Use of Radiation Detection, Measuring, and Imaging Instruments to Assess Internal Contamination from Intakes of Radionuclides

Part V: Calibration Factors for Gamma Cameras

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PREFACE

Part I of the present series (Anigstein et al. 2007a) described a study to evaluate radiation detection and imaging systems commonly found in hospitals to determine their suitability for rapidly scanning individuals for internal contamination, and to develop recommendations regarding their potential use. That report described the measurement of count rates from single discrete radioactive sources of ^{60}Co, ^{137}Cs, ^{192}Ir, and ^{241}Am, using a Philips AXIS gamma camera, an Atomlab thyroid uptake system, and a Ludlum waste monitor.

Part II (Anigstein et al. 2007b) extended the earlier investigation by using realistic anthropomorphic phantoms to study the responses of four instruments to five radionuclides distributed in the lungs. The experimental measurements were performed on sources in the lung region of a Rando Phantom—an anthropomorphic phantom that contains a human skeleton embedded in a tissue-equivalent urethane rubber. Count rates from each of five radionuclides—^{60}Co, ^{90}Sr, ^{137}Cs, ^{192}Ir, and ^{241}Am—were measured on a Siemens e.cam Fixed 180 gamma camera, an Atomlab thyroid probe, a Ludlum survey meter, and a Ludlum waste monitor. The Los Alamos MCNPX (Monte Carlo N Particle eXtended) computer code was used to calculate calibration factors that relate count rates on these instruments to lung burdens of each of the five nuclides. A mathematical model of each of the instruments was constructed, using engineering drawings and other data obtained from the manufacturers. This model was combined with an MCNP model of a Rando Phantom, constructed from CT scans of this phantom (Wang et al. 2004). The combined model was used to simulate the response of each instrument to sources in the phantom. The agreement between the calculated and measured responses validated the MCNP models of the four instruments.

Part III (Anigstein et al. 2007c) extended the investigations to the Philips SKYLight camera. The study was narrowed to three of the five radionuclides reported in part II: ^{60}Co, ^{137}Cs, and ^{241}Am. This study encompassed measurements and corresponding MCNP simulations of sources of the three nuclides located in the lung region of a Rando Phantom. In addition, measurements and simulations were carried out of the source capsules in air. The agreement between the calculated and measured responses validated the MCNP model of this instrument.

Part IV (Anigstein et al. 2010a) extended the earlier investigations to the response of the Philips SKYLight camera to bremsstrahlung x rays following the β decay of ^{90}Sr and its short-lived daughter, ^{90}Y. As reported in part II, the count rates recorded by the Siemens e.cam gamma camera exposed to ^{90}Sr sources in the Rando Phantom were approximately 50% higher than the values calculated with the MCNP model. Preliminary studies of count rates recorded by the Philips SKYLight camera exposed to ^{90}Sr sources in air also showed significant discrepancies with the corresponding MCNP calculations. Further measurements and Monte Carlo simulations of ^{90}Sr were therefore undertaken in an attempt to resolve this problem. These studies utilized, as a primary standard, a calibrated source of ^{90}Sr procured from the National Institute of Standards and Technology. Measurements and Monte Carlo simulations of this source, which was in the form of an aqueous solution sealed in a glass ampoule, were supplemented by further studies on the encapsulated sources described in part II. The agreement between the calculated and measured responses was adequate to justify the use of the model for simulating the response of this camera to distributions of ^{90}Sr/^{90}Y in the human body.

The present study developed calibration factors to enable the use of gamma cameras for assessing intakes of radionuclides and subsequent doses. The study utilized biokinetic models to determine the retention of activity taken into the body and the distribution of such activity among different regions of the body as a function of time following exposure. Normalized count rates from activities of six radionuclides—^{60}Co, ^{90}Sr, ^{131}I, ^{137}Cs, ^{192}Ir, and ^{241}Am—in various anatomical regions of children of five ages and adult men and women were calculated by MCNPX. Adult men and women were represented by the NORMAN and NAOMI voxel phantoms (Dimbylow 1998, 2005), while children were represented by the revised ORNL phantom series described by Han et al. (2006). The Siemens e.cam and Philips SKYLight gamma cameras were represented by models developed during the studies described in parts II and III, respectively. The results of the calculations developed during this study serve as input data to the Assess computer code package (Anigstein et al. 2009), an interactive program that estimates intakes of radioactive material and the resulting doses based on measurements made with gamma cameras. Instructions for using this program, which runs under Microsoft Windows, and a technical description, are presented by Anigstein et al. (2010b).

The authors gratefully acknowledge the support and assistance of a number of individuals and organizations, without whom this work would not have been possible. Keith Eckerman of the Oak Ridge National Laboratory provided advice and information on the use of the DCAL software system and reviewed the present report, making thoughtful comments and recommendations. Peter Dimbylow of the Radiation Protection Division of the Health Protection Agency in the United Kingdom provided access to the NORMAN and NAOMI databases and furnished additional data and information on the use of these models. Wesley Bolch, Professor of Radiological and Biomedical Engineering at the University of Florida, provided the MCNP models of the revised ORNL phantom series.

Chapter 1

INTRODUCTION

A radiological emergency, such as the detonation of a radioactive dispersion device (RDD or "dirty bomb"), could lead to the exposure of a large number of people to radioactive material. There would be a need to rapidly assess any intake of activity and determine the need for medical intervention.

1.1 Use of Gamma Cameras to Assess Exposed Individuals

As reported in part II of the present series, Anigstein et al. (2007b, chapter 3) determined empirical relationships between activities of selected radionuclides in the lungs and count rates measured by several instruments, including a Siemens e.cam gamma camera. However, such an empirical relationship cannot by itself be used to determine the intake of a given radionuclide by an exposed individual or the prospective dose resulting from such an intake: the distribution of the activity in various regions of the body following intake must also be considered.

1.2 Calibration Factors for Assessment of Intakes

Using a gamma camera to assess the intake of a given radionuclide by an exposed individual requires a set of calibration factors that relate the inhaled or ingested activity to the count rate registered by a given camera. Such calibration factors depend on the distribution of the activity in the body at the time of assessment, and vary with the age and sex of the individual. They also depend on the model of the camera and on the energy windows used for the measurement.

The derivation of these calibration factors proceeds in a series of three steps:

1. Use of biokinetic models to determine the fraction of the activity in each region of the body as a function of time after intake. The fraction will depend on:
   a. Mode of intake (inhalation or ingestion)
   b. Elapsed time following intake
   c. Particle-size distribution
   d. Chemical form of the radionuclide (for intake by inhalation)
   e. Age of exposed individual
2. Use of Monte Carlo simulations to determine the count rate on a given camera, normalized to a unit activity in a given region of the body. The count rate will depend on:
   a. Model of camera
   b. Energy window
   c. Age (of children) or sex (of adults)
3. Calculating the activity corresponding to a nominal count rate of 1,000 cpm.

Chapter 2

BIOKINETIC MODELS

The Life Sciences Division of the Oak Ridge National Laboratory has released a computer code that calculates the activities of radionuclides in various regions of the bodies of reference individuals of various ages, referred to as "source regions," at times ranging from approximately one minute to many years after intake. The Dose and Risk Calculation software, called DCAL (ORNL 2006), "[is] a comprehensive software system for the calculation of tissue dose and subsequent health risk from intakes of radionuclides or exposure to radionuclides present in environmental media" (Eckerman et al. 2006). DCAL has been used in the development of Federal Guidance Report Nos. 12 and 13 (Eckerman and Ryman 1993, and Eckerman et al. 1999) and several ICRP publications.

We utilized DCAL to determine the distribution of activities in the source regions over a range of time following the acute intake of a unit activity of each of the six radionuclides in the present study: ^{60}Co, ^{90}Sr, ^{131}I, ^{137}Cs, ^{192}Ir, and ^{241}Am. The biokinetic models of these nuclides are the same as those used in Federal Guidance Report No. 13 and those used to calculate dose coefficients for intakes by members of the public that are listed in ICRP Publication 72 (ICRP 1996). One exception is ^{90}Y, the short-lived daughter of ^{90}Sr. Yttrium-90 is assumed to be in secular equilibrium with ^{90}Sr at the time of intake and during all subsequent time periods modeled in the present study. ICRP Publication 30 describes a separate biokinetic model for yttrium taken into the body; however, ^{90}Y that grows in during the radioactive decay of ^{90}Sr is assumed to remain in secular equilibrium with its parent (ICRP 1998). This model of yttrium intakes was designed for the purpose of dose assessment and is very conservative in that it overestimates the yttrium concentrations in bone. The strontium model used by DCAL is much more sophisticated and more appropriate for the present application, where an overestimate of the yttrium concentration could lead to an overprediction of the count rates and thus underestimate the intake.[1]

2.1 DCAL Parameters

The present report assesses individuals at six stages of development—infant (age 100 days), ages 1, 5, 10, and 15 years, and adults—that correspond to the age-specific biokinetic models used by ICRP (1996). We selected 50 time steps between the time of intake and the time of assessment, spaced logarithmically over the interval 1 h–30 d, for calculating activity distributions used by the Assess computer code (Anigstein et al. 2009). The time steps start at one hour because that is the minimum likely time for the exposed individual to be transported to a hospital, undergo external decontamination, and be examined with the gamma camera.

The radionuclides addressed in the present study are isotopes of six chemical elements. All lung absorption types of these elements that are listed in ICRP Publication 68 (ICRP 1994b) are included in the calibration factors for intake by inhalation. These lung absorption type are listed in table 2-1. Absent specific information on the likely particle size distribution of the activities

[1] Keith Eckerman, Oak Ridge National Laboratory, private communication with Robert Anigstein, SC&A, Inc., August 27, 2009.

dispersed by an RDD, we assumed a value of 1 μm AMAD, which is the default value for environmental exposure assumed by ICRP (1996).

Table 2-1. Lung Absorption Types

Element	Lung Type	Chemical forms
Co	M	Unspecified compounds
	S	Oxides, hydroxides, halides, and nitrates
Sr	F	Unspecified compounds
	S	Strontium titanate ($SrTiO_3$)
I	F	All compounds
Cs	F	All compounds
Ir	F	Unspecified compounds
	M	Metallic iridium, halides, and nitrates
	S	Oxides and hydroxides
Am	M	All compounds

Source: ICRP 1994b, annexe F

The calibration factors are based on the age-dependent default f_1 values furnished with DCAL, which are listed in table 2-2.

Table 2-2. f_1 Values Used in DCAL Calculations

Element	Pathway	Lung Type	Age		
			Infant	1–15 y	Adult
Co	Ingestion		0.6	0.3	0.1
	Inhalation	M	0.2	0.1	0.1
		S	0.02	0.01	0.01
Sr	Ingestion		0.6	0.4	0.3
	Inhalation	F	0.6	0.4	0.3
		S	0.02	0.01	0.01
I	Ingestion		1	1	1
	Inhalation	F	1	1	1
Cs	Ingestion		1	1	1
	Inhalation	F	1	1	1
Ir	Ingestion		0.02	0.01	0.01
	Inhalation	All	0.02	0.01	0.01
Am	Ingestion		0.005	0.0005	0.0005
	Inhalation	M	0.005	0.0005	0.0005

DCAL calculates relative activities of a given intake of a given radionuclide in as many as 57 different source regions. For the purposes of the present study, we needed to establish a correspondence between the DCAL source regions and the anatomical regions specified in the

pediatric and adult anthropomorphic phantoms. In some cases, this required grouping the source regions, as shown in table 2-3. Further discussions of the anatomical regions of the anthropomorphic phantoms are presented in sections 3.1.1 and 3.1.2.

Table 2-3
Anatomical Regions of Anthropomorphic Phantoms Corresponding to DCAL Source Regions

Adult	Child	DCAL[a]	Description
Anterior nasal cavity	Nose contents	ET1-sur	Surface of anterior nasal passage
Lungs	Bronchial mucosa	BBi-gel BBi-sol BBi-seq	Bronchial airways
	Lungs	AI	Alveolar interstitium
		bbe-gel bbe-sol bbe-seq	Bronchiolar airways
Small intestine	Small intestine	SI_Cont	Small intestine content
Cortical bone	Bone	C_Bone-S	Cortical bone surface
		C_Bone-V	Cortical bone volume
Trabecular bone		T_Bone-S	Trabecular bone surface
		T_Bone-V	Trabecular bone volume

[a] Names of DCAL source regions, based on the ICRP model of the human respiratory tract (ICRP 1994a)

The distributions of six radionuclides in the source regions of individuals at six different stages of development, at 12 selected times after intake, are tabulated in appendix A. These time steps are a subset of the 50 time steps used by the Assess computer code. For each radionuclide, regions containing at least 99% of the total activity retained in the body were included in the analysis. Any region that contributed to that 99% of ingested or inhaled activity, of any lung clearance type listed in table 2-1 in the case of inhalation, at any time step, by a reference individual of a given age was included in the analysis of all intakes of that nuclide by that individual.

Chapter 3

MONTE CARLO SIMULATION OF COUNT RATES

Monte Carlo computer models were used to simulate the responses of two gamma cameras to distributions of six radionuclides in various anatomical regions of children of five ages and adults of both sexes. These analyses combined the MCNP model of the Siemens e.cam or Philips SKYLight gamma camera, described in parts II and III of the present series (Anigstein et al. 2007b, section 2.1.3; Anigstein et al. 2007c, section 2.1.2), respectively, with five pediatric and two adult anthropomorphic phantoms. The results of the analyses are sets of empirical relationships between the count rates on each camera and the activity in a given region of the body.

The methodology was essentially the same as used in the Monte Carlo simulations of count rates on the Siemens e.cam gamma camera from activities in the lungs of the NORMAN phantom using the MCNPX computer code, as described in part II, chapter 3. The following discussion summarizes the methods used in the analyses, focusing on differences from the previous studies.

3.1 MCNP Models of Anthropomorphic Phantoms

3.1.1 Models of Children

Eckerman et al. (1996) describe a series of anthropomorphic phantoms representing individuals at different stages of development, from infants to adults, developed at the Oak Ridge National Laboratory. Han et al. (2006) describe revisions to the ORNL phantom series that incorporate more recent developments in the field, including the new anatomical data in ICRP Publication 89 (ICRP 2002). The MCNP pediatric models—infant (age 100 days), and ages 1, 5, 10, and 15 years—that are based on these revised phantoms were furnished by Prof. Wesley Bolch (2005).[2] These models include both male and female organs. However, the total mass of the 15-year-old phantom—approximately 57 kg—is much closer to the 56-kg reference mass of the 15-y-old male than the 53-kg reference mass of the 15-y-old female (ICRP 2002, table 2.8). We therefore used these phantoms to represent male individuals and eliminated female breasts and reproductive organs from the models. However, the results of the simulations are also applicable to girls, given the variability among real individuals.

As listed in table 2-3, some anatomical regions of the Han phantoms correspond to more than one source region in the DCAL model. Conversely, some source regions encompass more than one anatomical region in the phantoms. Those source regions, and the corresponding anatomical regions, are listed in table 3-1. The activity in each source region was distributed among the

[2] For the sake of convenience, we will refer to these MCNP models as "Han phantoms." They were constructed wholly or in part by Dr. Eunyoung Han at the University of Florida.

corresponding anatomical regions in each phantom in proportion to the mass of each anatomical region, resulting in equal concentrations in these regions.[3]

Table 3-1. DCAL Source Regions and Corresponding Anatomical Regions in Han Phantoms

DCAL		Han phantoms
Name	Description	
ULI_Cont	Upper large intestine contents	Ascending colon contents
		Proximal transverse colon contents
		Distal transverse colon contents
LLI_Cont	Lower large intestine contents	Descending colon contents
		Sigmoid colon contents
Kidneys		Left kidney
		Right kidney

Bone in the Han phantoms comprises 16 anatomical structures. The DCAL model, however, identifies source regions for bone-seeking elements (strontium and americium in the present analysis) as cortical bone and trabecular bone. In the case of americium, each bone region is further divided into bone surface and bone volume. To calculate the activities of these elements in each of the bone regions of the Han phantoms, we distributed the total activity in the DCAL bone regions among these 16 structures in proportion to the relative mass of each osseous structure in each phantom.

