.0000E-05	1.0000E-08	7.0000E-05
Cf-253	3.0000E-07	1.0000E-03	3.0000E-07	1.0000E-03
Cf-254	3.0000E-10	1.0000E-06	2.0000E-10	1.0000E-06
Es-253	5.0000E-08	2.0000E-04	4.0000E-08	2.0000E-04
Es-254M	4.0000E-08	2.0000E-04	3.0000E-08	2.0000E-04
Es-254	3.0000E-08	1.0000E-04	3.0000E-08	1.0000E-04
Es-255	6.0000E-08	3.0000E-04	5.0000E-08	3.0000E-04
Fm-254	3.0000E-07	1.0000E-03	2.0000E-07	1.0000E-03
Fm-255	7.0000E-08	3.0000E-04	6.0000E-08	3.0000E-04
Fm-256	2.0000E-09	9.0000E-06	2.0000E-09	9.0000E-06

TABLE 4-2 INREM DOSE ESTIMATES FOR INHALATION OF A UNIT (1 μCi) OF EACH RADIONUCLIDE

DOSE COMMITMENT (REMS) FROM INHALATION OF RADIONUCLIDES

NUMBER OF THE REFERENCE EVENT = 1 .
AGE OF THE INDIVIDUAL AT TIME OF EVENT = 21.000 YEARS.
TIME AFTER EVENT WHEN INTAKE BEGINS = 0.0 YEARS.
TIME AFTER EVENT WHEN INTAKE ENDS = 0.003 YEARS.
DURATION OF THE INTAKE PERIOD = 0.003 YEARS.
TIME AFTER EVENT WHEN DOSE INTEGRATION BEGINS = 0.0 YEARS.
TIME AFTER EVENT WHEN DOSE INTEGRATION ENDS = 50.000 YEARS.
DURATION OF DOSE INTEGRATION = 50.000 YEARS.

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
1	H-3*	1.077E-04	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
2	BE-7	3.756E-04	3.417E-04	NO DATA	NO DATA	7.760E-04	8.135E-04	1.436E-04	NO DATA	NO DATA
3	C-14	4.240E-04	2.262E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
4	F-18	5.451E-05	4.573E-04	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
5	NA-22	1.382E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
6	NA-24	1.272E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
7	SI-31	4.621E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	4.043E-05	2.378E-05
8	P-32	6.144E-03	1.653E-01	NO DATA	NO DATA	9.519E-03	NO DATA	NO DATA	NO DATA	NO DATA
9	S-35	1.948E-03	4.462E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	7.682E-03	NO DATA
10	CL-36	5.921E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
11	CL-38	4.696E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
12	K-42	6.533E-04	NO DATA	9.960E-04	NO DATA	5.044E-04	NO DATA	1.143E-03	NO DATA	NO DATA
13	CA-45	8.023E-03	3.647E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
14	CA-47	3.950E-03	6.669E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
15	SC-46	7.486E-03	1.131E-02	NO DATA	NO DATA	2.759E-02	2.443E-02	NO DATA	NO DATA	NO DATA
16	SC-47	2.110E-04	1.444E-03	NO DATA	NO DATA	1.123E-03	8.062E-04	NO DATA	NO DATA	NO DATA
17	SC-48	9.789E-04	1.424E-03	NO DATA	NO DATA	3.225E-03	1.869E-03	NO DATA	NO DATA	NO DATA
18	V-48	6.000E-03	7.237E-03	NO DATA	NO DATA	1.017E-02	2.257E-02	1.218E-02	NO DATA	NO DATA
19	CR-51	1.741E-04	NO DATA	NO DATA	1.883E-04	NO DATA	5.303E-05	NO DATA	NO DATA	NO DATA
20	MN-52	2.770E-03	NO DATA	NO DATA	NO DATA	1.304E-02	NO DATA	NO DATA	NO DATA	NO DATA
21	MN-54	2.595E-03	NO DATA	NO DATA	NO DATA	1.596E-02	NO DATA	NO DATA	NO DATA	NO DATA
22	MN-56	6.565E-05	NO DATA	NO DATA	NO DATA	4.315E-04	NO DATA	NO DATA	NO DATA	NO DATA
23	FE-55	9.453E-04	1.358E-03	NO DATA	NO DATA	4.125E-03	NO DATA	7.393E-03	NO DATA	NO DATA
24	FE-59	1.086E-02	NO DATA	NO DATA	NO DATA	3.020E-02	NO DATA	4.176E-02	NO DATA	NO DATA
25	CO-57	3.468E-04	NO DATA	NO DATA	NO DATA	4.204E-04	8.091E-05	1.133E-04	NO DATA	NO DATA
26	CO-58M	1.534E-05	NO DATA	NO DATA	NO DATA	1.882E-05	3.471E-06	4.839E-06	NO DATA	NO DATA
27	CO-58	2.146E-03	NO DATA	NO DATA	NO DATA	2.100E-03	3.612E-04	5.056E-04	NO DATA	NO DATA
28	CO-60	5.968E-03	NO DATA	NO DATA	NO DATA	5.898E-03	1.040E-03	1.456E-03	NO DATA	NO DATA
29	NI-59	2.151E-03	1.290E-02	NO DATA	NO DATA	4.979E-03	NO DATA	NO DATA	NO DATA	NO DATA
30	NI-63	5.734E-03	1.794E-01	NO DATA	NO DATA	1.336E-02	NO DATA	NO DATA	NO DATA	NO DATA
31	NI-65	6.450E-05	1.221E-03	NO DATA	NO DATA	1.707E-04	NO DATA	NO DATA	NO DATA	NO DATA
32	CU-64	5.410E-05	NO DATA	NO DATA	NO DATA	1.302E-04	4.236E-04	1.047E-03	NO DATA	NO DATA
33	ZN-65	1.950E-02	8.110E-04	1.534E-02	NO DATA	4.695E-02	2.999E-02	NO DATA	3.546E-03	4.556E-03
34	ZN-69M	1.166E-04	5.739E-04	8.162E-05	NO DATA	1.375E-03	7.992E-04	NO DATA	1.234E-04	2.742E-04
35	ZN-69	4.184E-06	3.223E-05	2.929E-06	NO DATA	6.317E-05	3.905E-05	NO DATA	6.590E-06	1.464E-05
36	GA-72	2.544E-04	1.143E-03	NO DATA	NO DATA	1.583E-03	5.979E-04	5.871E-04	NO DATA	NO DATA
37	GE-71	2.504E-06	NO DATA	NO DATA	NO DATA	9.916E-06	1.173E-04	NO DATA	NO DATA	NO DATA
38	AS-73	1.035E-03	NO DATA	NO DATA	NO DATA	9.474E-04	1.591E-03	NO DATA	NO DATA	NO DATA

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-2 (continued)

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
39	AS-74	2.612E-03	NO DATA	NO DATA	NO DATA	2.228E-03	3.813E-03	NO DATA	NO DATA	NO DATA
40	AS-76	4.042E-04	NO DATA	NO DATA	NO DATA	4.173E-04	7.981E-04	NO DATA	NO DATA	NO DATA
41	AS-77	1.086E-04	NO DATA	NO DATA	NO DATA	1.324E-04	2.533E-04	NO DATA	NO DATA	NO DATA
42	SE-75	1.480E-03	NO DATA	NO DATA	NO DATA	4.053E-03	5.330E-03	1.970E-03	NO DATA	NO DATA
43	BR-80M*	1.034E-04	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
44	BR-82	1.837E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
45	BR-83*	2.954E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
46	BR-84*	4.008E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
47	RB-86	7.256E-03	NO DATA	8.780E-03	NO DATA	1.639E-02	NO DATA	1.277E-02	NO DATA	NO DATA
48	RB-87	3.180E-03	NO DATA	5.980E-03	NO DATA	9.778E-03	NO DATA	5.936E-03	NO DATA	NO DATA
49	RB-88*	2.678E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
50	RB-89*	3.421E-06	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
51	SR-85M	8.619E-06	1.724E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
52	SR-85	8.942E-03	1.729E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
53	SR-89	1.159E-02	4.137E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
54	SR-90*	2.217E-01	1.108E 01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
55	SR-91	3.518E-04	7.270E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
56	SR-92	1.198E-04	2.580E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
57	Y-90	6.243E-04	2.346E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
58	Y-91M	8.520E-06	2.089E-04	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
59	Y-91	8.957E-03	3.346E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
60	Y-92	6.282E-05	2.059E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
61	Y-93	1.869E-04	5.431E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
62	ZR-93	2.591E-03	9.423E-02	NO DATA	NO DATA	6.070E-03	2.419E-02	1.451E-02	NO DATA	NO DATA
63	ZR-95	1.598E-02	6.167E-02	NO DATA	NO DATA	2.605E-02	3.315E-02	1.989E-02	NO DATA	NO DATA
64	ZR-97	3.903E-04	4.148E-03	NO DATA	NO DATA	9.795E-04	1.301E-03	7.805E-04	NO DATA	NO DATA
65	NB-93M	6.266E-03	9.888E-02	NO DATA	NO DATA	2.254E-02	2.571E-02	2.807E-02	NO DATA	NO DATA
66	NB-95M*	1.320E-03	1.566E-03	NO DATA	NO DATA	1.029E-03	1.139E-03	8.819E-04	NO DATA	NO DATA
67	NB-95	4.472E-03	1.309E-02	NO DATA	NO DATA	7.532E-03	8.184E-03	6.006E-03	NO DATA	NO DATA
68	NB-97	1.161E-05	1.282E-04	NO DATA	NO DATA	2.814E-05	3.738E-05	2.990E-05	NO DATA	NO DATA
69	MO-99	6.615E-04	NO DATA	NO DATA	NO DATA	3.503E-03	8.428E-03	NO DATA	NO DATA	NO DATA
70	TC-96M	5.654E-06	1.470E-07	NO DATA	NO DATA	1.397E-06	1.847E-05	NO DATA	NO DATA	NO DATA
71	TC-96	5.863E-04	1.356E-05	NO DATA	NO DATA	1.573E-04	2.009E-03	NO DATA	NO DATA	NO DATA
72	TC-97M	4.664E-05	7.748E-05	NO DATA	NO DATA	1.339E-04	1.759E-03	NO DATA	NO DATA	NO DATA
73	TC-97	1.047E-05	4.973E-06	NO DATA	NO DATA	3.880E-05	4.886E-04	NO DATA	NO DATA	NO DATA
74	TC-99M	8.376E-06	5.235E-08	NO DATA	NO DATA	5.658E-07	7.940E-06	NO DATA	NO DATA	NO DATA
75	TC-99	4.921E-05	1.230E-04	NO DATA	NO DATA	1.824E-04	2.296E-03	NO DATA	NO DATA	NO DATA
76	RU-97	8.481E-05	6.533E-05	NO DATA	NO DATA	NO DATA	1.223E-03	NO DATA	NO DATA	NO DATA
77	RU-103	7.712E-04	1.558E-03	NO DATA	NO DATA	NO DATA	6.450E-03	NO DATA	NO DATA	NO DATA
78	RU-105	6.445E-05	1.393E-04	NO DATA	NO DATA	NO DATA	1.847E-03	NO DATA	NO DATA	NO DATA
79	RU-106	2.850E-03	2.042E-02	NO DATA	NO DATA	NO DATA	3.538E-02	NO DATA	NO DATA	NO DATA
80	RH-103M	7.659E-07	1.512E-06	NO DATA	NO DATA	1.261E-06	5.013E-06	3.509E-06	NO DATA	NO DATA
81	RH-105	9.748E-05	2.765E-04	NO DATA	NO DATA	1.605E-04	6.684E-04	4.614E-04	NO DATA	NO DATA
82	PD-103	9.147E-05	NO DATA	NO DATA	NO DATA	7.333E-03	4.918E-03	8.345E-04	NO DATA	NO DATA
83	PD-109	7.849E-05	NO DATA	NO DATA	NO DATA	2.988E-04	1.724E-03	3.950E-04	NO DATA	NO DATA
84	AG-105	7.546E-04	3.702E-04	NO DATA	NO DATA	1.059E-03	2.150E-03	NO DATA	NO DATA	NO DATA
85	AG-110M	2.268E-03	4.042E-03	NO DATA	NO DATA	3.960E-03	7.940E-03	NO DATA	NO DATA	NO DATA
86	AG-111	3.267E-04	1.470E-03	NO DATA	NO DATA	6.307E-04	1.808E-03	NO DATA	NO DATA	NO DATA
87	CD-109	4.031E-03	NO DATA	NO DATA	NO DATA	1.147E-01	1.101E-01	NO DATA	NO DATA	NO DATA
88	CD-115M	5.588E-03	NO DATA	NO DATA	NO DATA	1.749E-01	1.416E-01	NO DATA	NO DATA	NO DATA
89	CD-115	4.089E-04	NO DATA	NO DATA	NO DATA	1.045E-02	7.524E-03	NO DATA	NO DATA	NO DATA
90	IN-113M	5.541E-06	2.079E-05	NO DATA	4.280E-06	2.644E-05	3.388E-05	3.388E-05	NO DATA	NO DATA
91	IN-114M	6.094E-03	4.900E-02	NO DATA	2.427E-03	4.215E-02	6.134E-02	5.453E-02	NO DATA	NO DATA

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-2 (continued)

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
92	IN-115M	1.293E-05	5.888E-05	NO DATA	1.114E-05	6.553E-05	8.819E-05	8.819E-05	NO DATA	NO DATA
93	IN-115	2.136E-03	2.029E-02	NO DATA	5.233E-04	1.700E-02	2.492E-02	1.993E-02	NO DATA	NO DATA
94	SN-113	2.533E-03	3.107E-02	NO DATA	7.059E-04	1.194E-03	NO DATA	NO DATA	NO DATA	NO DATA
95	SN-119M*	5.490E-04	1.555E-03	NO DATA	9.524E-05	2.505E-04	NO DATA	NO DATA	NO DATA	NO DATA
96	SN-123*	4.162E-03	1.209E-01	NO DATA	2.396E-03	2.818E-03	NO DATA	NO DATA	NO DATA	NO DATA
97	SN-125	2.067E-03	3.498E-02	NO DATA	8.016E-04	9.531E-04	NO DATA	NO DATA	NO DATA	NO DATA
98	SB-122	6.027E-04	2.290E-03	NO DATA	2.767E-05	3.755E-05	NO DATA	NO DATA	NO DATA	NO DATA
99	SB-124	1.040E-02	2.745E-02	NO DATA	6.350E-05	4.561E-06	NO DATA	NO DATA	NO DATA	NO DATA
100	SB-125	3.664E-03	1.753E-02	NO DATA	1.642E-05	1.785E-04	NO DATA	NO DATA	NO DATA	NO DATA
101	TE-125M	7.161E-04	3.631E-03	NO DATA	1.195E-03	2.414E-03	2.052E-02	5.199E-03	4.434E-03	NO DATA
102	TE-127M	1.655E-03	1.228E-02	NO DATA	3.467E-03	6.346E-03	5.394E-02	1.307E-02	1.437E-02	NO DATA
103	TE-127	3.628E-05	1.666E-04	NO DATA	1.237E-04	8.071E-05	6.860E-04	1.738E-04	1.886E-04	NO DATA
104	TE-129M	4.376E-03	1.823E-02	NO DATA	6.723E-03	1.145E-02	9.147E-02	2.317E-02	2.225E-02	NO DATA
105	TE-129	1.989E-05	5.083E-05	NO DATA	4.261E-05	3.210E-05	2.542E-04	6.439E-05	6.167E-05	NO DATA
106	TE-131M	7.321E-04	1.111E-03	NO DATA	1.057E-03	1.004E-03	7.124E-03	1.782E-03	NO DATA	NO DATA
107	TE-132	1.965E-03	3.200E-03	NO DATA	2.473E-03	2.751E-03	2.040E-02	5.169E-03	4.267E-03	NO DATA
108	I-126*	2.185E-03	NO DATA	NO DATA	1.578E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
109	I-129*	6.989E-03	NO DATA	NO DATA	5.731E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
110	I-130*	6.592E-04	NO DATA	NO DATA	2.127E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
111	I-131*	2.626E-03	NO DATA	NO DATA	1.444E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
112	I-132*	1.295E-04	NO DATA	NO DATA	5.309E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
113	I-133*	5.739E-04	NO DATA	NO DATA	3.923E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
114	I-134*	4.240E-05	NO DATA	NO DATA	2.488E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
115	I-135*	2.858E-04	NO DATA	NO DATA	1.223E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
116	CS-131	1.993E-04	4.966E-05	1.977E-04	NO DATA	4.656E-04	3.078E-04	3.548E-04	NO DATA	NO DATA
117	CS-134M	1.940E-05	2.001E-05	2.477E-05	NO DATA	4.203E-05	2.620E-05	3.138E-05	NO DATA	NO DATA
118	CS-134	5.615E-02	3.732E-02	9.674E-02	NO DATA	9.952E-02	3.371E-02	7.516E-02	NO DATA	NO DATA
119	CS-135	3.628E-03	1.451E-02	6.772E-03	NO DATA	1.280E-02	5.079E-03	1.201E-02	NO DATA	NO DATA
120	CS-136	5.615E-03	2.691E-03	5.669E-03	NO DATA	8.601E-03	5.314E-03	6.192E-03	NO DATA	NO DATA
121	CS-137	3.243E-02	6.068E-02	5.967E-02	NO DATA	7.866E-02	2.847E-02	6.664E-02	NO DATA	NO DATA
122	CS-138*	4.660E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
123	BA-131	1.092E-03	2.144E-03	8.861E-06	NO DATA	1.601E-05	4.693E-06	5.842E-06	NO DATA	NO DATA
124	BA-140	7.215E-03	8.940E-02	5.923E-05	NO DATA	1.293E-04	4.186E-05	5.253E-05	NO DATA	NO DATA
125	LA-140	8.355E-04	4.749E-03	NO DATA	NO DATA	3.187E-03	NO DATA	NO DATA	NO DATA	NO DATA
126	CE-141	1.649E-03	1.972E-02	NO DATA	NO DATA	1.350E-02	6.596E-03	NO DATA	NO DATA	NO DATA
127	CE-143	3.377E-04	3.969E-03	NO DATA	NO DATA	2.902E-03	1.332E-03	NO DATA	NO DATA	NO DATA
128	CE-144	6.499E-02	1.202E 00	NO DATA	NO DATA	4.910E-01	3.033E-01	NO DATA	NO DATA	NO DATA
129	PR-142	1.780E-04	3.267E-03	NO DATA	NO DATA	1.397E-03	7.915E-04	NO DATA	NO DATA	NO DATA
130	PR-143	1.131E-03	2.278E-02	NO DATA	NO DATA	9.105E-03	5.277E-03	NO DATA	NO DATA	NO DATA
131	ND-144	3.434E 00	1.413E 02	NO DATA	NO DATA	1.468E 01	3.205E 01	NO DATA	NO DATA	NO DATA
132	ND-147	1.162E-03	1.478E-02	NO DATA	NO DATA	1.793E-02	8.406E-03	NO DATA	NO DATA	NO DATA
133	ND-149	2.390E-05	3.676E-04	NO DATA	NO DATA	4.605E-04	1.967E-04	NO DATA	NO DATA	NO DATA
134	PM-147	6.917E-03	1.880E-01	NO DATA	NO DATA	2.279E-02	3.228E-02	NO DATA	NO DATA	NO DATA
135	PM-148M*	1.520E-02	4.998E-02	NO DATA	NO DATA	2.588E-02	2.943E-02	NO DATA	NO DATA	NO DATA
136	PM-148*	1.498E-03	1.825E-02	NO DATA	NO DATA	3.967E-03	5.359E-03	NO DATA	NO DATA	NO DATA
137	PM-149	3.110E-04	3.939E-03	NO DATA	NO DATA	8.346E-04	1.129E-03	NO DATA	NO DATA	NO DATA
138	SM-147	3.949E 00	1.625E 02	NO DATA	NO DATA	1.669E 01	1.843E 01	NO DATA	NO DATA	NO DATA
139	SM-151	7.091E-03	1.766E-01	NO DATA	NO DATA	3.031E-02	3.309E-02	NO DATA	NO DATA	NO DATA
140	SM-153	1.531E-04	2.032E-03	NO DATA	NO DATA	1.957E-03	5.955E-04	NO DATA	NO DATA	NO DATA
141	EU-152M	8.753E-05	1.038E-03	NO DATA	NO DATA	6.979E-04	4.943E-04	NO DATA	NO DATA	NO DATA
142	EU-152	9.657E-02	4.821E-01	NO DATA	NO DATA	1.058E-01	5.153E-01	NO DATA	NO DATA	NO DATA
143	EU-154	1.946E-01	3.033E 00	NO DATA	NO DATA	2.758E-01	1.643E 00	NO DATA	NO DATA	NO DATA
144	EU-155	1.315E-02	1.158E-01	NO DATA	NO DATA	2.580E-02	6.661E-02	NO DATA	NO DATA	NO DATA

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-2 (continued)

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
145	GD-153	7.342E-03	6.899E-02	NO DATA	NO DATA	4.994E-03	NO DATA	NO DATA	NO DATA	NO DATA
146	GD-159	7.067E-05	6.478E-04	NO DATA	NO DATA	3.201E-04	NO DATA	NO DATA	NO DATA	NO DATA
147	TB-160	1.468E-02	1.175E-01	NO DATA	NO DATA	NO DATA	4.837E-02	NO DATA	NO DATA	NO DATA
148	DY-165	1.295E-05	2.285E-04	NO DATA	NO DATA	3.262E-05	NO DATA	NO DATA	NO DATA	NO DATA
149	DY-166	7.031E-04	2.082E-02	NO DATA	NO DATA	2.287E-03	NO DATA	NO DATA	NO DATA	NO DATA
150	HO-166	2.015E-04	6.265E-03	NO DATA	NO DATA	6.544E-04	9.271E-04	NO DATA	NO DATA	NO DATA
151	ER-169	9.007E-04	8.471E-03	NO DATA	NO DATA	6.544E-04	2.158E-03	NO DATA	NO DATA	NO DATA
152	ER-171	5.274E-05	9.737E-02	NO DATA	NO DATA	NO DATA	1.742E-04	NO DATA	NO DATA	NO DATA
153	TM-170	9.522E-03	3.218E-01	NO DATA	NO DATA	NO DATA	3.821E-02	NO DATA	NO DATA	NO DATA
154	YB-175	1.717E-04	4.572E-03	NO DATA	NO DATA	NO DATA	1.953E-03	NO DATA	NO DATA	NO DATA
155	LU-177	2.981E-04	9.131E-03	NO DATA	NO DATA	NO DATA	6.547E-04	NO DATA	NO DATA	NO DATA
156	HF-181	5.628E-03	1.333E-02	NO DATA	NO DATA	5.914E-02	1.313E-02	1.502E-01	NO DATA	NO DATA
157	TA-182	2.188E-02	4.293E-02	NO DATA	NO DATA	1.700E-01	7.256E-02	4.178E-02	NO DATA	NO DATA
158	W-181	6.282E-05	8.366E-05	NO DATA	NO DATA	2.926E-04	NO DATA	NO DATA	NO DATA	NO DATA
159	W-185	4.397E-05	1.139E-03	NO DATA	NO DATA	4.587E-04	NO DATA	NO DATA	NO DATA	NO DATA
160	W-187	1.068E-04	2.638E-04	NO DATA	NO DATA	3.035E-04	NO DATA	NO DATA	NO DATA	NO DATA
161	W-188*	2.670E-04	6.366E-03	NO DATA	NO DATA	2.916E-03	NO DATA	NO DATA	NO DATA	NO DATA
162	RE-183	8.041E-04	9.502E-06	NO DATA	1.265E-03	2.522E-04	NO DATA	NO DATA	NO DATA	NO DATA
163	RE-186	4.973E-04	1.715E-04	NO DATA	7.849E-03	2.377E-04	NO DATA	NO DATA	NO DATA	NO DATA
164	RE-187	4.397E-05	1.136E-05	NO DATA	4.617E-04	3.621E-05	NO DATA	NO DATA	NO DATA	NO DATA
165	RE-188	3.149E-04	1.205E-04	NO DATA	5.849E-03	1.246E-04	NO DATA	NO DATA	NO DATA	NO DATA
166	OS-185	3.204E-04	NO DATA	NO DATA	NO DATA	6.501E-04	5.863E-03	NO DATA	NO DATA	NO DATA
167	OS-191M	8.481E-06	NO DATA	NO DATA	NO DATA	1.098E-05	9.909E-05	NO DATA	NO DATA	NO DATA
168	OS-191	9.046E-05	NO DATA	NO DATA	NO DATA	2.121E-02	2.042E-03	NO DATA	NO DATA	NO DATA
169	OS-193	9.549E-05	NO DATA	NO DATA	NO DATA	1.638E-04	1.857E-03	NO DATA	NO DATA	NO DATA
170	IR-190	8.716E-04	NO DATA	NO DATA	NO DATA	4.008E-03	3.981E-03	3.412E-03	NO DATA	NO DATA
171	IR-192	5.459E-03	NO DATA	NO DATA	NO DATA	3.621E-02	5.130E-02	4.397E-02	NO DATA	NO DATA
172	IR-194	1.934E-04	NO DATA	NO DATA	NO DATA	1.882E-03	2.161E-03	1.852E-03	NO DATA	NO DATA
173	PT-191	5.936E-04	NO DATA	NO DATA	NO DATA	8.340E-05	4.676E-03	7.481E-04	NO DATA	NO DATA
174	PT-193M	7.067E-05	NO DATA	NO DATA	NO DATA	1.060E-05	5.394E-04	8.631E-05	NO DATA	NO DATA
175	PT-193	3.242E-04	NO DATA	NO DATA	NO DATA	3.932E-05	6.156E-03	9.850E-04	NO DATA	NO DATA
176	PT-197M	9.674E-06	NO DATA	NO DATA	NO DATA	2.955E-06	2.052E-04	3.283E-05	NO DATA	NO DATA
177	PT-197	5.962E-05	NO DATA	NO DATA	NO DATA	1.788E-05	1.247E-03	1.996E-04	NO DATA	NO DATA
178	AU-196	7.802E-04	NO DATA	NO DATA	NO DATA	4.979E-04	1.814E-03	6.046E-04	NO DATA	NO DATA
179	AU-198	4.737E-04	NO DATA	NO DATA	NO DATA	5.122E-04	2.434E-03	8.113E-04	NO DATA	NO DATA
180	AU-199	1.753E-04	NO DATA	NO DATA	NO DATA	1.737E-04	8.179E-04	2.726E-04	NO DATA	NO DATA
181	HG-197M	1.801E-04	NO DATA	NO DATA	NO DATA	6.856E-04	9.094E-03	7.476E-04	NO DATA	NO DATA
182	HG-197	1.344E-04	NO DATA	NO DATA	NO DATA	4.641E-04	5.315E-03	4.412E-04	NO DATA	NO DATA
183	HG-203	1.352E-03	NO DATA	NO DATA	NO DATA	6.860E-03	8.868E-02	6.010E-03	NO DATA	NO DATA
184	TL-200	1.849E-04	2.509E-05	1.759E-04	NO DATA	1.428E-04	7.393E-04	NO DATA	NO DATA	NO DATA
185	TL-201	1.623E-04	2.515E-04	2.052E-04	NO DATA	1.966E-04	1.354E-03	NO DATA	NO DATA	NO DATA
186	TL-202	6.684E-04	1.126E-03	9.172E-04	NO DATA	8.148E-04	6.192E-03	NO DATA	NO DATA	NO DATA
187	TL-204	6.282E-04	2.477E-03	8.734E-04	NO DATA	1.078E-03	1.026E-02	NO DATA	NO DATA	NO DATA
188	PB-203	1.450E-04	9.270E-05	NO DATA	NO DATA	2.023E-04	1.456E-03	NO DATA	NO DATA	NO DATA
189	PB-204M*	1.912E-05	1.220E-05	NO DATA	NO DATA	2.750E-05	2.021E-04	NO DATA	NO DATA	NO DATA
190	PB-210	1.895E 00	5.806E 01	NO DATA	NO DATA	1.487E 01	4.827E 01	NO DATA	NO DATA	NO DATA
191	PB-212	1.095E-02	1.511E-01	NO DATA	NO DATA	3.621E-02	3.483E-01	NO DATA	NO DATA	NO DATA
192	BI-206	1.372E-03	1.491E-04	NO DATA	NO DATA	6.208E-03	3.514E-02	2.874E-03	NO DATA	NO DATA
193	BI-207	1.361E-03	2.554E-04	NO DATA	NO DATA	1.156E-02	3.870E-02	4.192E-03	NO DATA	NO DATA
194	BI-210	6.806E-03	1.161E-02	NO DATA	NO DATA	8.519E-02	1.114E 00	6.479E-02	NO DATA	NO DATA
195	BI-212	9.490E-04	1.392E-03	NO DATA	NO DATA	6.012E-03	6.731E-02	4.375E-03	NO DATA	NO DATA
196	PO-210	4.031E-01	1.759E 00	NO DATA	NO DATA	3.794E 00	1.236E 01	1.129E 01	NO DATA	NO DATA
197	AT-211	1.437E-02	NO DATA	NO DATA	1.542E 00	NO DATA	NO DATA	1.788E-01	NO DATA	2.515E-01

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-2 (continued)