The Han phantoms do not have a region for red bone marrow. The activity of ^{241}Am (the only one of the six radionuclides that accumulates in the marrow) was distributed among the osseous structures according to the percentages of active (red) marrow in individual bones listed by Eckerman et al. (1996, table 2). However, some bones are grouped differently in the Han model than by Eckerman et al. In those cases—skull and regions of the spine in the Eckerman et al. listing—we distributed the activity among the subdivisions of these regions according to percentages of active marrow in these subdivisions listed by ICRP (2002, table 9.4) while preserving the total mass of marrow in the overall structure listed by Eckerman et al.

The Han phantoms also lack a region for blood. We therefore created a blood region, based on the distribution of regional blood volumes in adults listed by ICRP (2002, table 2.14). Absent comparable data for children, we based the distribution of blood in the Han pediatric models on the ICRP data for adult males.[4] When a given tissue in the ICRP blood-volume distribution corresponded to more than one region in the phantom, the activity in the blood in that tissue was distributed among such regions in proportion to the mass of each region.

[3] The mass of each anatomical region depends on the age of the individual. Thus, the relative activities in the anatomical regions corresponding to a given source region will vary with age; however, the activity concentration in each of the anatomical regions corresponding to a given source region in a given phantom will be uniform.

[4] The only significant difference between the reference values of distribution of blood volumes in adult males and females is the relative proportion of blood in muscle and in fat. We used the distribution for the adult male because the average ratio of muscle to fat in children (newborn to age 15) is closer to the muscle-to-fat ratio in adult males than in females.

The biokinetic models of all chemical elements, except cesium, that are addressed in the present study include a source region described as *Other*. This designation refers to all tissues other than those specified in the biokinetic model of the given element.[5] Thus, the tissues comprising this region depend on the particular element being modeled. The *Other* activity was distributed among the anatomical regions corresponding to these tissues in proportion to the mass of each region.

The biokinetic model of cesium includes a compartment called *Body Tissues* that comprises all living tissues, but excludes mineralized bone. The activity in *Body Tissues* was distributed among the corresponding anatomical regions in each phantom, in a manner similar to the distribution of *Other* activity.

3.1.2 Models of Adults

The NORMAN and NAOMI voxel phantoms were created from MRI images of an adult male and an adult female (Dimbylow 1998, 2005). These models, whose height and mass were scaled to the ICRP reference values for adults (ICRP 2002, table 2.8), are more realistic representations of the human body than the geometrical models described by Han et al. (2006). (We used the Han phantoms to represent children since pediatric phantoms comparable to NORMAN and NAOMI were not available to us at the time of these studies.)

There are 37 types of material in NORMAN and 40 in NAOMI. Because these models were originally used for the studies of the effects of nonionizing radiation on human subjects, they did not include the elemental composition of these materials. We assigned elemental compositions to the materials based on several references, in hierarchical order. First preference was given to the data presented by ICRP (2002, tables 13.2–13.3), which encompass soft tissues. The composition of hydrated cortical bones of adults, which is listed by ICRP (1995, table 27), was assigned to cortical and trabecular bone. The compositions of body fluids and other contents of the alimentary tract, including regions of the intestine which combine the wall and the contents, were taken from Jones (1997, table 1). The composition of lymph was taken from ICRU (1992).

Some anatomical regions in these phantoms correspond to more than one source region in the corresponding DCAL model. Conversely, as is the case with the Han phantoms, some other source regions encompass more than one anatomical region in the voxel phantoms. These source regions, and the corresponding anatomical regions, are listed in table 3-2.

Unlike the Han phantoms, the voxel phantoms do have anatomical regions for blood. However, the blood region in NORMAN encompasses only the contents of the heart and the major vessels. We therefore needed to adjust the blood region to include other tissues and organs. The first step was to separate the contribution of the blood in the heart from the blood in the vessels that are part of the NORMAN blood region. We started by performing an MCNP simulation of the normalized count rate from each radionuclide in the contents of the heart. By subtracting this count rate, scaled to the mass of blood in the heart listed by ICRP, from the normalized count

[5] Keith Eckerman, Oak Ridge National Laboratory, private communication with Robert Anigstein, SC&A, Inc., April 2007.

rate from the entire blood region, scaled to the total mass of blood in the NORMAN phantom, we derived the normalized count rate from the NORMAN vessels. We then distributed the activity of each radionuclide in the blood among the heart contents, the NORMAN vessels, and the other NORMAN tissues according to the ICRP reference values for regional blood volumes in adult males presented by ICRP (2002, table 2.14).

Table 3-2. DCAL Source Regions and Corresponding Anatomical Regions in Voxel Phantoms

DCAL		Voxel phantoms
Name	Description	
AI	Alveolar interstitial tissue	Lung
bbe-gel	Mucous (gel) layer of bronchiolar airways	
bbe-sol	Sol layer of bronchiolar airways	
bbe-seq	Macrophages in lumina propria that sequester particles	
BBi-gel	Mucous (gel) layer of bronchial airways	
BBi-sol	Sol layer of bronchial airways	
BBi-seq	Macrophages in lumina propria that sequester particles	
St_Cont	Stomach contents	Small intestine Duodenum
ULI_Cont	Upper large intestine contents	Upper large intestine (wall + contents)
LLI_Cont	Lower large intestine contents	Lower large intestine (wall + contents)
Kidneys		Left kidney Right kidney
T_Bone-S	Trabecular bone surface	Trabecular bone
T_Bone-V	Trabecular bone volume	
C_Bone-S	Cortical bone surface	Bone
C_Bone-V	Cortical bone volume	

This procedure was employed for calculating the count rates from activities of five of the six nuclides which are found in the blood in significant amounts following intake. As shown in tables A-11 and A-17, relatively little ^{241}Am accumulates in the blood. Given the small contribution that the activity in the blood would make to the total count rate from this nuclide, we employed simpler procedures in this case. For NORMAN, we apportioned the blood among the various organs, as listed by ICRP, but did not distinguish between the contribution of the heart contents and the major blood vessels.

In the case of NAOMI, the blood region consists primarily of the heart contents. In the MCNP simulations, we distributed the activity in the blood among the heart contents and the other regions in the NAOMI model in the proportions listed by ICRP (2002, table 2.14). In the case of ^{241}Am, we used a narrower range, consisting of the blood region, liver, small and large intestines, lungs, and cortical and trabecular bone.

The count rates from activities of ^{137}Cs in *Body Tissues* and of the other five nuclides in *Other* were calculated in a manner similar to that used for the Han phantoms, described in section 3.1.1.

Figure 3-1. Lung Scan of Adult Patient with Philips SKYLight (courtesy of Philips Healthcare)

Figure 3-2. Pediatric Patient with Philips SKYLight (courtesy of Philips Healthcare)

3.1.3 Position of Patient

Each phantom was placed in a position similar to one that would be used in the clinical situation. In performing lung scans of adult patients with the Siemens e.cam Fixed 180 camera, the two camera heads are of necessity at the same elevation, and the patient is positioned so that the lungs are within the field of view of the detectors. The heads of the Philips SKYLight can be positioned independently. The positions of the adult phantoms with respect to this camera are based on the illustration in figure 3-1, while those of children are based on the illustration shown in figure 3-2. Both pictures were provided through the courtesy of Philips Healthcare.

The actual position of each phantom with respect to each of the two gamma cameras in the present analysis is illustrated in appendix B.

3.2 MCNP Simulations of Gamma Cameras

The calculations utilized the MCNP pulse-height tallies, which record the detector events that fall into specified energy bins. In the present analysis, we utilized bins that were 1-keV wide and spanned the entire energy spectrum of each radionuclide. This enables us to estimate the count rates in any arbitrary energy window of the respective gamma camera. The analyses of the Siemens e.cam used two sets of energy windows for all radionuclides except ^{241}Am. The first set, consisting of six 50% windows for all nuclides except ^{241}Am, comprises the settings used in measuring count rates from sources of ^{60}Co, ^{90}Sr, ^{137}Cs, and ^{192}Ir that were presented in part II, section 3.2.2. Iodine-131, not included in the earlier study, was assigned the same energy windows as ^{90}Sr and ^{192}Ir. The analysis of ^{241}Am used the same two 50% windows that were

presented in part II. The second set, applied to five nuclides, spans a narrower range and consists of three 50% windows. These windows were selected to span a range that maximizes the count rates yet simplifies the setup on the camera for use in a radiological emergency. Windows for three nuclides—^{60}Co, ^{137}Cs, and ^{192}Ir—are the same as those listed in part II, table 3-2. New windows were calculated for ^{90}Sr and ^{131}I. Since the ^{241}Am measurements utilized only two energy windows, a second set was not needed. The energy windows used in the analysis of the Siemens e.cam gamma camera are listed in tables 3-3 and 3-4, below.

Table 3-3. Full Set of Energy Windows on Siemens e.cam Gamma Camera (keV)

Channel	Window	Peak	Min	Max	Peak	Min	Max	Peak	Min	Max
		Co-60, Cs-137			Sr-90/Y-90, I-131, Ir-192			Am-241		
1	1	41	30.75	51.25	35	26.25	43.75	35	26.25	43.75
2	2	69	51.75	86.25	59	44.25	73.75	59	44.25	73.75
	3	116	87	145	99	74.25	123.75			
	4	194	145.5	242.5	166	124.50	207.50			
	5	324	243	405	277	207.75	346.25			
3	6	541	405.75	676.25	462	346.50	577.50			

Note: All windows have widths equal to 50% of the peak energy

Table 3-4. Set of Three Energy Windows on Siemens e.cam Gamma Camera (keV)

Window	Peak	Min	Max	Peak	Min	Max	Peak	Min	Max
	Co-60			Sr-90/Y-90			I-131		
1	101.3	75.975	126.625	46.3	34.7	57.875	109.9	82.4	137.375
2	168.9	126.675	211.125	77.2	57.9	96.5	183.3	137.475	229.125
3	281.6	211.2	352	128.7	96.525	160.875	305.6	229.2	382
	Cs-137			Ir-192					
1	97.3	72.975	121.625	96	72	120			
2	162.3	121.725	202.875	160.1	120.075	200.125			
3	270.6	202.95	338.25	266.9	200.175	333.625			

Note: All windows have widths equal to 50% of the peak energy

The simulations of count rates from ^{60}Co, ^{137}Cs, and ^{241}Am on the Philips SKYLight camera utilized the same energy windows reported in part III of the present series. New windows were calculated for ^{90}Sr, ^{131}I, and ^{192}Ir. The settings for the six nuclides are listed in table 3-5, below. Because setting two contiguous windows is relatively straightforward and produces the optimum count rates, only one set of windows was used in the simulation of count rates from all nuclides. A single window was sufficient to span the part of the ^{241}Am spectrum that lies within the energy range of this camera system.

3.3 Radionuclide Emission Spectra

The emission spectra of five of the six radionuclides in the present study were presented in previous reports in this series. The photon spectra of ^{60}Co, ^{137}Cs, ^{192}Ir, and ^{241}Am were presented in part II, section 2.1.4. The β spectrum of ^{90}Sr/^{90}Y was revised from that described in the earlier

study, as discussed in part IV (Anigstein et al. 2010a). As discussed on page 2-2, ^{90}Y is assumed to be in secular equilibrium with ^{90}Sr at the time of intake and during all subsequent time periods modeled in the present study. The photon spectrum of ^{131}I is listed in table 3-6.

Table 3-5. Energy Windows on Philips SKYLight Gamma Camera (keV)

Window	Peak	Min	Max	Width (%)	Peak	Min	Max	Width (%)	Peak	Min	Max	Width (%)
	Co-60				Sr-90/Y-90				I-131			
1	124.6	71.0	178.2	86	59.6	29.8	89.4	100	87	43.5	130.5	100
2	312.6	178.2	447	86	138.7	89.4	188	71.1	261	130.5	392	100
	Cs-137				Ir-192				Am-241			
1	191.2	109	273.4	86	94.7	54	135.4	86	51.3	30	72.6	83
2	479.6	273.4	685.8	86	237.5	135.4	339.6	86				

3.4 Results

The results of the MCNP simulations of the normalized count rates on the two camera systems from activities in the various anatomical regions of the anthropomorphic phantoms, using the energy windows discussed in section 3.2, are presented in appendix C. These regions are identified by the same names as those of the corresponding source regions in the DCAL model.

Table 3-6. Photon Spectrum of ^{131}I

E (keV)	I (%)
29.112	0.00014
29.461	1.4
29.782	2.59
33.562	0.238
33.624	0.459
33.881	0.00467
34.419	0.139
34.496	0.0269
80.185	2.623
85.9	0.00009
177.214	0.2696
232.18	0.00319
272.498	0.05776
284.305	6.136
295.8	0.0018
302.4	0.00473
318.088	0.07761
324.651	0.02124
325.789	0.2737
358.4	0.01634
364.489	81.7
404.814	0.05474
503.004	0.3603
636.989	7.173
642.719	0.2173
722.911	1.773

Chapter 4

CALCULATION OF CALIBRATION FACTORS

Chapter 2 describes the distribution of activities among various regions of the human body, while chapter 3 describes the calculation of normalized count rates on gamma cameras from activities in these regions. In the present chapter, we combine these results to develop sets of calibration factors that are used by the Assess computer code. The code uses these factors to calculate the intake of a given radionuclide, by a given individual, via a given environmental pathway (inhalation or ingestion), based on the count rate on a given gamma camera, with a given set of energy windows, at a given time after intake. For intake via inhalation, the calibration factor also depends on the lung absorption type of the given nuclide, which in turn depends on its chemical form.

The calculation of such a calibration factor entails the following steps:

- For each time step, multiply the fractional activity in a given source region[6] by the normalized count rate registered by the camera from activity in the corresponding anatomical region (count rates in the recommended energy windows presented in section 3.2 are listed in appendix C).
- Add the count rates from all the regions.

The calibration factor can be represented mathematically by the following expression

$$F_{gijklpt} = \sum_m c_{giklm} f_{gijmpt}$$

$F_{gijklpt}$ = calibration factor for assessment of individual g (characterized by age of juvenile or sex of adult) exposed to radionuclide i via pathway p (in chemical form j for the inhalation pathway), measured with camera k using set of energy windows l, at time t after intake (cps/Bq)

c_{giklm} = normalized count rate from radionuclide i in organ m of individual g measured with camera k using set of energy windows l (cps/Bq)

f_{gijmpt} = fraction of activity of radionuclide i (in chemical form j for the inhalation pathway) in organ m of individual g at time t after intake via pathway p

An alternate set of calibration factors was calculated to provide a simple method of estimating intakes without using the Assess code. This alternate factor was computed by dividing the factor calculated above into 1,000 cpm to yield a calibration factor in units of Bq/kcpm.

$$G_{gijklpt} = \frac{1}{F_{gijklpt}\,\kappa}$$

[6] A subset of these activities, calculated for 12 time steps, are tabulated in appendix A.