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
198	RA-223	6.919E-01	6.860E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
199	RA-224	2.697E-01	2.134E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
200	RA-226	4.146E 01	4.028E 02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
201	RA-228	2.215E 01	1.667E 02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
202	AC-227	2.760E 02	4.990E 03	NO DATA	NO DATA	6.594E 02	2.395E 02	NO DATA	NO DATA	NO DATA
203	AC-228	1.565E-02	2.112E-01	NO DATA	NO DATA	8.160E-02	1.048E-02	NO DATA	NO DATA	NO DATA
204	TH-227	9.632E-01	3.433E 01	NO DATA	NO DATA	4.839E-01	2.742E 00	NO DATA	NO DATA	NO DATA
205	TH-228	4.160E 01	1.267E 03	NO DATA	NO DATA	1.668E 01	9.276E 01	NO DATA	NO DATA	NO DATA
206	TH-230	1.425E 02	5.253E 03	NO DATA	NO DATA	2.348E 02	1.128E 03	NO DATA	NO DATA	NO DATA
207	TH-231	5.041E-05	1.129E-03	NO DATA	NO DATA	7.381E-05	3.660E-04	NO DATA	NO DATA	NO DATA
208	TH-232	1.841E 02	5.910E 03	NO DATA	NO DATA	2.005E 02	9.636E 03	NO DATA	NO DATA	NO DATA
209	TH-234	5.740E-03	2.044E-01	NO DATA	NO DATA	9.351E-03	5.299E-02	NO DATA	NO DATA	NO DATA
210	PA-230	2.687E-01	6.525E 00	NO DATA	NO DATA	NO DATA	1.297E 00	NO DATA	NO DATA	NO DATA
211	PA-231	3.989E 02	1.003E 04	NO DATA	NO DATA	4.013E 02	2.162E 03	NO DATA	NO DATA	NO DATA
212	PA-233	2.295E-03	1.294E-02	NO DATA	NO DATA	2.764E-03	1.004E-02	NO DATA	NO DATA	NO DATA
213	PA-234*	8.062E-05	3.870E-04	NO DATA	NO DATA	9.259E-05	3.352E-04	NO DATA	NO DATA	NO DATA
214	U-230	1.576E 00	1.029E 01	NO DATA	NO DATA	NO DATA	2.083E 01	NO DATA	NO DATA	NO DATA
215	U-232	7.329E 00	1.055E 02	NO DATA	NO DATA	NO DATA	1.129E 01	NO DATA	NO DATA	NO DATA
216	U-233	1.309E 00	2.199E 01	NO DATA	NO DATA	NO DATA	5.130E 00	NO DATA	NO DATA	NO DATA
217	U-234	1.334E 00	2.111E 01	NO DATA	NO DATA	NO DATA	5.028E 00	NO DATA	NO DATA	NO DATA
218	U-235	1.204E 00	2.023E 01	NO DATA	NO DATA	NO DATA	4.720E 00	NO DATA	NO DATA	NO DATA
219	U-236	1.230E 00	2.023E 01	NO DATA	NO DATA	NO DATA	4.822E 00	NO DATA	NO DATA	NO DATA
220	U-237	2.839E-04	7.569E-04	NO DATA	NO DATA	NO DATA	3.570E-03	NO DATA	NO DATA	NO DATA
221	U-238	1.171E 00	1.935E 01	NO DATA	NO DATA	NO DATA	4.412E 00	NO DATA	NO DATA	NO DATA
222	NP-237	1.386E 02	3.344E 03	NO DATA	NO DATA	3.097E 02	1.030E 03	NO DATA	NO DATA	NO DATA
223	NP-239	1.769E-04	2.630E-03	NO DATA	NO DATA	2.873E-04	8.965E-04	NO DATA	NO DATA	NO DATA
224	PU-236	9.113E 01	3.220E 03	NO DATA	NO DATA	2.799E 02	2.091E 02	NO DATA	NO DATA	NO DATA
225	PU-238	1.435E 02	5.705E 03	NO DATA	NO DATA	8.164E 02	6.087E 02	NO DATA	NO DATA	NO DATA
226	PU-239	1.592E 02	6.559E 03	NO DATA	NO DATA	8.962E 02	6.764E 02	NO DATA	NO DATA	NO DATA
227	PU-240	1.590E 02	6.551E 03	NO DATA	NO DATA	8.962E 02	6.764E 02	NO DATA	NO DATA	NO DATA
228	PU-241	2.546E 00	1.240E 02	NO DATA	NO DATA	6.410E 00	1.219E 01	NO DATA	NO DATA	NO DATA
229	PU-242	1.534E 02	6.080E 03	NO DATA	NO DATA	8.623E 02	6.509E 02	NO DATA	NO DATA	NO DATA
230	PU-243	2.014E-05	8.711E-04	NO DATA	NO DATA	8.519E-05	9.401E-05	NO DATA	NO DATA	NO DATA
231	PU-244	1.757E 02	7.102E 03	NO DATA	NO DATA	NO DATA	7.454E 02	NO DATA	NO DATA	NO DATA
232	AM-241	1.356E 02	2.069E 03	NO DATA	NO DATA	7.174E 02	1.016E 03	NO DATA	NO DATA	NO DATA
233	AM-242M	1.371E 02	2.084E 03	NO DATA	NO DATA	6.994E 02	1.007E 03	NO DATA	NO DATA	NO DATA
234	AM-242	1.173E-02	1.478E-01	NO DATA	NO DATA	1.594E-01	8.005E-02	NO DATA	NO DATA	NO DATA
235	AM-243	1.325E 02	2.064E 03	NO DATA	NO DATA	6.977E 02	9.993E 02	NO DATA	NO DATA	NO DATA
236	AM-244	2.085E-04	2.985E-03	NO DATA	NO DATA	1.366E-03	1.451E-03	NO DATA	NO DATA	NO DATA
237	CM-242	3.380E 00	5.092E 01	NO DATA	NO DATA	5.189E 01	1.538E 01	NO DATA	NO DATA	NO DATA
238	CM-243	1.027E 02	1.771E 03	NO DATA	NO DATA	6.426E 02	4.791E 02	NO DATA	NO DATA	NO DATA
239	CM-244	7.450E 01	1.256E 03	NO DATA	NO DATA	5.419E 02	3.476E 02	NO DATA	NO DATA	NO DATA
240	CM-245	1.441E 02	2.551E 03	NO DATA	NO DATA	7.136E 02	6.725E 02	NO DATA	NO DATA	NO DATA
241	CM-246	1.441E 02	2.548E 03	NO DATA	NO DATA	7.136E 02	6.725E 02	NO DATA	NO DATA	NO DATA
242	CM-247	1.415E 02	2.462E 03	NO DATA	NO DATA	7.009E 02	6.605E 02	NO DATA	NO DATA	NO DATA
243	CM-248	1.167E 03	2.047E 04	NO DATA	NO DATA	5.776E 03	5.444E 03	NO DATA	NO DATA	NO DATA
244	CM-249	5.989E-05	9.329E-04	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
245	BK-249	2.875E-01	1.210E 01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
246	BK-250	1.999E-03	8.137E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
247	CF-249	1.742E 02	7.038E 03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
248	CF-250	5.527E 01	2.211E 03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
249	CF-251	1.738E 02	6.902E 03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
250	CF-252	4.359E 01	1.829E 03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-2 (continued)

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
251	CF-253	3.439E-01	1.395E 01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
252	CF-254	5.570E 01	2.216E 03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
253	ES-253	3.822E-01	1.550E 01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
254	ES-254M	5.444E-02	2.211E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
255	ES-254	1.495E 01	6.193E 02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
256	ES-255	5.889E-01	2.387E 01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
257	FM-254	4.661E-03	1.894E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
258	FM-255	1.759E-02	7.130E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
259	FM-256	1.046E-01	4.184E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA

TABLE 4-2 (continued)

		LUNGS		G.I. TRACT	
NO.	NUCLIDE	SOLUBLE	INSOLUBLE	SOLUBLE	INSOLUBLE
1	H-3*	NO DATA	NO DATA	NO DATA	NO DATA
2	BE-7	NO DATA	5.431E-03	5.336E-04	7.115E-04
3	C-14	NO DATA	5.936E-02	1.067E-04	5.336E-03
4	F-18	NO DATA	3.856E-04	1.067E-03	2.372E-03
5	NA-22	NO DATA	7.808E-01	3.049E-03	4.269E-02
6	NA-24	NO DATA	8.612E-03	5.336E-03	4.269E-02
7	SI-31	3.330E-04	5.940E-04	1.067E-03	7.115E-03
8	P-32	NO DATA	8.077E-02	1.067E-02	5.336E-02
9	S-35	NO DATA	2.589E-02	2.134E-04	4.269E-03
10	CL-36	NO DATA	2.858E-01	7.115E-04	2.134E-02
11	CL-38	NO DATA	4.525E-04	2.134E-02	3.049E-03
12	K-42	NO DATA	7.115E-03	3.049E-03	5.336E-02
13	CA-45	NO DATA	5.460E-02	2.134E-03	7.115E-03
14	CA-47	NO DATA	3.493E-02	1.067E-02	3.557E-02
15	SC-46	NO DATA	2.895E-01	2.668E-02	3.049E-02
16	SC-47	NO DATA	6.415E-03	1.067E-02	1.067E-02
17	SC-48	NO DATA	1.816E-02	3.557E-02	4.269E-02
18	V-48	NO DATA	1.170E-01	3.557E-02	4.269E-02
19	CR-51	2.729E-04	2.895E-03	5.336E-04	7.115E-04
20	MN-52	NO DATA	1.021E-01	3.049E-02	4.269E-02
21	MN-54	NO DATA	1.806E-01	7.115E-03	1.067E-02
22	MN-56	NO DATA	1.309E-03	7.115E-03	1.067E-02
23	FE-55	2.341E-03	6.443E-03	3.557E-04	5.336E-04
24	FE-59	8.219E-03	1.261E-01	2.134E-02	2.372E-02
25	CO-57	NO DATA	4.034E-02	2.134E-03	3.049E-03
26	CO-58M	NO DATA	6.941E-04	3.557E-04	5.336E-04
27	CO-58	NO DATA	2.515E-01	7.115E-03	1.067E-02
28	CO-60	NO DATA	7.445E-01	2.134E-02	3.557E-02
29	NI-59	NO DATA	8.465E-03	3.557E-04	7.115E-04
30	NI-63	NO DATA	2.299E-02	1.067E-03	2.134E-03
31	NI-65	NO DATA	1.208E-03	7.115E-03	1.067E-02
32	CU-64	NO DATA	9.185E-04	3.049E-03	5.336E-03
33	ZN-65	NO DATA	1.107E-01	5.336E-03	7.115E-03
34	ZN-69M	NO DATA	2.621E-03	1.067E-02	2.134E-02
35	ZN-69	NO DATA	1.342E-04	5.336E-04	7.115E-04
36	GA-72	NO DATA	5.917E-03	2.668E-02	3.557E-02
37	GE-71	NO DATA	9.994E-04	5.336E-04	7.115E-04
38	AS-73	NO DATA	1.748E-02	2.134E-03	2.668E-03
39	AS-74	NO DATA	5.317E-02	2.134E-02	2.372E-02
40	AS-76	NO DATA	1.098E-02	5.336E-02	7.115E-02
41	AS-77	NO DATA	3.514E-03	1.067E-02	2.134E-02
42	SE-75	NO DATA	1.719E-04	3.557E-04	4.269E-03
43	BR-80M*	NO DATA	1.232E-03	4.269E-02	NO DATA
44	BR-82	NO DATA	1.131E-02	3.557E-03	3.557E-02
45	BR-83*	NO DATA	3.387E-04	NO DATA	NO DATA
46	BR-84*	NO DATA	4.675E-04	NO DATA	NO DATA
47	RB-86	NO DATA	9.782E-02	2.134E-03	5.336E-02
48	RB-87	NO DATA	9.894E-02	2.668E-04	7.115E-03
49	RB-88*	NO DATA	2.908E-04	2.134E-03	2.668E-03
50	RB-89*	NO DATA	2.430E-05	1.067E-03	1.067E-03
51	SR-85M	NO DATA	7.179E-05	2.134E-04	2.134E-04

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-2 (continued)

NO.	NUCLIDE	LUNGS SOLUBLE	LUNGS INSOLUBLE	G.I. TRACT SOLUBLE	G.I. TRACT INSOLUBLE
52	SR-85	NO DATA	6.180E-02	4.269E-03	7.115E-03
53	SR-89	NO DATA	1.791E-01	2.372E-02	4.269E-02
54	SR-90*	NO DATA	1.195E 00	2.134E-02	3.557E-02
55	SR-91	NO DATA	5.478E-03	1.067E-02	2.372E-02
56	SR-92	NO DATA	2.014E-03	1.067E-02	2.134E-02
57	Y-90	NO DATA	2.137E-02	5.336E-02	7.115E-02
58	Y-91M	NO DATA	1.763E-04	2.668E-04	3.557E-04
59	Y-91	NO DATA	2.113E-01	3.557E-02	4.269E-02
60	Y-92	NO DATA	2.059E-03	2.134E-02	2.134E-02
61	Y-93	NO DATA	5.751E-03	3.557E-02	4.269E-02
62	ZR-93	NO DATA	2.199E-01	1.067E-03	2.134E-03
63	ZR-95	NO DATA	1.974E-01	2.134E-02	2.134E-02
64	ZR-97	NO DATA	1.035E-02	5.336E-02	7.115E-02
65	NB-93M	NO DATA	4.046E-02	2.372E-03	3.049E-03
66	NB-95M*	NO DATA	1.066E-02	1.334E-02	1.334E-02
67	NB-95	NO DATA	6.454E-02	1.067E-02	1.067E-02
68	NB-97	NO DATA	2.989E-04	1.067E-03	1.067E-03
69	MO-99	NO DATA	1.199E-02	4.269E-03	3.049E-02
70	TC-96M	4.512E-07	2.176E-04	7.115E-05	1.067E-04
71	TC-96	4.855E-05	2.434E-02	1.067E-02	2.668E-02
72	TC-97M	1.395E-05	4.294E-02	2.668E-03	7.115E-03
73	TC-97	3.298E-06	2.199E-02	5.336E-04	2.134E-03
74	TC-99M	2.770E-07	8.063E-05	2.134E-04	4.269E-04
75	TC-99	1.550E-05	1.033E-01	3.049E-03	7.115E-03
76	RU-97	NO DATA	3.350E-03	2.668E-03	3.557E-03
77	RU-103	NO DATA	7.559E-02	1.067E-02	2.134E-02
78	RU-105	NO DATA	1.581E-03	7.115E-03	1.067E-02
79	RU-106	NO DATA	1.158E 00	7.115E-02	1.067E-01
80	RH-103M	NO DATA	1.914E-05	7.115E-05	1.067E-04
81	RH-105	NO DATA	2.613E-03	7.115E-03	1.067E-02
82	PD-103	NO DATA	8.594E-03	2.668E-03	4.269E-03
83	PD-109	NO DATA	2.183E-03	1.067E-02	2.134E-02
84	AG-105	NO DATA	7.970E-02	1.067E-02	1.067E-02
85	AG-110M	NO DATA	6.279E-01	3.049E-02	4.269E-02
86	AG-111	NO DATA	2.457E-02	2.134E-02	2.668E-02
87	CD-109	NO DATA	8.776E-02	5.336E-03	7.115E-03
88	CD-115M	NO DATA	1.769E-01	3.557E-02	5.336E-02
89	CD-115	NO DATA	1.148E-02	2.668E-02	3.557E-02
90	IN-113M	NO DATA	1.404E-04	7.115E-04	1.067E-03
91	IN-114M	NO DATA	2.996E-01	5.336E-02	7.115E-02
92	IN-115M	NO DATA	3.476E-04	2.668E-03	3.557E-03
93	IN-115	NO DATA	1.869E-01	1.067E-02	1.067E-02
94	SN-113	NO DATA	1.221E-01	1.642E-03	2.134E-03
95	SN-119M*	NO DATA	2.823E-02	3.186E-02	4.185E-02
96	SN-123*	NO DATA	2.917E-01	1.067E-02	2.134E-02
97	SN-125	NO DATA	7.742E-02	5.336E-02	7.115E-02
98	SB-122	1.061E-03	1.679E-02	3.557E-02	4.269E-02
99	SB-124	2.050E-02	3.386E-01	4.269E-02	5.336E-02
100	SB-125	1.214E-02	2.417E-01	1.067E-02	1.067E-02
101	TE-125M	NO DATA	5.015E-02	2.134E-02	1.067E-02
102	TE-127M	NO DATA	1.642E-01	1.067E-02	2.372E-02

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-2 (continued)

NO.	NUCLIDE	LUNGS SOLUBLE	LUNGS INSOLUBLE	G.I. TRACT SOLUBLE	G.I. TRACT INSOLUBLE
103	TE-127	NO DATA	8.547E-04	3.557E-03	7.115E-03
104	TE-129M	NO DATA	1.968E-01	3.049E-02	5.336E-02
105	TE-129	NO DATA	3.409E-04	1.067E-03	2.134E-03
106	TE-131M	NO DATA	1.133E-02	2.134E-02	3.557E-02
107	TE-132	NO DATA	3.141E-02	3.049E-02	5.336E-02
108	I-126*	NO DATA	1.974E-02	5.336E-04	1.067E-02
109	I-129*	NO DATA	9.015E-02	2.372E-04	5.336E-03
110	I-130*	NO DATA	4.110E-03	3.557E-02	NO DATA
111	I-131*	NO DATA	2.073E-02	1.067E-03	2.134E-02
112	I-132*	NO DATA	8.879E-04	2.372E-03	7.115E-03
113	I-133*	NO DATA	5.064E-03	2.134E-03	3.049E-02
114	I-134*	NO DATA	3.627E-04	2.134E-03	2.134E-03
115	I-135*	NO DATA	1.971E-03	2.134E-03	2.134E-02
116	CS-131	3.762E-05	1.973E-03	5.336E-05	1.067E-03
117	CS-134M	3.725E-06	1.867E-04	2.134E-04	1.067E-03
118	CS-134	1.153E-02	5.483E-01	2.134E-03	3.049E-02
119	CS-135	1.558E-03	7.256E-02	2.134E-04	5.336E-03
120	CS-136	7.021E-04	3.761E-02	1.067E-03	2.134E-02
121	CS-137	9.538E-03	4.459E-01	1.067E-03	2.668E-02
122	CS-138*	NO DATA	3.939E-04	2.134E-03	2.668E-03
123	BA-131	8.884E-06	1.841E-02	5.336E-03	7.115E-03
124	BA-140	7.223E-05	1.483E-01	3.557E-02	5.336E-02
125	LA-140	NO DATA	1.670E-02	4.269E-02	5.336E-02
126	CE-141	NO DATA	4.166E-02	1.067E-02	1.067E-02
127	CE-143	NO DATA	1.000E-02	2.372E-02	3.049E-02
128	CE-144	NO DATA	1.011E 00	7.115E-04	1.067E-01
129	PR-142	NO DATA	5.897E-03	3.049E-02	4.269E-02
130	PR-143	NO DATA	3.605E-02	2.134E-02	2.372E-02
131	ND-144	NO DATA	2.199E 01	1.067E-02	2.134E-02
132	ND-147	NO DATA	2.838E-02	2.134E-02	2.134E-02
133	ND-149	NO DATA	7.523E-04	3.557E-03	4.269E-03
134	PM-147	NO DATA	6.710E-02	4.269E-03	5.336E-03
135	PM-148M*	NO DATA	2.166E-01	3.388E-02	4.269E-02
136	PM-148*	NO DATA	4.071E-02	5.082E-02	6.278E-02
137	PM-149	NO DATA	8.708E-03	2.134E-02	2.668E-02
138	SM-147	NO DATA	2.529E 01	1.067E-02	2.134E-02
139	SM-151	NO DATA	4.602E-02	2.668E-03	3.049E-03
140	SM-153	NO DATA	4.594E-03	1.067E-02	2.134E-02
141	EU-152M	NO DATA	2.529E-03	2.134E-02	2.134E-02
142	EU-152	NO DATA	3.538E-01	1.067E-02	2.134E-02
143	EU-154	NO DATA	9.264E-01	4.269E-02	5.336E-02
144	EU-155	NO DATA	8.753E-02	5.336E-03	5.336E-03
145	GD-153	NO DATA	7.276E-02	4.269E-03	5.336E-03
146	GD-159	NO DATA	2.253E-03	1.067E-02	2.134E-02
147	TB-160	NO DATA	1.981E-01	2.134E-02	2.668E-02
148	DY-165	NO DATA	3.463E-04	2.372E-03	3.049E-03
149	DY-166	NO DATA	2.272E-02	2.668E-02	3.049E-02
150	HO-166	NO DATA	6.890E-03	3.049E-02	3.557E-02
151	ER-169	NO DATA	1.757E-02	1.067E-02	1.067E-02
152	ER-171	NO DATA	1.388E-03	1.067E-02	1.067E-02
153	TM-170	NO DATA	1.922E-01	2.134E-02	2.668E-02

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-2 (continued)

NO.	NUCLIDE	LUNGS SOLUBLE	LUNGS INSOLUBLE	G.I. TRACT SOLUBLE	G.I. TRACT INSOLUBLE
154	YB-175	NO DATA	5.448E-03	1.067E-02	1.067E-02
155	LU-177	NO DATA	9.433E-03	1.067E-02	1.067E-02
156	HF-181	NO DATA	8.835E-02	1.067E-02	2.134E-02
157	TA-182	NO DATA	2.972E-01	2.372E-02	3.049E-02
158	W-181	NO DATA	5.150E-02	2.668E-03	3.557E-03
159	W-185	NO DATA	5.871E-02	7.115E-03	1.067E-02
160	W-187	NO DATA	3.998E-03	1.067E-02	2.134E-02
161	W-188*	NO DATA	3.585E-01	3.049E-02	4.269E-02
162	RE-183	NO DATA	4.158E-02	2.134E-03	4.269E-03
163	RE-186	NO DATA	1.245E-02	1.067E-02	2.668E-02
164	RE-187	NO DATA	1.319E-02	3.557E-04	1.067E-03
165	RE-188	NO DATA	5.496E-03	2.134E-02	3.557E-02
166	OS-185	NO DATA	1.409E-01	1.067E-02	2.134E-02
167	OS-191M	NO DATA	6.874E-04	3.557E-04	5.336E-04
168	OS-191	NO DATA	1.552E-02	5.336E-03	7.115E-03
169	OS-193	NO DATA	4.477E-03	2.134E-02	2.372E-02
170	IR-190	NO DATA	1.599E-02	5.336E-03	7.115E-03
171	IR-192	NO DATA	2.527E-01	2.372E-02	3.557E-02
172	IR-194	NO DATA	5.348E-03	2.668E-02	4.269E-02
173	PT-191	NO DATA	8.312E-03	7.115E-03	1.067E-02
174	PT-193M	NO DATA	9.693E-04	1.067E-03	1.067E-03
175	PT-193	NO DATA	2.087E-02	5.336E-04	7.115E-04
176	PT-197M	NO DATA	2.381E-04	1.067E-03	1.067E-03
177	PT-197	NO DATA	1.639E-03	7.115E-03	1.067E-02
178	AU-196	NO DATA	1.029E-02	5.336E-03	7.115E-03
179	AU-198	NO DATA	1.064E-02	2.134E-02	2.668E-02
180	AU-199	NO DATA	3.656E-03	5.336E-03	7.115E-03
181	HG-197M	NO DATA	1.817E-03	5.336E-02	7.115E-02
182	HG-197	NO DATA	1.258E-03	5.336E-04	2.372E-03
183	HG-203	NO DATA	5.163E-02	2.134E-03	1.067E-02
184	TL-200	3.634E-05	1.846E-03	2.372E-03	5.336E-03
185	TL-201	5.101E-05	3.218E-03	3.049E-03	7.115E-03
186	TL-202	2.295E-04	2.698E-02	7.115E-03	2.134E-02
187	TL-204	3.188E-04	2.478E-01	1.067E-02	2.134E-02
188	PB-203	NO DATA	1.836E-03	2.372E-03	3.557E-03
189	PB-204M*	NO DATA	2.539E-04	2.134E-02	2.668E-02
190	PB-210	NO DATA	2.703E 01	5.336E-03	7.115E-03
191	PB-212	NO DATA	3.333E-01	2.134E-03	7.115E-03
192	BI-206	NO DATA	4.453E-02	2.668E-02	3.049E-02
193	BI-207	NO DATA	4.751E-01	2.134E-02	2.134E-02
194	BI-210	NO DATA	1.146E 00	2.372E-02	3.049E-02
195	BI-212	NO DATA	3.192E-02	2.668E-03	3.557E-03
196	PO-210	NO DATA	3.238E 01	3.049E-02	4.269E-02
197	AT-211	NO DATA	1.672E-01	1.067E-03	2.134E-02
198	RA-223	NO DATA	2.671E 01	2.134E-01	3.049E-01
199	RA-224	NO DATA	9.062E 00	1.067E-01	2.372E-01
200	RA-226	NO DATA	1.209E 02	2.134E-02	3.557E-02
201	RA-228	NO DATA	1.675E 02	2.668E-02	5.336E-02
202	AC-227	NO DATA	2.491E 02	3.049E-03	4.269E-03
203	AC-228	NO DATA	3.803E-01	1.067E-02	1.067E-02
204	TH-227	NO DATA	3.829E 01	5.336E-02	7.115E-02

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-2 (continued)

		LUNGS		G.I. TRACT	
NO.	NUCLIDE	SOLUBLE	INSOLUBLE	SOLUBLE	INSOLUBLE
205	TH-228	NO DATA	1.037E 03	7.115E-02	1.067E-01
206	TH-230	NO DATA	6.419E 02	3.049E-02	3.557E-02
207	TH-231	NO DATA	1.077E-03	4.269E-03	5.336E-03
208	TH-232	NO DATA	6.152E 02	2.668E-02	3.049E-02
209	TH-234	NO DATA	1.955E-01	5.336E-02	7.115E-02
210	PA-230	NO DATA	8.479E 00	4.269E-03	5.336E-03
211	PA-231	NO DATA	5.936E 01	3.557E-02	4.269E-02
212	PA-233	NO DATA	3.678E-02	7.115E-03	1.067E-02
213	PA-234*	NO DATA	1.515E-03	NO DATA	NO DATA
214	U-230	NO DATA	5.684E 01	2.134E-01	2.668E-01
215	U-232	NO DATA	2.298E 02	3.557E-02	4.269E-02
216	U-233	NO DATA	5.497E 01	3.049E-02	3.557E-02
217	U-234	NO DATA	5.387E 01	3.049E-02	3.557E-02
218	U-235	NO DATA	5.057E 01	3.557E-02	4.269E-02
219	U-236	NO DATA	5.167E 01	3.049E-02	3.557E-02
220	U-237	NO DATA	7.084E-03	NO DATA	NO DATA
221	U-238	NO DATA	4.727E 01	2.668E-02	3.557E-02
222	NP-237	NO DATA	5.387E 01	3.049E-02	4.269E-02
223	NP-239	NO DATA	3.350E-03	7.115E-03	1.067E-02
224	PU-236	NO DATA	6.683E 02	NO DATA	NO DATA
225	PU-238	NO DATA	1.885E 02	3.557E-02	4.269E-02
226	PU-239	NO DATA	1.772E 02	3.557E-02	4.269E-02
227	PU-240	NO DATA	1.772E 02	3.557E-02	4.269E-02
228	PU-241	NO DATA	1.647E-01	7.115E-04	1.067E-03
229	PU-242	NO DATA	1.705E 02	3.049E-02	4.269E-02
230	PU-243	NO DATA	3.618E-04	3.557E-03	2.668E-03
231	PU-244	NO DATA	1.953E 02	1.067E-01	1.067E-01
232	AM-241	NO DATA	6.262E 01	3.557E-02	4.269E-02
233	AM-242M	NO DATA	2.490E 01	1.067E-02	1.067E-02
234	AM-242	NO DATA	1.379E-01	7.115E-03	1.067E-02
235	AM-243	NO DATA	5.936E 01	3.557E-02	4.269E-02
236	AM-244	NO DATA	2.653E-04	2.134E-04	2.668E-04
237	CM-242	NO DATA	4.047E 01	4.269E-02	5.336E-02
238	CM-243	NO DATA	6.529E 01	4.269E-02	5.336E-02
239	CM-244	NO DATA	6.475E 01	3.557E-02	4.269E-02
240	CM-245	NO DATA	6.046E 01	3.557E-02	4.269E-02
241	CM-246	NO DATA	6.156E 01	3.557E-02	4.269E-02
242	CM-247	NO DATA	6.046E 01	4.269E-02	5.336E-02
243	CM-248	NO DATA	4.983E 02	7.115E-01	1.067E 00
244	CM-249	NO DATA	1.249E-04	4.269E-04	5.336E-04
245	BK-249	NO DATA	5.365E-02	2.134E-03	2.134E-03
246	BK-250	NO DATA	2.820E-03	4.269E-03	5.336E-03
247	CF-249	NO DATA	6.591E 01	4.269E-02	5.336E-02
248	CF-250	NO DATA	6.602E 01	3.557E-02	5.336E-02
249	CF-251	NO DATA	6.483E 01	3.557E-02	4.269E-02
250	CF-252	NO DATA	2.008E 02	1.067E-01	2.134E-01
251	CF-253	NO DATA	8.460E 00	7.115E-03	7.115E-03
252	CF-254	NO DATA	1.329E 03	7.115E 00	1.067E 01
253	ES-253	NO DATA	1.068E 01	4.269E-02	5.336E-02
254	ES-254M	NO DATA	1.099E 00	5.336E-02	7.115E-02
255	ES-254	NO DATA	6.068E 01	7.115E-02	7.115E-02

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-2 (continued)

NO.	NUCLIDE	LUNGS SOLUBLE	LUNGS INSOLUBLE	G.I. TRACT SOLUBLE	G.I. TRACT INSOLUBLE
256	ES-255	NO DATA	1.605E 01	3.557E-02	4.269E-02
257	FM-254	NO DATA	9.636E-02	7.115E-03	1.067E-02
258	FM-255	NO DATA	5.948E-01	3.049E-02	3.557E-02
259	FM-256	NO DATA	3.657E 00	1.067E 00	1.067E 00

TABLE 4-3 INREM DOSE ESTIMATES FOR INGESTION OF A UNIT (1 μCi) OF EACH RADIONUCLIDE

DOSE COMMITMENT (REMS) FROM INGESTION OF RADIONUCLIDES

NUMBER OF THE REFERENCE EVENT = 1 .
AGE OF THE INDIVIDUAL AT TIME OF EVENT = 21.000 YEARS.
TIME AFTER EVENT WHEN INTAKE BEGINS = 0.0 YEARS.
TIME AFTER EVENT WHEN INTAKE ENDS = 0.003 YEARS.
DURATION OF THE INTAKE PERIOD = 0.003 YEARS.
TIME AFTER EVENT WHEN DOSE INTEGRATION BEGINS = 0.0 YEARS.
TIME AFTER EVENT WHEN DOSE INTEGRATION ENDS = 50.000 YEARS.
DURATION OF DOSE INTEGRATION = 50.000 YEARS.