$G_{gijklpt}$ = alternate calibration factor for assessment of individual *g* (characterized by age of juvenile or sex of adult) exposed to radionuclide *i* via pathway *p* (in chemical form *j* for the inhalation pathway), measured with camera *k* using set of energy windows *l*, at time *t* after intake (cps/Bq)

κ = factor for converting cps to kcpm
= 0.06

The resulting calibration factors, for 12 selected time steps after intake, are tabulated in appendix D, along with a more detailed discussion of the use of these factors for assessing intakes by exposed individuals. These time steps are a subset of the 50 time steps used by the Assess code.

Chapter 5

DOSE CALCULATIONS

Two sets of dose coefficients have been calculated to help in assessing the biological effects of internal exposure. The first are coefficients for the cumulative effective dose, which is the integrated effective dose from the time of acute intake until the time of the assessment. The second set represents the lifetime effective dose commitment to the exposed individual, absent any medical intervention.

Both sets of dose coefficients were calculated by the DCAL program. These coefficients depend on the radionuclide, the pathway (ingestion or inhalation), the lung absorption type (for exposure via inhalation), the age of the individual, and the elapsed time since intake (for the cumulative effective dose coefficients). They also depend on the f_1 values and, for the inhalation pathway, on the particle size distribution.

DCAL calculates the lifetime dose commitment to a child as the integrated dose until age 70. The committed dose to an adult is the dose integrated over a period of 50 years following intake.

These coefficients are used by the Assess computer code to determine the dose already delivered to the exposed individual, as well as the lifetime dose commitment, absent any medical intervention, based on the intake calculated by the code. Such dose calculations could be useful in assessing the efficacy of any potential intervention.

The coefficients are tabulated in appendix E for the same 12 time steps as the calibration factors in appendix D. They can be used to determine doses resulting from intakes that are calculated using these factors.

Appendix A

NORMALIZED ACTIVITIES IN DCAL SOURCE REGIONS AT SELECTED TIMES AFTER INTAKE

Tables A-2 to A-17 list the normalized activities in DCAL source regions in children and adults at 12 selected times after intake. These are a subset of the 50 time steps used by the Assess computer code (Anigstein et al. 2009) and are examples of data that are included in the computer code package. The first four time steps—0.042, 0.083, 0.167, and 0.333 day—are approximately 1, 2, 4, and 8 hours after intake. The column headings correspond to source regions in the DCAL model discussed in chapter 2. In some cases, these source regions are grouped according to the corresponding anatomical regions in the appropriate MCNP model of the body, as shown in table 2-3. Further descriptions of source regions are listed in table A-1, which omits regions that have common anatomical names and require no further explanation.

Table A-1. Further Descriptions of Certain DCAL Source Regions Listed in Tables A-2 to A-17

Column heading	Description
Lung	Different source regions in children and adults[a]
BBi	Bronchial airways[a]
ET1	Surface of anterior nasal passage (ET_1 in ICRP 1994a)
Stomach	Stomach contents
SI	Small intestine contents
ULI	Upper large intestine contents
LLI	Lower large intestine contents
Other	All tissues not specified in biokinetic model of given element
Body tissues	Similar to *Other*, but excluding mineralized bone
C_Bone	Cortical bone surface + volume
T_Bone	Trabecular bone surface + volume
Marrow	Red bone marrow
UB_Cont	Contents of urinary bladder
Retained	Fraction of ingested or inhaled activity retained in body

[a] See table 2-3

The source regions included in the analysis of a given radionuclide in an individual of a given age are those that contain a total of 99% or more of the retained activity following inhalation or ingestion of any chemical form of that nuclide at any time step in the present study. No activities are listed for some regions that do not meet that criterion in certain reference individuals because we did not perform MCNP analyses of regions that make no significant contributions to the total count rates—the columns corresponding to those regions are therefore blank. Fractional activities < 0.005% are rounded to 0.00.

The activity distributions were calculated with the DCAL computer software (ORNL 2006), using the age-dependent default f_1 values furnished with DCAL, which are listed in table 2-2. To model distributions following inhalation, we assumed a particle size of 1 μm AMAD, the default value for environmental exposure assumed by ICRP (1996).

Table A-2. Activity of Type *M* ^{60}Co in DCAL Source Regions at Selected Times after Inhalation (%)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Other	Liver	Retained
					Infant						
0.042	9.49	0.83	20.11	11.93	11.83	2.75	1.45	0.03	0.06	0.01	58.93
0.083	9.40	0.76	19.30	4.72	15.19	3.47	4.72	0.25	0.14	0.02	58.06
0.167	9.27	0.67	17.74	0.72	10.94	4.68	10.36	1.37	0.35	0.04	56.25
0.333	9.07	0.59	15.03	0.07	3.57	5.18	13.34	4.62	0.87	0.10	52.55
0.5	8.92	0.54	12.72	0.04	1.14	4.58	11.73	7.42	1.37	0.15	48.71
1	8.65	0.48	7.71	0.02	0.10	2.48	5.49	10.24	2.38	0.26	37.86
2	8.43	0.44	2.84	0.01	0.02	0.67	1.06	6.44	3.05	0.34	23.32
4	8.18	0.41	0.38	0.00	0.01	0.08	0.09	1.23	2.97	0.33	13.70
8	7.74	0.35	0.01	0.00	0.01	0.04	0.05	0.11	2.47	0.27	11.07
10	7.54	0.33	0.00	0.00	0.01	0.04	0.04	0.09	2.28	0.25	10.60
20	6.63	0.23	0.00	0.00	0.01	0.03	0.03	0.06	1.78	0.20	8.99
30	5.89	0.16	0.00	0.00	0.01	0.03	0.02	0.04	1.61	0.18	7.96
					1-y-old						
0.042	10.16	0.82	20.20	11.97	12.06	2.63	1.47	0.03	0.06	0.01	59.87
0.083	10.09	0.75	19.39	4.74	15.81	2.89	4.84	0.26	0.13	0.01	59.00
0.167	9.98	0.65	17.83	0.72	12.01	3.33	10.88	1.42	0.29	0.03	57.22
0.333	9.81	0.57	15.10	0.07	4.41	3.40	14.57	4.92	0.64	0.07	53.64
0.5	9.68	0.53	12.78	0.04	1.56	2.97	13.14	8.04	0.96	0.11	49.88
1	9.44	0.48	7.75	0.02	0.12	1.61	6.26	11.39	1.62	0.18	38.92
2	9.23	0.44	2.85	0.01	0.02	0.44	1.18	7.21	2.05	0.23	23.68
4	8.97	0.41	0.39	0.00	0.01	0.07	0.09	1.35	2.00	0.22	13.53
8	8.51	0.35	0.01	0.00	0.01	0.04	0.05	0.12	1.69	0.19	10.98
10	8.29	0.33	0.00	0.00	0.01	0.04	0.05	0.09	1.57	0.17	10.57
20	7.33	0.23	0.00	0.00	0.01	0.03	0.03	0.06	1.27	0.14	9.12
30	6.54	0.16	0.00	0.00	0.01	0.03	0.02	0.05	1.17	0.13	8.12
					5-y-old						
0.042	10.48	0.82	16.67	9.81	9.87	2.39	1.20	0.03	0.05	0.01	51.73
0.083	10.40	0.75	16.00	3.90	12.95	2.60	3.97	0.21	0.11	0.01	51.02
0.167	10.28	0.65	14.72	0.61	9.87	2.94	8.92	1.16	0.26	0.03	49.58
0.333	10.10	0.56	12.46	0.07	3.66	2.96	11.98	4.04	0.57	0.06	46.63
0.5	9.96	0.52	10.55	0.04	1.32	2.58	10.84	6.61	0.85	0.09	43.52
1	9.70	0.47	6.40	0.02	0.12	1.40	5.22	9.41	1.41	0.16	34.41
2	9.48	0.43	2.35	0.01	0.02	0.39	1.01	6.00	1.79	0.20	21.72
4	9.21	0.40	0.32	0.00	0.01	0.06	0.09	1.15	1.75	0.19	13.22
8	8.73	0.35	0.01	0.00	0.01	0.04	0.05	0.11	1.49	0.17	10.98
10	8.51	0.32	0.00	0.00	0.01	0.04	0.05	0.09	1.40	0.16	10.59
20	7.51	0.23	0.00	0.00	0.01	0.03	0.03	0.06	1.15	0.13	9.17
30	6.70	0.16	0.00	0.00	0.01	0.03	0.03	0.05	1.07	0.12	8.18

Table A-2 (continued)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Other	Liver	Retained
					10-y-old						
0.042	10.05	0.92	17.02	10.05	10.12	2.39	1.23	0.03	0.05	0.01	52.25
0.083	9.97	0.82	16.34	4.00	13.28	2.60	4.06	0.22	0.11	0.01	51.54
0.167	9.86	0.71	15.02	0.63	10.12	2.96	9.14	1.19	0.26	0.03	50.07
0.333	9.69	0.62	12.72	0.07	3.75	2.99	12.29	4.14	0.57	0.06	47.06
0.5	9.56	0.58	10.76	0.04	1.34	2.61	11.11	6.78	0.85	0.09	43.88
1	9.32	0.52	6.53	0.02	0.12	1.42	5.33	9.64	1.43	0.16	34.58
2	9.11	0.48	2.40	0.01	0.02	0.39	1.02	6.13	1.81	0.20	21.62
4	8.86	0.45	0.32	0.00	0.01	0.06	0.09	1.17	1.77	0.20	12.95
8	8.40	0.39	0.01	0.00	0.01	0.04	0.05	0.11	1.50	0.17	10.69
10	8.18	0.36	0.00	0.00	0.01	0.04	0.04	0.09	1.40	0.16	10.31
20	7.23	0.26	0.00	0.00	0.01	0.03	0.03	0.06	1.15	0.13	8.92
30	6.45	0.18	0.00	0.00	0.01	0.03	0.02	0.05	1.07	0.12	7.94
					15-y-old						
0.042	11.32	1.30	13.34	8.04	8.05	2.32	0.98	0.02	0.05	0.01	45.79
0.083	11.23	1.16	12.80	3.26	10.63	2.47	3.24	0.17	0.11	0.01	45.22
0.167	11.11	0.98	11.77	0.56	8.21	2.72	7.34	0.95	0.25	0.03	44.06
0.333	10.90	0.84	9.97	0.08	3.13	2.69	9.97	3.33	0.53	0.06	41.65
0.5	10.75	0.79	8.44	0.05	1.16	2.33	9.09	5.49	0.78	0.09	39.11
1	10.47	0.72	5.12	0.02	0.12	1.27	4.45	7.90	1.29	0.14	31.60
2	10.23	0.67	1.88	0.01	0.03	0.36	0.89	5.10	1.64	0.18	21.02
4	9.94	0.62	0.25	0.00	0.02	0.07	0.09	1.00	1.61	0.18	13.81
8	9.42	0.54	0.00	0.00	0.01	0.04	0.05	0.12	1.39	0.15	11.77
10	9.18	0.51	0.00	0.00	0.01	0.04	0.05	0.10	1.31	0.15	11.36
20	8.11	0.36	0.00	0.00	0.01	0.04	0.04	0.07	1.10	0.12	9.86
30	7.23	0.25	0.00	0.00	0.01	0.03	0.03	0.05	1.04	0.12	8.78
					Adult						
0.042	13.04		14.28	8.37	8.41	2.40	1.02	0.02	0.05		47.95
0.083	12.85		13.70	3.36	11.06	2.56	3.38	0.18	0.11		47.35
0.167	12.60		12.60	0.55	8.48	2.82	7.63	0.99	0.25		46.10
0.333	12.29		10.67	0.07	3.20	2.78	10.31	3.46	0.54		43.55
0.5	12.10		9.03	0.04	1.18	2.41	9.37	5.69	0.81		40.86
1	11.76		5.48	0.02	0.12	1.31	4.57	8.14	1.34		32.98
2	11.47		2.01	0.01	0.03	0.38	0.90	5.24	1.69		21.95
4	11.12		0.27	0.00	0.02	0.07	0.09	1.03	1.67		14.48
8	10.51		0.00	0.00	0.01	0.04	0.05	0.12	1.44		12.37
10	10.23		0.00	0.00	0.01	0.04	0.05	0.10	1.35		11.96
20	8.98		0.00	0.00	0.01	0.04	0.04	0.07	1.14		10.42
30	7.96		0.00	0.00	0.01	0.03	0.03	0.05	1.08		9.30

Table A-3. Activity of Type *S* ^{60}Co in DCAL Source Regions at Selected Times after Inhalation (%)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Other	Liver	Retained
					Infant						
0.042	10.51	0.93	20.11	12.62	12.71	0.06	1.52	0.04	0.00	0.00	58.96
0.083	10.44	0.85	19.30	5.01	16.98	0.13	5.11	0.27	0.00	0.00	58.14
0.167	10.30	0.74	17.74	0.77	13.40	0.27	11.71	1.51	0.01	0.00	56.51
0.333	10.09	0.65	15.03	0.08	5.37	0.37	16.18	5.35	0.05	0.01	53.20
0.5	9.93	0.60	12.72	0.05	2.08	0.36	14.90	8.89	0.09	0.01	49.65
1	9.65	0.54	7.71	0.02	0.19	0.21	7.29	12.90	0.17	0.02	38.72
2	9.45	0.49	2.84	0.01	0.03	0.06	1.36	8.25	0.23	0.03	22.74
4	9.26	0.46	0.38	0.00	0.02	0.01	0.09	1.53	0.22	0.02	12.01
8	8.94	0.41	0.01	0.00	0.01	0.00	0.05	0.12	0.18	0.02	9.75
10	8.78	0.38	0.00	0.00	0.01	0.00	0.05	0.09	0.17	0.02	9.52
20	8.12	0.29	0.00	0.00	0.01	0.00	0.04	0.07	0.13	0.01	8.68
30	7.58	0.21	0.00	0.00	0.01	0.00	0.03	0.05	0.11	0.01	8.02
					1-y-old						
0.042	11.26	0.91	20.20	12.67	12.77	0.04	1.53	0.04	0.00	0.00	59.89
0.083	11.20	0.83	19.39	5.03	17.09	0.08	5.14	0.27	0.00	0.00	59.07
0.167	11.08	0.72	17.83	0.76	13.53	0.14	11.79	1.52	0.01	0.00	57.43
0.333	10.90	0.63	15.10	0.07	5.45	0.19	16.32	5.39	0.03	0.00	54.12
0.5	10.77	0.59	12.78	0.04	2.11	0.18	15.06	8.97	0.05	0.01	50.57
1	10.53	0.53	7.75	0.02	0.18	0.11	7.35	13.02	0.09	0.01	39.61
2	10.35	0.49	2.85	0.01	0.03	0.03	1.35	8.31	0.12	0.01	23.56
4	10.15	0.46	0.39	0.00	0.02	0.00	0.09	1.53	0.12	0.01	12.79
8	9.82	0.41	0.01	0.00	0.01	0.00	0.05	0.12	0.10	0.01	10.54
10	9.66	0.38	0.00	0.00	0.01	0.00	0.05	0.09	0.09	0.01	10.32
20	8.97	0.28	0.00	0.00	0.01	0.00	0.04	0.07	0.07	0.01	9.47
30	8.40	0.21	0.00	0.00	0.01	0.00	0.03	0.06	0.06	0.01	8.80
					5-y-old						
0.042	11.62	0.91	16.67	10.38	10.45	0.04	1.25	0.03	0.00	0.00	51.74
0.083	11.55	0.83	16.00	4.14	14.00	0.06	4.20	0.22	0.00	0.00	51.06
0.167	11.42	0.72	14.72	0.65	11.12	0.12	9.67	1.24	0.01	0.00	49.71
0.333	11.23	0.63	12.46	0.08	4.53	0.16	13.42	4.42	0.02	0.00	46.98
0.5	11.08	0.58	10.55	0.04	1.78	0.15	12.42	7.37	0.04	0.00	44.05
1	10.82	0.52	6.40	0.02	0.18	0.09	6.13	10.76	0.07	0.01	35.01
2	10.62	0.48	2.35	0.01	0.03	0.02	1.15	6.92	0.10	0.01	21.71
4	10.42	0.45	0.32	0.00	0.02	0.00	0.09	1.30	0.10	0.01	12.73
8	10.08	0.40	0.01	0.00	0.01	0.00	0.05	0.12	0.08	0.01	10.78
10	9.92	0.38	0.00	0.00	0.01	0.00	0.05	0.09	0.08	0.01	10.55
20	9.20	0.28	0.00	0.00	0.01	0.00	0.04	0.07	0.06	0.01	9.68
30	8.61	0.21	0.00	0.00	0.01	0.00	0.03	0.06	0.05	0.01	9.00