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
1	H-3*	6.156E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
2	BE-7	3.005E-06	2.734E-06	NO DATA	NO DATA	6.208E-06	6.508E-06	1.149E-06	NO DATA	NO DATA
3	C-14	5.654E-04	2.827E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
4	F-18	7.268E-05	4.573E-04	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
5	NA-22	1.843E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
6	NA-24	1.696E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
7	SI-31	5.776E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	5.113E-05	2.973E-05
8	P-32	7.315E-03	1.938E-01	NO DATA	NO DATA	1.190E-02	NO DATA	NO DATA	NO DATA	NO DATA
9	S-35	2.597E-03	6.693E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	1.019E-02	NO DATA
10	CL-36	7.894E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
11	CL-38	6.261E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
12	K-42	8.711E-04	NO DATA	1.321E-03	NO DATA	6.725E-04	NO DATA	1.524E-03	NO DATA	NO DATA
13	CA-45	8.752E-03	3.938E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
14	CA-47	4.309E-03	7.203E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
15	SC-46	2.994E-06	4.523E-06	NO DATA	NO DATA	1.035E-05	9.772E-06	NO DATA	NO DATA	NO DATA
16	SC-47	8.439E-08	5.777E-07	NO DATA	NO DATA	4.210E-07	3.225E-07	NO DATA	NO DATA	NO DATA
17	SC-48	3.916E-07	5.696E-07	NO DATA	NO DATA	1.209E-06	7.476E-07	NO DATA	NO DATA	NO DATA
18	V-48	4.615E-04	5.066E-04	NO DATA	NO DATA	6.099E-04	1.806E-03	9.371E-04	NO DATA	NO DATA
19	CR-51	3.481E-06	NO DATA	NO DATA	3.685E-06	NO DATA	1.014E-06	NO DATA	NO DATA	NO DATA
20	MN-52	9.235E-04	NO DATA	NO DATA	NO DATA	3.725E-03	NO DATA	NO DATA	NO DATA	NO DATA
21	MN-54	8.650E-04	NO DATA	NO DATA	NO DATA	4.561E-03	NO DATA	NO DATA	NO DATA	NO DATA
22	MN-56	2.188E-05	NO DATA	NO DATA	NO DATA	1.233E-04	NO DATA	NO DATA	NO DATA	NO DATA
23	FE-55	3.151E-04	4.526E-04	NO DATA	NO DATA	1.341E-03	NO DATA	2.464E-03	NO DATA	NO DATA
24	FE-59	3.621E-03	NO DATA	NO DATA	NO DATA	9.816E-03	NO DATA	1.392E-02	NO DATA	NO DATA
25	CO-57	2.601E-04	NO DATA	NO DATA	NO DATA	1.471E-04	6.068E-05	8.496E-05	NO DATA	NO DATA
26	CO-58M	1.151E-05	NO DATA	NO DATA	NO DATA	6.588E-06	2.603E-06	3.645E-06	NO DATA	NO DATA
27	CO-58	1.609E-03	NO DATA	NO DATA	NO DATA	7.351E-04	2.709E-04	3.792E-04	NO DATA	NO DATA
28	CO-60	4.476E-03	NO DATA	NO DATA	NO DATA	2.064E-03	7.798E-04	1.092E-03	NO DATA	NO DATA
29	NI-59	1.613E-03	9.674E-03	NO DATA	NO DATA	3.320E-03	NO DATA	NO DATA	NO DATA	NO DATA
30	NI-63	4.301E-03	1.346E-01	NO DATA	NO DATA	8.909E-03	NO DATA	NO DATA	NO DATA	NO DATA
31	NI-65	4.837E-05	9.156E-04	NO DATA	NO DATA	1.138E-04	NO DATA	NO DATA	NO DATA	NO DATA
32	CU-64	3.884E-05	NO DATA	NO DATA	NO DATA	8.683E-05	2.118E-04	6.977E-04	NO DATA	NO DATA
33	ZN-65	6.500E-03	3.041E-03	5.113E-03	NO DATA	1.494E-02	9.997E-03	NO DATA	1.182E-03	1.519E-03
34	ZN-69M	3.886E-05	1.913E-04	2.721E-05	NO DATA	4.376E-04	2.664E-04	NO DATA	4.113E-05	9.139E-05
35	ZN-69	1.395E-06	1.074E-05	9.762E-07	NO DATA	2.010E-05	1.302E-05	NO DATA	2.197E-06	4.861E-06
36	GA-72	1.018E-06	4.573E-06	NO DATA	NO DATA	6.284E-06	2.392E-06	2.348E-06	NO DATA	NO DATA
37	GE-71	9.632E-08	NO DATA	NO DATA	NO DATA	3.966E-07	4.397E-06	NO DATA	NO DATA	NO DATA
38	AS-73	1.150E-04	NO DATA	NO DATA	NO DATA	1.066E-04	1.768E-04	NO DATA	NO DATA	NO DATA

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-3 (continued)

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
39	AS-74	2.902E-04	NO DATA	NO DATA	NO DATA	2.507E-04	4.236E-04	NO DATA	NO DATA	NO DATA
40	AS-76	4.492E-05	NO DATA	NO DATA	NO DATA	4.695E-05	8.868E-05	NO DATA	NO DATA	NO DATA
41	AS-77	1.206E-05	NO DATA	NO DATA	NO DATA	1.490E-05	2.814E-05	NO DATA	NO DATA	NO DATA
42	SE-75	1.903E-03	NO DATA	NO DATA	NO DATA	4.863E-03	7.106E-03	2.533E-03	NO DATA	NO DATA
43	BR-80M*	1.379E-04	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
44	BR-82	2.450E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
45	BR-83*	3.939E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
46	BR-84*	5.344E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
47	RB-86	9.674E-03	NO DATA	1.162E-02	NO DATA	2.049E-02	NO DATA	1.703E-02	NO DATA	NO DATA
48	RB-87	4.240E-03	NO DATA	7.915E-03	NO DATA	1.222E-02	NO DATA	7.915E-03	NO DATA	NO DATA
49	RB-88*	3.570E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
50	RB-89*	4.561E-06	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
51	SR-85M	6.464E-06	1.293E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
52	SR-85	6.706E-03	1.297E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
53	SR-89	8.690E-03	3.103E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
54	SR-90*	1.662E-01	8.312E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
55	SR-91	2.638E-04	5.453E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
56	SR-92	8.983E-05	1.935E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
57	Y-90	2.497E-07	9.260E-06	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
58	Y-91M	3.408E-09	8.245E-08	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
59	Y-91	3.583E-06	1.321E-04	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
60	Y-92	2.513E-08	8.127E-07	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
61	Y-93	7.476E-08	2.144E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
62	ZR-93	1.037E-06	3.769E-05	NO DATA	NO DATA	2.125E-06	9.674E-06	5.805E-06	NO DATA	NO DATA
63	ZR-95	6.392E-06	2.467E-05	NO DATA	NO DATA	9.117E-06	1.326E-05	7.956E-06	NO DATA	NO DATA
64	ZR-97	1.561E-07	1.659E-06	NO DATA	NO DATA	3.428E-07	5.204E-07	3.122E-07	NO DATA	NO DATA
65	NB-93M	2.507E-06	3.757E-05	NO DATA	NO DATA	1.014E-05	1.188E-05	1.123E-05	NO DATA	NO DATA
66	NB-95M*	2.538E-07	5.952E-07	NO DATA	NO DATA	4.631E-07	4.556E-07	3.528E-07	NO DATA	NO DATA
67	NB-95	1.789E-06	4.976E-06	NO DATA	NO DATA	3.390E-06	3.274E-06	2.642E-06	NO DATA	NO DATA
68	NB-97	4.646E-09	4.870E-08	NO DATA	NO DATA	1.266E-08	1.495E-08	1.196E-08	NO DATA	NO DATA
69	MO-99	8.141E-04	NO DATA	NO DATA	NO DATA	4.312E-03	1.011E-02	NO DATA	NO DATA	NO DATA
70	TC-96M	5.654E-06	1.470E-07	NO DATA	NO DATA	1.397E-06	1.847E-05	NO DATA	NO DATA	NO DATA
71	TC-96	5.863E-04	1.356E-05	NO DATA	NO DATA	1.573E-04	2.009E-03	NO DATA	NO DATA	NO DATA
72	TC-97M	4.664E-05	7.748E-05	NO DATA	NO DATA	1.339E-04	1.759E-03	NO DATA	NO DATA	NO DATA
73	TC-97	1.047E-05	4.973E-06	NO DATA	NO DATA	3.880E-05	4.886E-04	NO DATA	NO DATA	NO DATA
74	TC-99M	8.376E-06	5.235E-08	NO DATA	NO DATA	5.658E-07	7.940E-06	NO DATA	NO DATA	NO DATA
75	TC-99	4.921E-05	1.230E-04	NO DATA	NO DATA	1.824E-04	2.296E-03	NO DATA	NO DATA	NO DATA
76	RU-97	9.423E-06	7.840E-06	NO DATA	NO DATA	NO DATA	1.467E-04	NO DATA	NO DATA	NO DATA
77	RU-103	8.569E-05	1.870E-04	NO DATA	NO DATA	NO DATA	7.739E-04	NO DATA	NO DATA	NO DATA
78	RU-105	7.161E-06	1.671E-05	NO DATA	NO DATA	NO DATA	2.216E-04	NO DATA	NO DATA	NO DATA
79	RU-106	3.166E-04	2.450E-03	NO DATA	NO DATA	NO DATA	4.726E-03	NO DATA	NO DATA	NO DATA
80	RH-103M	4.376E-07	7.559E-07	NO DATA	NO DATA	7.208E-07	3.008E-06	2.005E-06	NO DATA	NO DATA
81	RH-105	5.570E-05	1.383E-04	NO DATA	NO DATA	9.174E-05	4.010E-04	2.636E-04	NO DATA	NO DATA
82	PD-103	5.227E-05	NO DATA	NO DATA	NO DATA	4.889E-04	3.279E-03	4.769E-04	NO DATA	NO DATA
83	PD-109	4.485E-05	NO DATA	NO DATA	NO DATA	1.992E-04	1.149E-03	2.257E-04	NO DATA	NO DATA
84	AG-105	2.902E-05	1.424E-05	NO DATA	NO DATA	4.126E-05	8.599E-05	NO DATA	NO DATA	NO DATA
85	AG-110M	8.722E-05	1.555E-04	NO DATA	NO DATA	1.543E-04	3.176E-04	NO DATA	NO DATA	NO DATA
86	AG-111	1.256E-05	5.654E-05	NO DATA	NO DATA	2.457E-05	7.231E-05	NO DATA	NO DATA	NO DATA
87	CD-109	4.031E-05	NO DATA	NO DATA	NO DATA	1.147E-03	1.101E-03	NO DATA	NO DATA	NO DATA
88	CD-115M	5.588E-05	NO DATA	NO DATA	NO DATA	1.749E-03	1.416E-03	NO DATA	NO DATA	NO DATA
89	CD-115	4.089E-06	NO DATA	NO DATA	NO DATA	1.045E-04	7.524E-05	NO DATA	NO DATA	NO DATA
90	IN-113M	4.433E-08	1.767E-07	NO DATA	3.424E-08	1.851E-07	2.711E-07	2.711E-07	NO DATA	NO DATA
91	IN-114M	4.875E-05	4.165E-04	NO DATA	1.942E-05	2.950E-04	4.907E-04	4.362E-04	NO DATA	NO DATA

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-3 (continued)

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
92	IN-115M	1.034E-07	5.005E-07	NO DATA	8.912E-08	4.587E-07	7.055E-07	7.055E-07	NO DATA	NO DATA
93	IN-115	1.709E-05	1.725E-04	NO DATA	4.186E-06	1.190E-04	1.993E-04	1.595E-04	NO DATA	NO DATA
94	SN-113	4.523E-04	7.769E-03	NO DATA	1.261E-04	2.132E-04	NO DATA	NO DATA	NO DATA	NO DATA
95	SN-119M*	9.804E-05	3.887E-04	NO DATA	1.701E-05	4.472E-05	NO DATA	NO DATA	NO DATA	NO DATA
96	SN-123*	7.432E-04	3.022E-02	NO DATA	4.278E-04	5.033E-04	NO DATA	NO DATA	NO DATA	NO DATA
97	SN-125	3.691E-04	8.745E-03	NO DATA	1.431E-04	1.702E-04	NO DATA	NO DATA	NO DATA	NO DATA
98	SB-122	6.697E-05	2.290E-04	NO DATA	3.113E-06	4.506E-06	NO DATA	NO DATA	NO DATA	NO DATA
99	SB-124	1.156E-03	2.745E-03	NO DATA	7.144E-06	5.473E-07	NO DATA	NO DATA	NO DATA	NO DATA
100	SB-125	4.071E-04	1.753E-03	NO DATA	1.847E-06	2.142E-05	NO DATA	NO DATA	NO DATA	NO DATA
101	TE-125M	4.711E-04	2.456E-03	NO DATA	7.860E-04	1.207E-03	1.368E-02	3.420E-03	3.023E-03	NO DATA
102	TE-127M	1.089E-03	8.308E-03	NO DATA	2.281E-03	3.173E-03	3.596E-02	8.990E-03	9.798E-03	NO DATA
103	TE-127	2.387E-05	1.127E-04	NO DATA	8.135E-05	4.035E-05	4.573E-04	1.143E-04	1.286E-04	NO DATA
104	TE-129M	2.879E-03	1.233E-02	NO DATA	4.423E-03	5.725E-03	6.098E-02	1.524E-02	1.517E-02	NO DATA
105	TE-129	1.308E-05	3.439E-05	NO DATA	2.803E-05	1.605E-05	1.694E-04	4.236E-05	4.205E-05	NO DATA
106	TE-131M	4.816E-04	7.513E-04	NO DATA	6.953E-04	5.018E-04	4.749E-03	1.173E-03	NO DATA	NO DATA
107	TE-132	1.293E-03	2.165E-03	NO DATA	1.627E-03	1.375E-03	1.360E-02	3.401E-03	2.909E-03	NO DATA
108	I-126*	2.914E-03	NO DATA	NO DATA	2.058E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
109	I-129*	9.318E-03	NO DATA	NO DATA	7.476E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
110	I-130*	8.789E-04	NO DATA	NO DATA	2.774E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
111	I-131*	3.501E-03	NO DATA	NO DATA	1.884E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
112	I-132*	1.727E-04	NO DATA	NO DATA	6.924E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
113	I-133*	7.651E-04	NO DATA	NO DATA	5.117E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
114	I-134*	5.654E-05	NO DATA	NO DATA	3.245E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
115	I-135*	3.811E-04	NO DATA	NO DATA	1.595E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
116	CS-131	2.657E-04	6.621E-05	2.636E-04	NO DATA	6.518E-04	4.104E-04	4.889E-04	NO DATA	NO DATA
117	CS-134M	2.586E-05	2.668E-05	3.303E-05	NO DATA	5.885E-05	3.493E-05	4.129E-05	NO DATA	NO DATA
118	CS-134	7.486E-02	4.975E-02	1.290E-01	NO DATA	1.393E-01	4.495E-02	9.889E-02	NO DATA	NO DATA
119	CS-135	4.837E-03	1.935E-02	9.029E-03	NO DATA	1.793E-02	6.772E-03	1.580E-02	NO DATA	NO DATA
120	CS-136	7.486E-03	3.588E-03	7.559E-03	NO DATA	1.204E-02	7.085E-03	8.147E-03	NO DATA	NO DATA
121	CS-137	4.324E-02	8.091E-02	7.956E-02	NO DATA	1.101E-01	3.796E-02	8.768E-02	NO DATA	NO DATA
122	CS-138*	6.213E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
123	BA-131	1.950E-04	3.950E-04	1.601E-06	NO DATA	2.826E-06	8.379E-07	1.043E-06	NO DATA	NO DATA
124	BA-140	1.288E-03	1.647E-02	1.070E-05	NO DATA	2.281E-05	7.476E-06	9.361E-06	NO DATA	NO DATA
125	LA-140	3.342E-07	1.900E-06	NO DATA	NO DATA	1.195E-06	NO DATA	NO DATA	NO DATA	NO DATA
126	CE-141	6.596E-07	7.887E-06	NO DATA	NO DATA	5.626E-06	2.638E-06	NO DATA	NO DATA	NO DATA
127	CE-143	1.351E-07	1.587E-06	NO DATA	NO DATA	1.209E-06	5.329E-07	NO DATA	NO DATA	NO DATA
128	CE-144	2.600E-05	4.809E-04	NO DATA	NO DATA	2.046E-04	1.213E-04	NO DATA	NO DATA	NO DATA
129	PR-142	7.120E-08	1.307E-06	NO DATA	NO DATA	5.587E-07	3.166E-07	NO DATA	NO DATA	NO DATA
130	PR-143	4.523E-07	9.113E-06	NO DATA	NO DATA	3.642E-06	2.111E-06	NO DATA	NO DATA	NO DATA
131	ND-144	1.374E-03	5.496E-02	NO DATA	NO DATA	5.648E-03	1.603E-02	NO DATA	NO DATA	NO DATA
132	ND-147	4.649E-07	5.746E-06	NO DATA	NO DATA	6.898E-06	4.203E-06	NO DATA	NO DATA	NO DATA
133	ND-149	9.559E-09	1.430E-07	NO DATA	NO DATA	1.771E-07	9.834E-08	NO DATA	NO DATA	NO DATA
134	PM-147	2.767E-06	7.311E-05	NO DATA	NO DATA	6.836E-06	1.291E-05	NO DATA	NO DATA	NO DATA
135	PM-148M*	6.079E-06	1.944E-05	NO DATA	NO DATA	7.765E-06	1.177E-05	NO DATA	NO DATA	NO DATA
136	PM-148*	5.994E-07	7.097E-06	NO DATA	NO DATA	1.190E-06	2.143E-06	NO DATA	NO DATA	NO DATA
137	PM-149	1.244E-07	1.532E-06	NO DATA	NO DATA	2.504E-07	4.515E-07	NO DATA	NO DATA	NO DATA
138	SM-147	1.580E-03	6.320E-02	NO DATA	NO DATA	6.490E-03	7.372E-03	NO DATA	NO DATA	NO DATA
139	SM-151	2.836E-06	6.868E-05	NO DATA	NO DATA	1.179E-05	1.324E-05	NO DATA	NO DATA	NO DATA
140	SM-153	6.125E-08	7.901E-07	NO DATA	NO DATA	7.611E-07	2.382E-07	NO DATA	NO DATA	NO DATA
141	EU-152M	3.501E-08	4.154E-07	NO DATA	NO DATA	2.908E-07	1.977E-07	NO DATA	NO DATA	NO DATA
142	EU-152	3.863E-05	1.928E-04	NO DATA	NO DATA	4.410E-05	2.061E-04	NO DATA	NO DATA	NO DATA
143	EU-154	7.785E-05	1.213E-03	NO DATA	NO DATA	1.149E-04	6.572E-04	NO DATA	NO DATA	NO DATA
144	EU-155	5.260E-06	4.633E-05	NO DATA	NO DATA	1.075E-05	2.664E-05	NO DATA	NO DATA	NO DATA

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-3 (continued)

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
145	GD-153	2.937E-06	2.760E-05	NO DATA	NO DATA	1.997E-06	NO DATA	NO DATA	NO DATA	NO DATA
146	GD-159	2.827E-08	2.650E-07	NO DATA	NO DATA	1.280E-07	NO DATA	NO DATA	NO DATA	NO DATA
147	TB-160	5.874E-06	4.699E-05	NO DATA	NO DATA	NO DATA	1.935E-05	NO DATA	NO DATA	NO DATA
148	DY-165	5.180E-09	9.140E-08	NO DATA	NO DATA	9.786E-09	NO DATA	NO DATA	NO DATA	NO DATA
149	DY-166	2.812E-07	8.330E-06	NO DATA	NO DATA	6.860E-07	NO DATA	NO DATA	NO DATA	NO DATA
150	HO-166	8.062E-08	2.506E-06	NO DATA	NO DATA	1.963E-07	3.708E-07	NO DATA	NO DATA	NO DATA
151	ER-169	3.603E-07	3.389E-06	NO DATA	NO DATA	2.618E-07	8.634E-07	NO DATA	NO DATA	NO DATA
152	ER-171	2.110E-08	3.895E-05	NO DATA	NO DATA	NO DATA	6.967E-08	NO DATA	NO DATA	NO DATA
153	TM-170	3.809E-06	1.307E-04	NO DATA	NO DATA	NO DATA	1.528E-05	NO DATA	NO DATA	NO DATA
154	YB-175	6.868E-08	1.768E-06	NO DATA	NO DATA	NO DATA	7.512E-07	NO DATA	NO DATA	NO DATA
155	LU-177	1.193E-07	3.652E-06	NO DATA	NO DATA	NO DATA	2.619E-07	NO DATA	NO DATA	NO DATA
156	HF-181	2.251E-06	4.997E-06	NO DATA	NO DATA	2.419E-05	5.252E-06	6.511E-05	NO DATA	NO DATA
157	TA-182	8.753E-06	1.717E-05	NO DATA	NO DATA	6.374E-05	2.902E-05	1.071E-05	NO DATA	NO DATA
158	W-181	2.094E-05	2.928E-05	NO DATA	NO DATA	8.777E-05	NO DATA	NO DATA	NO DATA	NO DATA
159	W-185	1.466E-05	3.987E-04	NO DATA	NO DATA	1.376E-04	NO DATA	NO DATA	NO DATA	NO DATA
160	W-187	3.560E-05	9.235E-05	NO DATA	NO DATA	9.105E-05	NO DATA	NO DATA	NO DATA	NO DATA
161	W-188*	8.899E-05	2.228E-03	NO DATA	NO DATA	8.748E-04	NO DATA	NO DATA	NO DATA	NO DATA
162	RE-183	8.041E-04	9.502E-06	NO DATA	1.265E-03	2.522E-04	NO DATA	NO DATA	NO DATA	NO DATA
163	RE-186	4.973E-04	1.715E-04	NO DATA	7.849E-03	2.377E-04	NO DATA	NO DATA	NO DATA	NO DATA
164	RE-187	4.397E-05	1.136E-05	NO DATA	4.617E-04	3.621E-05	NO DATA	NO DATA	NO DATA	NO DATA
165	RE-188	3.149E-04	1.205E-04	NO DATA	5.849E-03	1.246E-04	NO DATA	NO DATA	NO DATA	NO DATA
166	OS-185	1.068E-04	NO DATA	NO DATA	NO DATA	2.600E-04	1.466E-03	NO DATA	NO DATA	NO DATA
167	OS-191M	2.827E-06	NO DATA	NO DATA	NO DATA	4.394E-06	2.477E-05	NO DATA	NO DATA	NO DATA
168	OS-191	3.015E-05	NO DATA	NO DATA	NO DATA	8.484E-05	5.106E-04	NO DATA	NO DATA	NO DATA
169	OS-193	3.183E-05	NO DATA	NO DATA	NO DATA	6.553E-05	4.642E-04	NO DATA	NO DATA	NO DATA
170	IR-190	2.905E-04	NO DATA	NO DATA	NO DATA	1.317E-03	1.280E-03	1.137E-03	NO DATA	NO DATA
171	IR-192	1.820E-03	NO DATA	NO DATA	NO DATA	1.190E-02	1.649E-02	1.466E-02	NO DATA	NO DATA
172	IR-194	6.445E-05	NO DATA	NO DATA	NO DATA	6.184E-04	6.946E-04	6.174E-04	NO DATA	NO DATA
173	PT-191	1.979E-04	NO DATA	NO DATA	NO DATA	2.780E-05	1.559E-03	2.494E-04	NO DATA	NO DATA
174	PT-193M	2.356E-05	NO DATA	NO DATA	NO DATA	3.532E-06	1.798E-04	2.877E-05	NO DATA	NO DATA
175	PT-193	1.081E-04	NO DATA	NO DATA	NO DATA	1.311E-05	2.052E-03	3.283E-04	NO DATA	NO DATA
176	PT-197M	3.225E-06	NO DATA	NO DATA	NO DATA	9.850E-07	6.840E-05	1.094E-05	NO DATA	NO DATA
177	PT-197	1.987E-05	NO DATA	NO DATA	NO DATA	5.960E-06	4.158E-04	6.653E-05	NO DATA	NO DATA
178	AU-196	2.601E-04	NO DATA	NO DATA	NO DATA	1.992E-04	6.046E-04	2.015E-04	NO DATA	NO DATA
179	AU-198	1.579E-04	NO DATA	NO DATA	NO DATA	2.049E-04	8.113E-04	2.704E-04	NO DATA	NO DATA
180	AU-199	5.842E-05	NO DATA	NO DATA	NO DATA	6.950E-05	2.726E-04	9.088E-05	NO DATA	NO DATA
181	HG-197M	2.144E-04	NO DATA	NO DATA	NO DATA	8.380E-04	1.075E-02	1.495E-03	NO DATA	NO DATA
182	HG-197	1.600E-04	NO DATA	NO DATA	NO DATA	5.672E-04	6.282E-03	8.824E-04	NO DATA	NO DATA
183	HG-203	1.610E-03	NO DATA	NO DATA	NO DATA	8.384E-03	1.048E-01	1.202E-02	NO DATA	NO DATA
184	TL-200	1.734E-04	2.412E-05	1.759E-04	NO DATA	1.428E-04	7.085E-04	NO DATA	NO DATA	NO DATA
185	TL-201	1.522E-04	2.419E-04	1.894E-04	NO DATA	1.966E-04	1.298E-03	NO DATA	NO DATA	NO DATA
186	TL-202	6.266E-04	1.083E-03	8.466E-04	NO DATA	8.148E-04	5.934E-03	NO DATA	NO DATA	NO DATA
187	TL-204	5.889E-04	2.382E-03	8.062E-04	NO DATA	1.078E-03	9.833E-03	NO DATA	NO DATA	NO DATA
188	PB-203	3.999E-05	2.317E-05	NO DATA	NO DATA	5.628E-05	3.641E-04	NO DATA	NO DATA	NO DATA
189	PB-204M*	5.275E-06	3.051E-06	NO DATA	NO DATA	7.651E-06	5.052E-05	NO DATA	NO DATA	NO DATA
190	PB-210	5.226E-01	1.450E 01	NO DATA	NO DATA	4.138E 00	1.207E 01	NO DATA	NO DATA	NO DATA
191	PB-212	3.022E-03	3.778E-02	NO DATA	NO DATA	1.008E-02	8.707E-02	NO DATA	NO DATA	NO DATA
192	BI-206	5.277E-05	5.808E-06	NO DATA	NO DATA	2.328E-04	1.318E-03	1.105E-04	NO DATA	NO DATA
193	BI-207	5.235E-05	9.951E-06	NO DATA	NO DATA	4.336E-04	1.451E-03	1.612E-04	NO DATA	NO DATA
194	BI-210	2.618E-04	4.523E-04	NO DATA	NO DATA	3.195E-03	4.178E-02	2.492E-03	NO DATA	NO DATA
195	BI-212	3.650E-05	5.422E-05	NO DATA	NO DATA	2.254E-04	2.524E-03	1.083E-04	NO DATA	NO DATA
196	PO-210	8.638E-02	3.518E-01	NO DATA	NO DATA	7.588E-01	2.472E 00	2.257E 00	NO DATA	NO DATA
197	AT-211	1.916E-02	NO DATA	NO DATA	2.012E 00	NO DATA	NO DATA	2.682E-01	NO DATA	3.353E-01

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-3 (continued)

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
198	RA-223	5.189E-01	5.145E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
199	RA-224	2.023E-01	1.601E 00	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
200	RA-226	3.110E 01	3.021E 02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
201	RA-228	1.662E 01	1.250E 02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
202	AC-227	1.104E-01	1.871E 00	NO DATA	NO DATA	2.536E-01	7.984E-02	NO DATA	NO DATA	NO DATA
203	AC-228	6.261E-06	7.922E-05	NO DATA	NO DATA	3.139E-05	3.493E-06	NO DATA	NO DATA	NO DATA
204	TH-227	3.853E-04	1.335E-02	NO DATA	NO DATA	2.419E-04	1.371E-03	NO DATA	NO DATA	NO DATA
205	TH-228	1.664E-02	4.927E-01	NO DATA	NO DATA	8.341E-03	4.638E-02	NO DATA	NO DATA	NO DATA
206	TH-230	5.701E-02	2.043E 00	NO DATA	NO DATA	1.174E-01	5.641E-01	NO DATA	NO DATA	NO DATA
207	TH-231	2.017E-08	4.392E-07	NO DATA	NO DATA	3.690E-08	1.830E-07	NO DATA	NO DATA	NO DATA
208	TH-232	7.364E-02	2.298E 00	NO DATA	NO DATA	1.003E-01	4.818E 00	NO DATA	NO DATA	NO DATA
209	TH-234	2.296E-06	7.948E-05	NO DATA	NO DATA	4.675E-06	2.649E-05	NO DATA	NO DATA	NO DATA
210	PA-230	1.075E-04	2.669E-03	NO DATA	NO DATA	NO DATA	5.189E-04	NO DATA	NO DATA	NO DATA
211	PA-231	1.595E-01	4.104E 00	NO DATA	NO DATA	1.543E-01	8.648E-01	NO DATA	NO DATA	NO DATA
212	PA-233	9.180E-07	5.293E-06	NO DATA	NO DATA	1.063E-06	4.016E-06	NO DATA	NO DATA	NO DATA
213	PA-234*	3.225E-08	1.583E-07	NO DATA	NO DATA	3.561E-08	1.341E-07	NO DATA	NO DATA	NO DATA
214	U-230	6.303E-02	4.042E-01	NO DATA	NO DATA	NO DATA	8.183E-01	NO DATA	NO DATA	NO DATA
215	U-232	2.932E-01	4.146E 00	NO DATA	NO DATA	NO DATA	4.434E-01	NO DATA	NO DATA	NO DATA
216	U-233	5.235E-02	8.638E-01	NO DATA	NO DATA	NO DATA	2.015E-01	NO DATA	NO DATA	NO DATA
217	U-234	5.130E-02	8.292E-01	NO DATA	NO DATA	NO DATA	1.975E-01	NO DATA	NO DATA	NO DATA
218	U-235	4.816E-02	7.947E-01	NO DATA	NO DATA	NO DATA	1.854E-01	NO DATA	NO DATA	NO DATA
219	U-236	4.921E-02	7.947E-01	NO DATA	NO DATA	NO DATA	1.895E-01	NO DATA	NO DATA	NO DATA
220	U-237	1.092E-05	2.973E-05	NO DATA	NO DATA	NO DATA	1.403E-04	NO DATA	NO DATA	NO DATA
221	U-238	4.502E-02	7.601E-01	NO DATA	NO DATA	NO DATA	1.733E-01	NO DATA	NO DATA	NO DATA
222	NP-237	5.542E-02	1.368E 00	NO DATA	NO DATA	1.191E-01	4.122E-01	NO DATA	NO DATA	NO DATA
223	NP-239	7.075E-08	1.076E-06	NO DATA	NO DATA	1.105E-07	3.586E-07	NO DATA	NO DATA	NO DATA
224	PU-236	1.094E-02	3.863E-01	NO DATA	NO DATA	3.315E-02	2.509E-02	NO DATA	NO DATA	NO DATA
225	PU-238	1.722E-02	6.846E-01	NO DATA	NO DATA	9.668E-02	7.305E-02	NO DATA	NO DATA	NO DATA
226	PU-239	1.911E-02	7.871E-01	NO DATA	NO DATA	1.061E-01	8.117E-02	NO DATA	NO DATA	NO DATA
227	PU-240	1.908E-02	7.861E-01	NO DATA	NO DATA	1.061E-01	8.117E-02	NO DATA	NO DATA	NO DATA
228	PU-241	3.055E-04	1.488E-02	NO DATA	NO DATA	7.590E-04	1.463E-03	NO DATA	NO DATA	NO DATA
229	PU-242	1.841E-02	7.296E-01	NO DATA	NO DATA	1.021E-01	7.811E-02	NO DATA	NO DATA	NO DATA
230	PU-243	2.417E-09	1.045E-07	NO DATA	NO DATA	1.009E-08	1.128E-08	NO DATA	NO DATA	NO DATA
231	PU-244	2.109E-02	8.522E-01	NO DATA	NO DATA	NO DATA	8.944E-02	NO DATA	NO DATA	NO DATA
232	AM-241	5.422E-02	8.211E-01	NO DATA	NO DATA	2.853E-01	4.065E-01	NO DATA	NO DATA	NO DATA
233	AM-242M	5.485E-02	8.270E-01	NO DATA	NO DATA	2.782E-01	4.029E-01	NO DATA	NO DATA	NO DATA
234	AM-242	4.693E-06	5.866E-05	NO DATA	NO DATA	6.341E-05	3.202E-05	NO DATA	NO DATA	NO DATA
235	AM-243	5.300E-02	8.189E-01	NO DATA	NO DATA	2.775E-02	3.997E-01	NO DATA	NO DATA	NO DATA
236	AM-244	8.338E-08	1.184E-06	NO DATA	NO DATA	5.432E-07	5.805E-07	NO DATA	NO DATA	NO DATA
237	CM-242	1.352E-03	2.037E-02	NO DATA	NO DATA	2.075E-02	6.151E-03	NO DATA	NO DATA	NO DATA
238	CM-243	4.106E-02	7.083E-01	NO DATA	NO DATA	2.570E-01	1.916E-01	NO DATA	NO DATA	NO DATA
239	CM-244	2.980E-02	5.025E-01	NO DATA	NO DATA	2.168E-02	1.391E-01	NO DATA	NO DATA	NO DATA
240	CM-245	5.765E-02	1.020E 00	NO DATA	NO DATA	2.854E-01	2.690E-01	NO DATA	NO DATA	NO DATA
241	CM-246	5.765E-02	1.019E 00	NO DATA	NO DATA	2.854E-01	2.690E-01	NO DATA	NO DATA	NO DATA
242	CM-247	5.662E-02	9.850E-01	NO DATA	NO DATA	2.803E-01	2.642E-01	NO DATA	NO DATA	NO DATA
243	CM-248	4.666E-01	8.190E 00	NO DATA	NO DATA	2.311E 00	2.178E 00	NO DATA	NO DATA	NO DATA
244	CM-249	2.396E-08	3.732E-07	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
245	BK-249	3.449E-05	1.452E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
246	BK-250	2.399E-07	9.765E-06	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
247	CF-249	2.090E-02	8.445E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
248	CF-250	6.632E-03	2.653E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
249	CF-251	2.085E-02	8.282E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
250	CF-252	5.231E-03	2.195E-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-3 (continued)

NO.	NUCLIDE	TOTAL BODY	BONE	MUSCLE	THYROID	LIVER	KIDNEYS	SPLEEN	TESTES	OVARIES
251	CF-253	4.127E-05	1.674E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
252	CF-254	6.684E-03	2.66 CE-01	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
253	ES-253	4.586E-05	1.859E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
254	ES-254M	6.533E-06	2.654E-04	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
255	ES-254	1.794E-03	7.431E-02	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
256	ES-255	7.067E-05	2.865E-03	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
257	FM-254	5.593E-07	2.273E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
258	FM-255	2.111E-06	8.556E-05	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
259	FM-256	1.255E-05	5.021E-04	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA

TABLE 4-3 (continued)

NO.	NUCLIDE	LUNGS SOLUBLE	G.I. TRACT SOLUBLE	G.I. TRACT INSOLUBLE
1	H-3*	NO DATA	NO DATA	NO DATA
2	BE-7	NO DATA	9.702E-04	9.702E-04
3	C-14	NO DATA	2.156E-04	9.702E-03
4	F-18	NO DATA	2.426E-03	3.881E-03
5	NA-22	NO DATA	6.468E-03	6.468E-02
6	NA-24	NO DATA	9.702E-03	6.468E-02
7	SI-31	4.281E-04	2.156E-03	9.702E-03
8	P-32	NO DATA	2.156E-02	9.702E-02
9	S-35	NO DATA	3.881E-04	6.468E-03
10	CL-36	NO DATA	1.940E-03	3.234E-02
11	CL-38	NO DATA	4.851E-03	4.851E-03
12	K-42	NO DATA	6.468E-03	9.702E-02
13	CA-45	NO DATA	4.851E-03	9.702E-03
14	CA-47	NO DATA	2.426E-02	6.468E-02
15	SC-46	NO DATA	4.851E-02	4.851E-02
16	SC-47	NO DATA	2.156E-02	2.156E-02
17	SC-48	NO DATA	6.468E-02	6.468E-02
18	V-48	NO DATA	6.468E-02	6.468E-02
19	CR-51	5.459E-06	9.702E-04	9.702E-04
20	MN-52	NO DATA	6.468E-02	6.468E-02
21	MN-54	NO DATA	1.940E-02	1.940E-02
22	MN-56	NO DATA	1.940E-02	1.940E-02
23	FE-55	7.803E-04	6.468E-04	9.702E-04
24	FE-59	2.740E-03	3.234E-02	3.881E-02
25	CO-57	NO DATA	3.881E-03	4.851E-03
26	CO-58M	NO DATA	6.468E-04	9.702E-04
27	CO-58	NO DATA	1.940E-02	2.156E-02
28	CO-60	NO DATA	3.881E-02	6.468E-02
29	NI-59	NO DATA	6.468E-04	9.702E-04
30	NI-63	NO DATA	1.940E-03	2.772E-03
31	NI-65	NO DATA	1.940E-02	1.940E-02
32	CU-64	NO DATA	6.468E-03	9.702E-03
33	ZN-65	NO DATA	9.702E-03	9.702E-03
34	ZN-69M	NO DATA	2.772E-02	3.234E-02
35	ZN-69	NO DATA	9.702E-04	9.702E-04
36	GA-72	NO DATA	4.851E-02	4.851E-02
37	GE-71	NO DATA	9.702E-04	9.702E-04
38	AS-73	NO DATA	3.881E-03	3.881E-03
39	AS-74	NO DATA	3.881E-02	3.881E-02
40	AS-76	NO DATA	9.702E-02	9.702E-02
41	AS-77	NO DATA	2.426E-02	2.426E-02
42	SE-75	NO DATA	6.468E-04	6.468E-03
43	BR-80M*	NO DATA	NO DATA	NO DATA
44	BR-82	NO DATA	6.468E-03	4.851E-02
45	BR-83*	NO DATA	NO DATA	NO DATA
46	BR-84*	NO DATA	NO DATA	NO DATA
47	RB-86	NO DATA	3.881E-03	9.702E-02
48	RB-87	NO DATA	6.468E-04	9.702E-03
49	RB-88*	NO DATA	4.851E-03	4.851E-03
50	RB-89*	NO DATA	1.940E-03	1.940E-03
51	SR-85M	NO DATA	2.772E-04	2.772E-04

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-3 (continued)

NO.	NUCLIDE	LUNGS SOLUBLE	G.I. TRACT SOLUBLE	G.I. TRACT INSOLUBLE
52	SR-85	NO DATA	9.702E-03	9.702E-03
53	SR-89	NO DATA	4.851E-02	6.468E-02
54	SR-90*	NO DATA	3.881E-02	4.851E-02
55	SR-91	NO DATA	2.772E-02	3.881E-02
56	SR-92	NO DATA	2.772E-02	3.234E-02
57	Y-90	NO DATA	9.702E-02	9.702E-02
58	Y-91M	NO DATA	6.468E-04	6.468E-04
59	Y-91	NO DATA	6.468E-02	6.468E-02
60	Y-92	NO DATA	3.234E-02	3.234E-02
61	Y-93	NO DATA	6.468E-02	6.468E-02
62	ZR-93	NO DATA	2.426E-03	2.426E-03
63	ZR-95	NO DATA	3.234E-02	3.234E-02
64	ZR-97	NO DATA	9.702E-02	9.702E-02
65	NB-93M	NO DATA	4.851E-03	4.851E-03
66	NB-95M*	NO DATA	2.426E-02	2.426E-02
67	NB-95	NO DATA	1.940E-02	1.940E-02
68	NB-97	NO DATA	2.156E-03	2.156E-03
69	MO-99	NO DATA	9.702E-03	4.851E-02
70	TC-96M	4.512E-07	1.940E-04	1.940E-04
71	TC-96	4.855E-05	1.940E-02	3.881E-02
72	TC-97M	1.395E-05	4.851E-03	9.702E-03
73	TC-97	3.298E-06	9.702E-04	2.426E-03
74	TC-99M	2.770E-07	3.234E-04	6.468E-04
75	TC-99	1.550E-05	6.468E-03	9.702E-03
76	RU-97	NO DATA	4.851E-03	6.468E-03
77	RU-103	NO DATA	2.426E-02	2.426E-02
78	RU-105	NO DATA	1.940E-02	1.940E-02
79	RU-106	NO DATA	1.940E-01	1.940E-01
80	RH-103M	NO DATA	1.940E-04	1.940E-04
81	RH-105	NO DATA	1.940E-02	1.940E-02
82	PD-103	NO DATA	6.468E-03	6.468E-03
83	PD-109	NO DATA	2.156E-02	2.772E-02
84	AG-105	NO DATA	1.940E-02	1.940E-02
85	AG-110M	NO DATA	6.468E-02	6.468E-02
86	AG-111	NO DATA	4.851E-02	4.851E-02
87	CD-109	NO DATA	9.702E-03	9.702E-03
88	CD-115M	NO DATA	6.468E-02	6.468E-02
89	CD-115	NO DATA	6.468E-02	4.851E-02
90	IN-113M	NO DATA	1.940E-03	1.940E-03
91	IN-114M	NO DATA	9.702E-02	9.702E-02
92	IN-115M	NO DATA	4.851E-03	4.851E-03
93	IN-115	NO DATA	2.156E-02	2.156E-02
94	SN-113	NO DATA	3.181E-03	3.346E-03
95	SN-119M*	NO DATA	6.468E-02	6.691E-02
96	SN-123*	NO DATA	2.156E-02	2.426E-02
97	SN-125	NO DATA	9.702E-02	9.702E-02
98	SB-122	1.193E-04	6.468E-02	6.468E-02
99	SB-124	2.306E-03	9.702E-02	9.702E-02
100	SB-125	1.365E-03	1.940E-02	1.940E-02
101	TE-125M	NO DATA	9.702E-03	1.940E-02
102	TE-127M	NO DATA	2.426E-02	3.881E-02

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-3 (continued)

NO.	NUCLIDE	LUNGS SOLUBLE	G.I. TRACT SOLUBLE	G.I. TRACT INSOLUBLE
103	TE-127	ND DATA	6.468E-03	9.702E-03
104	TE-129M	ND DATA	6.468E-02	9.702E-02
105	TE-129	ND DATA	2.426E-03	2.426E-03
106	TE-131M	ND DATA	3.234E-02	4.851E-02
107	TE-132	ND DATA	6.468E-02	9.702E-02
108	I-126*	ND DATA	9.702E-04	2.156E-02
109	I-129*	ND DATA	4.851E-04	9.702E-03
110	I-130*	ND DATA	6.468E-02	6.468E-02
111	I-131*	ND DATA	1.940E-03	3.234E-02
112	I-132*	ND DATA	4.851E-03	9.702E-03
113	I-133*	ND DATA	3.234E-03	4.851E-02
114	I-134*	ND DATA	3.234E-03	3.234E-03
115	I-135*	ND DATA	3.881E-03	2.772E-02
116	CS-131	4.907E-05	9.702E-05	2.156E-03
117	CS-134M	4.859E-06	3.234E-04	1.940E-03
118	CS-134	1.504E-02	3.881E-03	4.851E-02
119	CS-135	2.032E-03	3.881E-04	9.702E-03
120	CS-136	9.158E-04	2.426E-03	3.234E-02
121	CS-137	1.244E-02	2.426E-03	4.851E-02
122	CS-138*	ND DATA	4.851E-03	4.851E-03
123	BA-131	1.615E-06	9.702E-03	9.702E-03
124	BA-140	1.313E-05	6.468E-02	9.702E-02
125	LA-140	ND DATA	9.702E-02	9.702E-02
126	CE-141	ND DATA	2.156E-02	2.156E-02
127	CE-143	ND DATA	4.851E-02	4.851E-02
128	CE-144	ND DATA	1.940E-01	1.940E-01
129	PR-142	ND DATA	6.468E-02	6.468E-02
130	PR-143	ND DATA	3.881E-02	3.881E-02
131	ND-144	ND DATA	2.426E-02	2.426E-02
132	ND-147	ND DATA	3.234E-02	3.234E-02
133	ND-149	ND DATA	6.468E-03	6.468E-03
134	PM-147	ND DATA	9.702E-03	9.702E-03
135	PM-148M*	ND DATA	6.930E-02	6.930E-02
136	PM-148*	ND DATA	1.021E-01	1.021E-01
137	PM-149	ND DATA	4.851E-02	4.851E-02
138	SM-147	ND DATA	2.772E-02	2.772E-02
139	SM-151	ND DATA	4.851E-03	4.851E-03
140	SM-153	ND DATA	2.426E-02	2.426E-02
141	EU-152M	ND DATA	3.234E-02	3.234E-02
142	EU-152	ND DATA	2.426E-02	2.426E-02
143	EU-154	ND DATA	9.702E-02	9.702E-02
144	EU-155	ND DATA	9.702E-03	9.702E-03
145	GD-153	ND DATA	9.702E-03	9.702E-03
146	GD-159	ND DATA	2.426E-02	2.426E-02
147	TB-160	ND DATA	4.851E-02	4.851E-02
148	DY-165	ND DATA	4.851E-03	4.851E-03
149	DY-166	ND DATA	4.851E-02	4.851E-02
150	HO-166	ND DATA	6.468E-02	6.468E-02
151	ER-169	ND DATA	2.156E-02	2.156E-02
152	ER-171	ND DATA	1.940E-02	1.940E-02
153	TM-170	ND DATA	3.881E-02	3.881E-02

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-3 (continued)

NO.	NUCLIDE	LUNGS SOLUBLE	G.I. TRACT SOLUBLE	G.I. TRACT INSOLUBLE
154	YB-175	NO DATA	1.940E-02	1.940E-02
155	LU-177	NO DATA	1.940E-02	1.940E-02
156	HF-181	NO DATA	2.772E-02	2.772E-02
157	TA-182	NO DATA	4.851E-02	4.851E-02
158	W-181	NO DATA	4.851E-03	6.468E-03
159	W-185	NO DATA	1.940E-02	1.940E-02
160	W-187	NO DATA	2.772E-02	3.234E-02
161	W-188*	NO DATA	6.468E-02	6.468E-02
162	RE-183	NO DATA	3.234E-03	6.468E-03
163	RE-186	NO DATA	2.156E-02	3.881E-02
164	RE-187	NO DATA	6.468E-04	9.702E-04
165	RE-188	NO DATA	3.234E-02	6.468E-02
166	OS-185	NO DATA	2.772E-02	2.772E-02
167	OS-191M	NO DATA	6.468E-04	9.702E-04
168	OS-191	NO DATA	9.702E-03	9.702E-03
169	OS-193	NO DATA	3.234E-02	3.881E-02
170	IR-190	NO DATA	9.702E-03	9.702E-03
171	IR-192	NO DATA	4.851E-02	4.851E-02
172	IR-194	NO DATA	6.468E-02	6.468E-02
173	PT-191	NO DATA	1.940E-02	1.940E-02
174	PT-193M	NO DATA	1.940E-03	1.940E-03
175	PT-193	NO DATA	9.702E-04	9.702E-04
176	PT-197M	NO DATA	1.940E-03	2.156E-03
177	PT-197	NO DATA	1.940E-02	1.940E-02
178	AU-196	NO DATA	9.702E-03	1.940E-02
179	AU-198	NO DATA	3.881E-02	3.881E-02
180	AU-199	NO DATA	9.702E-03	9.702E-03
181	HG-197M	NO DATA	9.702E-02	9.702E-02
182	HG-197	NO DATA	9.702E-04	3.881E-03
183	HG-203	NO DATA	4.851E-03	1.940E-02
184	TL-200	3.384E-05	4.851E-03	9.702E-03
185	TL-201	4.749E-05	6.468E-03	9.702E-03
186	TL-202	2.137E-04	1.940E-02	2.772E-02
187	TL-204	2.968E-04	1.940E-02	3.234E-02
188	PB-203	NO DATA	4.851E-03	4.851E-03
189	PB-204M*	NO DATA	4.851E-02	4.851E-02
190	PB-210	NO DATA	9.702E-03	9.702E-03
191	PB-212	NO DATA	2.772E-03	9.702E-03
192	BI-206	NO DATA	4.851E-02	4.851E-02
193	BI-207	NO DATA	3.234E-02	3.234E-02
194	BI-210	NO DATA	4.851E-02	4.851E-02
195	BI-212	NO DATA	4.851E-03	4.851E-03
196	PO-210	NO DATA	6.468E-02	6.468E-02
197	AT-211	NO DATA	2.772E-03	2.772E-02
198	RA-223	NO DATA	3.234E-01	4.851E-01
199	RA-224	NO DATA	2.772E-01	3.881E-01
200	RA-226	NO DATA	3.881E-02	6.468E-02
201	RA-228	NO DATA	4.851E-02	6.468E-02
202	AC-227	NO DATA	6.468E-03	6.468E-03
203	AC-228	NO DATA	2.156E-02	2.156E-02
204	TH-227	NO DATA	9.702E-02	9.702E-02

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-3 (continued)

NO.	NUCLIDE	LUNGS SOLUBLE	G.I. TRACT SOLUBLE	G.I. TRACT INSOLUBLE
205	TH-228	NO DATA	1.940E-01	1.940E-01
206	TH-230	NO DATA	6.468E-02	6.468E-02
207	TH-231	NO DATA	9.702E-03	9.702E-03
208	TH-232	NO DATA	4.851E-02	4.851E-02
209	TH-234	NO DATA	9.702E-02	9.702E-02
210	PA-230	NO DATA	9.702E-03	9.702E-03
211	PA-231	NO DATA	6.468E-02	6.468E-02
212	PA-233	NO DATA	1.940E-02	1.940E-02
213	PA-234*	NO DATA	NO DATA	NO DATA
214	U-230	NO DATA	3.881E-01	3.881E-01
215	U-232	NO DATA	6.468E-02	6.468E-02
216	U-233	NO DATA	6.468E-02	6.468E-02
217	U-234	NO DATA	6.468E-02	6.468E-02
218	U-235	NO DATA	6.468E-02	6.468E-02
219	U-236	NO DATA	6.468E-02	6.468E-02
220	U-237	NO DATA	NO DATA	NO DATA
221	U-238	NO DATA	4.851E-02	4.851E-02
222	NP-237	NO DATA	6.468E-02	6.468E-02
223	NP-239	NO DATA	1.940E-02	1.940E-02
224	PU-236	NO DATA	NO DATA	NO DATA
225	PU-238	NO DATA	6.468E-02	6.468E-02
226	PU-239	NO DATA	6.468E-02	6.468E-02
227	PU-240	NO DATA	6.468E-02	6.468E-02
228	PU-241	NO DATA	1.940E-03	1.940E-03
229	PU-242	NO DATA	6.468E-02	6.468E-02
230	PU-243	NO DATA	6.468E-03	6.468E-03
231	PU-244	NO DATA	1.940E-01	1.940E-01
232	AM-241	NO DATA	6.468E-02	6.468E-02
233	AM-242M	NO DATA	2.156E-02	2.156E-02
234	AM-242	NO DATA	1.940E-02	1.940E-02
235	AM-243	NO DATA	6.468E-02	6.468E-02
236	AM-244	NO DATA	3.881E-04	3.881E-04
237	CM-242	NO DATA	9.702E-02	9.702E-02
238	CM-243	NO DATA	9.702E-02	9.702E-02
239	CM-244	NO DATA	6.468E-02	6.468E-02
240	CM-245	NO DATA	6.468E-02	6.468E-02
241	CM-246	NO DATA	6.468E-02	6.468E-02
242	CM-247	NO DATA	9.702E-02	9.702E-02
243	CM-248	NO DATA	1.940E 00	1.940E 00
244	CM-249	NO DATA	9.702E-04	9.702E-04
245	BK-249	NO DATA	3.234E-03	3.234E-03
246	BK-250	NO DATA	9.702E-03	9.702E-03
247	CF-249	NO DATA	9.702E-02	9.702E-02
248	CF-250	NO DATA	6.468E-02	6.468E-02
249	CF-251	NO DATA	6.468E-02	6.468E-02
250	CF-252	NO DATA	2.772E-01	2.772E-01
251	CF-253	NO DATA	1.940E-02	1.940E-02
252	CF-254	NO DATA	1.940E 01	1.940E 01
253	ES-253	NO DATA	9.702E-02	9.702E-02
254	ES-254M	NO DATA	9.702E-02	9.702E-02
255	ES-254	NO DATA	1.940E-01	1.940E-01

*One or more parameters taken from a source other than ICRP Publication 2.

TABLE 4-3 (continued)

NO.	NUCLIDE	LUNGS SOLUBLE	G.I. TRACT SOLUBLE	G.I. TRACT INSOLUBLE
256	ES-255	NO DATA	6.468E-02	6.468E-02
257	FM-254	NO DATA	1.940E-02	1.940E-02
258	FM-255	NO DATA	6.468E-02	6.468E-02
259	FM-256	NO DATA	2.156E 00	2.156E 00

TABLE 4-4 INREM SAMPLE PROBLEM INPUT DATA: MASSES (g) OF TOTAL BODY AND THYROID

	Age groups (years)					
Organ	0-1	1-5	5-10	10-15	15-20	20-70
Total body	8000	15,400	25,100	41,000	65,000	69,700
Thyroid	2	3	5	12	15	18

TABLE 4-5 INREM SAMPLE PROBLEM INPUT DATA: RADIONUCLIDE 187 - ^{131}I

		Age groups (years)					
		0-1	1-5	5-10	10-15	15-20	20-70
Eff. half-time (days)	Total body	4	4.5	5.5	6	6.5	7
	Thyroid	4	4.5	5.5	6	6.5	7
Eff. absorbed energy (MeV)	Total body	.44	.44	.44	.44	.44	.44
	Thyroid	.21	.21	.22	.22	.23	.23
Fractional absorption (ingestion)	Total body	1	1	1	1	1	1
	Thyroid	.2	.2	.2	.2	.2	.2
No. of points in intake rate function		4	4	4	4	4	4
Times (days) after reference event at which intake function values are given		0	0	0	0	0	0
		30	30	30	30	30	30
		60	60	60	60	60	60
		120	120	120	120	120	120
Values of intake function (μCi/day) corresponding to times given above		5×10^{-2}	6×10^{-2}	6×10^{-2}	7.5×10^{-2}	1×10^{-2}	6×10^{-2}
		2×10^{-3}	2.5×10^{-3}	2.3×10^{-3}	2.6×10^{-3}	4×10^{-3}	2.4×10^{-3}
		5×10^{-5}	5.2×10^{-5}	5.5×10^{-5}	5.6×10^{-5}	8×10^{-5}	5×10^{-5}
		0	0	0	0	0	0
change from linear to logarithmic interpolation after days		60	60	60	60	60	60

[a]Radioactive half-life: 8.05 days.

TABLE 4-6 INREM SAMPLE PROBLEM INPUT DATA: RADIONUCLIDE 210 - ^{137}Cs

		Age groups (years)					
		0-1	1-5	5-10	10-15	15-20	20-70
Eff. half-time (days)	Total body	17	18	30	46	54	51
	Thyroid	--	--	--	--	--	--
Eff. absorbed energy (MeV)	Total body	.48	.52	.54	.55	.57	.59
	Thyroid	--	--	--	--	--	--
Fractional absorption (ingestion)	Total body	1	1	1	1	1	1
	Thyroid	--	--	--	--	--	--
No. of points in intake rate function		6	6	6	6	6	6
Times (days) after reference event at which intake function values are given		0	0	0	0	0	0
		60	60	60	60	60	60
		100	100	100	100	100	100
		360	360	360	360	360	360
		700	700	700	700	700	700
		25,550	25,550	25,500	25,550	25,500	25,550
Values of intake function (μCi/day) corresponding to times given above		$6x10^{-3}$	$7x10^{-3}$	$8x10^{-3}$	$9x10^{-3}$	$1x10^{-2}$	$2x10^{-2}$
		$7.5x10^{-3}$	$8x10^{-3}$	$1.2x10^{-2}$	$1.5x10^{-2}$	$1.7x10^{-2}$	$4x10^{-2}$
		$1x10^{-3}$	$1.5x10^{-3}$	$3x10^{-3}$	$4x10^{-3}$	$4x10^{-3}$	$8x10^{-3}$
		$2x10^{-5}$	$3x10^{-5}$	$2.5x10^{-5}$	$3x10^{-5}$	$2x10^{-5}$	$2x10^{-5}$
		$1x10^{-6}$	$1x10^{-6}$	$1x10^{-6}$	$1x10^{-6}$	$1x10^{-6}$	$1x10^{-6}$
		$1x10^{-6}$	$1x10^{-6}$	$1x10^{-6}$	$1x10^{-6}$	$1x10^{-6}$	$1x10^{-6}$
change from linear to logarithmic interpolation after (days)		$5x10^{4}$	$5x10^{4}$	$5x10^{4}$	$5x10^{4}$	$5x10^{4}$	$5x10^{4}$

[a]Radioactive half-life: 1.1×10^{4} days.

TABLE 4-7 INREM SAMPLE PROBLEM I

LISTING OF THE INPUT PARAMETERS FOR INREM

SAMPLE PROBLEM FOR INREM

```
TOTAL NUMBER OF RADIONUCLIDES =    2
TOTAL NUMBER OF AGE GROUPS    =    6
TOTAL NUMBER OF ORGANS        =    2

AGE GROUPS.

   GROUP     LOWER LIMIT     UPPER LIMIT
    NO.        (YRS)           (YRS)
     1       0.0          TO 0.10000E 01
     2       0.10000E 01  TO 0.50000E 01
     3       0.50000E 01  TO 0.10000E 02
     4       0.10000E 02  TO 0.15000E 02
     5       0.15000E 02  TO 0.20000E 02
     6       0.20000E 02  TO 0.70000E 02

RADIONUCLIDE IDENTIFICATION.

   NUMBER    INDEX   NAME        HALF-LIFE
                                  (DAYS)
      1       187    I-131      0.80500E 01
      2       210    CS-137     0.11000E 05

ORGAN MASS (GRAMS).

      NAME   TOTAL BODY  THYROID
 AGE
GROUP
  1          8.0000E 03  2.0000E 00
  2          1.5400E 04  3.0000E 00
  3          2.5100E 04  5.0000E 00
  4          4.1000E 04  1.2000E 01
  5          6.5000E 04  1.5000E 01
  6          6.9700E 04  1.8000E 01

EFFECTIVE HALF-LIFE (DAYS).

ORGAN NAME  TOTAL BODY THYROID

NUCLIDE AGE
 INDEX GROUP
  187
          1  4.000E 00  4.000E 00
          2  4.500E 00  4.500E 00
          3  5.500E 00  5.500E 00
          4  6.000E 00  6.000E 00
          5  6.500E 00  6.500E 00
          6  7.000E 00  7.000E 00
  210
          1  1.700E 01  0.0
          2  1.800E 01  0.0
          3  3.000E 01  0.0
          4  4.600E 01  0.0
          5  5.400E 01  0.0
          6  6.100E 01  0.0

EFFECTIVE ABSORBED ENERGY (MEV).

ORGAN NAME  TOTAL BODY THYROID

NUCLIDE AGE
 INDEX GROUP
  187
          1  4.400E-01  2.100E-01
          2  4.400E-01  2.100E-01
          3  4.400E-01  2.200E-01
          4  4.400E-01  2.200E-01
          5  4.400E-01  2.300E-01
          6  4.400E-01  2.300E-01
```

```
 210
        1  4.800E-01  0.0
        2  5.200E-01  0.0
        3  5.400E-01  0.0
        4  5.500E-01  0.0
        5  5.700E-01  0.0
        6  5.900E-01  0.0

FRACTIONAL ABSORPTION FROM INGESTION (DIMENSIONLESS).

ORGAN NAME  TOTAL BODY THYROID

NUCLIDE AGE
 INDEX GROUP
  187
        1  1.000E 00  2.000E-01
        2  1.000E 00  2.000E-01
        3  1.000E 00  2.000E-01
        4  1.000E 00  2.000E-01
        5  1.000E 00  2.000E-01
        6  1.000E 00  2.000E-01
  210
        1  1.000E 00  0.0
        2  1.000E 00  0.0
        3  1.000E 00  0.0
        4  1.000E 00  0.0
        5  1.000E 00  0.0
        6  1.000E 00  0.0

INTAKE.

   NUCLIDE    AGE    NUMBER     TIME          INTAKE
    INDEX    GROUP              (DAY)    (MICROCURIES/DAY)
     187
              1        1     0.0              5.0000E-02
                       2     3.0000E 01       2.0000E-03
                       3     6.0000E 01       5.0000E-05
                       4     1.2000E 02       1.0000E-15
              2        1     0.0              6.0000E-02
                       2     3.0000E 01       2.5000E-03
                       3     6.0000E 01       5.2000E-05
                       4     1.2000E 02       1.0000E-15
              3        1     0.0              6.0000E-02
                       2     3.0000E 01       2.3000E-03
                       3     6.0000E 01       5.5000E-05
                       4     1.2000E 02       1.0000E-15
              4        1     0.0              7.5000E-02
                       2     3.0000E 01       2.6000E-03
                       3     6.0000E 01       5.6000E-05
                       4     1.2000E 02       1.0000E-15
              5        1     0.0              1.0000E-02
                       2     3.0000E 01       4.0000E-03
                       3     6.0000E 01       8.0000E-05
                       4     1.2000E 02       1.0000E-15
              6        1     0.0              6.0000E-02
                       2     3.0000E 01       2.4000E-03
                       3     6.0000E 01       5.0000E-05
                       4     1.2000E 02       1.0000E-15
     210
              1        1     0.0              6.0000E-03
                       2     6.0000E 01       7.5000E-03
                       3     1.0000E 02       1.0000E-03
                       4     3.6000E 02       2.0000E-05
                       5     7.0000E 02       1.0000E-06
                       6     2.5550E 04       1.0000E-06
              2        1     0.0              7.0000E-03
                       2     6.0000E 01       8.0000E-03
                       3     1.0000E 02       1.5000E-03
                       4     3.6000E 02       3.0000E-05
                       5     7.0000E 02       1.0000E-06
                       6     2.5550E 04       1.0000E-06
              3        1     0.0              8.0000E-03
                       2     6.0000E 01       1.2000E-02
                       3     1.0000E 02       3.0000E-02
                       4     3.6000E 02       2.5000E-05
                       5     7.0000E 02       1.0000E-06
                       6     2.5550E 04       1.0000E-06
```

4	1	0.0	5.0000E-03
	2	6.0000E 01	1.5000E-02
	3	1.0000E 02	4.0000E-03
	4	3.6000E 02	3.0000E-05
	5	7.0000E 02	1.0000E-06
	6	2.5550E 04	1.0000E-06
5	1	0.0	1.0000E-02
	2	6.0000E 01	1.7000E-02
	3	1.0000E 02	4.0000E-03
	4	3.6000E 02	2.0000E-05
	5	7.0000E 02	1.0000E-06
	6	2.5550E 04	1.0000E-06
6	1	0.0	2.0000E-02
	2	6.0000E 01	4.0000E-02
	3	1.0000E 02	8.0000E-03
	4	3.6000E 02	2.0000E-05
	5	7.0000E 02	1.0000E-06
	6	2.5550E 04	1.0000E-06

USE LOGARITHMIC INTERPOLATION AFTER THE FOLLOWING TIMES.

NUCLIDE INDEX	AGE GROUP	TIME (DAYS)
187	1	6.00000E 01
	2	6.00000E 01
	3	6.00000E 01
	4	6.00000E 01
	5	6.00000E 01
	6	6.00000E 01
210	1	5.00000E 04
	2	5.00000E 04
	3	5.00000E 04
	4	5.00000E 04
	5	5.00000E 04
	6	5.00000E 04

SAMPLE PROBLEM FOR INREM

DOSE COMMITMENT (REMS) FROM INGESTION OF RADIONUCLIDES

NUMBER OF THE REFERENCE EVENT = 1 .
AGE OF THE INDIVIDUAL AT TIME OF EVENT = 0.0 YEARS.
TIME AFTER EVENT WHEN INTAKE BEGINS = 0.0 YEARS.
TIME AFTER EVENT WHEN INTAKE ENDS = 1.000 YEARS.
DURATION OF THE INTAKE PERIOD = 1.000 YEARS.
TIME AFTER EVENT WHEN DOSE INTEGRATION BEGINS = 0.0 YEARS.
TIME AFTER EVENT WHEN DOSE INTEGRATION ENDS = 50.000 YEARS.
DURATION OF DOSE INTEGRATION = 50.000 YEARS.

NO.	NUCLIDE	LABEL	TOTAL BODY	THYROID
1	I-131	187	1.313E-02	5.012E 00
2	CS-137	210	5.304E-02	NO DATA
	TOTAL		6.617E-02	5.012E 00

SAMPLE PROBLEM FOR INREM

DOSE COMMITMENT (REMS) FROM INGESTION OF RADIONUCLIDES

NUMBER OF THE REFERENCE EVENT = 1 .
AGE OF THE INDIVIDUAL AT TIME OF EVENT = 0.0 YEARS.
TIME AFTER EVENT WHEN INTAKE BEGINS = 0.0 YEARS.
TIME AFTER EVENT WHEN INTAKE ENDS = 50.000 YEARS.
DURATION OF THE INTAKE PERIOD = 50.000 YEARS.
TIME AFTER EVENT WHEN DOSE INTEGRATION BEGINS = 0.0 YEARS.
TIME AFTER EVENT WHEN DOSE INTEGRATION ENDS = 50.000 YEARS.
DURATION OF DOSE INTEGRATION = 50.000 YEARS.

NO.	NUCLIDE	LABEL	TOTAL BODY	THYROID
1	I-131	187	1.313E-02	5.012E 00
2	CS-137	210	5.396E-02	NO DATA
	TOTAL		6.709E-02	5.012E 00

TABLE 4-8 INREM SAMPLE PROBLEM II

Internal dose calculations for ^{60}Co in liquid effluents at a concentration of 1×10^{-10} μCi/cm³ or in gaseous effluents at 1×10^{-15} μCi/cm³. A deposition velocity of 10^{-2} m/sec was assumed in calculating ground deposition of radioactivity from the air.

a. Inhalation of radioactive material (50-year whole-body dose commitment)

2×10^7 cm³/day

1.0×10^{-15} μCi/cm³ x 20 m³ day x 10^6 cm³/m³ x 365 days/yr — intake

x 5.97×10^{-3} rem/μCi (Table 4-2) x 10^3 mrem/rem = 4.36 — conversion

x 10^{-5} mrem/yr.

b. Ingestion of water that contains radioactive material

1.0×10^{-10} μCi/cm³ x 10^3 cm³ liter x 1.2 liters/day

x 365 days/yr x 4.48×10^{-3} rem/μCi (Table 4-3)

x 10^3 mrem/rem = 1.96×10^{-4} mrem/yr.

c. Ingestion of fish

1.0×10^{-10} μCi/cm³ x 1 cm³/g x 2.0×10^1 (freshwater bioaccumulation factor from Table 4-12A) x 20 g/day

x 365 days/yr x 4.48×10^{-3} rem/μCi (Table 4-3)

x 10^3 mrem/rem = 6.54×10^{-5} mrem/yr.

d. Ingestion of terrestrial food

1. Above-surface crops

1.0×10^{-15} μCi/cm³ x 10^{-2} m/sec x 3.15×10^7 sec/yr

x 1.19 $\frac{\mu Ci/day}{\mu Ci/m^2\text{-}day}$ (Table 2-8) x 4.48×10^{-3} rem/μCi (Table 4-3) x 10^3 mrem/rem x 10^6 cm³/m³ = 1.68×10^{-3} mrem/yr.

TABLE 4-8 (CONTINUED)

2. Milk

1.0×10^{-15} μCi/cm^3 x 10^{-2} m/sec x 3.15×10^7 sec/yr x 0.113 $\frac{\mu Ci/day}{\mu Ci/m^2\text{-}day}$ (Table 2-8) x 4.48×10^{-3} rem/μCi (Table 4-3) x 10^3 mrem/rem x 10^6 cm^3/m^3 = 1.59×10^{-4} mrem/yr.

3. Beef

1.0×10^{-15} μCi/cm^3 x 10^{-2} m/sec x 3.15×10^7 sec/yr x 0.743 $\frac{\mu Ci/day}{\mu Ci/m^2\text{-}day}$ (Table 2-8) x 4.48×10^{-3} rem/μCi (Table 4-3) x 10^3 mrem/rem x 10^6 cm^3/m^3 = 1.05×10^{-3} mrem/yr.