Table A-3 (continued)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Other	Liver	Retained
					10-y-old						
0.042	11.13	1.02	17.02	10.64	10.71	0.04	1.28	0.03	0.00	0.00	52.26
0.083	11.07	0.91	16.34	4.25	14.35	0.07	4.31	0.23	0.00	0.00	51.57
0.167	10.95	0.79	15.02	0.67	11.41	0.12	9.91	1.28	0.01	0.00	50.20
0.333	10.77	0.68	12.72	0.07	4.64	0.16	13.76	4.53	0.02	0.00	47.41
0.5	10.64	0.64	10.76	0.04	1.81	0.16	12.73	7.56	0.04	0.00	44.41
1	10.40	0.58	6.53	0.02	0.17	0.09	6.26	11.02	0.08	0.01	35.17
2	10.21	0.54	2.40	0.01	0.03	0.03	1.17	7.06	0.10	0.01	21.57
4	10.02	0.51	0.32	0.00	0.02	0.00	0.09	1.32	0.10	0.01	12.41
8	9.69	0.45	0.01	0.00	0.01	0.00	0.05	0.11	0.08	0.01	10.44
10	9.54	0.42	0.00	0.00	0.01	0.00	0.05	0.09	0.08	0.01	10.22
20	8.86	0.31	0.00	0.00	0.01	0.00	0.04	0.07	0.06	0.01	9.37
30	8.30	0.23	0.00	0.00	0.01	0.00	0.03	0.06	0.05	0.01	8.70
					15-y-old						
0.042	12.55	1.44	13.34	8.51	8.53	0.03	1.02	0.02	0.00	0.00	45.80
0.083	12.47	1.28	12.80	3.47	11.49	0.06	3.44	0.18	0.00	0.00	45.26
0.167	12.34	1.09	11.77	0.60	9.25	0.10	7.95	1.02	0.01	0.00	44.18
0.333	12.12	0.94	9.97	0.09	3.86	0.14	11.16	3.65	0.02	0.00	41.98
0.5	11.96	0.88	8.44	0.05	1.56	0.13	10.41	6.12	0.03	0.00	39.61
1	11.68	0.80	5.12	0.02	0.17	0.08	5.22	9.02	0.06	0.01	32.21
2	11.47	0.75	1.88	0.01	0.03	0.02	1.02	5.87	0.08	0.01	21.16
4	11.25	0.71	0.25	0.00	0.02	0.00	0.09	1.14	0.08	0.01	13.57
8	10.88	0.63	0.00	0.00	0.02	0.00	0.06	0.13	0.07	0.01	11.81
10	10.70	0.59	0.00	0.00	0.02	0.00	0.06	0.10	0.07	0.01	11.56
20	9.93	0.44	0.00	0.00	0.01	0.00	0.04	0.08	0.05	0.01	10.58
30	9.30	0.32	0.00	0.00	0.01	0.00	0.03	0.06	0.05	0.01	9.81
					Adult						
0.042	14.45		14.28	8.86	8.90	0.03	1.06	0.02	0.00		47.96
0.083	14.27		13.70	3.57	11.96	0.06	3.58	0.19	0.00		47.38
0.167	13.99		12.60	0.59	9.56	0.11	8.27	1.06	0.01		46.23
0.333	13.67		10.67	0.08	3.95	0.14	11.54	3.79	0.02		43.89
0.5	13.46		9.03	0.05	1.58	0.13	10.73	6.33	0.03		41.38
1	13.12		5.48	0.02	0.17	0.08	5.35	9.30	0.07		33.61
2	12.85		2.01	0.01	0.03	0.02	1.04	6.03	0.09		22.11
4	12.59		0.27	0.00	0.02	0.00	0.09	1.16	0.09		14.26
8	12.14		0.00	0.00	0.02	0.00	0.06	0.13	0.07		12.44
10	11.93		0.00	0.00	0.02	0.00	0.06	0.10	0.07		12.20
20	10.99		0.00	0.00	0.01	0.00	0.04	0.08	0.06		11.21
30	10.24		0.00	0.00	0.01	0.00	0.04	0.07	0.05		10.43

Table A-4. Activity of Type *F* ^{90}Sr in DCAL Source Regions at Selected Times after Inhalation (%)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	UB_Cont	C_Bone	T_Bone	Other	Retained
							Infant						
0.042	0.16	0.01	20.11	5.65	5.85	16.04	0.94	0.03		1.54	6.17	2.05	58.75
0.083	0.00	0.00	19.30	2.11	5.68	10.70	2.40	0.15		2.70	10.80	3.58	57.61
0.167	0.00	0.00	17.74	0.28	2.46	5.28	4.02	0.63		3.97	15.86	5.23	55.56
0.333	0.00	0.00	15.03	0.01	0.25	1.86	3.87	1.66		4.69	18.77	6.11	52.29
0.5	0.00	0.00	12.72	0.00	0.02	1.29	2.98	2.35		4.79	19.16	6.15	49.48
1	0.00	0.00	7.71	0.00	0.00	1.15	1.28	2.80		4.78	19.10	5.92	42.77
2	0.00	0.00	2.84	0.00	0.00	1.02	0.30	1.69		4.68	18.74	5.56	34.84
4	0.00	0.00	0.38	0.00	0.00	0.81	0.09	0.42		4.54	18.16	5.13	29.55
8	0.00	0.00	0.01	0.00	0.00	0.54	0.06	0.12		4.35	17.40	4.34	26.82
10	0.00	0.00	0.00	0.00	0.00	0.44	0.05	0.09		4.30	17.19	3.94	26.02
20	0.00	0.00	0.00	0.00	0.00	0.19	0.02	0.04		4.21	16.84	2.28	23.58
30	0.00	0.00	0.00	0.00	0.00	0.10	0.01	0.02		4.18	16.74	1.30	22.36
							1-y-old						
0.042	0.17	0.01	20.20	5.67	6.49	16.03	1.15	0.03		0.94	3.76	4.52	59.49
0.083	0.00	0.00	19.39	2.12	7.12	10.07	2.94	0.18		1.62	6.46	7.59	57.99
0.167	0.00	0.00	17.83	0.28	4.16	4.86	5.39	0.80		2.31	9.23	10.29	55.40
0.333	0.00	0.00	15.10	0.01	0.87	2.26	5.95	2.32		2.77	11.08	11.12	51.58
0.5	0.00	0.00	12.78	0.00	0.17	1.70	4.87	3.47		2.92	11.69	10.67	48.33
1	0.00	0.00	7.75	0.00	0.00	1.32	2.21	4.42		3.06	12.25	9.20	40.27
2	0.00	0.00	2.85	0.00	0.00	1.00	0.56	2.80		2.98	11.92	7.93	30.08
4	0.00	0.00	0.39	0.00	0.00	0.68	0.17	0.75		2.65	10.58	7.25	22.48
8	0.00	0.00	0.01	0.00	0.00	0.38	0.09	0.19		2.27	9.06	6.12	18.13
10	0.00	0.00	0.00	0.00	0.00	0.30	0.07	0.14		2.19	8.74	5.49	16.94
20	0.00	0.00	0.00	0.00	0.00	0.12	0.03	0.05		2.09	8.36	2.98	13.64
30	0.00	0.00	0.00	0.00	0.00	0.07	0.01	0.03		2.07	8.29	1.60	12.08
							5-y-old						
0.042	0.17	0.01	16.68	4.64	5.30	14.73	0.98	0.03	0.71	0.84	2.97	4.48	51.55
0.083	0.00	0.00	16.00	1.74	5.83	9.21	2.49	0.15	0.95	1.45	5.11	7.52	50.44
0.167	0.00	0.00	14.72	0.23	3.40	4.43	4.52	0.67	0.78	2.07	7.28	10.11	48.21
0.333	0.00	0.00	12.46	0.00	0.72	2.12	4.98	1.94	0.37	2.50	8.77	10.80	44.65
0.5	0.00	0.00	10.55	0.00	0.14	1.62	4.09	2.90	0.22	2.65	9.30	10.30	41.76
1	0.00	0.00	6.40	0.00	0.00	1.24	1.89	3.72	0.15	2.80	9.82	8.82	34.83
2	0.00	0.00	2.35	0.00	0.00	0.90	0.51	2.40	0.11	2.71	9.51	7.57	26.05
4	0.00	0.00	0.32	0.00	0.00	0.59	0.16	0.67	0.07	2.35	8.26	6.91	19.34
8	0.00	0.00	0.01	0.00	0.00	0.32	0.08	0.18	0.04	1.98	6.94	5.78	15.32
10	0.00	0.00	0.00	0.00	0.00	0.25	0.06	0.13	0.03	1.90	6.67	5.17	14.22
20	0.00	0.00	0.00	0.00	0.00	0.11	0.03	0.05	0.01	1.82	6.39	2.78	11.18
30	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.03	0.01	1.81	6.34	1.48	9.74

Table A-4 (continued)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	UB_Cont	C_Bone	T_Bone	Other	Retained
							10-y-old						
0.042	0.17	0.02	17.02	4.75	5.43	14.63	0.93	0.03		1.34	3.98	3.30	52.12
0.083	0.00	0.00	16.34	1.78	5.97	9.06	2.42	0.15		2.30	6.83	5.58	51.12
0.167	0.00	0.00	15.02	0.24	3.49	4.17	4.45	0.66		3.26	9.65	7.62	49.11
0.333	0.00	0.00	12.72	0.00	0.73	1.80	4.91	1.91		3.83	11.36	8.32	45.83
0.5	0.00	0.00	10.77	0.00	0.14	1.34	4.00	2.85		3.99	11.81	8.06	43.10
1	0.00	0.00	6.53	0.00	0.00	1.10	1.79	3.62		4.10	12.15	7.12	36.50
2	0.00	0.00	2.40	0.00	0.00	0.89	0.43	2.26		4.02	11.92	6.22	28.23
4	0.00	0.00	0.33	0.00	0.00	0.65	0.13	0.58		3.72	11.01	5.69	22.16
8	0.00	0.00	0.01	0.00	0.00	0.39	0.07	0.15		3.33	9.87	4.86	18.70
10	0.00	0.00	0.00	0.00	0.00	0.31	0.06	0.12		3.24	9.60	4.39	17.74
20	0.00	0.00	0.00	0.00	0.00	0.13	0.02	0.04		3.12	9.24	2.43	14.99
30	0.00	0.00	0.00	0.00	0.00	0.07	0.01	0.02		3.10	9.19	1.32	13.72
							15-y-old						
0.042	0.19	0.02	13.34	3.78	4.32	14.34	0.70	0.02		1.90	4.91	1.91	45.72
0.083	0.00	0.00	12.80	1.41	4.74	8.70	1.85	0.11		3.27	8.44	3.27	45.00
0.167	0.00	0.00	11.77	0.19	2.77	3.72	3.44	0.50		4.56	11.77	4.53	43.57
0.333	0.00	0.00	9.97	0.00	0.58	1.44	3.79	1.48		5.22	13.48	5.09	41.19
0.5	0.00	0.00	8.44	0.00	0.11	1.07	3.08	2.20		5.33	13.76	5.11	39.16
1	0.00	0.00	5.12	0.00	0.00	0.93	1.34	2.77		5.33	13.77	4.90	34.21
2	0.00	0.00	1.88	0.00	0.00	0.82	0.29	1.69		5.24	13.51	4.57	28.05
4	0.00	0.00	0.25	0.00	0.00	0.66	0.08	0.40		5.07	13.09	4.20	23.78
8	0.00	0.00	0.00	0.00	0.00	0.43	0.05	0.10		4.86	12.54	3.54	21.54
10	0.00	0.00	0.00	0.00	0.00	0.35	0.04	0.08		4.80	12.39	3.21	20.90
20	0.00	0.00	0.00	0.00	0.00	0.16	0.02	0.03		4.73	12.20	1.83	18.97
30	0.00	0.00	0.00	0.00	0.00	0.08	0.01	0.02		4.73	12.19	1.02	18.04
							Adult						
0.042	0.22		14.28	3.95	4.65	14.83	0.95	0.03	0.89	1.32	1.06	5.56	47.73
0.083	0.00		13.70	1.48	5.30	9.11	2.36	0.15	1.19	2.28	1.83	9.23	46.61
0.167	0.00		12.60	0.20	3.39	4.34	4.34	0.64	0.97	3.23	2.59	12.06	44.34
0.333	0.00		10.67	0.00	0.89	2.31	5.02	1.90	0.47	3.93	3.15	12.50	40.84
0.5	0.00		9.03	0.00	0.21	1.84	4.26	2.90	0.31	4.25	3.42	11.82	38.05
1	0.00		5.48	0.00	0.00	1.30	2.07	3.85	0.20	4.63	3.72	10.02	31.27
2	0.00		2.01	0.00	0.00	0.82	0.57	2.57	0.12	4.46	3.58	8.45	22.58
4	0.00		0.27	0.00	0.00	0.46	0.17	0.72	0.07	3.71	2.98	7.46	15.83
8	0.00		0.00	0.00	0.00	0.23	0.07	0.16	0.03	3.08	2.47	5.96	12.02
10	0.00		0.00	0.00	0.00	0.18	0.06	0.12	0.03	3.00	2.41	5.25	11.04
20	0.00		0.00	0.00	0.00	0.08	0.02	0.05	0.01	2.99	2.40	2.71	8.26
30	0.00		0.00	0.00	0.00	0.04	0.01	0.02	0.01	3.00	2.41	1.41	6.90