TABLE 4-9 DOSE ESTIMATES FOR INDOS2 FOR EXPOSURE VIA INHALATION (50-YEAR DOSE COMMITMENT PER μCi OF INTAKE)

Radionuclide	Reference Organ	rem/μCi
^{3}H	Total Body	1.71 E-4
^{14}C	Bone	2.74 E-4
^{22}Na	Total Body	1.48 E-2
^{32}P	Bone	1.59 E-1
^{35}S	Total Body	6.63 E-5
^{36}Cl	Total Body	2.06 E-3
^{45}Ca	Bone	1.83 E-1
^{59}Fe	Spleen	4.25 E-2
^{60}Co	Total Body	4.09 E-3
^{65}Zn	Total Body	1.16 E-2
^{86}Rb	Total Body	7.97 E-3
^{85}Sr	Total Body	2.29 E-3
^{89}Sr	Bone	1.49 E-1
^{90}Sr	Bone	1.57 E 1
^{132}Te	Total Body	1.23 E-3
^{131}I	Thyroid	1.45 E 0
^{137}Cs	Total Body	4.52 E-2
^{140}Ba	Bone	7.00 E-2
^{144}Ce	Bone	1.32 E 0
^{198}Au	Kidneys	9.00 E-4
^{210}Po	Kidneys	1.18 E 1
^{226}Ra	Bone	6.12 E 1
^{228}Th	Bone	1.28 E 3
^{232}Th	Bone	5.96 E 3
^{233}U	Bone	1.38 E 1
^{234}U	Bone	1.33 E 1
^{239}Np	Bone	2.51 E-3
^{239}Pu	Bone	7.20 E 3
^{241}Pu	Bone	1.29 E 2

TABLE 4-10 DOSE ESTIMATES FROM INDOS2 FOR EXPOSURE VIA INGESTION (50-YEAR DOSE COMMITMENT PER μCi OF INTAKE)

Radionuclide	Reference Organ	rem/μCi
^{3}H	Total Body	1.71 E-4
^{14}C	Bone	3.42 E-4
^{22}Na	Total Body	1.98 E-2
^{32}P	Bone	1.86 E-1
^{35}S	Total Body	8.84 E-5
^{36}Cl	Total Body	2.74 E-3
^{45}Ca	Bone	1.98 E-1
^{59}Fe	Spleen	1.42 E-2
^{60}Co	Total Body	3.07 E-3
^{65}Zn	Total Body	3.88 E-3
^{86}Rb	Total Body	1.06 E-2
^{85}Sr	Total Body	1.71 E-3
^{89}Sr	Bone	1.11 E-1
^{90}Sr	Bone	1.18 E 1
^{132}Te	Total Body	8.09 E-4
^{131}I	Thyroid	1.90 E 0
^{137}Cs	Total Body	6.03 E-2
^{140}Ba	Bone	1.84 E-2
^{144}Ce	Bone	5.28 E-4
^{198}Au	Kidneys	3.00 E-4
^{210}Po	Kidneys	2.52 E 0
^{226}Ra	Bone	4.59 E 1
^{228}Th	Bone	4.97 E-1
^{232}Th	Bone	2.32 E 0
^{233}U	Bone	5.43 E-1
^{234}U	Bone	5.22 E-1
^{239}Np	Bone	1.03 E-6
^{239}Pu	Bone	8.64 E-1
^{241}Pu	Bone	1.55 E-2

TABLE 4-11 INDOS2 SAMPLE PROBLEM

```
REFERENCE ORGAN RADIATION DOSE CALCULATION
------------------------------------------


ENTER CODE NO. OF NUCLIDE.
187

MODE OF INTAKE...
TYPE
1-FOR INGESTION
2-FOR INHALATION
1

TYPE
1-FOR DISCRETE INTAKES
2-FOR CONTINUOUS INTAKE AT CONSTANT RATE
1

HOW MANY DISCRETE INTAKES? (1 TO 50)
1

ENTER THE  1 TIMES (DAYS) AND THE
CORRESPONDING INTAKES (MICROCURIES)
----------  ----------
0           1.0E-6

TYPE
1-FOR TABULATION
2-FOR GRAPH
1

FOR TABULATION, ENTER (DAYS)
MIN. TIME   INCREMENT   MAX. TIME
----------  ----------  ----------
0           5           50

TYPE 1-FOR INPUT SUMMARY
     2-TO SUPPRESS
1



SUMMARY OF INPUTS
EXPONENTIAL MODEL
----------- -----


RADIONUCLIDE                  53 I-131

REFERENCE ORGAN               THYROID

RADIOACTIVE HALF-LIFE          8.040E+00 DAYS

RADIOACTIVE DECAY RATE         8.621E-02 PER DAY

EFF. ABSORBED ENERGY           2.300E-01 MEV

MASS OF REFERENCE ORGAN        2.000E+01 G

BIOLOGICAL CONV. FACTOR        5.888E-01 REMS/MICROCURIE-DAY

MODE OF INTAKE                INGESTION

UPTAKE FRACTION                3.000E-01
```

PARAMETERS ASSOCIATED WITH EXPONENTIAL TERMS...

	COEFFICIENTS	EXCRETORY HALF-LIVES	EXCRETION RATES
1	1.000E+00	1.000E+02	6.931E-03

DISCRETE TIMES AND INTAKES...

TIME (DAYS)	TOTAL INTAKE TO BODY (MICROCURIES)	UPTAKE (MICROCURIES)
0.000E-01	1.0000E-06	3.0000E-07

TABULATION OF DOSE RATES AND DOSES
--- -- --- --- --- ---

RADIONUCLIDE -- 53 I-131

REFERENCE ORGAN -- THYROID

MODE OF INTAKE -- INGESTION

TIME (DAYS)	RATE (REMS/DAY)	DOSE (REMS)
0.000E-01	1.7664E-07	0.0000E-01
5.000E+00	1.1087E-07	7.0607E-07
1.000E+01	6.9594E-08	1.1493E-06
1.500E+01	4.3683E-08	1.4274E-06
2.000E+01	2.7419E-08	1.6020E-06
2.500E+01	1.7210E-08	1.7116E-06
3.000E+01	1.0803E-08	1.7804E-06
3.500E+01	6.7807E-09	1.8236E-06
4.000E+01	4.2561E-09	1.8507E-06
4.500E+01	2.6715E-09	1.8677E-06
5.000E+01	1.6769E-09	1.8784E-06

TYPE
1-FOR MORE TABULATION
2-TO CHANGE INTAKES
3-TO CHANGE NUCLIDES
4-FOR GRAPH
5-TO EXIT
3

ENTER CODE NO. OF NUCLIDE.
348

MODE OF INTAKE...
TYPE
1-FOR INGESTION
2-FOR INHALATION
1

TYPE
1-FOR DISCRETE INTAKES
2-FOR CONTINUOUS INTAKE AT CONSTANT RATE
2

```
ENTER
INITIAL  BODY  BURDEN   INTAKE RATE
     (MICRO-CI)        (MICRO-CI/DAY)
     ----------         ----------
     0.0                 1.0E-6

TYPE
1-FOR TABULATION
2-FOR GRAPH
1

FOR TABULATION, ENTER (DAYS)
MIN. TIME   INCREMENT   MAX. TIME
----------  ----------  ----------
0           1825        18250

TYPE 1-FOR INPUT SUMMARY
     2-TO SUPPRESS
1



SUMMARY OF INPUTS
EXPONENTIAL MODEL
----------- -----


RADIONUCLIDE                  88 RA-226

REFERENCE ORGAN               BONE

RADIOACTIVE HALF-LIFE          5.913E+05 DAYS

RADIOACTIVE DECAY RATE         1.172E-06 PER DAY

EFF. ABSORBED ENERGY           1.100E+02 MEV

MASS OF REFERENCE ORGAN        7.000E+03 G

BIOLOGICAL CONV. FACTOR        8.046E-01 REMS/MICROCURIE-DAY

MODE OF INTAKE                INGESTION

UPTAKE FRACTION                3.000E-01
```

PARAMETERS ASSOCIATED WITH EXPONENTIAL TERMS...

	COEFFICIENTS	EXCRETORY HALF-LIVES	EXCRETION RATES
1	5.400E-01	3.980E-01	1.742E+00
2	2.900E-01	4.950E+00	1.400E-01
3	1.100E-01	5.775E+01	1.200E-02
4	4.000E-02	6.930E+02	1.000E-03
5	2.000E-02	5.331E+03	1.300E-04

INITIAL BURDENS...

INTAKE 0.000E-01 MICROCURIES

UPTAKE 0.000E-01 MICROCURIES

CONSTANT RATES...

INTAKE RATE 1.000E-06 MICROCURIES/DAY

UPTAKE RATE 3.000E-07 MICROCURIES/DAY

TABULATION OF DOSE RATES AND DOSES

RADIONUCLIDE -- 88 RA-226

REFERENCE ORGAN -- BONE

MODE OF INTAKE -- INGESTION

TIME (DAYS)	RATE (REMS/DAY)	DOSE (REMS)
0.000E-01	0.0000E-01	0.0000E-01
1.825E+03	1.8712E-05	2.1848E-02
3.650E+03	2.6180E-05	6.3379E-02
5.475E+03	3.1243E-05	1.1601E-01
7.300E+03	3.5097E-05	1.7669E-01
9.125E+03	3.8109E-05	2.4360E-01
1.095E+04	4.0476E-05	3.1540E-01
1.277E+04	4.2339E-05	3.9103E-01
1.460E+04	4.3805E-05	4.6969E-01
1.642E+04	4.4959E-05	5.5073E-01
1.825E+04	4.5867E-05	6.3364E-01

TYPE
1-FOR MORE TABULATION
2-TO CHANGE INTAKES
3-TO CHANGE NUCLIDES
4-FOR GRAPH
5-TO EXIT
5

CPU TIME: 3.92 ELAPSED TIME: 11:10.62
NO EXECUTION ERRORS DETECTED

EXIT

TABLE 4-12A BIORA2 BIOACCUMULATION FACTORS FOR FRESHWATER BIOTA[a]

RADIONUCLIDE	AQUATIC-PLANTS	INVERTEBRATES	FISH	MUSKRAT
H-3	1.00E+00	1.00E+00	1.00E+00	1.00E+00
C-14	4.55E+03	9.09E+03	4.55E+03	6.55E+03
NA-22	1.00E+02	1.70E+01	2.00E+01	1.58E+02
NA-24	1.00E+02	1.70E+01	2.00E+01	8.64E+00
P-32	1.00E+04	1.00E+05	1.00E+05	1.46E+04
S-35	1.00E+02	1.00E+02	7.50E+02	6.38E+02
SC-46	1.00E+04	1.00E+03	1.00E+02	3.17E+00
CR-51	4.00E+01	2.00E+01	4.00E+01	7.66E-01
MN-54	1.00E+04	4.00E+04	1.00E+02	8.06E+02
FE-55	1.00E+03	3.20E+03	1.00E+02	1.44E+03
FE-59	1.00E+03	3.20E+03	1.00E+02	6.15E+02
CO-57	2.00E+02	2.00E+02	2.00E+01	7.95E+01
CO-58	2.00E+02	2.00E+02	2.00E+01	7.26E+01
CO-60	2.00E+02	2.00E+02	2.00E+01	8.21E+01
NI-63	5.00E+01	1.00E+02	1.00E+02	2.16E+02
CU-64	1.00E+03	1.00E+03	2.00E+02	2.14E+01
ZN-65	1.00E+03	1.00E+04	1.00E+03	1.44E+03
ZN-69M	1.00E+03	1.00E+04	1.00E+03	8.35E+00
BR-80M	5.00E+01	3.33E+02	4.17E+02	1.30E+00
BR-82	5.00E+01	3.33E+02	4.17E+02	9.36E+00
BR-83	5.00E+01	3.33E+02	4.17E+02	7.20E-01
BR-84	5.00E+01	3.33E+02	4.17E+02	1.51E+00
RB-86	1.00E+03	1.00E+03	2.00E+03	1.90E+03
RB-88	1.00E+03	1.00E+03	2.00E+03	1.44E+00
RB-89	1.00E+03	1.00E+03	2.00E+03	2.88E-01
SR-89	5.00E+02	1.00E+02	5.00E+00	1.09E+03
SR-90	5.00E+02	1.00E+02	5.00E+00	2.16E+03
SR-91	5.00E+02	1.00E+02	5.00E+00	8.64E+00
Y-90	5.00E+03	1.00E+03	2.50E+01	1.93E-01
Y-91	5.00E+03	1.00E+03	2.50E+01	4.18E+00
Y-93	5.00E+03	1.00E+03	2.50E+01	3.02E-02
ZR-95	1.00E+03	6.67E+00	3.33E+00	7.99E-01
ZR-97	1.00E+03	6.67E+00	3.33E+00	1.02E-02
NB-95	8.00E+02	1.00E+02	3.00E+04	3.86E-01
MO-99	1.00E+03	1.00E+01	1.00E+01	2.07E+02
TC-99	4.00E+01	5.00E+00	1.50E+01	2.88E+00
RU-103	2.00E+02	3.00E+02	1.00E+01	5.36E+00
RU-106	2.00E+02	3.00E+02	1.00E+01	6.22E+00
RH-105	2.00E+02	3.00E+02	1.00E+01	7.66E+00
AG-110M	2.00E+02	7.69E+02	2.31E+00	1.41E+00
SN-125	1.00E+02	1.00E+03	3.00E+03	5.40E+00
SB-122	1.50E+03	1.00E+01	1.00E+00	1.68E+01
SB-124	1.50E+03	1.00E+01	1.00E+00	1.49E+02
SB-125	1.50E+03	1.00E+01	1.00E+00	2.33E+02
SB-127	1.50E+03	1.00E+01	1.00E+00	2.27E+01
TE-125M	1.00E+03[b]	6.10E+03[b]	4.00E+02[b]	4.32E+02
TE-127	1.00E+03[b]	6.10E+03[b]	4.00E+02[b]	1.37E+01
TE-127M	1.00E+03[b]	6.10E+03[b]	4.00E+02[b]	4.68E+02
TE-129	1.00E+03[b]	6.10E+03[b]	4.00E+02[b]	1.84E+00
TE-129M	1.00E+03[b]	6.10E+03[b]	4.00E+02[b]	3.60E+02
TE-131M	1.00E+03[b]	6.10E+03[b]	4.00E+02[b]	4.14E+01
TE-132	1.00E+03[b]	6.10E+03[b]	4.00E+02[b]	9.36E+01
I-129	4.00E+01	5.00E+00	1.50E+01	5.76E+02
I-130	4.00E+01	5.00E+00	1.50E+01	2.93E+00
I-131	4.00E+01	5.00E+00	1.50E+01	4.38E+01
I-132	4.00E+01	5.00E+00	1.50E+01	5.43E-01
I-133	4.00E+01	5.00E+00	1.50E+01	5.01E+00
I-134	4.00E+01	5.00E+00	1.50E+01	2.07E-01
I-135	4.00E+01	5.00E+00	1.50E+01	1.61E+00

[a]If not otherwise noted, factors for aquatic plants, invertebrates, and fish are derived from values given in S. E. Thompson et al., Concentration Factors of Chemical Elements in Edible Aquatic Organisms, Lawrence Livermore Laboratory, UCRL-50564 Rev. 1 (October 10, 1972).

[b]Calculated from stable element analysis listed in the Farley Nuclear Power Station Environmental Report, Georgia Power and Light Company (1972).

TABLE 4-12A (continued)

RADIONUCLIDE	AQUATIC-PLANTS	INVERTEBRATES	FISH	MUSKRAT
CS-134	8.00E+01	1.00E+02	4.00E+02	7.49E+02
CS-136	8.00E+01	1.00E+02	4.00E+02	1.27E+02
CS-137	8.00E+01	1.00E+02	4.00E+02	8.06E+02
CS-138	8.00E+01	1.00E+02	4.00E+02	2.53E+00
BA-140	5.00E+02	2.00E+02	4.00E+00	3.85E+01
LA-140	5.00E+03	1.00E+03	2.50E+01	1.21E-01
CE-141	5.00E+03	1.00E+03	2.50E+01	2.16E+00
CE-143	5.00E+03	1.00E+03	2.50E+01	9.58E-02
CE-144	5.00E+03	1.00E+03	2.50E+01	7.20E+00
PR-143	5.00E+03	1.00E+03	2.50E+01	9.72E-01
ND-147	5.00E+03	1.00E+03	2.50E+01	7.99E-01
PM-147	5.00E+03	1.00E+03	2.50E+01	7.20E+00
EU-154	5.00E+03	1.00E+03	2.50E+01	7.20E+00
EU-155	5.00E+03	1.00E+03	2.50E+01	7.20E+00
TA-182	8.00E+02	6.67E+02	3.00E+04	8.76E-01
W-185	1.20E+03	1.00E+01	1.20E+03	1.73E+01
W-187	1.20E+03	1.00E+01	1.20E+03	8.64E+00
PB-210	2.00E+02	1.00E+02	3.00E+02	2.30E+03
BI-210	1.00E+05 [c]	1.00E+05 [c]	1.50E+01 [c]	3.60E+02
PO-210	2.00E+03	2.00E+04	5.00E+01	4.32E+02
RA-226	2.50E+03	2.50E+02	5.00E+01	1.08E+04
TH-228	1.50E+03	5.00E+02	3.00E+01	2.16E+00
TH-230	1.50E+03	5.00E+02	3.00E+01	2.16E+00
TH-231	1.50E+03	5.00E+02	3.00E+01	2.31E-02
TH-234	1.50E+03	5.00E+02	3.00E+01	5.20E-01
PA-234	1.13E+03	1.13E+02	1.13E+01	4.56E-03
U-232	1.00E+03	1.00E+02	1.00E+01	1.44E+00
U-233	1.00E+03	1.00E+02	1.00E+01	1.44E+00
U-234	1.00E+03	1.00E+02	1.00E+01	1.44E+00
U-235	1.00E+03	1.00E+02	1.00E+01	1.44E+00
U-236	1.00E+03	1.00E+02	1.00E+01	1.44E+00
U-237	1.00E+03	1.00E+02	1.00E+01	9.00E-02
U-238	1.00E+03	1.00E+02	1.00E+01	1.44E+00
NP-237	1.00E+03	4.00E+02	1.00E+01	1.44E+00
NP-239	1.00E+03	4.00E+02	1.00E+01	3.36E-02
PU-236	3.50E+02	1.00E+02	3.50E+02	1.50E-01
PU-238	3.50E+02	1.00E+02	3.50E+02	1.50E-01
PU-239	3.50E+02	1.00E+02	3.50E+02	1.50E-01
PU-240	3.50E+02	1.00E+02	3.50E+02	1.50E-01
PU-241	3.50E+02	1.00E+02	3.50E+02	1.50E-01
PU-242	3.50E+02	1.00E+02	3.50E+02	1.50E-01
AM-241	5.00E+03	1.00E+03	2.50E+01	7.20E+00
AM-243	5.00E+03	1.00E+03	2.50E+01	7.20E+00
CM-242	5.00E+03	1.00E+03	2.50E+01	7.20E+00
CM-244	5.00E+03	1.00E+03	2.50E+01	7.20E+00

[c] Y. C. Ng et al., Prediction of the Maximum Dosage to Man from the Fallout of Nuclear Devices: IV. Handbook for Estimating the Maximum Internal Dose from Radionuclides Released to the Biosphere, Lawrence Livermore Laboratory, UCRL-50163 Part IV (May 1968).

TABLE 4-12B BIORA2 BIOACCUMULATION FACTORS FOR MARINE BIOTA[a]

RADIONUCLIDE	ALGAE	MOLLUSKS/ CRUSTACEANS	FISH	WATERFOWL/ SHORE BIRDS
H-3	1.00E+00	1.00E+00	1.00E+00	1.00E+00
C-14	1.00E+00	1.00E+00	1.00E+00	1.44E+00
NA-22	1.00E+00	1.00E+00	1.00E+00	1.58E+00
NA-24	1.00E+00	1.00E+00	1.00E+00	8.64E-02
P-32	1.00E+05	1.00E+04	1.00E+04	1.46E+05
S-35	4.00E+00	4.00E+00	4.00E+00	2.55E+01
SC-46	1.00E+03	3.00E+02	1.00E+02	3.17E-01
CR-51	1.00E+03	1.00E+03	1.00E+02	1.91E+01
MN-54	1.00E+04	5.00E+04	3.00E+03	8.06E+02
FE-55	6.00E+03	2.00E+04	1.00E+03	8.60E+03
FE-59	6.00E+03	2.00E+04	1.00E+03	3.69E+03
CO-57	1.00E+02	1.00E+04	1.00E+02	3.97E+01
CO-58	1.00E+02	1.00E+04	1.00E+02	3.63E+01
CO-60	1.00E+02	1.00E+04	1.00E+02	4.10E+01
NI-63	1.00E+02	1.00E+02	5.00E+02	4.32E+02
CU-64	1.00E+03	5.00E+03	1.00E+03	2.14E+01
ZN-65	1.00E+03	5.00E+04	5.00E+03	1.44E+03
ZN-69M	1.00E+03	5.00E+04	5.00E+03	8.35E+00
BR-80M	1.00E+02	1.00E+01	3.00E+00	2.59E+00
BR-82	1.00E+02	1.00E+01	3.00E+00	1.87E+01
BR-83	1.00E+02	1.00E+01	3.00E+00	1.44E+00
BR-84	1.00E+02	1.00E+01	3.00E+00	3.02E+00
RB-86	1.00E+01	5.00E+01	3.00E+01	1.90E+01
RB-88	1.00E+01	5.00E+01	3.00E+01	1.44E-02
RB-89	1.00E+01	5.00E+01	3.00E+01	2.88E-03
SR-89	2.00E+01	1.00E+00	1.00E+00	4.32E+01
SR-90	2.00E+01	1.00E+00	1.00E+00	8.64E+01
SR-91	2.00E+01	1.00E+00	1.00E+00	3.45E-01
Y-90	3.00E+02	1.00E+02	3.00E+01	1.16E-02
Y-91	3.00E+02	1.00E+02	3.00E+01	2.50E-01
Y-93	3.00E+02	1.00E+02	3.00E+01	1.81E-03
ZR-95	1.00E+03	1.00E+02	3.00E+01	7.99E-01
ZR-97	1.00E+03	1.00E+02	3.00E+01	1.02E-02
NB-95	1.00E+02	2.00E+02	1.00E+02	4.82E-02
MO-99	1.00E+02	1.00E+02	1.00E+01	2.07E+01
TC-99	1.00E+03	1.00E+02	1.00E+01	7.20E+01
RU-103	1.00E+03	1.00E+02	3.00E+00	2.68E+01
RU-106	1.00E+03	1.00E+02	3.00E+00	3.11E+01
RH-105	1.00E+02	1.00E+02	1.00E+01	3.83E+00
AG-110M	1.00E+03	5.00E+03	1.00E+03	7.06E+00
SN-125	1.00E+01	3.00E+00	3.00E+00	5.40E-01
SB-122	1.00E+04	1.00E+03	1.00E+03	1.12E+02
SB-124	1.00E+04	1.00E+03	1.00E+03	9.94E+02
SB-125	1.00E+04	1.00E+03	1.00E+03	1.55E+03
SB-127	1.00E+04	1.00E+03	1.00E+03	1.17E+03
TE-125M	1.00E+03	1.00E+02	1.00E+01	4.32E+02
TE-127	1.00E+03	1.00E+02	1.00E+01	1.37E+01
TE-127M	1.00E+03	1.00E+02	1.00E+01	4.68E+02
TE-129	1.00E+03	1.00E+02	1.00E+01	1.84E+00
TE-129M	1.00E+03	1.00E+02	1.00E+01	3.60E+02
TE-131M	1.00E+03	1.00E+02	1.00E+01	4.14E+01
TE-132	1.00E+03	1.00E+02	1.00E+01	9.36E+01
I-129	1.00E+04	1.00E+02	2.00E+01	1.44E+05
I-130	1.00E+04	1.00E+02	2.00E+01	6.91E+02
I-131	1.00E+04	1.00E+02	2.00E+01	1.09E+04
I-132	1.00E+04	1.00E+02	2.00E+01	1.40E+02
I-133	1.00E+04	1.00E+02	2.00E+01	1.25E+03
I-134	1.00E+04	1.00E+02	2.00E+01	5.18E+01
I-135	1.00E+04	1.00E+02	2.00E+01	4.03E+02

[a]If not otherwise noted, factors for algae, mollusks/crustaceans, and fish were taken from A. M. Freke, "A model for the approximate calculation of safe rates of discharge of radioactive wastes into marine environments," Health Phys. 13 (7), 743 (1967).

TABLE 4-12B (continued)

RADIONUCLIDE	ALGAE	MOLLUSKS/ CRUSTACEANS	FISH	WATERFOWL/ SHORE BIRDS
CS-134	1.00E+01	5.00E+01	3.00E+01	9.36E+01
CS-136	1.00E+01	5.00E+01	3.00E+01	1.58E+01
CS-137	1.00E+01	5.00E+01	3.00E+01	1.01E+02
CS-138	1.00E+01	5.00E+01	3.00E+01	3.22E-01
BA-140	1.00E+02	3.00E+00	3.00E+00	7.70E+00
LA-140	3.00E+02	1.00E+02	3.00E+01	7.26E-03
CE-141	3.00E+02	1.00E+02	3.00E+01	1.30E-01
CE-143	3.00E+02	1.00E+02	3.00E+01	5.74E-03
CE-144	3.00E+02	1.00E+02	3.00E+01	4.32E-01
PR-143	1.00E+03	1.00E+03	1.00E+02	1.94E-01
ND-147	1.00E+03	1.00E+03	1.00E+02	1.60E-01
PM-147	1.00E+03	1.00E+03	1.00E+02	1.44E+00
EU-154	1.00E+03	1.00E+03	1.00E+02	1.44E+00
EU-155	1.00E+03	1.00E+03	1.00E+02	1.44E+00
TA-182	1.00E+02	1.00E+03	1.00E+02	1.09E-01
W-185	1.00E+02	1.00E+02	1.00E+01	1.44E+00
W-187	1.00E+02	1.00E+02	1.00E+01	7.20E-01
PB-210	1.00E+03	1.00E+03	3.00E+02	1.15E+03
BI-210	1.00E+05[b]	1.00E+05[b]	1.50E+01[b]	3.60E+02
PO-210	2.00E+03	2.00E+04	2.00E+03	4.32E+02
RA-226	1.00E+02	1.00E+02	5.00E+01	4.32E+02
TH-228	3.00E+03	2.00E+03	1.00E+04	4.32E+00
TH-230	3.00E+03	2.00E+03	1.00E+04	4.32E+00
TH-231	3.00E+03	2.00E+03	1.00E+04	4.62E-02
TH-234	3.00E+03	2.00E+03	1.00E+04	1.04E+00
PA-234	6.00E+00	1.00E+01	1.00E+01	2.42E-05
U-232	6.67E+01[c]	1.00E+01[c]	1.00E+01[c]	9.60E-02
U-233	6.67E+01[c]	1.00E+01[c]	1.00E+01[c]	9.60E-02
U-234	6.67E+01[c]	1.00E+01[c]	1.00E+01[c]	9.60E-02
U-235	6.67E+01[c]	1.00E+01[c]	1.00E+01[c]	9.60E-02
U-236	6.67E+01[c]	1.00E+01[c]	1.00E+01[c]	9.60E-02
U-237	6.67E+01[c]	1.00E+01[c]	1.00E+01[c]	6.00E-03
U-238	6.67E+01[c]	1.00E+01[c]	1.00E+01[c]	9.60E-02
NP-237	6.00E+00[c]	1.00E+01[c]	1.00E+01[c]	8.64E-03
NP-239	6.00E+00[c]	1.00E+01[c]	1.00E+01[c]	2.01E-04
PU-236	3.50E+02[c]	1.00E+02[c]	3.50E+00[c]	1.51E-01
PU-238	3.50E+02[c]	1.00E+02[c]	3.50E+00[c]	1.51E-01
PU-239	3.50E+02[c]	1.00E+02[c]	3.50E+00[c]	1.51E-01
PU-240	3.50E+02[c]	1.00E+02[c]	3.50E+00[c]	1.51E-01
PU-241	3.50E+02[c]	1.00E+02[c]	3.50E+00[c]	1.51E-01
PU-242	3.50E+02[c]	1.00E+02[c]	3.50E+00[c]	1.51E-01
AM-241	5.00E+03[c]	1.00E+03[c]	2.50E+01[c]	7.20E-01
AM-243	5.00E+03[c]	1.00E+03[c]	2.50E+01[c]	7.20E-01
CM-242	5.00E+03[c]	1.00E+03[c]	2.50E+01[c]	7.20E-01
CM-244	5.00E+03[c]	1.00E+03[c]	2.50E+01[c]	7.20E-01

[b] Y. C. Ng et al, Prediction of the Maximum Dosage to Man from the Fallout of Nuclear Devices: IV. Handbook for Estimating the Maximum Internal Dose from Radionuclides Released to the Biosphere, Lawrence Livermore Laboratory, UCRL-50163 Part IV (May 14, 1968).

[c] S. E. Thompson et al, Concentration Factors of Chemical Elements in Edible Aquatic Organisms, Lawrence Livermore Laboratory, UCRL-50564 Rev. 1 (October 10, 1972).

TABLE 4-13A BIORA2 ESTIMATES OF INTERNAL DOSE TO FRESHWATER BIOTA (millirads/year)

RADIO-NUCLIDES	MICRO-CURIE/ML	AQUATIC PLANTS	INVERTE-BRATES	FISH	MUSKRATS
H-3	1.0E+00	1.9E+05	1.9E+05	1.9E+05	1.9E+05
C-14	1.0E+00	4.6E+09	9.2E+09	4.6E+09	6.6E+09
NA-22	1.0E+00	3.0E+09	5.1E+08	6.0E+08	2.4E+09
NA-24	1.0E+00	5.0E+09	8.6E+08	1.0E+09	2.4E+08
P-32	1.0E+00	1.3E+11	1.3E+12	1.3E+12	1.9E+11
S-35	1.0E+00	1.0E+08	1.0E+08	7.9E+08	6.7E+08
SC-46	1.0E+00	2.4E+11	2.4E+10	2.4E+09	3.8E+07
CR-51	1.0E+00	1.9E+07	9.4E+06	1.9E+07	2.0E+05
MN-54	1.0E+00	9.5E+10	3.8E+11	9.5E+08	3.5E+09
FE-55	1.0E+00	1.2E+08	3.9E+08	1.2E+07	1.8E+08
FE-59	1.0E+00	1.5E+10	4.8E+10	1.5E+09	4.8E+09
CO-57	1.0E+00	3.4E+08	3.4E+08	3.4E+07	7.9E+07
CO-58	1.0E+00	2.3E+09	2.3E+09	2.3E+08	3.9E+08
CO-60	1.0E+00	5.6E+09	5.6E+09	5.6E+08	1.1E+09
NI-63	1.0E+00	2.0E+07	3.9E+07	3.9E+07	8.5E+07
CU-64	1.0E+00	4.7E+09	4.7E+09	9.4E+08	7.6E+07
ZN-65	1.0E+00	6.0E+09	6.0E+10	6.0E+09	4.0E+09
ZN-69M	1.0E+00	1.2E+10	1.2E+11	1.2E+10	7.8E+07
BR-80M	1.0E+00	6.9E+08	4.6E+09	5.8E+09	1.8E+07
BR-82	1.0E+00	1.7E+09	1.1E+10	1.4E+10	3.2E+08
BR-83	1.0E+00	3.6E+08	2.4E+09	3.0E+09	5.1E+06
BR-84	1.0E+00	2.2E+09	1.4E+10	1.8E+10	6.6E+07
RB-86	1.0E+00	1.3E+10	1.3E+10	2.6E+10	2.3E+10
RB-88	1.0E+00	5.1E+10	5.1E+10	1.0E+11	7.4E+07
RB-89	1.0E+00	3.7E+10	3.7E+10	7.4E+10	1.1E+07
SR-89	1.0E+00	5.1E+09	1.0E+09	5.1E+07	1.1E+10
SR-90	1.0E+00	1.0E+10	2.1E+09	1.0E+08	4.4E+10
SR-91	1.0E+00	2.0E+10	3.9E+09	2.0E+08	2.4E+08
Y-90	1.0E+00	8.3E+10	1.7E+10	4.2E+08	3.2E+06
Y-91	1.0E+00	5.5E+10	1.1E+10	2.8E+08	4.6E+07
Y-93	1.0E+00	1.6E+11	3.2E+10	7.9E+08	8.5E+05
ZR-95	1.0E+00	2.1E+10	1.4E+08	6.8E+07	8.5E+06
ZR-97	1.0E+00	3.9E+10	2.6E+08	1.3E+08	3.1E+05
NB-95	1.0E+00	7.6E+09	9.5E+08	2.9E+11	1.9E+06
MO-99	1.0E+00	1.0E+10	1.0E+08	1.0E+08	1.8E+09
TC-99	1.0E+00	7.0E+07	8.8E+06	2.6E+07	5.1E+06
RU-103	1.0E+00	1.6E+09	2.5E+09	8.2E+07	2.7E+07
RU-106	1.0E+00	5.2E+09	7.9E+09	2.6E+08	1.6E+08
RH-105	1.0E+00	6.7E+08	1.0E+09	3.4E+07	2.6E+07
AG-110M	1.0E+00	6.4E+09	2.4E+10	7.3E+07	2.2E+07
SN-125	1.0E+00	1.8E+09	1.8E+10	5.3E+10	9.5E+07
SB-122	1.0E+00	2.3E+10	1.5E+08	1.5E+07	2.1E+08
SB-124	1.0E+00	4.5E+10	3.0E+08	3.0E+07	2.6E+09
SB-125	1.0E+00	1.0E+10	6.7E+07	6.7E+06	1.6E+09
SB-127	1.0E+00	2.8E+10	1.9E+08	1.9E+07	3.6E+08
TE-125M	1.0E+00	2.8E+09	1.7E+10	1.1E+09	1.1E+09
TE-127	1.0E+00	4.5E+09	2.7E+10	1.8E+09	6.1E+07
TE-127M	1.0E+00	6.0E+09	3.7E+10	2.4E+09	2.8E+09
TE-129	1.0E+00	1.8E+10	1.8E+12	7.3E+09	2.5E+07
TE-129M	1.0E+00	2.1E+10	2.1E+12	8.2E+09	5.6E+09
TE-131M	1.0E+00	3.0E+10	1.8E+11	1.2E+10	7.5E+08
TE-132	1.0E+00	3.6E+10	3.6E+12	1.4E+10	1.9E+09
I-129	1.0E+00	6.0E+07	7.5E+06	2.2E+07	7.0E+08
I-130	1.0E+00	9.7E+08	1.2E+08	3.6E+08	3.2E+07
I-131	1.0E+00	3.3E+08	4.1E+07	1.2E+08	2.5E+08
I-132	1.0E+00	1.3E+09	1.6E+08	4.8E+08	1.0E+07
I-133	1.0E+00	6.3E+08	7.9E+07	2.4E+08	6.0E+07
I-134	1.0E+00	1.1E+09	1.4E+08	4.2E+08	4.3E+06
I-135	1.0E+00	9.7E+08	1.2E+08	3.6E+08	2.3E+07

TABLE 4-13A (continued)

INTERNAL DOSE TO BIOTA,MRADS/YR

RADIO-NUCLIDES	MICRO-CURIE/ML	AQUATIC PLANTS	INVERTE-BRATES	FISH	MUSKRATS
CS-134	1.0E+00	1.6E+09	2.1E+09	8.2E+09	8.0E+09
CS-136	1.0E+00	9.7E+08	1.2E+09	4.9E+09	8.3E+08
CS-137	1.0E+00	8.8E+08	1.1E+09	4.4E+09	6.2E+09
CS-138	1.0E+00	3.9E+09	4.8E+09	1.9E+10	9.0E+07
BA-140	1.0E+00	2.2E+10	8.6E+09	1.7E+08	1.0E+09
LA-140	1.0E+00	1.8E+11	3.6E+10	8.9E+08	2.5E+06
CE-141	1.0E+00	2.0E+10	3.9E+09	9.8E+07	7.3E+06
CE-143	1.0E+00	9.1E+10	1.8E+10	4.5E+08	1.5E+06
CE-144	1.0E+00	1.2E+11	2.4E+10	6.1E+08	1.8E+08
PR-143	1.0E+00	3.0E+10	6.0E+09	1.5E+08	5.8E+06
ND-147	1.0E+00	3.7E+10	7.5E+09	1.9E+08	4.8E+06
PM-147	1.0E+00	6.5E+09	1.3E+09	3.2E+07	9.3E+06
EU-154	1.0E+00	1.2E+11	2.4E+10	6.1E+08	1.2E+08
EU-155	1.0E+00	1.5E+10	3.0E+09	7.5E+07	1.3E+07
TA-182	1.0E+00	1.6E+10	1.4E+10	6.2E+11	9.2E+06
W-185	1.0E+00	3.1E+09	2.6E+07	3.1E+09	4.5E+07
W-187	1.0E+00	1.5E+10	1.3E+08	1.5E+10	7.1E+07
PB-210	1.0E+00	3.7E+10	1.9E+10	5.6E+10	1.1E+12
BI-210	1.0E+00	1.9E+13	1.9E+13	2.8E+09	1.8E+11
PO-210	1.0E+00	2.1E+12	2.1E+13	5.1E+10	4.4E+11
RA-226	1.0E+00	5.1E+12	5.1E+11	1.0E+11	2.2E+13
TH-228	1.0E+00	6.5E+12	2.2E+12	1.3E+11	9.7E+09
TH-230	1.0E+00	1.3E+12	4.5E+11	2.7E+10	1.9E+09
TH-231	1.0E+00	5.0E+09	1.7E+09	1.0E+08	4.8E+04
TH-234	1.0E+00	2.6E+10	8.5E+09	5.1E+08	8.8E+06
PA-234	1.0E+00	2.3E+10	2.3E+09	2.3E+08	5.1E+04
U-232	1.0E+00	5.2E+12	5.2E+11	5.2E+10	5.7E+09
U-233	1.0E+00	9.4E+11	9.4E+10	9.3E+09	1.3E+09
U-234	1.0E+00	9.2E+11	9.2E+10	9.2E+09	1.3E+09
U-235	1.0E+00	8.6E+11	8.6E+10	8.6E+09	1.2E+09
U-236	1.0E+00	8.8E+11	8.8E+10	8.8E+09	1.3E+09
U-237	1.0E+00	3.1E+09	3.1E+08	3.1E+07	2.0E+05
U-238	1.0E+00	8.0E+11	8.0E+10	8.0E+09	1.2E+09
NP-237	1.0E+00	9.2E+11	3.7E+11	9.2E+09	1.3E+09
NP-239	1.0E+00	5.4E+09	2.2E+09	5.4E+07	1.4E+05
PU-236	1.0E+00	2.2E+12	6.4E+11	2.2E+12	4.8E+08
PU-238	1.0E+00	3.7E+11	1.1E+11	3.7E+11	1.6E+08
PU-239	1.0E+00	3.5E+11	9.9E+10	3.5E+11	1.5E+08
PU-240	1.0E+00	3.5E+11	9.9E+10	3.5E+11	1.5E+08
PU-241	1.0E+00	1.5E+10	4.3E+09	1.5E+10	6.5E+06
PU-242	1.0E+00	3.3E+11	9.5E+10	3.3E+11	1.4E+08
AM-241	1.0E+00	5.3E+12	1.1E+12	2.7E+10	7.7E+09
AM-243	1.0E+00	5.0E+12	1.0E+12	2.5E+10	7.3E+09
CM-242	1.0E+00	7.5E+12	1.5E+12	3.7E+10	8.6E+09
CM-244	1.0E+00	5.6E+12	1.1E+12	2.8E+10	8.1E+09

TABLE 4-13B BIORA2 ESTIMATES OF INTERNAL DOSE TO MARINE BIOTA (millirads/year)

RADIO-NUCLIDES	MICRO-CURIE/ML	ALGAE	MOLLUSKS/ CRUSTACEANS	FISH	WATERFOWL/ SHORE BIRDS
H-3	1.0E+00	1.9E+05	1.9E+05	1.9E+05	1.9E+05
C-14	1.0E+00	1.0E+06	1.0E+06	1.0E+06	1.5E+06
NA-22	1.0E+00	3.0E+07	3.0E+07	3.0E+07	2.4E+07
NA-24	1.0E+00	5.0E+07	5.0E+07	5.0E+07	2.4E+06
P-32	1.0E+00	1.3E+12	1.3E+11	1.3E+11	1.9E+12
S-35	1.0E+00	4.2E+06	4.2E+06	4.2E+06	2.7E+07
SC-46	1.0E+00	2.4E+10	7.3E+09	2.4E+09	3.8E+06
CR-51	1.0E+00	4.7E+08	4.7E+08	4.7E+07	5.0E+06
MN-54	1.0E+00	9.5E+10	4.8E+11	2.9E+10	3.5E+09
FE-55	1.0E+00	7.3E+08	2.4E+09	1.2E+08	1.0E+09
FE-59	1.0E+00	9.1E+10	3.0E+11	1.5E+10	2.9E+10
CO-57	1.0E+00	1.7E+08	1.7E+10	1.7E+08	3.9E+07
CO-58	1.0E+00	1.1E+09	1.1E+11	1.1E+09	2.0E+08
CO-60	1.0E+00	2.8E+09	2.8E+11	2.8E+09	5.5E+08
NI-63	1.0E+00	3.9E+07	3.9E+07	2.0E+08	1.7E+08
CU-64	1.0E+00	4.7E+09	2.3E+10	4.7E+09	7.6E+07
ZN-65	1.0E+00	6.0E+09	3.0E+11	3.0E+10	4.0E+09
ZN-69M	1.0E+00	1.2E+10	6.0E+11	6.0E+10	7.8E+07
BR-80M	1.0E+00	1.4E+09	1.4E+08	4.2E+07	3.6E+07
BR-82	1.0E+00	3.4E+09	3.4E+08	1.0E+08	6.3E+08
BR-83	1.0E+00	7.1E+08	7.1E+07	2.1E+07	1.0E+07
BR-84	1.0E+00	4.3E+09	4.3E+08	1.3E+08	1.3E+08
RB-86	1.0E+00	1.3E+08	6.5E+08	3.9E+08	2.3E+08
RB-88	1.0E+00	5.1E+08	2.6E+09	1.5E+09	7.4E+05
RB-89	1.0E+00	3.7E+08	1.9E+09	1.1E+09	1.1E+05
SR-89	1.0E+00	2.1E+08	1.0E+07	1.0E+07	4.4E+08
SR-90	1.0E+00	4.1E+08	2.1E+07	2.1E+07	1.8E+09
SR-91	1.0E+00	7.9E+08	3.9E+07	3.9E+07	9.7E+06
Y-90	1.0E+00	5.0E+09	1.7E+09	5.0E+08	1.9E+05
Y-91	1.0E+00	3.3E+09	1.1E+09	3.3E+08	2.8E+06
Y-93	1.0E+00	9.5E+09	3.2E+09	9.5E+08	5.1E+04
ZR-95	1.0E+00	2.1E+10	2.1E+09	6.2E+08	8.5E+06
ZR-97	1.0E+00	3.9E+10	3.9E+09	1.2E+09	3.1E+05
NB-95	1.0E+00	9.5E+08	1.9E+09	9.5E+08	2.3E+05
MO-99	1.0E+00	1.0E+09	1.0E+09	1.0E+08	1.8E+08
TC-99	1.0E+00	1.8E+09	1.8E+08	1.8E+07	1.3E+08
RU-103	1.0E+00	8.2E+09	8.2E+08	2.5E+07	1.4E+08
RU-106	1.0E+00	2.6E+10	2.6E+09	7.9E+07	8.1E+08
RH-105	1.0E+00	3.4E+08	3.4E+08	3.4E+07	1.3E+07
AG-110M	1.0E+00	3.2E+10	1.6E+11	3.2E+10	1.1E+08
SN-125	1.0E+00	1.8E+08	5.3E+07	5.3E+07	9.5E+06
SB-122	1.0E+00	1.5E+11	1.5E+10	1.5E+10	1.4E+09
SB-124	1.0E+00	3.0E+11	3.0E+10	3.0E+10	1.7E+10
SB-125	1.0E+00	6.7E+10	6.7E+09	6.7E+09	1.0E+10
SB-127	1.0E+00	1.9E+11	1.9E+10	1.9E+10	1.8E+10
TE-125M	1.0E+00	2.8E+09	2.8E+08	2.8E+07	1.1E+09
TE-127	1.0E+00	4.5E+09	4.5E+08	4.5E+07	6.1E+07
TE-127M	1.0E+00	6.0E+09	6.0E+08	6.0E+07	2.8E+09
TE-129	1.0E+00	1.8E+10	1.8E+09	1.8E+08	2.5E+07
TE-129M	1.0E+00	2.1E+10	2.1E+09	2.1E+08	5.6E+09
TE-131M	1.0E+00	3.0E+10	3.0E+09	3.0E+08	7.5E+08
TE-132	1.0E+00	3.6E+10	3.6E+09	3.6E+08	1.9E+09
I-129	1.0E+00	9.4E+09	9.4E+07	1.9E+07	1.3E+11
I-130	1.1E+01	2.7E+12	2.7E+10	5.3E+09	8.4E+10
I-131	1.0E+00	8.2E+10	8.2E+08	1.6E+08	6.1E+10
I-132	1.0E+00	3.2E+11	3.2E+09	6.4E+08	2.6E+09
I-133	1.0E+00	1.6E+11	1.6E+09	3.1E+08	1.5E+10
I-134	1.0E+00	2.8E+11	2.8E+09	5.6E+08	1.1E+09
I-135	1.0E+00	2.4E+11	2.4E+09	4.9E+08	5.8E+09

TABLE 4-13B (continued)

INTERNAL DOSE TO BIOTA,MRADS/YR

RADIO-NUCLIDES	MICRO-CURIE/ML	ALGAE	MOLLUSKS/ CRUSTACEANS	FISH	WATERFOWL/ SHORE BIRDS
CS-134	1.0E+00	2.1E+08	1.0E+09	6.2E+08	1.0E+09
CS-136	1.0E+00	1.2E+08	6.1E+08	3.6E+08	1.0E+08
CS-137	1.0E+00	1.1E+08	5.5E+08	3.3E+08	7.7E+08
CS-138	1.0E+00	4.8E+08	2.4E+09	1.4E+09	1.2E+07
BA-140	1.0E+00	4.3E+09	1.3E+08	1.3E+08	2.0E+08
LA-140	1.0E+00	1.1E+10	3.6E+09	1.1E+09	1.5E+05
CE-141	1.0E+00	1.2E+09	3.9E+08	1.2E+08	4.4E+05
CE-143	1.0E+00	5.4E+09	1.8E+09	5.4E+08	9.1E+04
CE-144	1.0E+00	7.3E+09	2.4E+09	7.3E+08	1.1E+07
PR-143	1.0E+00	6.0E+09	6.0E+09	6.0E+08	1.2E+06
ND-147	1.0E+00	7.5E+09	7.5E+09	7.5E+08	9.6E+05
PM-147	1.0E+00	1.3E+09	1.3E+09	1.3E+08	1.9E+06
EU-154	1.0E+00	2.4E+10	2.4E+10	2.4E+09	2.3E+07
EU-155	1.0E+00	3.0E+09	3.0E+09	3.0E+08	2.6E+06
TA-182	1.0E+00	2.1E+09	2.1E+10	2.1E+09	1.1E+06
W-185	1.0E+00	2.6E+08	2.6E+08	2.6E+07	3.8E+06
W-187	1.0E+00	1.3E+09	1.3E+09	1.3E+08	5.9E+06
PB-210	1.0E+00	9.7E+11	9.7E+11	2.9E+11	5.4E+11
BI-210	1.0E+00	1.9E+13	1.9E+13	2.8E+09	1.8E+11
PO-210	1.0E+00	2.1E+12	2.1E+13	2.1E+12	4.4E+11
RA-226	1.0E+00	2.1E+11	2.1E+11	1.0E+11	8.9E+11
TH-228	1.0E+00	1.3E+13	8.6E+12	4.3E+13	1.9E+10
TH-230	1.0E+00	2.7E+12	1.8E+12	9.0E+12	3.9E+09
TH-231	1.0E+00	1.0E+10	6.7E+09	3.4E+10	9.5E+04
TH-234	1.0E+00	5.1E+10	3.4E+10	1.7E+11	1.8E+07
PA-234	1.0E+00	1.2E+08	2.1E+08	2.1E+08	2.7E+02
U-232	1.0E+00	3.5E+11	5.2E+10	5.2E+10	3.8E+08
U-233	1.0E+00	6.2E+10	9.3E+09	9.3E+09	9.0E+07
U-234	1.0E+00	6.1E+10	9.2E+09	9.2E+09	8.8E+07
U-235	1.0E+00	5.7E+10	8.6E+09	8.6E+09	8.3E+07
U-236	1.0E+00	5.9E+10	8.8E+09	8.8E+09	8.4E+07
U-237	1.0E+00	2.1E+08	3.1E+07	3.1E+07	1.4E+04
U-238	1.0E+00	5.4E+10	8.0E+09	8.0E+09	7.7E+07
NP-237	1.0E+00	5.5E+09	9.2E+09	9.2E+09	7.9E+06
NP-239	1.0E+00	2.6E+08	4.4E+08	4.4E+08	8.8E+03
PU-236	1.0E+00	2.2E+12	6.4E+11	2.2E+10	7.6E+08
PU-238	1.0E+00	3.7E+11	1.1E+11	3.7E+09	1.6E+08
PU-239	1.0E+00	3.5E+11	9.9E+10	3.5E+09	1.5E+08
PU-240	1.0E+00	3.5E+11	9.9E+10	3.5E+09	1.5E+08
PU-241	1.0E+00	1.5E+10	4.3E+09	1.5E+08	1.5E+05
PU-242	1.0E+00	3.3E+11	9.5E+10	3.3E+09	1.4E+08
AM-241	1.0E+00	5.3E+12	1.1E+12	2.7E+10	7.7E+08
AM-243	1.0E+00	5.0E+12	1.0E+12	2.5E+10	7.3E+08
CM-242	1.0E+00	7.5E+12	1.5E+12	3.7E+10	8.6E+08
CM-244	1.0E+00	5.6E+12	1.1E+12	2.8E+10	8.1E+08

TABLE 4-14 BIORA2 SAMPLE PROBLEM

```
BIORA2          08:23          29-MAY-75

BIOACCUMULATION FACTORS FOR SALINE AND FRESH H20 ARE STORED IN PROGRAM
IS YOUR CHOICE FRESH WATER  ?YES
FRESH SELECTED

W = CONCENTRATION IN WATER FOR A SPECIFIC RADIONUCLIDE
    (MICRO-CURIE/ML)
S = CONCENTRATION IN SEDIMENT FOR A SPECIFIC RADIONUCLIDE
    (MICRO-CURIE/ML) OR (MICRO-CURIE/GM)

ANY COMPUTATIONS INVOLVING W  ?YES

ANY COMPUTATIONS INVOLVING S  ?NO

TYPE DONE FOR NUCLIDE = ? WHEN ALL NUCLIDES INPUT

NUCLIDE =  ?SR-90
W =  ?1

NUCLIDE =  ?I-131
W =  ?1

NUCLIDE =  ?CS-137
W =  ?1

NUCLIDE =  ?DONE

TYPE IN THE DESIRED NAME OF THE NUCLEAR POWER STATION
TO APPEAR IN THE COMPUTATION TABULATION
ONLY THE FIRST 25 CHARACTERS WILL BE USED
 ?BIORAD SAMPLE PROBLEM FOR

BIORAD SAMPLE PROBLEM FOR
IS THIS NAME O.K  ?YES

  BIORAD SAMPLE PROBLEM FOR FUEL CYCLE FACILITY
         INTERNAL DOSE TO BIOTA,MRADS/YR

 RADIO-      MICRO-     AQUATIC    INVERTE-    FISH      MUSKRATS
NUCLIDES    CURIE/ML    PLANTS     BRATES
 SR-90       1.0E+00    1.0E+10    2.1E+09    1.0E+08    4.4E+10
 I-131       1.0E+00    3.3E+08    4.1E+07    1.2E+08    2.5E+08
 CS-137      1.0E+00    8.8E+08    1.1E+09    4.4E+09    6.2E+09
 TOT DOSE               1.1E+10    3.2E+09    4.6E+09    5.1E+10

  BIORAD SAMPLE PROBLEM FOR FUEL CYCLE FACILITY
   WATER IMMERSION DOSE TO ALL BIOTA,MRADS/YR

      RADIO-      MICRO-     BETA +     GAMMA
     NUCLIDES    CURIE/ML    GAMMA
      SR-90       1.0E+00    1.0E+07    0.0E+00
      I-131       1.0E+00    9.1E+06    7.1E+06
      CS-137      1.0E+00    1.2E+07    9.9E+06
      TOT DOSE               3.2E+07    1.7E+07
DO YOU WANT A TABLE OF BIOACCUMULATION FACTORS FOR THE DOSE COMPUTATIONS

 ?YES
            BIORAD SAMPLE PROBLEM FOR FUEL CYCLE FACILITY
                      BIOACCUMULATION FACTORS

RADIONUCLIDE  AQUATIC-PLANTS INVERTEBRATES      FISH        MUSKRAT
SR-90            5.00E+02       1.00E+02      5.00E+00      2.16E+03
I-131            4.00E+01       5.00E+00      1.50E+01      4.38E+01
CS-137           8.00E+01       1.00E+02      4.00E+02      8.06E+02

END BIORAD SESSION
```

5 Estimation of Individual and Population Doses from Consumer Products that Contain Radioactive Materials

5.1 The CONDOS Methodology

A variety of consumer products containing radioactive materials are available to, or are being developed for use by, the general public.[1] These consumer products include a diversity of items, such as timepieces containing tritium or promethium-147, incandescent gas mantles containing thorium, and certain types of glazed ceramic tableware containing uranium. The distribution, use, and disposal of such products can present situations (events) in which man may receive radiation doses. Estimates of the doses that might be received by individuals, groups of individuals, and entire populations are required for evaluation of the radiological impacts associated with the consumer products. To this end, a model of the life span of a consumer product has been developed and a computer code which calculates radiation doses to man during the life span of the product is being developed. When used together, the model and computer code constitute the CONDOS methodology for systematically estimating the potential radiation doses to man from a diversity of products. This section describes the model and the first version of the CONDOS computer code 2. Several additions to and refinement of the first version of the code have been made and constitute the revised, (CONDOS II) computer code.[3] Continued evolution of the methodology, as dictated by application, is expected.

The CONDOS model provides a prescription whereby the life span of a consumer product is divided into five main stages, and provides a guide

for description of the exposure events. These descriptions identify homogeneous groups of exposed persons and, thus, facilitate the selection of individuals who represent the exposed population groups. The radiation doses associated with one year of product use by representative individuals can be estimated for each mode of exposure that is applicable to each event. Summation of the doses to representative individuals yields estimates of group and total population doses.

A total dose has two components. One component results from radionuclides[a] outside the body (external exposure), and the other component results from nuclides deposited in the body (internal exposure).[b] External exposure is considered, according to the relevant exposure modes, in Sect. 5.1.2.1, and internal exposure is considered, according to the relevant modes of nuclide deposition, in Sect. 5.1.2.2.

The generalized model and product information, and the mathematical techniques required to program the model, are presented in Sects. 5.1.1 and 5.1.2, respectively. The first version of CONDOS[2] provides estimates of the radiation doses to the total body (from all radiations) and to the hands (from beta particles) associated with one year of distribution, use, and disposal of a consumer product containing natural uranium or thorium. The capability to estimate doses to other selected body organs and skin is provided in the revised computer code[3], and additional nuclides have been added to the data file of the revised code so that a

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[a]For the sake of convenience, "radionuclide" is shortened to "nuclide" in this section.

[b]All internal doses are the 50-year dose commitments from intake of the radioactive material during the year being considered. Total doses to individuals and populations are the sums of the appropriate annual external doses and the appropriate 50-year dose commitments.

greater variety of products can be investigated. The CONDOS II code[3] (which is available from the Radiation Shielding Information Center of Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830) is written in FORTRAN IV for use in the batch mode on an IBM 360 computer.

5.1.1 Modeling Techniques

The estimation of radiation doses to man from a consumer product requires (1) a description of the product; (2) a description of the life span of the product; (3) the identification and description of events, i.e., actions or acts by which man may be exposed to radiation from the product; (4) a determination of the conditions and modes of exposure relevant to each event; (5) a definition of all persons who may be exposed to radiation from the product; (6) the estimation of doses that may be received by each person exposed; and (7) an estimation of the total population dose attributable to the product.

The CONDOS model provides a guide for the implementation of items (1) through (5) and provides a mechanism for the achievement of (6) and (7). This model is described in the following sections.

5.1.1.1 Product Description

A description of the consumer product to be assessed, although not a part of the model *per se*, is required by the model. Such a description provides the basic information to be used in the estimation of doses and in the selection of parts of the product life span model that are applicable to the specific consumer product. The following information is required:

1. names and quantities of the nuclides in the radioactive material which is in or on the product;

2. chemical and physical characteristics of the radioactive material, especially those that may be significant in the determination of release rates for the material, e.g., leach rate, vapor pressure, etc;

3. density and thickness of the radioactive material;

4. density and thickness of the matrix (including the radioactive material) in which the radioactive material is incorporated;

5. density and thickness of any protective materials that may cover the radioactive material;

6. geometry of the product or of collections of the product, e.g., a shipping package;

7. identification of possible uses of the product;

8. identification of the means of transport, distribution, repair, and disposal of the product; and

9. identification of accident or misuse conditions to which the product might be subjected.

5.1.1.2 Model of Product Life Span and Conditions of Exposure

The model of the life span of a consumer product is outlined in Fig. 5-1, and the components that should be considered in completing the outline are listed in Table 5-1. The life span of a product is divided into five main "stages"--distribution, transport, use, disposal, and emergency or misuse situations. Although both distribution and transport are part of the physical transfer of the product from manufacturer to user, Table 5-1 shows that transport describes shipments of

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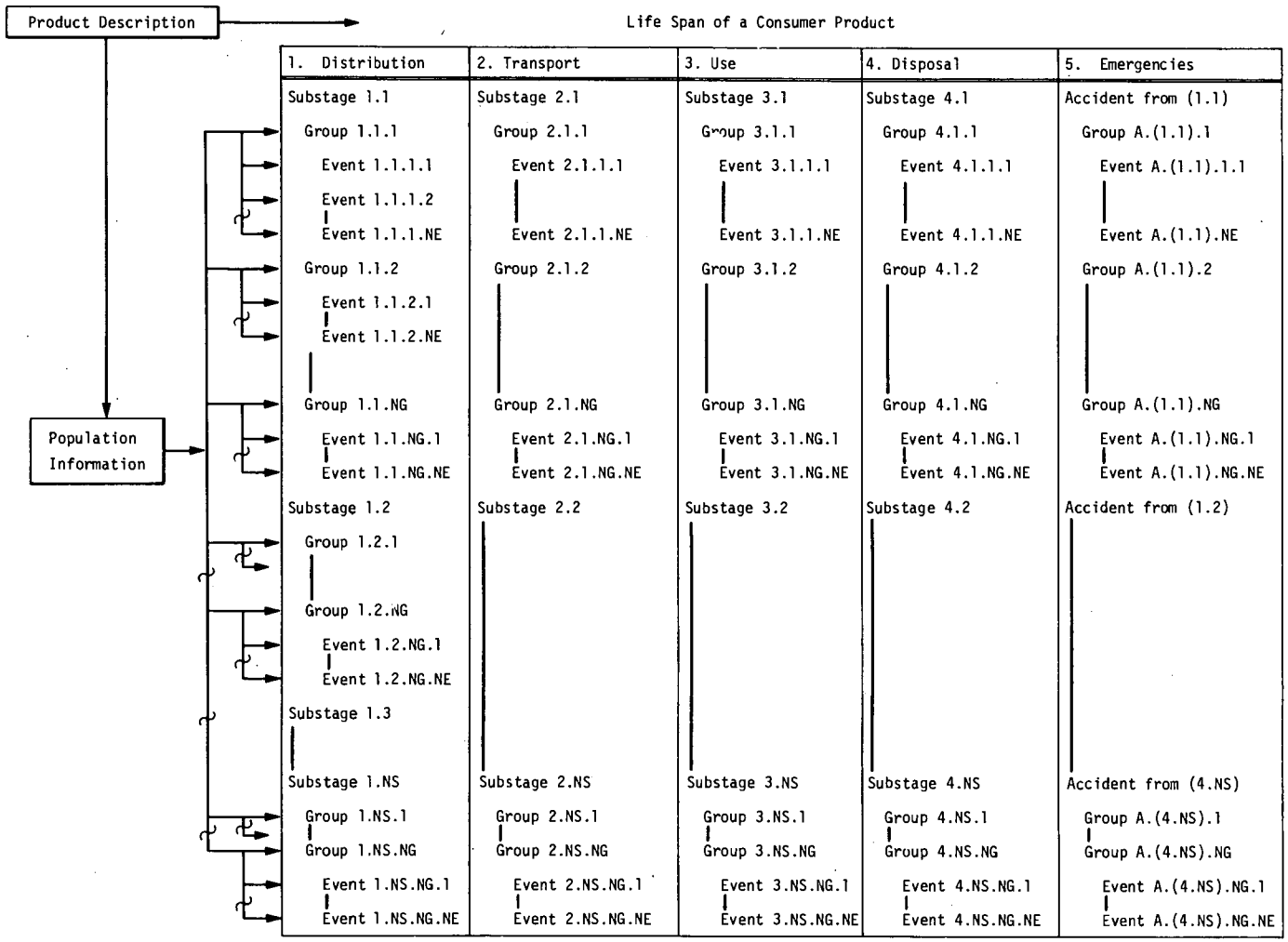

Fig. 5-1. Outline of model of the life span of a consumer product.

the product and distribution describes the presence of the product in distribution facilities such as warehouses.

Each stage is divided into a set of "substages" that delineate the general types of activities by which man could be exposed to the product. These activities are made more specific by subdivision into "groups" of functionally related activities.

Population information is supplied to the model at this point by determination of the number of persons engaged in the activities of each group and exposed to the product as a result of those activities. These persons are called group members.

The group activities are further divided into a set of actions during which group members may be exposed to the product--the "events". An event description contains the parameters required to solve the dose equations and defines an individual typical of the group exposed. This individual may be an average group member (one who represents the entire group), the maximally exposed member, or any other group member. The radiation doses estimated for each event are doses that the selected individual may receive from that event. Since the event descriptions prescribe the parameters to be used in the solutions of the dose equations, the correspondence of the events described with reality and how well they are described determine how well the estimated doses reflect actual doses.

The description of an event must include the following parameters:

1. the probability that a member of the group will be involved in the event,

2. the time periods during which the individual will experience

each mode of exposure,

3. the quantity of radioactive material in the product.

4. the number of point sources chosen to represent the source,

5. the Cartesian coordinates of each point source and of the receptor,

6. the attenuation (shielding) factor for the composite of all materials between each point source and the receptor,

7. the quantity of radioactive material ingested,

8. the concentration of radioactive material in air,

9. the effective radius or volume of the airspace (e.g., a room) containing the radioactive material,

10. the rate of leakage of material from the product to the airspace or the total amount of material that has leaked into the airspace, and

11. the rate of air exchange between the space and its surroundings.

Some of the substages and groups listed in Table 5-1 may not be required to model the life span of a particular consumer product. The modeler is responsible for choosing the substages, groups, and events that are appropriate to the description of the life span and for deleting those that are not appropriate.

All event descriptions must be supplied by the user of both versions of the CONDOS computer code. The inclusion of a set of standard events which the user may select is being considered for a future version. However, considerable experience in evaluating real products will be required before construction of such a data file will be feasible. Descriptions of the normal activities of the members of each group may require specification of more than one event because some of the activities

may present very different conditions of exposure. Similarly, more than one accident or misuse event may be required.

5.1.1.3 Methodology for Estimation of Radiation Doses to Man

The methodology used in CONDOS for the estimation of potential radiation doses to man from a consumer product containing radioactive material consists of three parts: information assembly, life span model construction, and dose estimation. This section shows how the three parts are combined to form the methodology. Figure 5-2 illustrates the flow of operations used in the methodology.

Product information (Sect. 5.1.1.1) and population information (the number of persons potentially exposed to the product and their behavioral patterns in exposure situations) are gathered and sorted. This information is used to construct the life span model for the consumer product.

The model is constructed, as shown in Fig. 5-2, by division of each of the five stages (1. - 5.) into an appropriate set of substages, e.g., stage "3. Use" is divided into substages 3.1,...,3.X,...,3.NS. Each substage is then divided into a set of groups, e.g., substage 3.X is divided into groups 3.X.1,...,3.X.Y,...,3.X.NG. The number of persons (NM) in each group[a] is determined at this point. The various activities by which the members of each group may be exposed to the product (the events) are identified next for each group, e.g., group 3.X.Y is involved in events 3.X.Y.1,...,3.X.Y.Z,...,3.X.Y.NE.

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[a]NM may be taken as the total number of group members (e.g., all countermen who work in diners) or may be restricted to the number of group members potentially exposed to the product (e.g., all countermen who work in diners that use the product). Selection of the restricted number is preferred.