Table A-5. Activity of Type *S* ^{90}Sr in DCAL Source Regions at Selected Times after Inhalation (%)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	UB_Cont	C_Bone	T_Bone	Other	Retained
							Infant						
0.042	10.51	0.93	20.11	12.62	12.71	0.04	1.52	0.04		0.00	0.01	0.00	58.96
0.083	10.44	0.85	19.30	5.01	16.98	0.08	5.11	0.27		0.01	0.03	0.01	58.14
0.167	10.30	0.74	17.74	0.77	13.40	0.12	11.71	1.51		0.03	0.11	0.04	56.52
0.333	10.09	0.65	15.03	0.08	5.37	0.08	16.17	5.35		0.06	0.24	0.08	53.23
0.5	9.93	0.60	12.72	0.05	2.08	0.04	14.90	8.89		0.08	0.30	0.10	49.71
1	9.66	0.54	7.71	0.02	0.19	0.02	7.29	12.90		0.08	0.34	0.11	38.87
2	9.45	0.49	2.84	0.01	0.03	0.02	1.35	8.24		0.08	0.34	0.10	22.98
4	9.27	0.46	0.38	0.00	0.02	0.02	0.09	1.53		0.08	0.33	0.09	12.29
8	8.96	0.41	0.01	0.00	0.01	0.01	0.05	0.12		0.08	0.32	0.08	10.07
10	8.81	0.39	0.00	0.00	0.01	0.01	0.05	0.09		0.08	0.32	0.08	9.85
20	8.16	0.29	0.00	0.00	0.01	0.00	0.04	0.07		0.08	0.33	0.05	9.05
30	7.64	0.21	0.00	0.00	0.01	0.00	0.03	0.05		0.08	0.33	0.03	8.42
							1-y-old						
0.042	11.26	0.91	20.20	12.67	12.77	0.03	1.53	0.04		0.00	0.00	0.01	59.89
0.083	11.20	0.83	19.39	5.03	17.09	0.05	5.14	0.27		0.00	0.01	0.02	59.07
0.167	11.09	0.72	17.83	0.76	13.53	0.06	11.79	1.52		0.01	0.04	0.04	57.44
0.333	10.91	0.63	15.10	0.07	5.45	0.04	16.33	5.39		0.02	0.08	0.08	54.13
0.5	10.77	0.59	12.78	0.04	2.11	0.03	15.06	8.97		0.03	0.10	0.10	50.59
1	10.54	0.53	7.75	0.02	0.18	0.01	7.35	13.02		0.03	0.12	0.10	39.67
2	10.35	0.49	2.85	0.01	0.03	0.01	1.35	8.31		0.03	0.12	0.08	23.65
4	10.17	0.46	0.39	0.00	0.02	0.01	0.09	1.54		0.03	0.11	0.07	12.90
8	9.84	0.41	0.01	0.00	0.01	0.00	0.05	0.12		0.02	0.10	0.07	10.65
10	9.69	0.38	0.00	0.00	0.01	0.00	0.05	0.09		0.02	0.09	0.06	10.43
20	9.02	0.29	0.00	0.00	0.01	0.00	0.04	0.07		0.02	0.09	0.04	9.61
30	8.48	0.21	0.00	0.00	0.01	0.00	0.03	0.06		0.02	0.10	0.02	8.95
							5-y-old						
0.042	11.62	0.91	16.68	10.38	10.45	0.03	1.25	0.03	0.00	0.00	0.00	0.01	51.74
0.083	11.55	0.83	16.00	4.14	14.00	0.04	4.20	0.22	0.00	0.00	0.01	0.01	51.06
0.167	11.42	0.72	14.72	0.65	11.12	0.05	9.67	1.24	0.00	0.01	0.03	0.04	49.71
0.333	11.23	0.63	12.46	0.08	4.53	0.04	13.43	4.42	0.00	0.02	0.06	0.08	46.99
0.5	11.08	0.58	10.55	0.04	1.78	0.02	12.42	7.37	0.00	0.02	0.07	0.09	44.07
1	10.83	0.52	6.40	0.02	0.18	0.01	6.13	10.76	0.00	0.03	0.09	0.08	35.06
2	10.63	0.48	2.35	0.01	0.03	0.01	1.15	6.92	0.00	0.03	0.09	0.07	21.78
4	10.44	0.45	0.32	0.00	0.02	0.01	0.09	1.30	0.00	0.02	0.08	0.07	12.81
8	10.10	0.40	0.01	0.00	0.01	0.00	0.05	0.12	0.00	0.02	0.07	0.06	10.86
10	9.95	0.38	0.00	0.00	0.01	0.00	0.05	0.09	0.00	0.02	0.07	0.05	10.64
20	9.25	0.28	0.00	0.00	0.01	0.00	0.04	0.07	0.00	0.02	0.07	0.03	9.80
30	8.69	0.21	0.00	0.00	0.01	0.00	0.03	0.06	0.00	0.02	0.07	0.02	9.13

Table A-5 (continued)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	UB_Cont	C_Bone	T_Bone	Other	Retained
							10-y-old						
0.042	11.13	1.02	17.02	10.64	10.71	0.03	1.28	0.03		0.00	0.00	0.00	52.26
0.083	11.07	0.91	16.34	4.25	14.35	0.04	4.31	0.23		0.00	0.01	0.01	51.57
0.167	10.96	0.79	15.02	0.67	11.41	0.05	9.91	1.28		0.01	0.04	0.03	50.20
0.333	10.77	0.68	12.72	0.07	4.64	0.03	13.77	4.53		0.03	0.08	0.06	47.42
0.5	10.64	0.64	10.77	0.04	1.81	0.02	12.73	7.56		0.03	0.10	0.07	44.43
1	10.40	0.58	6.53	0.02	0.17	0.01	6.26	11.02		0.04	0.11	0.07	35.22
2	10.22	0.54	2.40	0.01	0.03	0.01	1.17	7.07		0.04	0.11	0.06	21.66
4	10.04	0.51	0.33	0.00	0.02	0.01	0.09	1.32		0.04	0.11	0.06	12.52
8	9.72	0.45	0.01	0.00	0.01	0.00	0.05	0.12		0.03	0.10	0.05	10.56
10	9.57	0.42	0.00	0.00	0.01	0.00	0.05	0.09		0.03	0.10	0.05	10.34
20	8.91	0.32	0.00	0.00	0.01	0.00	0.04	0.07		0.03	0.10	0.03	9.53
30	8.37	0.23	0.00	0.00	0.01	0.00	0.03	0.06		0.04	0.10	0.02	8.88
							15-y-old						
0.042	12.55	1.44	13.34	8.51	8.53	0.02	1.02	0.02		0.00	0.01	0.00	45.80
0.083	12.47	1.28	12.80	3.47	11.49	0.03	3.44	0.18		0.01	0.01	0.01	45.26
0.167	12.34	1.09	11.77	0.60	9.25	0.04	7.95	1.02		0.02	0.04	0.02	44.18
0.333	12.12	0.94	9.97	0.09	3.86	0.03	11.16	3.65		0.03	0.08	0.03	42.00
0.5	11.96	0.88	8.44	0.05	1.56	0.02	10.41	6.12		0.04	0.10	0.04	39.63
1	11.69	0.80	5.12	0.02	0.17	0.01	5.22	9.02		0.04	0.11	0.04	32.26
2	11.47	0.75	1.88	0.01	0.03	0.01	1.01	5.87		0.04	0.11	0.04	21.25
4	11.26	0.71	0.25	0.00	0.02	0.01	0.09	1.14		0.04	0.11	0.04	13.69
8	10.90	0.63	0.00	0.00	0.02	0.00	0.06	0.13		0.04	0.11	0.03	11.95
10	10.74	0.59	0.00	0.00	0.02	0.00	0.06	0.10		0.04	0.11	0.03	11.71
20	9.99	0.44	0.00	0.00	0.01	0.00	0.04	0.08		0.05	0.12	0.02	10.78
30	9.38	0.33	0.00	0.00	0.01	0.00	0.04	0.06		0.05	0.13	0.01	10.03
							Adult						
0.042	14.45		14.28	8.86	8.90	0.02	1.06	0.02	0.00	0.00	0.00	0.01	47.96
0.083	14.27		13.70	3.57	11.96	0.03	3.58	0.19	0.00	0.00	0.00	0.02	47.38
0.167	14.00		12.60	0.59	9.56	0.04	8.27	1.06	0.00	0.01	0.01	0.04	46.23
0.333	13.67		10.67	0.08	3.95	0.03	11.55	3.79	0.01	0.02	0.02	0.08	43.89
0.5	13.46		9.03	0.05	1.58	0.02	10.73	6.34	0.00	0.03	0.02	0.09	41.39
1	13.12		5.48	0.02	0.17	0.01	5.35	9.31	0.00	0.04	0.03	0.09	33.64
2	12.86		2.01	0.01	0.03	0.01	1.04	6.04	0.00	0.04	0.03	0.08	22.16
4	12.61		0.27	0.00	0.02	0.00	0.09	1.17	0.00	0.03	0.03	0.07	14.31
8	12.17		0.00	0.00	0.02	0.00	0.06	0.13	0.00	0.03	0.02	0.06	12.50
10	11.96		0.00	0.00	0.02	0.00	0.06	0.11	0.00	0.03	0.02	0.05	12.26
20	11.06		0.00	0.00	0.01	0.00	0.04	0.08	0.00	0.03	0.02	0.03	11.30
30	10.33		0.00	0.00	0.01	0.00	0.04	0.07	0.00	0.03	0.03	0.02	10.54

Table A-6. Activity of Type F ^{131}I in DCAL Source Regions at Selected Times after Inhalation (%)

Time (d)	ET1	Stomach	SI	Blood	LLI	Thyroid	UB_Cont	Other	Retained
				Infant					
0.042	20.04	5.63	0.23	29.87	0.00	0.82	1.03	0.00	57.87
0.083	19.16	2.10	0.09	30.12	0.01	1.84	1.38	0.00	54.81
0.167	17.49	0.28	0.01	25.29	0.02	3.76	1.30	0.02	48.27
0.333	14.60	0.01	0.00	15.93	0.05	6.43	0.83	0.07	38.00
0.5	12.18	0.00	0.00	9.89	0.06	8.01	0.52	0.13	30.86
1	7.08	0.00	0.00	2.40	0.06	9.54	0.13	0.33	19.57
2	2.39	0.00	0.00	0.22	0.05	8.86	0.01	0.57	12.15
4	0.27	0.00	0.00	0.11	0.07	6.78	0.01	0.64	7.91
8	0.00	0.00	0.00	0.08	0.05	3.99	0.00	0.43	4.58
10	0.00	0.00	0.00	0.06	0.04	3.07	0.00	0.33	3.52
20	0.00	0.00	0.00	0.02	0.01	0.83	0.00	0.09	0.95
30	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.02	0.26
				1-y-old					
0.042	20.13	5.65	0.24	30.60	0.00	0.84	1.18	0.00	58.90
0.083	19.25	2.11	0.09	30.79	0.01	1.89	1.69	0.00	55.94
0.167	17.58	0.28	0.01	25.83	0.02	3.85	1.66	0.01	49.35
0.333	14.68	0.01	0.00	16.27	0.05	6.59	1.08	0.05	38.80
0.5	12.24	0.00	0.00	10.10	0.06	8.23	0.67	0.10	31.46
1	7.11	0.00	0.00	2.44	0.06	9.85	0.16	0.27	19.92
2	2.40	0.00	0.00	0.19	0.05	9.26	0.01	0.50	12.43
4	0.27	0.00	0.00	0.08	0.05	7.24	0.00	0.62	8.29
8	0.00	0.00	0.00	0.06	0.04	4.45	0.00	0.46	5.05
10	0.00	0.00	0.00	0.05	0.04	3.50	0.00	0.37	3.98
20	0.00	0.00	0.00	0.02	0.01	1.05	0.00	0.11	1.20
30	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.03	0.36
				5-y-old					
0.042	16.61	4.62	0.19	27.36	0.00	0.75	1.43	0.00	51.23
0.083	15.89	1.72	0.07	27.29	0.01	1.69	2.60	0.00	49.36
0.167	14.50	0.23	0.01	22.78	0.02	3.42	3.48	0.01	44.54
0.333	12.11	0.00	0.00	14.34	0.04	5.85	2.83	0.03	35.27
0.5	10.10	0.00	0.00	8.90	0.05	7.31	1.85	0.06	28.31
1	5.87	0.00	0.00	2.14	0.05	8.80	0.45	0.16	17.49
2	1.98	0.00	0.00	0.15	0.03	8.38	0.03	0.33	10.91
4	0.23	0.00	0.00	0.04	0.02	6.72	0.01	0.46	7.49
8	0.00	0.00	0.00	0.04	0.02	4.32	0.01	0.41	4.82
10	0.00	0.00	0.00	0.03	0.02	3.47	0.00	0.35	3.89
20	0.00	0.00	0.00	0.01	0.01	1.17	0.00	0.13	1.32
30	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.04	0.45

Table A-6 (continued)

Time (d)	ET1	Stomach	SI	Blood	LLI	Thyroid	UB_Cont	Other	Retained
				10-y-old					
0.042	16.96	4.73	0.20	27.42	0.00	0.75	1.43	0.00	51.75
0.083	16.22	1.76	0.07	27.41	0.01	1.69	2.61	0.00	49.87
0.167	14.80	0.23	0.01	22.91	0.02	3.44	3.50	0.00	45.01
0.333	12.36	0.00	0.00	14.42	0.04	5.90	2.84	0.01	35.65
0.5	10.31	0.00	0.00	8.95	0.05	7.38	1.86	0.03	28.62
1	5.99	0.00	0.00	2.14	0.05	8.95	0.45	0.07	17.68
2	2.02	0.00	0.00	0.13	0.03	8.67	0.03	0.15	11.02
4	0.23	0.00	0.00	0.01	0.01	7.16	0.00	0.26	7.67
8	0.00	0.00	0.00	0.01	0.01	4.86	0.00	0.30	5.19
10	0.00	0.00	0.00	0.01	0.01	4.01	0.00	0.29	4.32
20	0.00	0.00	0.00	0.01	0.00	1.54	0.00	0.15	1.70
30	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.06	0.66
				15-y-old					
0.042	13.29	3.76	0.16	25.79	0.00	0.71	1.35	0.00	45.33
0.083	12.71	1.40	0.06	25.40	0.01	1.59	2.44	0.00	43.68
0.167	11.60	0.19	0.01	21.05	0.02	3.20	3.24	0.00	39.37
0.333	9.69	0.00	0.00	13.23	0.03	5.46	2.61	0.01	31.08
0.5	8.08	0.00	0.00	8.21	0.04	6.82	1.70	0.02	24.91
1	4.69	0.00	0.00	1.97	0.04	8.26	0.41	0.06	15.45
2	1.58	0.00	0.00	0.12	0.02	8.01	0.02	0.12	9.88
4	0.18	0.00	0.00	0.01	0.01	6.63	0.00	0.21	7.04
8	0.00	0.00	0.00	0.01	0.00	4.53	0.00	0.25	4.80
10	0.00	0.00	0.00	0.01	0.00	3.74	0.00	0.24	4.00
20	0.00	0.00	0.00	0.00	0.00	1.45	0.00	0.13	1.60
30	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.06	0.63
				Adult					
0.042	14.23	3.93	0.16	26.74	0.00	0.74	1.40	0.00	47.47
0.083	13.61	1.47	0.06	26.35	0.01	1.65	2.53	0.00	45.74
0.167	12.42	0.19	0.01	21.84	0.02	3.32	3.36	0.00	41.24
0.333	10.37	0.00	0.00	13.73	0.03	5.66	2.71	0.01	32.57
0.5	8.65	0.00	0.00	8.52	0.04	7.08	1.77	0.02	26.11
1	5.03	0.00	0.00	2.04	0.04	8.58	0.43	0.05	16.18
2	1.70	0.00	0.00	0.12	0.02	8.33	0.02	0.11	10.30
4	0.19	0.00	0.00	0.00	0.00	6.92	0.00	0.20	7.32
8	0.00	0.00	0.00	0.00	0.00	4.75	0.00	0.26	5.02
10	0.00	0.00	0.00	0.00	0.00	3.93	0.00	0.26	4.20
20	0.00	0.00	0.00	0.00	0.00	1.54	0.00	0.17	1.71
30	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.08	0.69

Table A-7. Activity of Type *F* ^{137}Cs in DCAL Source Regions at Selected Times after Inhalation (%)