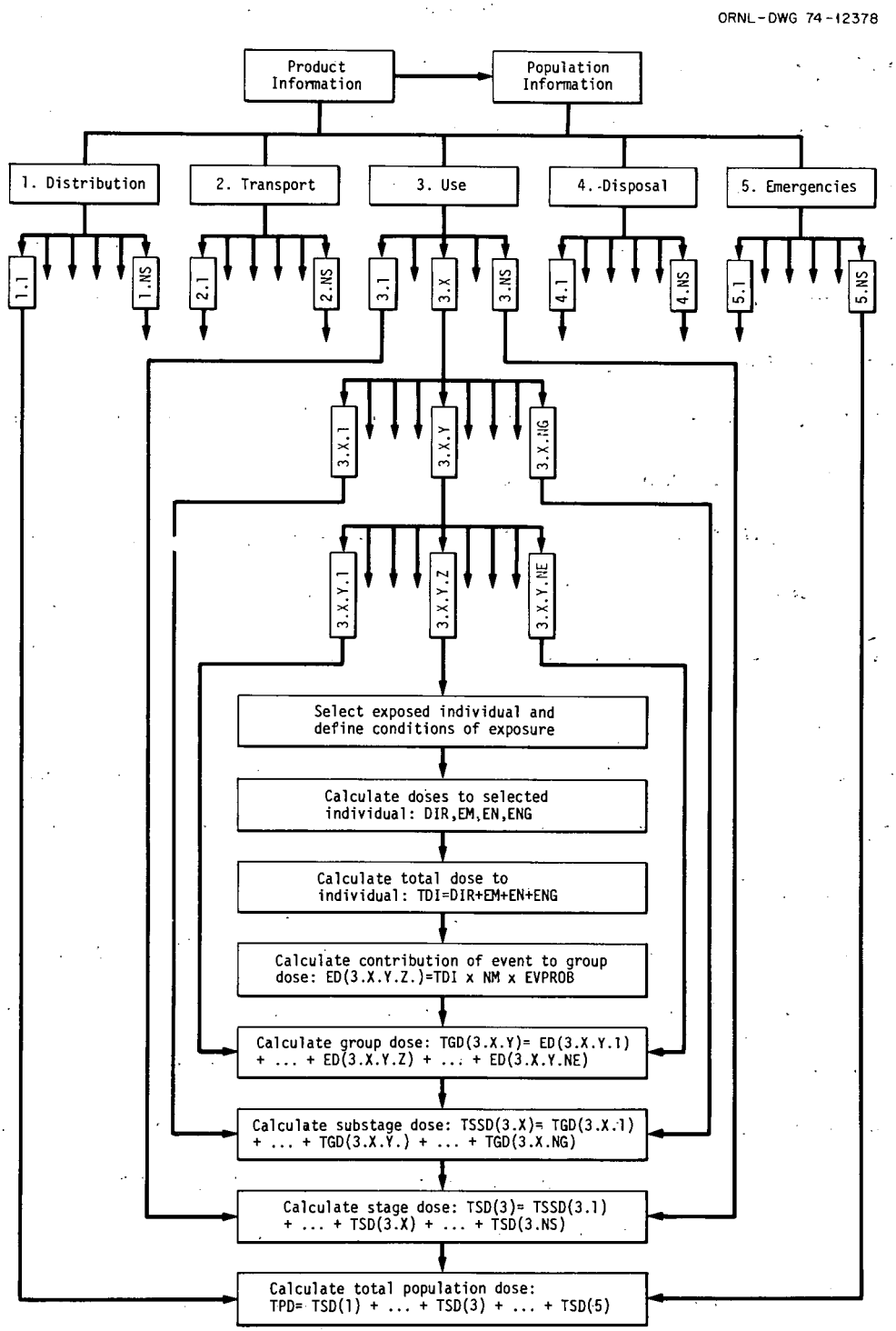

Fig. 5-2. Flow diagram of the methodology for estimation of radiation doses to man from consumer product containing radioactive materials.

The model is completed by selection of an individual from the group who participates in one event, description of the event, and repetition of the selection and description process for every event identified for every group. The individual selected determines how the event should be described and, thus, determines the conditions of exposure that will be used to quantify the parameters required to solve the dose equations. If an average individual (one who represents the entire group) is selected, average conditions of exposure are chosen in the event description. If the maximally exposed individual is selected, conditions of maximum exposure are selected. The selection of individuals should be consistent for all events and for all groups, i.e., only average individuals should be selected, or only maximally exposed individuals should be selected.

Each event description is input to the computer code. The conditions of exposure for each event, e.g., event 3.X.Y.Z in Fig. 5-2, are used to calculate potential radiation doses to the total body (Sect. 5.1.2) of each selected individual by four exposure pathways: direct exposure to gamma rays (DIR) emitted from the radioactive material in or on the product, immersion in air contaminated with radioactive material (EM) released from the product, and ingestion (ENG) and inhalation (EN) of released material. The total dose to the individual (TDI) is the sum of the doses delivered via the four exposure pathways. Each TDI contributes to the collective dose received by all group members (the group dose, TGD). The contribution of each TDI is called an event dose, e.g., ED(3.X.Y.Z), and is quantified by weighting TDI by NM and by the joint

probability (EVPROB)[a] that a group member will participate in the event and that the event will occur. An ED is calculated for each event.

Population doses, the sum of the total body doses to each member of a population group, are estimated for each group, substage, stage, and an entire population as follows. Group doses are the sum of the appropriate event doses, e.g., $TGD(3.X.Y.) = \sum_{Y=1}^{NE} TGD(3.X.Y)$. A TSSD is estimated for all substages delineated in the model. The potential collective dose to all persons involved in a stage of the product life span is obtained by summation of the appropriate substage doses, e.g., $TSD(3) = \sum_{X=1}^{NS} TSSD(3.X)$. A similar sequence of calculations is made to obtain the remaining TSDs, and the total population dose associated with one year of product availability is estimated by $TPD = \sum_{S=1}^{5} TSD(S)$.

The capability to estimate radiation doses to the skin, skeleton, testes, ovaries, liver, kidneys, lungs, and gastrointestinal (GI) tract has been added to the CONDOS II code[3]. The procedure for estimation of the organ doses parallels that for total-body dose estimation.

CONDOS also provides an estimate of the radiation dose to the skin from contact with a product containing radioactive material that emits beta particles. Both versions of the computer code estimate this beta

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[a] If an average individual participates in a common event (one that will occur every time the group is exposed to the product), EVPROB = 1. If the maximally exposed individual is involved, EVPROB = 1/NM. For other individuals $1 \geq EVPROB \geq 1/NM$. If the event is not a common one, its probability of occurrence will be <1, e.g., = P. In this case, for the individuals noted above, EVPROB = P, P/NM, or in general, $P \geq EVPROB \geq P/NM$, respectively.

dose only for a single event, and provide the estimated dose for a specified period of contact (Sect. 5.1.2.1.3).

5.1.1.4 Discussion

CONDOS provides a methodology for estimating potential radiation doses to man from consumer products containing radioactive materials. These doses can, in principle, be estimated fairly accurately. That is, the dose equations (Sect. 5.1.2) will calculate the doses fairly accurately if the input data from the "real-world" descriptions of the product and its life span are accurate. Thus, the accuracy of the dose estimates is limited essentially by the accuracy of the "real-world" descriptions.

A product can be well defined, but such a definition will frequently be unavailable. A manufacturer may be unable to supply the type of information needed (he might not have it). For example, a product might be described as tableware coated with a ceramic glaze containing 14 wt% uranium. The desired description would specify the number, sizes, and shapes of the various forms of tableware, the composition, and thickness of the glaze, and the identities and quantities of the nuclides present. In addition, several manufacturers of the product could exist, and each might manufacture a product with a design that is different from the designs of all other manufacturers.

The life span of a product cannot be defined precisely. Each of the infinitely large number of possible events that can occur during distribution, use, and disposal of a product cannot be considered individually. An average, or typical, event that represents many closely

related events must be constructed, if the modeler is not to be overwhelmed by voluminous amounts of data. Such a construction must introduce uncertainties in the data. For example, a person might spend 8 hr/day between 1 and 100 m from a source with various absorbers between the person and the source. An accurate description, which might require 100 events, would specify the time, distance, and absorber for each different event. Construction of the average event might describe an exposure of 8 hr/day at 50 m with an average shielding factor to account for the absorbing material. If the relative movements of products and individuals and the interposition of several, mostly uncharacterized, absorbers during these movements are considered, the complexity of life span definition becomes apparent.

Because of the uncertainties and variations possible in product definition and life-span modeling, some input parameters used to solve the dose equations could be in error by as much as a factor of 10. Careful selection of the parameters could reduce the errors appreciably.

The expected errors in input data were considered in and have influenced the models of the dose equations. Some of the calculations and nuclear data files were simplified by procedures that might introduce a combined error of less than ± 10% into the dose estimates. This error is small compared with expected input data errors. The sources of the errors are discussed in the appropriate subsections.

Another important factor is that the first version of CONDOS[2] is designed primarily to estimate doses from products containing natural uranium or thorium. Therefore, the dose equation models and computer program logic are designed to accommodate heavy-element decay chains,

not individual nuclides. However, this does not restrict the utility of CONDOS, because only minor modifications in certain program functions are required to add such a capability. These modifications have been made in the revised code,[3] and the radionuclides H-3, C-14, Co-60, Ni-63, Kr-85, Tc-99, Cs-137, Pm-147, Po-210, U-232, U-236, Np-237, and Am-241 have been added to the data file.

5.1.2 Model Equations

The potential doses from a consumer product to representative individuals and population groups that are considered by CONDOS are discussed in Sect. 5.1.1.3. The mathematical models of the dose equations, as they appear in the first version of computer code, are presented here. Several variables have been redefined in the revised code, but the equations are essentially the same in both versions.

5.1.2.1 External Exposure

The modes of external exposure considered in CONDOS are direct irradiation, immersion in a contaminated cloud, and contact with a beta-particle-emitting surface.

5.1.2.1.1 Dose from Direct Irradiation

The direct radiation dose from gamma photons emitted from a consumer product represented by an array of point sources is computed from the standard point source, dose rate equation.[4]

A typical consumer product will contain several nuclides that are part of a decay chain. Therefore, a simple counting of photons of various

energies becomes complicated. A general method for counting photons is adopted in CONDOS. The gamma ray energy spectrum is divided into 25 energy intervals (see Sect. 5.1.3) and the photons emitted by each nuclide are placed in the appropriate energy interval. In addition, all energy-dependent quantities are defined in terms of these energy intervals and those that are stored as data variables in the code are listed in Sect. 5.1.3.

Since the source term for a consumer product will probably be given as the number of grams of radioactive material contained, a method for deriving the quantity of each nuclide present in the material is provided. Since natural uranium and thorium were of primary interest initially, the factors necessary to convert from grams of these materials to photons/sec with energies in each energy interval are provided in the code as data variables. These variables are also listed in Sect. 5.1.3. As other nuclides are added to the data base, the corresponding conversion factors must be incorporated in the data base. This is done in the CONDOS II code.

The model of the dose equation for direct irradiation is:

$$DIR = 79.6*TDIR* \sum_{I=1}^{NGINT} ENRGY(I)*CONVR(I)*\sum_{J=1}^{NN} ACT(J)*FGM(I,J)* \sum_{K=1}^{NP} S(K)*ATN(I,K)*AATN(K)*R(K)^{-2}$$

where

DIR = direct dose equivalent rate (mrem/year),

I = energy interval index,

J = nuclide index,

K = source index,

NGINT = number of photon energy intervals,

NN = number of nuclides in the product,

NP = number of point sources,

79.6 = dimensional conversion factor (1000 mrem-rem^{-1}/4Π),

TDIR = duration (hr/year) of exposure,

IEL = radioactive material index (1 → thorium; 2 → uranium),

ENRGY(I) = average energy (MeV/photon) of a photon in the I-th energy interval,

CONVR(I) = exposure rate-energy flux ratio for I-th energy photons, (r-hr^{-1}/MeV-cm^{-2}-sec^{-1})

ACT(J) = YI(J)*RA(J)*CH(J)*AVO/3600

= disintegration rate (dps/g) of J-th nuclide per gram of IEL-th material,

YI(J) = abundance (g/g) of the mother nuclide of the decay chain containing the J-th nuclide in the material,

RA(J) = ratio (dps/dps) of the disintegration rate of the J-th nuclide to that of its mother,

CH(J) = $\frac{\lambda m/Mm}{DEC(IEL)}$, ratio (mole-g^{-1} hr^{-1}/mole-g^{-1}-hr^{-1}) relating the disintegration rate per gram of the mother nuclide (m)[a] of the decay chain containing the J-th nuclide to that of the primary nuclide (p),[b]

λ_x = decay constant (hr^{-1}) for the x-th nuclide,

M_x = molecular weight (g/mole) of the x-th nuclide,

DEC(IEL) = λ_p/M_p, constant (mole/g-hr) for the IEL-th material that is proportional to the disintegration rate[a] of one gram of the primary nuclide[b],

AVO = Avogadro's number (6.023×10^{23} atoms/mole),

3600 = dimensional conversion factor (sec/hr),

FGM(I,J) = number of photons (photon/dis) with energy in the I-th interval emitted per disintegration of the J-th nuclide,

S(K) = amount (g) of the IEL-th material in or on the k-th source,

ATN(I,K)[c] = shielding factor (dimensionless) for k-th source and photons in I-th energy group,

AATN(K)[d] = shielding factor (dimensionless) for k-th source--taken the same for all photon energies,

R(K) = $\{[X(K) - XO]^2 + [Y(K) - YO]^2 + [Z(K) - ZO]^2\}^{1/2}$

= distance (cm) between the k-th source and the receptor,

X(K),Y(K),Z(K) = coordinates (cm) of the k-th source

XO,YO,ZO = coordinates (cm) of the receptor.

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[a] AVO * λ_x/M_x = disintegration rate per gram (dis/hr-g) of the x-th nuclide.

[b] The primary nuclides are chosen to be U-238 in natural uranium and Th-232 in natural thorium.

[c] For a given point source (K), either AATN(K) or ATN(I,K) must be set equal to 1, i.e., one variable is not used in the calculation. If AATN(K) is used, its value is an input variable. If ATN(I,K) is used, it must be evaluated for each of the 25 values of I.

[d] For a given point source (k), either AATN(K) or ATN(I,K) must be set equal to 1, i.e., one variable is not used in the calculation. If AATN(K) is used, its value is an input variable. If ATN(I,K) is used, it must be evaluated for each of the 25 values of I.

Use of this equation requires that, for any exposure situation, the source be described as a single point source or as a distribution of such sources. The distance R(K) between each source and the receptor must be specified. This may be done in three ways:

(1) set the receptor at the origin (XO=YO=ZO=0) and specify the desired distance as X(K); set Y(K)=Z(K)=0, or

(2) set the receptor at the origin and specify each point source coordinate, or

(3) specify the coordinates of the receptor and each point source.

Because the information required to calculate explicit attenuation factors will probably be unavailable, only the option to specify gross shielding factors is included. These factors may be energy independent [$0 \leq$ AATN(K) ≤ 1] or dependent [$0 \leq$ ATN(I,K) ≤ 1] and must be specified for each point source. The latter option will facilitate the eventual incorporation of the capability to deal directly with volume source distributions, the most general case. The option to calculate explicit attenuation factors will be added, if found to be necessary.

The conversion factor (rad/R) and modifying factor (rem/rad) were set equal to unity and not stated explicitly in the model equation. These approximations should not introduce significant errors into the results unless the dose to bone is of importance.[4] The backscatter correction was also set to unity; a procedure which could lead to underestimates of the direct dose in some exposure situations of interest.

Geometric conversions

Sometimes consumer products contain radioactive sources in configurations which are not easily, or accurately, described as an array of point sources. The dose from a plane source may be calculated as follows. Let G(r) be the point source kernel for an isotropic point source of unit strength that is imbedded in an infinite homogeneous medium. If a disk of radius RD (Fig. 5-3) and source strength SD per unit area is imbedded in such a medium and is represented by an array of point sources, the dose rate at point P, normal to the center of the disk, is

$$DR(P) = \int_0^{RD} G(r)\ (2\pi\ SD\ \rho\ d\rho) = \int_x^{(x^2 + RD^2)^{1/2}} r\ G(r)\ dr, \text{ since}$$

$$r^2 = x^2 + \rho^2.$$

If the plane is of infinite extent,

$$DR(P) = 2\pi\ SD \int_x^{\infty} r\ G(r)\ dr$$

Replacement of a distributed volume source by an approximately equivalent surface source is sometimes desirable. This can be accomplished by the approximation

$$SS = SV*T\ ,$$

where

SS = equivalent surface source,

SV = volume source,

$$T = \begin{cases} \text{thickness of volume source if } T < 1/\mu\ , \\ 1/\mu \text{ otherwise,} \end{cases}$$

$1/\mu$ = mean free path (cm) of the radiation in the absorbing medium.

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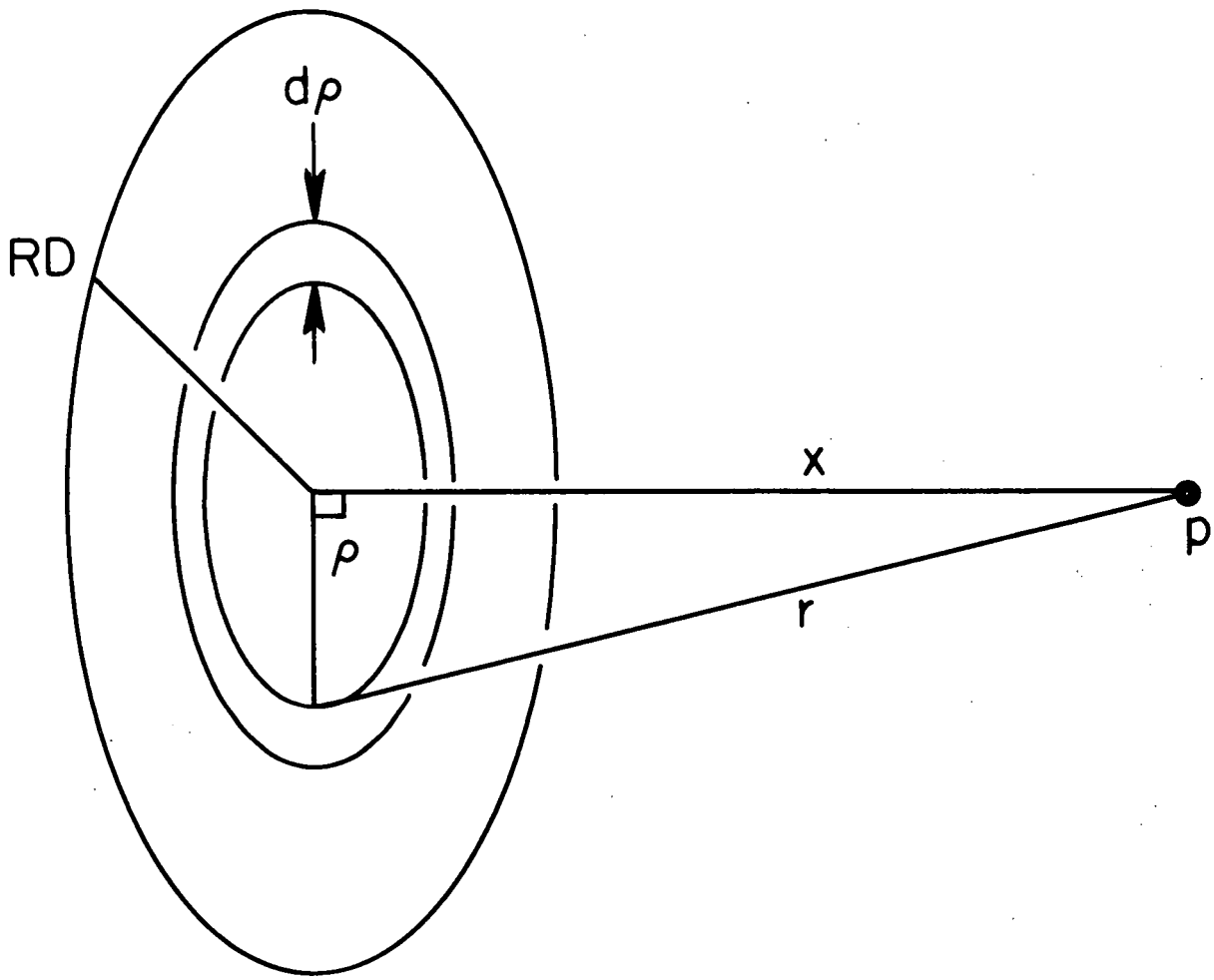

Fig. 5-3. Coordinate system for conversion from disk to point source.

5.1.2.1.2 Dose from Immersion in Contaminated Air

The dose equivalent rate (EM) from photons emitted from radioactive material suspended in air is calculated by the equation:

$$EM = (3.74E4*8760)^{-1} *CONC*TIMM*F(ABS)* \sum_{J=1}^{NN} ACT(J)*CIMM(J)$$

where

EM = immersion dose equivalent rate (mrem/year),

J, NN and ACT(J) are defined in Eq. (5-1),

(3.74E4*8760) = dimensional conversion factor (dps/μCi)*(hr/year),

CONC = concentration (g/cm^3) of radioactive material in air,

TIMM = duration (hr/year) of immersion in contaminated air,

F(ABS) = correction factor (dimensionless) to compute dose in a medium of finite extent relative to that in an infinite medium,

CIMM(J) = dose conversion factor ($mrem\text{-}year^{-1}/\mu Ci\text{-}cm^{-3}$) for immersion in air contaminated with the J-th nuclide.

The source term CONC may be expressed by one of three methods: (1) as a specified concentration of radioactive material containing the J-th nuclides, (2) as a calculated steady-state concentration from a specified leakage rate of radioactive material into a finite air space (e.g., a room) that has a specified air exchange rate, or (3) as a calculated concentration from a specified amount of material which has leaked into a specified volume (a room) with poor ventilation (or no air exchange).

The EXREM III[5] computer code which calculates the dose rate in an infinite volume of contaminated air was used to provide the dose conversion factor (mrem/hr per $\mu Ci/m^3$) for each nuclide. Each nuclide that

contributes significantly to the dose from 20-year-old natural uranium and thorium (see Sect. 5.1.3) was processed. These factors, CIMM(J), are stored as data variables in the program and are also listed in Sect. 5.1.3.

The correction factor F(ABS) can be quite important if the air volume is defined by a closed room. It can easily be shown that the ratio of the photon dose rate at the center of a sphere of radius R to that from an infinite volume is F(ABS) = 1-exp(-μR). This expression is solved in a FUNCTION subroutine and requires input for the effective radius R of the room.

5.1.2.1.3 Dose to Skin from Contact with a Beta-Particle Source

The beta dose to the skin can be important if a product containing beta-emitting nuclides is handled. The beta dose equation is derived from the well-known Loevinger point-source dose-rate formula.[6,7] CONDOS provides dose rate estimates for the case of an infinite-plane slab source of finite thickness[6] by the model equation:

$$\text{DBETA} = \text{PMEG*TBETA*(SOB/ROB)*AVO*DEC(IEL)*} \sum_{I=1}^{\text{NBINT}} \text{EA(I)*THETA(EO(I))*}$$

$$\text{BCOR(STH,HTH,EO(I))*BCON(I)*} \sum_{J=1}^{\text{NN}} \text{FBT(I,J)*CC(J)} \qquad (5\text{-}3)$$

where

DBETA = beta dose equivalent (rem) for TBETA hours of contact,

TBETA = duration (hr) of contact,

PMEG = dimensional conversion factor (1/2 x 1.6E-8 g-rad/MeV),

SOB = concentration (g/cm^3) of radioactive material in the

matrix material,

ROB = density (g/cm^3) of the matrix material plus the radioactive material imbedded in it,

AVO, DEC(IEL), J, and NN were defined in Eq. (5-1),

I = beta-particle energy group index (dimensionless),

NBINT = number (dimensionless) of beta-particle energy groups,

EA(I) = mean energy (MeV/beta) of a distribution of beta particles whose maximum energy falls within the I-th energy group,

THETA(EO(I)) = $[3c^2 - e(c^2-1)]^{-1}$,

e = base of natural logarithmus, 2.71828

EO(I) = maximum energy (MeV/beta) assigned to a distribution of beta particles whose actual maximum energy lies within the boundaries of the I-th energy group,

$$\begin{aligned}
\mathrm{BCOR(STH,HTH,EO(I))} &= c^2\left[3 - \frac{\nu\cdot STH}{c}\left(2 + \ln\frac{c}{\nu\cdot STH}\right) - \exp\left(1 - \frac{\nu\cdot STH}{c}\right)\right] \\
&\quad + \exp(1 - \nu\cdot STH)\,[1 - \exp(-\nu\cdot HTH)]\ , \\
&\quad \text{if}\quad STH + HTH \geqq \frac{c}{\nu} \geqq STH\ ; \\
&= c^2\left\{\frac{\nu(STH+HTH)}{c}\left[2 + \ln\frac{c}{\nu(STH+HTH)}\right] - \frac{\nu\cdot STH}{c}\left[2 + \ln\frac{c}{\nu\cdot STH}\right]\right. \\
&\quad \left. - \exp\left(1 - \frac{\nu\cdot STH}{c}\right)\left[1 - \exp\left(-\frac{\nu\cdot HTH}{c}\right)\right]\right\} \\
&\quad + \exp(1 - \nu\cdot STH)\,[1 - \exp(-\nu\cdot HTH)]\ ,\ \text{if}\quad STH + HTH > \frac{c}{\nu}\ ; \\
&= \exp(1 - \nu\cdot STH)\,[1 - \exp(-\nu\cdot HTH)]\ ,\ \text{if}\quad STH > \frac{c}{\nu}\ .
\end{aligned}$$

$$c = \begin{cases} 2.0, & \text{if}\quad 0.17 \leqq EO(I) \leqq 0.5, \\ 1.5, & \text{if}\quad 0.5 < EO(I) \leqq 1.5, \\ 1.0, & \text{if}\quad 1.5 < EO(I) \leqq 3.0; \end{cases}$$

BCON(I) = dose conversion factor (rem/rad),

STH = absorbing layer thickness (mg/cm^2),

HTH = beta source thickness (mg/cm^2),

FBT(I,J) = number of beta particles with energies in the I-th group emitted per disintegration of the J-th nuclide (beta/dis),

CC(J) = YI(J)*RA(J)*CH(J), all of which are defined in Eq. (5-1).

The solution of Eq. (5-3) is expressed in the output as the absorbed dose (rad) from TBETA hours of contact with the product. This form of expression disregards the dose conversion factor BCON(I), which has been set equal to unity for all I in the computer code, thus allowing DBETA to be expressed as an absorbed dose rather than as a dose equivalent.

The user must supply SOB, ROB, STH, HTH, and TBETA. If more convenient, the weight fraction [g(IEL)/g(matrix)] of the radioactive material in the matrix may be substituted for SOB and ROB set equal to unity.

5.1.2.2 Internal Exposure

The modes of internal exposure considered in CONDOS are ingestion and inhalation of a radioactive material. All types of radiations are considered to contribute to the dose.

$$\nu = \text{apparent absorption coefficient } (cm^2/g)$$
$$= 18.6\ (EO(I) - 0.036)^{-1.37},$$

5.1.2.2.1 Dose from Ingestion

The 50-year dose commitment to the total body of an individual who ingests radioactive material during the year being considered is given approximately by:

$$ENG = (AMT/37)* \sum_{J=1}^{NN} ACT(J)*CING(J) \qquad (5\text{-}4)$$

where

ENG = 50-year dose commitment (mrem/year) to the total body from ingestion during the year being considered,

J, ACT(J), and NN are defined in Eq. (5-1),

AMT = amount (g/year) of radioactive material ingested,

37 = dimensional conversion factor (3.7E4 dps/μCi)/(1000 mrem/rem),

CING(J) = 50-year dose-conversion factor (rem/μCi) to the total body from ingestion.

The INREM[8] computer code which calculates internal dose commitments from intake of radioactive materials was used to determine the values of CING(J). The CING(J) for 50-year, total-body dose commitments from ingestion of 1 μCi of the nuclides of interest, are stored as data variables in the program and are listed Sect. 5.1.3. The user must supply only AMT to obtain ENG. The dose commitments to other organs can be calculated by Eq. (5-4), if the appropriate dose-conversion factors [CING(J)] are used. This feature has been included in the CONDOS II computer code[3].

5.1.2.2.2 Dose from Inhalation

The 50-year dose commitment to the total body of an individual who inhales radioactive material during the year being considered is given approximately by:

$$EN = CONC*TINH*(BR/37)* \sum_{J=1}^{NN} ACT(J)*CINH(J) \qquad (5\text{-}5)$$

where

EN = 50-year dose commitment (mrem/year) to the total body from inhalation during the year being considered,

J, ACT(J), and NN are defined in Eq. (5-1),

CONC = concentration (g/cm^3) of radioactive material in air,

TINH = time (hr/year) spent breathing contaminated air,

BR = breathing rate (0.833E+6 cm^3/hr) of average person,

37 = dimensional conversion factor (3.7E4 dps/μCi)/(1000 mrem/rem),

CINH(J) = 50-year dose-conversion factor (rem/μCi) to the total body from inhalation.

The INREM[8] code was used to obtain the values of CINH(J). The values for 50-year, total-body dose commitments from inhalation of 1 μCi of the nuclides of interest are stored as data variables and listed in Sect. 5.1.3.

The user must provide TINH and the means to compute CONC. Equation (5-5) can calculate dose commitments to other body organs, if the appropriate dose-conversion factors are used. This option has also been included in the revised computer code[3].

Concentration of Radioactive Material in Air

The variable CONC, the concentration of radioactive material in air, which is used in Eqs. (5-2) and (5-5), can be specified in one of three ways. The index ICON selects the method for specification of CONC.

1. ICON = 1. The user supplies the air concentration in g/cm^3.

2. ICON = 2. This option calculates the equilibrium air concentration in a ventilated room with an air exchange rate, VRATE (cm^3/hr), and inleakage of radioactive material, SRATE (g/hr). If the room has a volume V (cm^3), the time-dependent concentration of material in the room is

$$\frac{d\ CONC}{dt} = \frac{SRATE}{V} - \frac{VRATE}{V} * CONC.$$

At equilibrium, $\frac{dCONC}{dt} = 0$,

and CONC = SRATE/VRATE .

SRATE AND VRATE must be specified by the user, if this option is chosen.

3. ICON = 3. The air concentration in an unventilated room is computed. In this case, CONC = TLEAK/V,

where

TLEAK = the total amount (g) of material leaked into the room,

V = volume (cm^3) of the room.

The concentration of radioactive material in the room is a factor in both internal (inhalation) and external (submersion in contaminated air) exposure modes.

5.1.3 Data Files

The data base includes the 17 nuclides that contribute about 99% of the dose from natural uranium and thorium which have been purified and aged for 20 years. As noted in Sec. 5.1.1.4, thirteen nuclides have been added to the data base of the revised code[3].

Table 5-2 lists the data variables related to individual radionuclides; the nuclides are also identified by name and index number J. The YI(J) are the natural abundances of the mother nuclides for each decay chain. The CH(J) are essentially the relative specific activities of the mothers to the principal nuclides in the uranium or thorium decay chains. The RA(J) are the relative disintegration rates of each nuclide in a decay chain to that of the parent of the chain. The RA(J) are time dependent terms in that they are determined at a specified time after purification of the radioactive material. These values were computed from the equations given in I. Kaplan, Nuclear Physics, Addison-Wesley, Reading, Massachusetts, 1955.

The dose conversion factors CIMM(J), CINH(J), and CING(J) were supplied by the EXREM III[5] and INREM[8] computer codes, as noted in Sect. 5.1.2.

All radionuclide data in the data base were assembled from:

1. C. M. Lederer, J. M. Hollander, and I. Perlman, Table of Isotopes, sixth edition, John Wiley and Sons, New York, 1968.

2. Unpublished data of the Information Center for Internal Exposure, Oak Ridge National Laboratory.

Table 5-3 lists the values of FGM(I,J), the photon energy and yield per disintegration of each nuclide. Table 5-4 lists the corresponding quantities for beta emission, FBT(I,J).

Table 5-5 lists the data variables related to photon and beta particle energy. The energy interval index I is specified according to the range of energies included in each interval and the average photon [ENRGY(I)] and beta particle [EO(I)] energy in that range. The mean beta particle energy, EA(I), corresponding to EO(I) was obtained from M. F. James, B. G. Steel, and J. S. Story, Average Electron Energy in Beta Decay, AERE-M 640, Atomic Energy Research Establishment, Harwell, England, 1960. The exposure rate-energy flux ratios, CONVR(I), were obtained from H. Goldstein, Fundamental Aspects of Reactor Shielding, Addison-Wesley, Reading, Massachusetts, 1959.

5.1.4 CONDOS Sample Problem

The use of the first version of CONDOS is demonstrated by estimating the radiation doses to man from a hypothetical consumer product: earthen tableware designed for use in homes and commercial eating establishments. The tableware is assumed to be coated with a glaze containing 20 wt% natural uranium which has aged 20 years since purification. Since the density of the glaze is assumed to be 4.2 g/cm^3, the concentration of uranium in the glaze is 0.84 g/cm^3. The average piece of tableware is assumed to have a surface area of 750 cm^2 and to contain 100 g of uranium.