Time (d)	ET1	Stomach	Blood	LLI	Body tissues	Retained
			Infant			
0.042	20.11	5.65	29.98	0.00	2.73	58.96
0.083	19.30	2.11	30.33	0.01	6.19	58.15
0.167	17.74	0.28	25.66	0.03	12.72	56.57
0.333	15.03	0.01	16.39	0.05	22.14	53.75
0.5	12.72	0.00	10.32	0.07	28.04	51.29
1	7.71	0.00	2.58	0.14	35.07	45.67
2	2.84	0.00	0.16	0.23	35.93	39.36
4	0.38	0.00	0.00	0.29	33.08	33.95
8	0.01	0.00	0.00	0.26	27.79	28.22
10	0.00	0.00	0.00	0.24	25.46	25.85
20	0.00	0.00	0.00	0.15	16.41	16.66
30	0.00	0.00	0.00	0.10	10.53	10.695
			1-y-old			
0.042	20.20	5.67	30.71	0.00	2.80	59.89
0.083	19.39	2.12	31.01	0.01	6.34	59.08
0.167	17.83	0.28	26.20	0.03	13.00	57.48
0.333	15.10	0.01	16.74	0.05	22.59	54.64
0.5	12.78	0.00	10.54	0.08	28.57	52.13
1	7.75	0.00	2.63	0.15	35.59	46.34
2	2.85	0.00	0.16	0.28	36.12	39.67
4	0.39	0.00	0.00	0.36	32.61	33.60
8	0.01	0.00	0.00	0.31	26.34	26.85
10	0.00	0.00	0.00	0.27	23.68	24.13
20	0.00	0.00	0.00	0.16	13.89	14.15
30	0.00	0.00	0.00	0.09	8.15	8.304
			5-y-old			
0.042	16.68	4.64	27.46	0.00	2.51	51.74
0.083	16.00	1.74	27.49	0.01	5.66	51.06
0.167	14.72	0.23	23.11	0.02	11.55	49.76
0.333	12.46	0.00	14.75	0.04	20.02	47.43
0.5	10.55	0.00	9.29	0.06	25.31	45.38
1	6.40	0.00	2.32	0.12	31.60	40.66
2	2.35	0.00	0.15	0.22	32.27	35.25
4	0.32	0.00	0.00	0.27	29.62	30.45
8	0.01	0.00	0.00	0.23	24.91	25.33
10	0.00	0.00	0.00	0.20	22.94	23.31
20	0.00	0.00	0.00	0.12	15.72	15.94
30	0.00	0.00	0.00	0.07	11.33	11.466

Table A-7 (continued)

Time (d)	ET1	Stomach	Blood	LLI	Body tissues	Retained
			10-y-old			
0.042	17.02	4.75	27.52	0.00	2.52	52.26
0.083	16.34	1.78	27.61	0.01	5.67	51.58
0.167	15.02	0.24	23.24	0.02	11.60	50.25
0.333	12.72	0.00	14.84	0.04	20.12	47.88
0.5	10.77	0.00	9.34	0.06	25.45	45.79
1	6.53	0.00	2.34	0.12	31.80	41.01
2	2.40	0.00	0.15	0.21	32.58	35.58
4	0.33	0.00	0.00	0.25	30.22	31.00
8	0.01	0.00	0.00	0.19	26.35	26.69
10	0.00	0.00	0.00	0.16	24.83	25.12
20	0.00	0.00	0.00	0.08	19.71	19.86
30	0.00	0.00	0.00	0.05	16.60	16.70
			15-y-old			
0.042	13.34	3.78	25.88		2.38	45.80
0.083	12.80	1.41	25.58		5.32	45.26
0.167	11.77	0.19	21.35		10.78	44.22
0.333	9.97	0.00	13.61		18.60	42.35
0.5	8.44	0.00	8.57		23.49	40.70
1	5.12	0.00	2.14		29.34	36.89
2	1.88	0.00	0.13		30.23	32.61
4	0.25	0.00	0.00		28.76	29.31
8	0.00	0.00	0.00		26.98	27.13
10	0.00	0.00	0.00		26.40	26.52
20	0.00	0.00	0.00		24.31	24.38
30	0.00	0.00	0.00		22.55	22.61
			Adult			
0.042	14.28	3.95	26.83		2.46	47.96
0.083	13.70	1.48	26.54		5.52	47.39
0.167	12.60	0.20	22.16		11.19	46.27
0.333	10.67	0.00	14.13		19.32	44.28
0.5	9.03	0.00	8.89		24.42	42.54
1	5.48	0.00	2.22		30.59	38.56
2	2.01	0.00	0.14		31.71	34.18
4	0.27	0.00	0.00		30.51	31.03
8	0.00	0.00	0.00		29.04	29.16
10	0.00	0.00	0.00		28.56	28.65
20	0.00	0.00	0.00		26.69	26.75
30	0.00	0.00	0.00		25.04	25.10

Table A-8. Activity of Type *F* ^{192}Ir in DCAL Source Regions at Selected Times after Inhalation (%)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Liver	Kidneys	Spleen	Other	Retained
						Infant							
0.042	0.16	0.01	20.10	5.65	7.00	22.75	1.15	0.03	0.46	0.09	0.05	1.25	58.82
0.083	0.00	0.00	19.28	2.11	8.51	20.50	3.22	0.19	0.95	0.19	0.10	2.58	57.77
0.167	0.00	0.00	17.72	0.28	6.40	16.30	6.73	0.92	1.80	0.36	0.18	4.87	55.67
0.333	0.00	0.00	14.98	0.01	2.44	10.33	9.00	3.06	3.00	0.60	0.30	8.09	51.89
0.5	0.00	0.00	12.66	0.00	0.88	6.52	8.29	5.01	3.75	0.75	0.37	10.12	48.40
1	0.00	0.00	7.64	0.00	0.04	1.63	4.14	7.23	4.66	0.93	0.47	12.59	39.35
2	0.00	0.00	2.79	0.00	0.00	0.10	0.82	4.66	4.83	0.97	0.48	13.05	27.69
4	0.00	0.00	0.37	0.00	0.00	0.00	0.11	0.94	4.60	0.92	0.46	12.42	19.81
8	0.00	0.00	0.01	0.00	0.00	0.00	0.06	0.14	4.18	0.84	0.42	11.28	16.92
10	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.11	4.00	0.80	0.40	10.79	16.16
20	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	3.32	0.66	0.33	8.95	13.34
30	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	2.84	0.57	0.28	7.67	11.41
						1-y-old							
0.042	0.17	0.01	20.20	5.67	7.03	23.45	1.16	0.03	0.48	0.10	0.05	1.28	59.77
0.083	0.00	0.00	19.38	2.12	8.56	21.11	3.25	0.19	0.98	0.20	0.10	2.65	58.72
0.167	0.00	0.00	17.80	0.28	6.47	16.75	6.79	0.93	1.86	0.37	0.19	5.01	56.60
0.333	0.00	0.00	15.06	0.01	2.49	10.59	9.12	3.09	3.08	0.62	0.31	8.32	52.78
0.5	0.00	0.00	12.72	0.00	0.91	6.66	8.42	5.07	3.85	0.77	0.38	10.39	49.24
1	0.00	0.00	7.68	0.00	0.04	1.66	4.22	7.34	4.78	0.96	0.48	12.92	40.10
2	0.00	0.00	2.80	0.00	0.00	0.10	0.83	4.74	4.96	0.99	0.50	13.38	28.30
4	0.00	0.00	0.37	0.00	0.00	0.00	0.11	0.95	4.72	0.94	0.47	12.74	20.31
8	0.00	0.00	0.01	0.00	0.00	0.00	0.07	0.14	4.28	0.86	0.43	11.56	17.35
10	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.11	4.10	0.82	0.41	11.07	16.57
20	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	3.40	0.68	0.34	9.18	13.68
30	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	2.91	0.58	0.29	7.86	11.70
						5-y-old							
0.042	0.17	0.01	16.67	4.64	5.75	21.52	0.97	0.03	0.43	0.09	0.04	1.17	51.67
0.083	0.00	0.00	15.99	1.73	7.00	19.39	2.70	0.16	0.90	0.18	0.09	2.43	50.86
0.167	0.00	0.00	14.69	0.23	5.29	15.38	5.63	0.77	1.70	0.34	0.17	4.59	49.16
0.333	0.00	0.00	12.43	0.00	2.04	9.72	7.57	2.57	2.83	0.57	0.28	7.63	45.91
0.5	0.00	0.00	10.50	0.00	0.74	6.12	7.00	4.21	3.53	0.71	0.35	9.53	42.89
1	0.00	0.00	6.34	0.00	0.04	1.52	3.53	6.12	4.39	0.88	0.44	11.85	35.16
2	0.00	0.00	2.31	0.00	0.00	0.09	0.71	3.97	4.55	0.91	0.45	12.27	25.28
4	0.00	0.00	0.31	0.00	0.00	0.00	0.10	0.81	4.33	0.87	0.43	11.68	18.54
8	0.00	0.00	0.01	0.00	0.00	0.00	0.06	0.13	3.93	0.79	0.39	10.61	15.92
10	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.10	3.76	0.75	0.38	10.15	15.20
20	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	3.12	0.62	0.31	8.42	12.56
30	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	2.67	0.53	0.27	7.21	10.73

Table A-8 (continued)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Liver	Kidneys	Spleen	Other	Retained
						10-y-old							
0.042	0.17	0.02	17.01	4.75	5.89	21.44	0.99	0.03	0.43	0.09	0.04	1.17	52.20
0.083	0.00	0.00	16.32	1.78	7.17	19.31	2.76	0.16	0.90	0.18	0.09	2.42	51.38
0.167	0.00	0.00	15.00	0.24	5.42	15.32	5.75	0.78	1.70	0.34	0.17	4.58	49.65
0.333	0.00	0.00	12.68	0.00	2.09	9.68	7.73	2.62	2.82	0.56	0.28	7.60	46.35
0.5	0.00	0.00	10.72	0.00	0.76	6.09	7.14	4.30	3.52	0.70	0.35	9.50	43.27
1	0.00	0.00	6.47	0.00	0.04	1.52	3.60	6.24	4.37	0.87	0.44	11.80	35.40
2	0.00	0.00	2.36	0.00	0.00	0.09	0.72	4.04	4.53	0.91	0.45	12.23	25.34
4	0.00	0.00	0.31	0.00	0.00	0.00	0.10	0.82	4.31	0.86	0.43	11.64	18.49
8	0.00	0.00	0.01	0.00	0.00	0.00	0.06	0.13	3.91	0.78	0.39	10.57	15.86
10	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.10	3.75	0.75	0.37	10.12	15.15
20	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	3.11	0.62	0.31	8.39	12.51
30	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	2.66	0.53	0.27	7.19	10.69
						15-y-old							
0.042	0.19	0.02	13.33	3.78	4.68	21.05	0.82	0.02	0.42	0.08	0.04	1.13	45.74
0.083	0.00	0.00	12.79	1.41	5.70	18.98	2.27	0.13	0.87	0.17	0.09	2.36	45.07
0.167	0.00	0.00	11.75	0.19	4.31	15.05	4.71	0.64	1.66	0.33	0.17	4.48	43.64
0.333	0.00	0.00	9.94	0.00	1.66	9.51	6.33	2.15	2.76	0.55	0.28	7.45	40.91
0.5	0.00	0.00	8.40	0.00	0.60	5.98	5.88	3.53	3.45	0.69	0.34	9.32	38.38
1	0.00	0.00	5.07	0.00	0.03	1.49	3.00	5.15	4.29	0.86	0.43	11.58	31.95
2	0.00	0.00	1.85	0.00	0.00	0.09	0.62	3.37	4.44	0.89	0.44	12.00	23.72
4	0.00	0.00	0.25	0.00	0.00	0.00	0.10	0.71	4.23	0.85	0.42	11.42	17.98
8	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.12	3.84	0.77	0.38	10.37	15.56
10	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.10	3.68	0.74	0.37	9.92	14.86
20	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	3.05	0.61	0.30	8.23	12.27
30	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	2.61	0.52	0.26	7.05	10.49
						Adult							
0.042	0.22		14.27	3.95	4.89	21.78	0.86	0.02	0.43	0.09	0.04	1.17	47.90
0.083	0.00		13.69	1.48	5.96	19.64	2.36	0.14	0.91	0.18	0.09	2.44	47.19
0.167	0.00		12.58	0.20	4.50	15.58	4.91	0.67	1.72	0.34	0.17	4.64	45.68
0.333	0.00		10.64	0.00	1.73	9.84	6.61	2.24	2.86	0.57	0.29	7.71	42.78
0.5	0.00		8.99	0.00	0.63	6.19	6.14	3.68	3.57	0.71	0.36	9.64	40.10
1	0.00		5.43	0.00	0.03	1.54	3.13	5.37	4.44	0.89	0.44	11.98	33.31
2	0.00		1.98	0.00	0.00	0.10	0.64	3.51	4.60	0.92	0.46	12.42	24.64
4	0.00		0.26	0.00	0.00	0.00	0.10	0.74	4.38	0.88	0.44	11.82	18.62
8	0.00		0.00	0.00	0.00	0.00	0.06	0.13	3.97	0.79	0.40	10.73	16.10
10	0.00		0.00	0.00	0.00	0.00	0.05	0.10	3.80	0.76	0.38	10.27	15.38
20	0.00		0.00	0.00	0.00	0.00	0.03	0.05	3.16	0.63	0.32	8.52	12.70
30	0.00		0.00	0.00	0.00	0.00	0.02	0.03	2.70	0.54	0.27	7.30	10.86

Table A-9. Activity of Type *M* ^{192}Ir in DCAL Source Regions at Selected Times after Inhalation (%)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Liver	Kidneys	Spleen	Other	Retained
						Infant							
0.042	9.48	0.83	20.10	11.92	12.14	2.31	1.48	0.04	0.05	0.01	0.00	0.13	58.92
0.083	9.39	0.76	19.28	4.72	16.13	2.14	4.92	0.26	0.10	0.02	0.01	0.26	58.07
0.167	9.26	0.67	17.72	0.72	12.69	1.84	11.20	1.45	0.19	0.04	0.02	0.51	56.35
0.333	9.05	0.58	14.98	0.07	5.07	1.30	15.43	5.11	0.33	0.07	0.03	0.90	52.95
0.5	8.88	0.54	12.66	0.04	1.95	0.87	14.20	8.47	0.43	0.09	0.04	1.16	49.36
1	8.58	0.48	7.64	0.02	0.18	0.25	6.93	12.24	0.56	0.11	0.06	1.51	38.57
2	8.28	0.43	2.79	0.01	0.02	0.03	1.28	7.77	0.60	0.12	0.06	1.61	23.01
4	7.89	0.39	0.37	0.00	0.01	0.02	0.09	1.43	0.59	0.12	0.06	1.58	12.56
8	7.20	0.33	0.01	0.00	0.01	0.01	0.05	0.12	0.56	0.11	0.06	1.52	9.99
10	6.89	0.30	0.00	0.00	0.01	0.01	0.05	0.09	0.55	0.11	0.06	1.49	9.57
20	5.54	0.19	0.00	0.00	0.01	0.01	0.03	0.06	0.52	0.10	0.05	1.39	7.91
30	4.50	0.13	0.00	0.00	0.01	0.01	0.02	0.04	0.48	0.10	0.05	1.31	6.65
						1-y-old							
0.042	10.16	0.82	20.20	11.97	12.20	2.36	1.49	0.04	0.05	0.01	0.00	0.13	59.86
0.083	10.08	0.75	19.38	4.73	16.23	2.16	4.94	0.26	0.10	0.02	0.01	0.27	59.00
0.167	9.96	0.65	17.80	0.72	12.81	1.78	11.28	1.46	0.19	0.04	0.02	0.51	57.28
0.333	9.78	0.56	15.06	0.07	5.14	1.20	15.57	5.15	0.32	0.06	0.03	0.88	53.86
0.5	9.64	0.53	12.72	0.04	1.98	0.78	14.34	8.55	0.41	0.08	0.04	1.12	50.25
1	9.36	0.47	7.68	0.02	0.17	0.22	6.99	12.36	0.53	0.11	0.05	1.43	39.39
2	9.07	0.43	2.80	0.01	0.02	0.03	1.28	7.82	0.56	0.11	0.06	1.51	23.72
4	8.65	0.39	0.37	0.00	0.01	0.02	0.09	1.43	0.55	0.11	0.06	1.49	13.20
8	7.92	0.33	0.01	0.00	0.01	0.02	0.05	0.12	0.53	0.11	0.05	1.44	10.60
10	7.58	0.30	0.00	0.00	0.01	0.01	0.05	0.09	0.53	0.11	0.05	1.42	10.17
20	6.12	0.19	0.00	0.00	0.01	0.01	0.03	0.06	0.50	0.10	0.05	1.35	8.44
30	4.99	0.13	0.00	0.00	0.01	0.01	0.02	0.04	0.47	0.09	0.05	1.28	7.10
						5-y-old							
0.042	10.48	0.82	16.67	9.80	9.98	2.17	1.22	0.03	0.04	0.01	0.00	0.12	51.71
0.083	10.39	0.74	15.99	3.90	13.30	1.98	4.05	0.22	0.09	0.02	0.01	0.24	51.01
0.167	10.27	0.65	14.69	0.61	10.53	1.63	9.25	1.20	0.17	0.03	0.02	0.47	49.59
0.333	10.07	0.56	12.43	0.07	4.27	1.09	12.81	4.23	0.30	0.06	0.03	0.80	46.76
0.5	9.91	0.52	10.50	0.04	1.67	0.71	11.84	7.03	0.38	0.08	0.04	1.02	43.77
1	9.62	0.46	6.34	0.02	0.16	0.20	5.83	10.22	0.48	0.10	0.05	1.30	34.78
2	9.31	0.42	2.31	0.01	0.02	0.03	1.09	6.52	0.51	0.10	0.05	1.38	21.77
4	8.88	0.38	0.31	0.00	0.01	0.02	0.09	1.22	0.51	0.10	0.05	1.37	12.95
8	8.12	0.32	0.01	0.00	0.01	0.02	0.05	0.11	0.49	0.10	0.05	1.33	10.63
10	7.77	0.29	0.00	0.00	0.01	0.01	0.05	0.09	0.49	0.10	0.05	1.32	10.20
20	6.28	0.19	0.00	0.00	0.01	0.01	0.03	0.06	0.47	0.09	0.05	1.26	8.46
30	5.11	0.12	0.00	0.00	0.01	0.01	0.02	0.04	0.45	0.09	0.04	1.21	7.13

Table A-9 (continued)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Liver	Kidneys	Spleen	Other	Retained
						10-y-old							
0.042	10.04	0.92	17.01	10.05	10.23	2.16	1.25	0.03	0.04	0.01	0.00	0.12	52.24
0.083	9.96	0.82	16.32	4.00	13.63	1.97	4.15	0.22	0.09	0.02	0.01	0.24	51.52
0.167	9.85	0.71	15.00	0.62	10.80	1.62	9.49	1.23	0.17	0.03	0.02	0.47	50.07
0.333	9.66	0.61	12.68	0.07	4.37	1.09	13.13	4.33	0.30	0.06	0.03	0.80	47.18
0.5	9.52	0.57	10.72	0.04	1.70	0.71	12.13	7.20	0.38	0.08	0.04	1.02	44.14
1	9.24	0.52	6.47	0.02	0.16	0.20	5.95	10.46	0.48	0.10	0.05	1.30	34.94
2	8.95	0.47	2.36	0.01	0.02	0.03	1.11	6.66	0.51	0.10	0.05	1.38	21.66
4	8.54	0.43	0.31	0.00	0.01	0.02	0.09	1.23	0.50	0.10	0.05	1.36	12.67
8	7.81	0.36	0.01	0.00	0.01	0.02	0.05	0.11	0.49	0.10	0.05	1.33	10.35
10	7.48	0.33	0.00	0.00	0.01	0.01	0.05	0.09	0.49	0.10	0.05	1.31	9.93
20	6.04	0.21	0.00	0.00	0.01	0.01	0.03	0.06	0.46	0.09	0.05	1.25	8.23
30	4.93	0.14	0.00	0.00	0.01	0.01	0.02	0.04	0.44	0.09	0.04	1.20	6.93
						15-y-old							
0.042	11.32	1.30	13.33	8.04	8.14	2.12	1.00	0.02	0.04	0.01	0.00	0.11	45.78
0.083	11.23	1.15	12.79	3.26	10.91	1.93	3.32	0.18	0.09	0.02	0.01	0.24	45.21
0.167	11.09	0.98	11.75	0.56	8.75	1.58	7.62	0.98	0.17	0.03	0.02	0.46	44.07
0.333	10.87	0.84	9.94	0.08	3.63	1.05	10.66	3.49	0.29	0.06	0.03	0.78	41.77
0.5	10.70	0.79	8.40	0.05	1.46	0.69	9.92	5.84	0.37	0.07	0.04	0.99	39.34
1	10.38	0.71	5.07	0.02	0.16	0.19	4.96	8.57	0.47	0.09	0.05	1.26	31.95
2	10.05	0.66	1.85	0.01	0.03	0.03	0.96	5.54	0.50	0.10	0.05	1.34	21.12
4	9.59	0.60	0.25	0.00	0.02	0.02	0.09	1.06	0.49	0.10	0.05	1.33	13.62
8	8.77	0.50	0.00	0.00	0.01	0.02	0.06	0.12	0.49	0.10	0.05	1.31	11.44
10	8.39	0.46	0.00	0.00	0.01	0.02	0.05	0.10	0.48	0.10	0.05	1.30	10.98
20	6.78	0.30	0.00	0.00	0.01	0.01	0.04	0.07	0.47	0.09	0.05	1.27	9.09
30	5.52	0.19	0.00	0.00	0.01	0.01	0.03	0.05	0.45	0.09	0.05	1.23	7.63
						Adult							
0.042	13.04		14.27	8.37	8.50	2.19	1.04	0.02	0.04	0.01	0.00	0.12	47.94
0.083	12.84		13.69	3.36	11.35	2.00	3.46	0.18	0.09	0.02	0.01	0.25	47.33
0.167	12.58		12.58	0.55	9.05	1.64	7.92	1.02	0.18	0.04	0.02	0.47	46.11
0.333	12.26		10.64	0.07	3.72	1.09	11.03	3.63	0.30	0.06	0.03	0.80	43.67
0.5	12.04		8.99	0.04	1.48	0.71	10.24	6.05	0.38	0.08	0.04	1.02	41.10
1	11.65		5.43	0.02	0.16	0.20	5.09	8.84	0.48	0.10	0.05	1.30	33.34
2	11.26		1.98	0.01	0.03	0.03	0.98	5.69	0.51	0.10	0.05	1.39	22.05
4	10.73		0.26	0.00	0.02	0.02	0.09	1.09	0.51	0.10	0.05	1.38	14.27
8	9.78		0.00	0.00	0.01	0.02	0.06	0.12	0.50	0.10	0.05	1.36	12.03
10	9.35		0.00	0.00	0.01	0.02	0.05	0.10	0.50	0.10	0.05	1.35	11.55
20	7.50		0.00	0.00	0.01	0.01	0.04	0.07	0.49	0.10	0.05	1.32	9.59
30	6.08		0.00	0.00	0.01	0.01	0.03	0.05	0.47	0.09	0.05	1.28	8.08

Table A-10. Activity of Type *S* ^{192}Ir in DCAL Source Regions at Selected Times after Inhalation (%)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Liver	Kidneys	Spleen	Other	Retained
							Infant						
0.042	10.51	0.93	20.10	12.62	12.71	0.05	1.52	0.04	0.00	0.00	0.00	0.00	58.94
0.083	10.43	0.85	19.28	5.01	16.97	0.12	5.11	0.27	0.00	0.00	0.00	0.01	58.10
0.167	10.29	0.74	17.72	0.77	13.38	0.24	11.70	1.51	0.01	0.00	0.00	0.03	56.43
0.333	10.06	0.65	14.98	0.08	5.35	0.29	16.14	5.33	0.04	0.01	0.00	0.10	53.06
0.5	9.88	0.60	12.66	0.05	2.07	0.24	14.85	8.85	0.06	0.01	0.01	0.17	49.47
1	9.57	0.53	7.64	0.02	0.19	0.08	7.24	12.80	0.10	0.02	0.01	0.27	38.48
2	9.28	0.48	2.79	0.01	0.03	0.01	1.33	8.11	0.11	0.02	0.01	0.31	22.50
4	8.93	0.44	0.37	0.00	0.02	0.00	0.09	1.48	0.11	0.02	0.01	0.30	11.79
8	8.31	0.38	0.01	0.00	0.01	0.00	0.05	0.11	0.10	0.02	0.01	0.28	9.30
10	8.03	0.35	0.00	0.00	0.01	0.00	0.04	0.08	0.10	0.02	0.01	0.27	8.93
20	6.78	0.24	0.00	0.00	0.01	0.00	0.03	0.06	0.09	0.02	0.01	0.23	7.47
30	5.78	0.16	0.00	0.00	0.01	0.00	0.02	0.04	0.08	0.02	0.01	0.20	6.33
							1-y-old						
0.042	11.26	0.91	20.20	12.66	12.77	0.04	1.53	0.04	0.00	0.00	0.00	0.00	59.87
0.083	11.19	0.83	19.38	5.02	17.07	0.07	5.13	0.27	0.00	0.00	0.00	0.00	59.03
0.167	11.07	0.72	17.80	0.76	13.51	0.13	11.78	1.52	0.01	0.00	0.00	0.02	57.35
0.333	10.87	0.63	15.06	0.07	5.43	0.15	16.28	5.37	0.02	0.00	0.00	0.05	53.97
0.5	10.72	0.58	12.72	0.04	2.10	0.12	15.00	8.93	0.03	0.01	0.00	0.09	50.36
1	10.44	0.53	7.68	0.02	0.18	0.04	7.29	12.91	0.05	0.01	0.01	0.14	39.31
2	10.16	0.48	2.80	0.01	0.03	0.00	1.33	8.16	0.06	0.01	0.01	0.16	23.22
4	9.79	0.44	0.37	0.00	0.02	0.00	0.09	1.48	0.06	0.01	0.01	0.16	12.45
8	9.14	0.38	0.01	0.00	0.01	0.00	0.05	0.11	0.05	0.01	0.01	0.15	9.93
10	8.83	0.35	0.00	0.00	0.01	0.00	0.04	0.08	0.05	0.01	0.01	0.14	9.55
20	7.49	0.24	0.00	0.00	0.01	0.00	0.03	0.06	0.05	0.01	0.00	0.12	8.03
30	6.41	0.16	0.00	0.00	0.01	0.00	0.02	0.04	0.04	0.01	0.00	0.11	6.83
							5-y-old						
0.042	11.61	0.91	16.67	10.37	10.45	0.03	1.25	0.03	0.00	0.00	0.00	0.00	51.72
0.083	11.54	0.83	15.99	4.13	13.99	0.06	4.20	0.22	0.00	0.00	0.00	0.00	51.02
0.167	11.41	0.72	14.69	0.65	11.11	0.11	9.65	1.24	0.01	0.00	0.00	0.02	49.64
0.333	11.19	0.63	12.43	0.08	4.51	0.13	13.39	4.41	0.02	0.00	0.00	0.05	46.85
0.5	11.03	0.58	10.50	0.04	1.77	0.10	12.37	7.34	0.03	0.01	0.00	0.07	43.87
1	10.73	0.52	6.34	0.02	0.17	0.03	6.08	10.67	0.04	0.01	0.00	0.12	34.74
2	10.43	0.47	2.31	0.01	0.03	0.00	1.13	6.80	0.05	0.01	0.00	0.13	21.40
4	10.06	0.43	0.31	0.00	0.02	0.00	0.09	1.26	0.05	0.01	0.00	0.13	12.37
8	9.38	0.37	0.01	0.00	0.01	0.00	0.05	0.11	0.05	0.01	0.00	0.12	10.12
10	9.06	0.34	0.00	0.00	0.01	0.00	0.04	0.08	0.04	0.01	0.00	0.12	9.74
20	7.68	0.23	0.00	0.00	0.01	0.00	0.03	0.06	0.04	0.01	0.00	0.11	8.19
30	6.57	0.16	0.00	0.00	0.01	0.00	0.02	0.04	0.04	0.01	0.00	0.10	6.96

Table A-10 (continued)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Liver	Kidneys	Spleen	Other	Retained
						10-y-old							
0.042	11.13	1.01	17.01	10.63	10.70	0.03	1.28	0.03	0.00	0.00	0.00	0.00	52.24
0.083	11.06	0.91	16.32	4.24	14.34	0.06	4.30	0.23	0.00	0.00	0.00	0.00	51.54
0.167	10.94	0.79	15.00	0.67	11.39	0.11	9.90	1.27	0.01	0.00	0.00	0.02	50.12
0.333	10.74	0.68	12.68	0.07	4.62	0.13	13.73	4.52	0.02	0.00	0.00	0.05	47.28
0.5	10.59	0.64	10.72	0.04	1.81	0.10	12.68	7.52	0.03	0.01	0.00	0.08	44.23
1	10.31	0.58	6.47	0.02	0.17	0.03	6.21	10.92	0.05	0.01	0.00	0.12	34.90
2	10.03	0.53	2.36	0.01	0.03	0.00	1.15	6.94	0.05	0.01	0.01	0.14	21.26
4	9.67	0.49	0.31	0.00	0.02	0.00	0.08	1.28	0.05	0.01	0.00	0.13	12.06
8	9.02	0.42	0.01	0.00	0.01	0.00	0.05	0.11	0.05	0.01	0.00	0.13	9.81
10	8.72	0.39	0.00	0.00	0.01	0.00	0.04	0.08	0.05	0.01	0.00	0.12	9.44
20	7.40	0.26	0.00	0.00	0.01	0.00	0.03	0.06	0.04	0.01	0.00	0.11	7.93
30	6.33	0.18	0.00	0.00	0.01	0.00	0.02	0.04	0.04	0.01	0.00	0.10	6.74
						15-y-old							
0.042	12.54	1.44	13.33	8.51	8.53	0.03	1.02	0.02	0.00	0.00	0.00	0.00	45.78
0.083	12.46	1.28	12.79	3.46	11.48	0.05	3.43	0.18	0.00	0.00	0.00	0.00	45.23
0.167	12.32	1.09	11.75	0.60	9.24	0.09	7.94	1.02	0.00	0.00	0.00	0.01	44.11
0.333	12.09	0.93	9.94	0.09	3.85	0.11	11.13	3.64	0.01	0.00	0.00	0.04	41.87
0.5	11.91	0.87	8.40	0.05	1.55	0.09	10.37	6.10	0.02	0.00	0.00	0.06	39.45
1	11.58	0.80	5.07	0.02	0.17	0.03	5.18	8.95	0.04	0.01	0.00	0.10	31.96
2	11.26	0.74	1.85	0.01	0.03	0.00	1.00	5.77	0.04	0.01	0.00	0.12	20.84
4	10.85	0.68	0.25	0.00	0.02	0.00	0.09	1.10	0.04	0.01	0.00	0.11	13.17
8	10.12	0.58	0.00	0.00	0.02	0.00	0.05	0.12	0.04	0.01	0.00	0.11	11.07
10	9.78	0.54	0.00	0.00	0.01	0.00	0.05	0.10	0.04	0.01	0.00	0.10	10.65
20	8.30	0.36	0.00	0.00	0.01	0.00	0.04	0.07	0.04	0.01	0.00	0.09	8.93
30	7.10	0.25	0.00	0.00	0.01	0.00	0.03	0.05	0.03	0.01	0.00	0.09	7.58
						Adult							
0.042	14.45		14.27	8.86	8.90	0.03	1.06	0.02	0.00	0.00	0.00	0.00	47.94
0.083	14.26		13.69	3.57	11.95	0.05	3.58	0.19	0.00	0.00	0.00	0.00	47.35
0.167	13.97		12.58	0.59	9.55	0.09	8.25	1.06	0.01	0.00	0.00	0.01	46.16
0.333	13.63		10.64	0.08	3.94	0.11	11.51	3.78	0.01	0.00	0.00	0.04	43.77
0.5	13.40		8.99	0.05	1.58	0.09	10.69	6.31	0.02	0.00	0.00	0.06	41.21
1	13.00		5.43	0.02	0.17	0.03	5.31	9.22	0.04	0.01	0.00	0.11	33.35
2	12.62		1.98	0.01	0.03	0.00	1.02	5.93	0.04	0.01	0.00	0.12	21.78
4	12.15		0.26	0.00	0.02	0.00	0.09	1.12	0.04	0.01	0.00	0.12	13.83
8	11.29		0.00	0.00	0.02	0.00	0.05	0.12	0.04	0.01	0.00	0.11	11.67
10	10.90		0.00	0.00	0.01	0.00	0.05	0.10	0.04	0.01	0.00	0.11	11.24
20	9.18		0.00	0.00	0.01	0.00	0.04	0.07	0.04	0.01	0.00	0.10	9.46
30	7.82		0.00	0.00	0.01	0.00	0.03	0.05	0.03	0.01	0.00	0.09	8.05