Shipments of the tableware are assumed to be restricted to longhaul and local-delivery truck. Warehouses and retail stores are the only distribution facilities assumed to contain the tableware. A single

emergency situation is considered, i.e., a truck accident involving a cargo fire. Broken pieces of tableware are discarded in trash cans and disposed of in sanitary landfills.

Table 5-6 lists and indexes the parts of the consumer product life span model (see Sect. 5.1.1.2) selected for this example. Note that only a few of the possible parts were chosen. The names, as listed in the table, of the stages, substages, groups, and events are the alphanumeric input variables. The input variables required to describe each event are listed in Table 5-7.

Almost all events describe the conditions for direct photon irradiation from a single point source. The receptor was set at the origin for all cases, and the source to receptor distance defined by a single coordinate, X(K), for most events. Multiple point sources requiring more than one coordinate are described for events 3.1.1.1, 3.1.2.1, and 3.1.3.1. The option to specify an AATN(K), which may be regarded as a shielding factor, is selected for all direct irradiation events. If the ATN(I,K) option had been selected, 25 values of that variable would have been required for each direct irradiation event for which the option was used.

Immersion in a cloud of contaminated air is considered in events 2.1.1.3 (ICON = 1; CONC specified), 3.2.1.1, and 3.2.2.1 (ICON = 2; CONC = SRATE/VRATE). Ingestion of the radioactive material is considered only for users of the tableware--events 3.1.1.1, 3.1.2.1, 3.1.3.1, and 3.2.3.1. Inhalation is considered for truckers (2.1.1.3) and emergency workers (5.1.1.1, 5.1.2.1, and 5.1.3.1) in a truck-cargo fire situation by specifying the concentration of radioactive material in

air. Inhalation by dishwashers (3.2.1.1) and servers - waiters (3.2.2.1) makes use of the calculated value of CONC.

Table 5-8 is the computer output of the radiation doses to man for the conditions assumed for the distribution, transport, use, disposal, and emergency care of the hypothetical consumer product. The most affected population groups and individuals can be determined easily, as can the contributions to the total dose by each exposure pathway considered in the hypothetical example. The beta skin dose from one hour of contact is listed at the end of the table.

References

1. Code of Federal Regulations, Title 10--Atomic Energy, Chapter I, Parts 20, 30-36, 40, and 70.

2. F. R. O'Donnell, L. R. McKay, O. W. Burke, and F. H. Clark, CONDOS-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man from the Distribution Use, and Disposal of Consumer Products that Contain Radioactive Materials, ORNL-TM-4663, Oak Ridge National Laboratory, Oak Ridge, Tennessee (May 1975).

3. F. R. O'Donnell, O. W. Burke, and F. H. Clark, The CONDOS II Methodology for Estimating Radiation Doses from Radionuclide-Containing Consumer Products, ORNL-TM-5190, Oak Ridge National Laboratory, Oak Ridge, Tennessee (scheduled for publication in January 1976).

4. K. Z. Morgan and J. E. Turner, eds., Principles of Radiation Protection, John Wiley and Sons, Inc., New York, 1967.

5. D. K. Trubey and S. V. Kaye, The EXREM III Computer Code for Estimating External Radiation Doses to Populations from Environmental Releases, ORNL-TM-4322, Oak Ridge National Laboratory, Oak Ridge, Tennessee (December 1973).

6. J. J. Fitzgerald, G. L. Brownell, and F. J. Mahoney, Mathematical Theory of Radiation Dosimetry, Gordon and Breach, New York, 1967.

7. J. A. B. Gibson and J. U. Ahmed, Measurement of Short-Range Radiations, Technical Reports Series No. 150, International Atomic Energy Agency, Vienna, 1973.

8. G. G. Killough, P. S. Rohwer, and W. D. Turner, INREM - A FORTRAN Code Which Implements ICRP 2 Models of Internal Radiation Dose to

Man, ORNL-5003, Oak Ridge National Laboratory, Oak Ridge, Tennessee (February 1975).

TABLE 5-1 LIST OF COMPONENTS TO BE CONSIDERED IN MODELING THE LIFE SPAN OF A CONSUMER PRODUCT

Stages	Substages	Groups	Events (same for all groups)
Distribution	Factory	Sorters, packers, inspectors, handlers other workers, visitors, neighbors, passersby, any others	Each normal group activity, each accident or misuse
	Wholesale	See factory groups	
	Retail	Receivers, stock clerks, sales people, cashiers, other workers, examining customers, other customers, neighbors, passersby, others	
	Representative	Representatives, customers, customers' neighbors, people along representatives' routes, others	
Transport	Truck-long haul	Loaders, drivers, helpers, service personnel, people at truck stops, people along routes, passing motorists, others	
	Truck-short haul	See truck-long haul	
	Truck-local delivery	See truck-long haul	
	Rail	Loaders, train crewmen, passengers, other rail workers, people in stations, people along railways, others	
	Air	Loaders, flight crew, passengers, other workers, people at airports, people along flight routes (accidents only), others	
	Bus	Drivers, passengers, depot workers, depot visitors, service personnel, people at bus stops, people along routes, passing motorists, others	

TABLE 5-1 (continued)

Stages	Substages	Groups	Events (same for all groups)
	Water	Loaders, crew, passengers, other dock workers, passing boats, people along waterways, people at docks, others	Each normal group activity, each accident or misuse
	Mail	Handlers, sorters, carriers, other postal workers, post office visitors, other substages for long distance mail, people along delivery routes	
Use	Use No. 1 Use No. 2 Etc.	Specify user groups whose methods of use are significantly different (e.g., use no. 1, 2,..., frequent users, occasional users, etc.), people present during use, passersby, neighbors to users, others - similar for all uses	
	Maintenance	Maintenance-men, other workers, visitors, neighbors, others	
	Repair	Repairmen, other workers, visitors, neighbors, others	
Disposal	Collection	Collectors, drivers, unloaders, people along collection routes, passersby, others	
	Incineration	Facility operators, nearby residents, distant residents, people who frequent the area of the facility, passersby, others	
	Open-pit burning	See incineration	
	Conical burning	See incineration	
	Maceration	See incineration	

TABLE 5-1 (continued)

Stages	Substages	Groups	Events (same for all groups)
	Compaction	See incineration	Each normal group activity, each accident or misuse
	Sanitary landfill	See incineration	
	Dump	See incineration	
	Other methods	See incineration	
Emergencies	List each accident or misuse considered in the preceeding groups	Firemen, policemen, medical teams, other emergency workers, nearby residents, passersby, other people involved in accident or misuse, spectators, others	

TABLE 5-2 DATA VARIABLES RELATED TO INDIVIDUAL RADIONUCLIDES

Radionuclide Index J	Identification	YI(J)	RA(J)	CH(J)	CIMM(J) mrem/hr / μCi/cm³	CINH(J) rem/μCi	CING(J) rem/μCi	ENRG(J) MeV
1[a,b]	Th-232	1.0	1.00	1.00	1.18E+3	1.84E+2	7.36E-2	0.015
2	Ra-228	1.0	0.874	1.00	3.21E+4	2.22E+1	1.66E+1	0.100
3	Ac-228	1.0	0.874	1.00	7.52E+5	1.57E-2	6.26E-6	1.000
4	Th-228	1.0	0.824	1.00	3.58E+3	4.16E+1	1.66E-2	0.015
5	Ra-224	1.0	0.824	1.00	1.02E+4	2.70E-1	2.02E-1	0.200
6	Rn-220	1.0	0.824	1.00	0.0	0.0	0.0	0.500
7	Po-216	1.0	0.824	1.00	0.0	3.46E-8	7.42E-9	0.100
8	Pb-212	1.0	0.824	1.00	1.48E+5	1.10E-2	3.02E-3	0.200
9	Bi-212	1.0	0.824	1.00	1.11E+5	9.49E-4	3.65E-5	0.800
10	Tl-208	1.0	0.297	1.00	3.42E+6	2.11E-6	1.98E-6	0.700
11	Po-212	1.0	0.527	1.00	0.0	8.97E-14	1.92E-14	0.100
12[a,b]	U-238	0.993	1.00	1.00	1.20E+3	1.17	4.50E-2	0.015
13	Th-234	0.993	1.00	1.00	7.57E+3	5.74E-3	2.30E-6	0.090
14	Pa-234m	0.993	1.00	1.00	2.81E+2	8.06E-5	3.23E-8	0.700
15[a]	U-234	6.0E-5	1.00	1.87E+4	1.55E+3	1.33	5.13E-2	0.015
16[a]	U-235	7.1E-3	1.00	6.48	1.56E+5	1.20	4.82E-2	0.200
17	Th-231	7.1E-3	1.00	6.48	2.97E+4	5.04E-5	2.02E-8	0.015

[a]Mother nuclide of the decay chain of nuclides which follow it.

[b]Principal nuclide in radioactive material.

TABLE 5-3 PHOTON YIELDS PER DISINTEGRATION OF EACH RADIONUCLIDE (J) PER ENERGY INTERVAL (I)

FGM(I,J)

I,J=	1	2	3	4	5	6	7
	Th-232	Ra-228	Ac-228	Th-228	Ra-224	Rn-220	Po-216
1	0.0361			0.0442	0.00189		
2	0.0338		0.306	0.0414	0.00201		
3	0.00455		0.0199	0.00557			
4							
5							
6							
7	0.00191		0.00501				
8							
9				0.0129	0.00325		
10			0.0584	0.00058	0.00076		
11			0.0740	0.00014	0.00024		
12			0.0193	0.00298			
13			0.0563	0.00307	0.0401		
14			0.247				
15			0.0245				
16			0.0353			0.00067	
17							
18							
19			0.0784				
20			0.225				
21			0.197				
22			0.105				
23							
24							
25							

TABLE 5-3 (continued)

FGM(I,J)

I,J=	8	9	10	11	12	13	14
	Pb-212	Bi-212	Tl-208	Po-212	U-238	Th-234	Pa-234m
1	0.0660	0.0701	0.0124				
2	0.0702	0.00503	0.0132		0.0719	0.0413	0.000513
3					0.00468	0.00269	0.00034
4							
5		0.00897	0.0030				0.00001
6					0.00059		
7						0.00962	
8	0.0896	0.00136	0.0464				
9	0.162	0.00218	0.0106				
10	0.0748	0.00056	0.00305			0.0663	0.00115
11	0.00636				0.00028		0.00312
12							
13	0.462		0.00462				
14	0.0284	0.00439	0.0768				0.00047
15	0.00017	0.00015					
16		0.00395	0.234				
17			0.852				
18		0.0710					0.00354
19		0.00958					0.00384
20		0.00388	0.117				
21		0.00777	0.00598				
22		0.0208					
23							
24			0.998				
25							

TABLE 5-3 (continued)

FGM(I,J)

I,J=	15	16	17
	U-234	U-235	Th-231
1			
2	0.0874	0.349	0.720
3	0.00569	0.227	0.137
4		0.00156	0.121
5		0.00506	0.0005
6	0.00161		
7			0.00454
8			0.0024
9			0.0864
10		0.0849	0.0129
11	0.0058	0.0488	0.0306
12		0.151	0.00331
13		0.584	0.0004
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

TABLE 5-4 BETA PARTICLE YIELDS PER DISINTEGRATION OF EACH RADIONUCLIDE (J) PER ENERGY INTERVAL (I)

FBT(I,J)

I,J=	1	2	3	4	5	6	7
	Th-232	Ra-228	Ac-228	Th-228	Ra-224	Rn-220	Po-216
1		1.00					
2							
3							
4							
5			0.105				
6			0.055				
7							
8							
9							
10			0.113				
11			0.065				
12			0.330				
13							
14							
15							
16							
17							
18			0.200				
19							
20							
21			0.130				
22							
23							
24							
25							

TABLE 5-4 (continued)

FBT(I,J)

I,J=	8	9	10	11	12	13	14
	Pb-212	Bi-212	Tl-208	Po-212	U-238	Th-234	Pa-234m
1						0.190	
2	0.050					0.810	
3	0.810						
4							
5		0.008					
6	0.140	0.021					
7		0.013					
8							
9		0.001					
10			0.038				
11							
12							
13			0.250				0.0074
14							
15			0.210				0.0072
16		0.050					
17							
18			0.500				
19							
20							
21							
22							
23		0.547					0.985
24							
25							

TABLE 5-4 (continued)

FBT(I,J)

I,J=	15	16	17
	U-234	U-235	Th-231
1			0.014
2			0.277
3			0.709
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

TABLE 5-5 DATA VARIABLES RELATED TO PHOTON AND BETA PARTICLE ENERGY

Energy group index I	Photon energy interval MeV	ENRGY(I) MeV	CONVR(I) $\frac{r/hr}{MeV/cm^2\text{-}sec}$	Beta energy interval MeV	EO(I) MeV	EA(I) MeV
1	0-0.012	0.01	2.901E-4	0-0.15	0.1	0.026
2	0.013-0.018	0.015	8.183E-5	0.16-0.25	0.2	0.054
3	0.019-0.025	0.02	3.302E-5	0.26-0.35	0.3	0.084
4	0.026-0.035	0.03	0.955E-5	0.36-0.45	0.4	0.116
5	0.036-0.045	0.04	0.424E-5	0.46-0.55	0.5	0.149
6	0.046-0.055	0.05	0.259E-5	0.56-0.65	0.6	0.183
7	0.056-0.065	0.06	0.198E-5	0.66-0.75	0.7	0.217
8	0.066-0.075	0.07	0.169E-5	0.76-0.85	0.8	0.253
9	0.076-0.085	0.08	0.163E-5	0.86-0.95	0.9	0.289
10	0.086-0.096	0.09	0.154E-5	0.96-1.05	1.0	0.326
11	0.096-0.12	0.10	0.160E-5	1.06-1.15	1.1	0.363
12	0.13-0.18	0.15	0.173E-5	1.16-1.25	1.2	0.401
13	0.19-0.25	0.20	0.185E-5	1.26-1.35	1.3	0.442
14	0.26-0.35	0.30	0.199E-5	1.36-1.45	1.4	0.481
15	0.36-0.45	0.40	0.204E-5	1.46-1.55	1.5	0.522
16	0.46-0.55	0.50	0.204E-5	1.56-1.65	1.6	0.563
17	0.56-0.65	0.60	0.204E-5	1.66-1.75	1.7	0.605
18	0.66-0.75	0.70	0.202E-5	1.76-1.85	1.8	0.647
19	0.76-0.85	0.80	0.199E-5	1.86-1.95	1.9	0.688
20	0.86-0.95	0.90	0.196E-5	1.96-2.05	2.0	0.731
21	0.96-1.2	1.00	0.192E-5	2.06-2.15	2.1	0.774
22	1.3-1.7	1.50	0.177E-5	2.16-2.25	2.2	0.818
23	1.8-2.5	2.0	0.164E-5	2.26-2.35	2.3	0.862
24	2.6-3.5	3.0	0.145E-5	2.36-2.45	2.4	0.906
25	3.6-4.5	4.0	0.133E-5	2.46-2.55	2.5	0.950

TABLE 5-6 CONDOS SAMPLE PROBLEM: LIFE SPAN MODEL FOR HYPOTHETICAL TABLEWARE

1. Distribution
   - 1.1 Warehouse
     - 1.1.1 Handlers
       - 1.1.1.1 handling
       - 1.1.1.2 storage
     - 1.1.2 Nearby residents
       - 1.1.2.1 at home
     - 1.1.3 Passersby
       - 1.1.3.1 passing by
   - 1.2 Retail stores
     - 1.2.1 Clerks
       - 1.2.1.1 display
       - 1.2.1.2 storage
     - 1.2.2 Shoppers
       - 1.2.2.1 at display
       - 1.2.2.2 in store
     - 1.2.3 Nearby clerks
       - 1.2.3.1 at work
     - 1.2.4 Passersby
       - 1.2.4.1 normal

2. Transport
   - 2.1 Truck - long haul
     - 2.1.1 Drivers - helpers
       - 2.1.1.1 driving
       - 2.1.1.2 stops - rest
       - 2.1.1.3 accident - cargo fire
     - 2.1.2 Persons at stops
       - 2.1.2.1 normal activities
     - 2.1.3 Persons along route
       - 2.1.3.1 normal activities
     - 2.1.4 Motorists
       - 2.1.4.1 passing trucks
   - 2.2 Truck - local delivery
     - 2.2.1 Deliverymen
       - 2.2.1.1 normal activities
     - 2.2.2 Persons along route
       - 2.2.2.1 normal activities

3. Use
   - 3.1 Domestic use
     - 3.1.1 Frequent users
       - 3.1.1.1 eating
       - 3.1.1.2 storage
     - 3.1.2 Occasional users
       - 3.1.2.1 eating
       - 3.1.2.2 storage
     - 3.1.3 Guests
       - 3.1.3.1 eating
     - 3.1.4 Neighbors
       - 3.1.4.1 at home
   - 3.2 Commercial use
     - 3.2.1 Dishwashers
       - 3.2.1.1 at work
     - 3.2.2 Servers - waiters
       - 3.2.2.1 at work
     - 3.2.3 Patrons
       - 3.2.3.1 dining out
     - 3.2.4 Passersby
       - 3.2.4.1 normal activities

4. Disposal
   - 4.1 Landfill
     - 4.1.1 Collectors
       - 4.1.1.1 at work
     - 4.1.2 Passersby
       - 4.1.2.1 passing cans
     - 4.1.3 Fill workers
       - 4.1.3.1 at work
     - 4.1.4 Area users
       - 4.1.4.1 normal activities

5. Emergencies
   - 5.1 Transport accident
     - 5.1.1 Firemen
       - 5.1.1.1 fighting fire
     - 5.1.2 Policemen
       - 5.1.2.1 crowd control
     - 5.1.3 Medical team
       - 5.1.3.1 first aid

TABLE 5-7 CONDOS SAMPLE PROBLEM: LIST OF INPUT VARIABLES THAT DESCRIBE THE EVENTS IN THE LIFE SPAN OF THE HYPOTHETICAL TABLEWARE

IEL=2; SOB=0.84; ROB=4.2; STH=40; HTH=666; TBETA=1
TITLE1: SAMPLE PROBLEM FOR CONDOS - HYPOTHETICAL EARTHENWARE COATED WITH CERAMIC GLAZE
TITLE2: CONTAINING 100 G OF 20-YEAR OLD NATURAL URANIUM - HYPOTHETICAL PARAMETERS.

Index	IGP	ISP	NOEV	NM	NP	ICON	ITN	EVPROB	R	TINH	XO	YO	ZO	CONC	TDIR	AMT	TIMM	SRATE	TLEAK	VRATE	V	S(K)	X(K)	Y(K)	Z(K)	AATN(K)
1.1.1.1	1	1	2	1200	1	1	0	1.0							0.1							2,000	30.5			1.
1.1.1.2	-	-	-	-	1	1	0	1.0							40							2,000	305			1.
1.1.2.1	1	1	1	1200	1	1	0	1.0							70							2,000	18,000			0.9
1.1.3.1	1	1	1	100000	1	1	0	1.0							0.02							2,000	9,000			0.9
1.2.1.1	1	2	2	500	1	1	0	1.0							120							500	150			0.9
1.2.1.2	-	-	-	-	1	1	0	1.0							480							200	700			0.9
1.2.2.1	1	2	2	1000000	1	1	0	1.0							0.05							500	150			1.
1.2.2.2	-	-	-	-	1	1	0	1.0							0.5							200	1,500			0.85
1.2.3.1	1	2	1	2000	1	1	0	1.0							1920							400	18,000			0.5
1.2.4.1	1	2	1	999000000	1	1	0	1.0							0.02							400	18,000			0.5
2.1.1.1	2	1	3	510	1	1	0	1.0							28							4,000	650			0.8
2.1.1.2	-	-	-	-	1	1	0	1.0							8							4,000	9,000			0.6
2.1.1.3	-	-	-	-	0	1	0	3.5E-3	1000	0.08				1.2E-10	0		0.08									
2.1.2.1	2	1	1	5100	1	1	0	1.0							1							4,000	9,000			0.6
2.1.3.1	2	1	1	35700000	1	1	0	1.0							0.02							4,000	15,250			0.3
2.1.4.1	2	1	1	35700	1	1	0	1.0							0.02							4,000	3,050			0.6
2.2.1.1	2	2	1	200	1	1	0	1.0							2							200	650			0.8
2.2.2.1	2	2	1	1000000	1	1	0	1.0							0.02							200	9,000			0.7
3.1.1.1	3	1	2	2000	4	1	0	1.0							700	5E-3						500	30.5			0.9
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	152.5			0.9
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	76.3	76.3		0.9
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	76.3	76.3		0.9
3.1.1.2	-	-	-	-	1	1	0	1.0							2920							400	1,525			0.8
3.1.2.1	3	1	2	2000	4	1	0	1.0							100	1E-3						500	30.5			0.9
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	152.5			0.9
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	76.3	76.3		0.9
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	76.3	76.3		0.9
3.1.2.2	-	-	-	-	1	1	0	1.0							2920							400	1,525			0.8
3.1.3.1	3	1	1	40000	4	1	0	1.0							1	1E-5						500	30.5			0.9
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	152.5			0.9
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	76.3	76.3		0.9
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	76.3	76.3		0.9
3.1.4.1	3	1	1	8000	1	1	0	1.0							2920							400	4,575			0.8
3.2.1.1	3	2	1	500	1	2	0	1.0	95	2000					2000		2000	1E-9		1.2E6	3.6E6	375	90.0			1.
3.2.2.1	3	2	1	1000	1	2	0	1.0	95	250					1000		250	1E-9		1.2E6	3.6E6	500	152.5			1.
3.2.3.1	3	2	1	7500000	1	1	0	1.0							4	1E-4						500	61.0			0.9
3.2.2.4	3	2	1	99900000	1	1	0	1.0							0.02							1,000	18,000			0.5
4.1.1.1	4	1	1	30	1	1	0	1.0							1							100	90.0			0.7
4.1.2.1	4	1	1	100000	1	1	0	1.0							0.02							100	150.0			0.7
4.1.3.1	4	1	1	40	1	1	0	1.0							1							500	9,000			0.5
4.1.4.1	4	1	1	1000000	1	1	0	1.0							8							500	30,000			0.5
5.1.1.1	5	1	1	5	1	1	0	1.0	1000	1				1.2E-10	1							50,000	3,050			0.7
5.1.2.1	5	1	1	2	1	1	0	1.0	1000	1				1.2E-10	1							50,000	7,100			0.7
5.1.3.1	5	1	1	3	1	1	0	1.0	1000	0.25				1.2E-10	0.25							50,000	7,100			0.7

[a]Dashes (-) indicate variables and input cards that may not be filled-in. All blank variables are set equal to zero.

TABLE 5-8 CONDOS SAMPLE PROBLEM

POPULATION RADIATION DOSE FROM THE DISTRIBUTION, USE, AND DISPOSAL

OF CONSUMER PRODUCTS CONTAINING RADIOACTIVE MATERIALS

SAMPLE PROBLEM FOR CONDOS - HYPOTHETICAL EARTHEN TABLEWARE COATED WITH CERAMIC GLAZE CONTAINING 100 G OF 20-YEAR OLD NATURAL URANIUM - HYPOTHETICAL PARAMETERS.

	DOSE PER INDIVIDUAL INVOLVED (MREM/YR)					POPULATION DOSE		
	EXTERNAL		INTERNAL		TOTAL			
	DIRECT	IMMERSION	INHALATION	INGESTION		PROBABILITY	GROUP DOSE (MAN-REM/YR)	TOTAL DOSE (MAN-REM/YR)
DISTRIBUTION								
WAREHOUSE								
HANDLERS (1.200E 03 MEMBERS)								
HANDLING	7.99E-02	0.0	0.0	0.0	7.99E-02	1.00E 00	9.58E-02	
STORAGE	3.19E-01	0.0	0.0	0.0	3.19E-01	1.00E 00	3.83E-01	
TOTAL DOSE --- HANDLERS								4.79E-01
NEARBY RESIDENTS (1.200E 03 MEMBERS)								
AT HOME	1.44E-04	0.0	0.0	0.0	1.44E-04	1.00E 00	1.73E-04	
TOTAL DOSE --- NEARBY RESIDENTS								1.73E-04
PASSERSBY (1.000E 05 MEMBERS)								
PASSING BY	1.65E-07	0.0	0.0	0.0	1.65E-07	1.00E 00	1.65E-05	
TOTAL DOSE --- PASSERSBY								1.65E-05
TOTAL DOSE --- WAREHOUSE								4.79E-01
RETAIL STORES								
CLERKS (5.000E 02 MEMBERS)								
DISPLAY	8.91E-01	0.0	0.0	0.0	8.91E-01	1.00E 00	4.46E-01	
STORAGE	6.55E-02	0.0	0.0	0.0	6.55E-02	1.00E 00	3.27E-02	
TOTAL DOSE --- CLERKS								4.78E-01
SHOPPERS (1.000E 06 MEMBERS)								
AT DISPLAY	4.13E-04	0.0	0.0	0.0	4.13E-04	1.00E 00	4.13E-01	
IN STORE	1.40E-05	0.0	0.0	0.0	1.40E-05	1.00E 00	1.40E-02	
TOTAL DOSE --- SHOPPERS								4.27E-01
NEARBY CLERKS (2.000E 03 MEMBERS)								

TABLE 5-8 (continued)

AT WORK	4.40E-04	0.0	0.0	0.0	4.40E-04	1.00E 00	8.80E-04	
TOTAL DOSE --- NEARBY CLERKS								8.80E-04
PASSERSBY (9.990E 08 MEMBERS)								
NORMAL	4.59E-09	0.0	0.0	0.0	4.59E-09	1.00E 00	4.58E-03	
TOTAL DOSE --- PASSERSBY								4.58E-03
TOTAL DOSE --- RETAIL STORES								9.11E-01
TOTAL DOSE --- DISTRIBUTION								1.39E 00
TRANSPORT								
TRUCK - LONG HAUL								
DRIVERS - HELPERS (5.100E 02 MEMBERS)								
DRIVING	7.88E-02	0.0	0.0	0.0	7.88E-02	1.00E 00	4.02E-02	
STOPS - REST	8.80E-05	0.0	0.0	0.0	8.80E-05	1.00E 00	4.49E-05	
ACCIDENT-CARGO FIRE	0.0	7.05E-12	7.25E-03	0.0	7.25E-03	3.50E-03	1.29E-05	
TOTAL DOSE --- DRIVERS - HELPERS								4.02E-02
PERSONS AT STOPS (5.100E 03 MEMBERS)								
NORMAL ACTIVITIES	1.10E-05	0.0	0.0	0.0	1.10E-05	1.00E 00	5.61E-05	
TOTAL DOSE --- PERSONS AT STOPS								5.61E-05
PERSONS ALONG ROUTE (3.570E 07 MEMBERS)								
NORMAL ACTIVITIES	3.83E-08	0.0	0.0	0.0	3.83E-08	1.00E 00	1.37E-03	
TOTAL DOSE --- PERSONS ALONG ROUTE								1.37E-03
MOTORISTS (3.570E 04 MEMBERS)								
PASSING TRUCKS	1.92E-06	0.0	0.0	0.0	1.92E-06	1.00E 00	6.84E-05	
TOTAL DOSE --- MOTORISTS								6.84E-05
TOTAL DOSE --- TRUCK - LONG HAUL								4.17E-02
TRUCK-LOCAL DELIVERY								
DELIVERYMEN (2.000E 02 MEMBERS)								
NORMAL ACTIVITIES	2.81E-04	0.0	0.0	0.0	2.81E-04	1.00E 00	5.63E-05	
TOTAL DOSE --- DELIVERYMEN								5.63E-05
PERSONS ALONG ROUTE (1.000E 06 MEMBERS)								
NORMAL ACTIVITIES	1.28E-08	0.0	0.0	0.0	1.28E-08	1.00E 00	1.28E-05	
TOTAL DOSE --- PERSONS ALONG ROUTE								1.28E-05

TABLE 5-8 (continued)

TOTAL DOSE --- TRUCK-LOCAL DELIVERY								6.91E-05
TOTAL DOSE --- TRANSPORT								4.18E-02
USE								
DOMESTIC USE								
FREQUENT USERS (2.000E 03 MEMBERS)								
EATING	1.51E 02	0.0	0.0	1.74E-01	1.51E 02	1.00E 00	3.02E 02	
STORAGE	1.49E-01	0.0	0.0	0.0	1.49E-01	1.00E 00	2.98E-01	
TOTAL DOSE --- FREQUENT USERS								3.02E 02
OCCASIONAL USERS (2.000E 03 MEMBERS)								
EATING	2.16E 01	0.0	0.0	3.49E-02	2.16E 01	1.00E 00	4.32E 01	
STORAGE	1.49E-01	0.0	0.0	0.0	1.49E-01	1.00E 00	2.98E-01	
TOTAL DOSE --- OCCASIONAL USERS								4.35E 01
GUESTS (4.000E 04 MEMBERS)								
EATING	2.16E-01	0.0	0.0	3.49E-04	2.16E-01	1.00E 00	8.64E 00	
TOTAL DOSE --- GUESTS								8.64E 00
NEIGHBORS (8.000E 03 MEMBERS)								
AT HOME	1.66E-02	0.0	0.0	0.0	1.66E-02	1.00E 00	1.33E-01	
TOTAL DOSE --- NEIGHBORS								1.33E-01
TOTAL DOSE --- DOMESTIC USE								3.55E 02
COMMERCIAL USE								
DISHWASHERS (5.000E 02 MEMBERS)								
AT WORK	3.44E 01	1.13E-12	1.26E-03	0.0	3.44E 01	1.00E 00	1.72E 01	
TOTAL DOSE --- DISHWASHERS								1.72E 01
SERVERS - WAITERS (1.000E 03 MEMBERS)								
AT WORK	7.93E 00	1.42E-13	1.57E-04	0.0	7.93E 00	1.00E 00	7.93E 00	
TOTAL DOSE --- SERVERS - WAITERS								7.93E 00
PATRONS (7.500E 06 MEMBERS)								
DINING OUT	1.80E-01	0.0	0.0	3.49E-03	1.83E-01	1.00E 00	1.37E 03	
TOTAL DOSE --- PATRONS								1.37E 03
PASSERSBY (9.990E 07 MEMBERS)								
NORMAL ACTIVITIES	1.15E-08	0.0	0.0	0.0	1.15E-08	1.00E 00	1.15E-03	

TABLE 5-8 (continued)

TOTAL DOSE --- PASSERSBY								1.15E-03
TOTAL DOSE --- COMMERCIAL USE								1.40E 03
TOTAL DOSE --- USE								1.75E 03
DISPOSAL								
LANDFILL								
COLLECTORS (3.000E 01 MEMBERS)								
AT WORK	3.21E-03	0.0	0.0	0.0	3.21E-03	1.00E 00	9.63E-05	
TOTAL DOSE --- COLLECTORS								9.63E-05
PASSERSBY (1.000E 05 MEMBERS)								
PASSING CARS	2.31E-05	0.0	0.0	0.0	2.31E-05	1.00E 00	2.31E-03	
TOTAL DOSE --- PASSERSBY								2.31E-03
FILL WORKERS (4.000E 01 MEMBERS)								
AT WORK	1.15E-06	0.0	0.0	0.0	1.15E-06	1.00E 00	4.59E-08	
TOTAL DOSE --- FILL WORKERS								4.59E-08
AREA USERS (1.000E 06 MEMBERS)								
NORMAL ACTIVITIES	8.25E-07	0.0	0.0	0.0	8.25E-07	1.00E 00	8.25E-04	
TOTAL DOSE --- AREA USERS								8.25E-04
TOTAL DOSE --- LANDFILL								3.23E-03
TOTAL DOSE --- DISPOSAL								3.23E-03
EMERGENCIES								
TRANSPORT ACCIDENT								
FIREMEN (5.000E 00 MEMBERS)								
FIREFIGHTING	1.40E-03	8.81E-11	9.07E-02	0.0	9.21E-02	1.00E 00	4.60E-04	
TOTAL DOSE --- FIREMEN								4.60E-04
POLICEMEN (2.000E 00 MEMBERS)								
CROWD CONTROL	2.58E-04	8.81E-11	9.07E-02	0.0	9.09E-02	1.00E 00	1.82E-04	
TOTAL DOSE --- POLICEMEN								1.82E-04
MEDICAL TEAM (3.000E 00 MEMBERS)								
FIRST AID	6.45E-05	2.20E-11	2.27E-02	0.0	2.27E-02	1.00E 00	6.82E-05	
TOTAL DOSE --- MEDICAL TEAM								6.82E-05

TABLE 5-8 (continued)

TOTAL DOSE --- TRANSPORT ACCIDENT	7.10E-04
TOTAL DOSE --- EMERGENCIES	7.10E-04
GRAND TOTAL DOSE	1.75E 03

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