Table A-11. Activity of Type *M* ^{241}Am in DCAL Source Regions at Selected Times after Inhalation (%)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Liver	Other	C_Bone	T_Bone	Marrow	Retained
							Infant							
0.042	9.49	0.83	20.11	11.93	12.17	0.82	1.48	0.03	0.12	0.61	0.42	0.42	0.00	58.91
0.083	9.40	0.76	19.30	4.72	16.21	0.25	4.91	0.26	0.16	0.81	0.58	0.58	0.00	58.05
0.167	9.27	0.67	17.74	0.72	12.84	0.06	11.22	1.45	0.19	0.84	0.65	0.65	0.00	56.40
0.333	9.07	0.59	15.03	0.07	5.20	0.03	15.53	5.13	0.20	0.78	0.71	0.71	0.00	53.13
0.5	8.92	0.54	12.72	0.04	2.03	0.03	14.34	8.53	0.21	0.71	0.75	0.74	0.00	49.66
1	8.66	0.48	7.71	0.02	0.19	0.02	7.04	12.42	0.24	0.54	0.83	0.82	0.01	39.03
2	8.44	0.44	2.84	0.01	0.03	0.01	1.30	7.94	0.26	0.37	0.91	0.90	0.01	23.53
4	8.19	0.41	0.38	0.00	0.01	0.00	0.08	1.46	0.28	0.28	0.99	0.96	0.03	13.15
8	7.76	0.35	0.01	0.00	0.01	0.00	0.04	0.10	0.30	0.27	1.06	1.00	0.06	11.03
10	7.56	0.33	0.00	0.00	0.01	0.00	0.04	0.08	0.31	0.27	1.09	1.01	0.07	10.84
20	6.68	0.23	0.00	0.00	0.01	0.00	0.03	0.06	0.34	0.28	1.23	1.08	0.15	10.14
30	5.96	0.17	0.00	0.00	0.01	0.00	0.02	0.04	0.37	0.29	1.35	1.13	0.22	9.61
							1-y-old							
0.042	10.16	0.82	20.20	11.97	12.22	0.85	1.49	0.04	0.12	0.62	0.43	0.43	0.00	59.85
0.083	10.09	0.75	19.39	4.74	16.28	0.24	4.93	0.26	0.17	0.83	0.59	0.59	0.00	58.98
0.167	9.98	0.65	17.83	0.72	12.92	0.04	11.27	1.46	0.19	0.85	0.66	0.66	0.00	57.32
0.333	9.81	0.57	15.10	0.07	5.24	0.03	15.62	5.16	0.20	0.77	0.71	0.70	0.00	54.04
0.5	9.68	0.53	12.78	0.04	2.04	0.02	14.42	8.58	0.21	0.70	0.74	0.74	0.00	50.55
1	9.45	0.48	7.75	0.02	0.18	0.02	7.05	12.48	0.23	0.53	0.82	0.82	0.00	39.87
2	9.24	0.44	2.85	0.01	0.02	0.01	1.29	7.96	0.26	0.36	0.90	0.90	0.00	24.31
4	8.98	0.41	0.39	0.00	0.01	0.00	0.08	1.46	0.28	0.28	0.98	0.97	0.01	13.92
8	8.53	0.35	0.01	0.00	0.01	0.00	0.04	0.11	0.30	0.27	1.05	1.03	0.02	11.79
10	8.32	0.33	0.00	0.00	0.01	0.00	0.04	0.08	0.31	0.27	1.08	1.06	0.03	11.59
20	7.38	0.23	0.00	0.00	0.01	0.00	0.03	0.06	0.34	0.29	1.24	1.18	0.06	10.87
30	6.61	0.17	0.00	0.00	0.01	0.00	0.02	0.04	0.38	0.29	1.37	1.29	0.09	10.32
							5-y-old							
0.042	10.48	0.82	16.68	9.81	10.00	0.78	1.22	0.03	0.34	0.57	0.28	0.28	0.00	51.72
0.083	10.40	0.75	16.00	3.90	13.34	0.23	4.04	0.21	0.46	0.76	0.39	0.39	0.00	51.01
0.167	10.28	0.65	14.72	0.61	10.61	0.04	9.24	1.19	0.52	0.78	0.43	0.43	0.00	49.62
0.333	10.10	0.56	12.46	0.07	4.34	0.03	12.84	4.23	0.55	0.71	0.46	0.46	0.00	46.90
0.5	9.96	0.52	10.55	0.04	1.72	0.02	11.89	7.05	0.58	0.64	0.49	0.48	0.00	44.02
1	9.71	0.47	6.40	0.02	0.17	0.01	5.87	10.30	0.64	0.49	0.54	0.54	0.00	35.22
2	9.49	0.43	2.35	0.01	0.03	0.01	1.10	6.62	0.71	0.34	0.59	0.59	0.00	22.33
4	9.22	0.40	0.32	0.00	0.01	0.00	0.08	1.24	0.77	0.26	0.64	0.64	0.00	13.66
8	8.76	0.35	0.01	0.00	0.01	0.00	0.04	0.10	0.83	0.25	0.70	0.69	0.01	11.81
10	8.54	0.32	0.00	0.00	0.01	0.00	0.04	0.08	0.86	0.26	0.72	0.71	0.01	11.62
20	7.57	0.23	0.00	0.00	0.01	0.00	0.03	0.06	0.98	0.27	0.84	0.82	0.02	10.88
30	6.77	0.16	0.00	0.00	0.01	0.00	0.02	0.05	1.08	0.28	0.94	0.91	0.04	10.31

Table A-11 (continued)

Time (d)	Lung	BBi	ET1	Stomach	SI	Blood	ULI	LLI	Liver	Other	C_Bone	T_Bone	Marrow	Retained
							10-y-old							
0.042	10.05	0.92	17.02	10.05	10.24	0.78	1.25	0.03	0.34	0.57	0.28	0.28	0.00	52.25
0.083	9.97	0.82	16.34	4.00	13.67	0.23	4.14	0.22	0.46	0.76	0.39	0.39	0.00	51.53
0.167	9.86	0.71	15.02	0.63	10.89	0.04	9.47	1.22	0.52	0.78	0.43	0.43	0.00	50.11
0.333	9.69	0.62	12.72	0.07	4.45	0.03	13.16	4.34	0.55	0.71	0.46	0.46	0.00	47.33
0.5	9.56	0.58	10.77	0.04	1.75	0.02	12.19	7.23	0.58	0.64	0.48	0.48	0.00	44.39
1	9.33	0.52	6.53	0.02	0.16	0.01	6.00	10.55	0.64	0.49	0.53	0.53	0.00	35.38
2	9.12	0.48	2.40	0.01	0.02	0.01	1.12	6.76	0.71	0.34	0.59	0.59	0.00	22.21
4	8.87	0.45	0.33	0.00	0.01	0.00	0.08	1.26	0.76	0.26	0.64	0.64	0.00	13.37
8	8.42	0.39	0.01	0.00	0.01	0.00	0.04	0.10	0.82	0.25	0.69	0.69	0.01	11.50
10	8.21	0.36	0.00	0.00	0.01	0.00	0.04	0.08	0.85	0.25	0.72	0.71	0.01	11.31
20	7.29	0.26	0.00	0.00	0.01	0.00	0.03	0.06	0.97	0.27	0.83	0.81	0.02	10.59
30	6.52	0.18	0.00	0.00	0.01	0.00	0.02	0.04	1.07	0.28	0.93	0.90	0.03	10.03
							15-y-old							
0.042	11.32	1.30	13.34	8.04	8.16	0.78	0.99	0.02	0.33	0.55	0.27	0.27		45.78
0.083	11.23	1.16	12.80	3.26	10.94	0.23	3.30	0.18	0.45	0.74	0.38	0.38		45.21
0.167	11.11	0.98	11.77	0.56	8.82	0.04	7.60	0.98	0.51	0.77	0.42	0.42		44.09
0.333	10.90	0.84	9.97	0.08	3.70	0.02	10.67	3.49	0.54	0.69	0.45	0.45		41.90
0.5	10.75	0.79	8.44	0.05	1.50	0.02	9.95	5.85	0.57	0.63	0.47	0.47		39.57
1	10.48	0.72	5.12	0.02	0.16	0.01	4.99	8.63	0.63	0.48	0.53	0.53		32.36
2	10.24	0.67	1.88	0.01	0.03	0.01	0.96	5.61	0.70	0.33	0.58	0.58		21.67
4	9.95	0.62	0.25	0.00	0.02	0.00	0.08	1.08	0.76	0.26	0.64	0.63		14.37
8	9.45	0.54	0.00	0.00	0.01	0.00	0.05	0.11	0.82	0.25	0.70	0.69		12.71
10	9.22	0.51	0.00	0.00	0.01	0.00	0.05	0.09	0.85	0.26	0.72	0.72		12.49
20	8.17	0.36	0.00	0.00	0.01	0.00	0.04	0.07	0.99	0.28	0.85	0.83		11.65
30	7.31	0.25	0.00	0.00	0.01	0.00	0.03	0.05	1.10	0.29	0.96	0.94		11.01
							Adult							
0.042	13.04		14.28	8.37	8.51	0.80	1.04	0.02	0.56	0.57	0.17	0.17		47.95
0.083	12.85		13.70	3.36	11.39	0.23	3.44	0.18	0.78	0.77	0.23	0.23		47.34
0.167	12.60		12.60	0.55	9.12	0.04	7.90	1.02	0.88	0.80	0.26	0.26		46.14
0.333	12.29		10.67	0.07	3.78	0.03	11.04	3.62	0.93	0.72	0.28	0.28		43.80
0.5	12.10		9.03	0.04	1.52	0.02	10.27	6.06	0.98	0.65	0.30	0.30		41.34
1	11.77		5.48	0.02	0.16	0.01	5.12	8.90	1.08	0.50	0.33	0.33		33.77
2	11.48		2.02	0.01	0.03	0.01	0.98	5.77	1.20	0.35	0.36	0.36		22.63
4	11.14		0.27	0.00	0.02	0.00	0.09	1.11	1.31	0.27	0.40	0.40		15.06
8	10.54		0.00	0.00	0.01	0.00	0.05	0.11	1.42	0.27	0.43	0.43		13.35
10	10.27		0.00	0.00	0.01	0.00	0.05	0.09	1.48	0.27	0.45	0.45		13.13
20	9.04		0.00	0.00	0.01	0.00	0.04	0.07	1.72	0.29	0.53	0.53		12.29
30	8.05		0.00	0.00	0.01	0.00	0.03	0.05	1.93	0.31	0.61	0.60		11.64

Table A-12. Activity of ^{60}Co in DCAL Source Regions at Selected Times after Ingestion (%)

Time (d)	Stomach	SI	Blood	ULI	LLI	Other	Liver	Retained
				Infant				
0.042	36.49	44.71	11.03	7.32	0.21	0.11	0.01	99.96
0.083	13.64	40.41	26.25	17.34	1.11	0.59	0.07	99.66
0.167	1.82	16.94	43.18	28.15	4.49	2.49	0.28	97.93
0.333	0.03	1.72	43.05	27.10	11.72	7.08	0.79	92.16
0.5	0.00	0.15	34.97	21.16	16.57	11.04	1.23	85.67
1	0.00	0.00	17.53	9.47	20.00	18.39	2.04	67.74
2	0.00	0.00	4.38	2.03	12.15	22.82	2.54	44.03
4	0.00	0.00	0.27	0.21	2.41	21.70	2.41	27.05
8	0.00	0.00	0.00	0.08	0.21	17.39	1.93	19.64
10	0.00	0.00	0.00	0.07	0.14	15.79	1.75	17.77
20	0.00	0.00	0.00	0.02	0.05	11.33	1.26	12.67
30	0.00	0.00	0.00	0.01	0.02	9.57	1.06	10.67
				1-y-old				
0.042	36.49	51.76	3.45	8.00	0.22	0.03	0.00	99.99
0.083	13.64	55.15	8.94	20.59	1.25	0.19	0.02	99.88
0.167	1.82	34.34	17.15	38.88	5.65	0.90	0.10	99.10
0.333	0.03	8.91	20.74	45.06	16.97	2.93	0.33	95.35
0.5	0.00	2.14	18.22	37.61	25.87	4.94	0.55	89.69
1	0.00	0.03	9.48	16.48	33.41	8.90	0.99	69.49
2	0.00	0.00	2.37	2.98	20.06	11.37	1.26	38.11
4	0.00	0.00	0.15	0.16	3.58	10.88	1.21	16.00
8	0.00	0.00	0.00	0.04	0.15	8.72	0.97	9.89
10	0.00	0.00	0.00	0.03	0.08	7.92	0.88	8.92
20	0.00	0.00	0.00	0.01	0.02	5.67	0.63	6.34
30	0.00	0.00	0.00	0.01	0.01	4.79	0.53	5.34
				5-y-old				
0.042	36.49	51.76	3.45	8.00	0.22	0.03	0.00	99.99
0.083	13.64	55.15	8.94	20.59	1.25	0.19	0.02	99.92
0.167	1.82	34.34	17.15	38.88	5.65	0.90	0.10	99.33
0.333	0.03	8.91	20.74	45.06	16.97	2.93	0.33	95.91
0.5	0.00	2.14	18.22	37.61	25.87	4.94	0.55	90.30
1	0.00	0.03	9.48	16.48	33.41	8.90	0.99	69.87
2	0.00	0.00	2.37	2.98	20.06	11.37	1.26	38.24
4	0.00	0.00	0.15	0.16	3.58	10.88	1.21	16.04
8	0.00	0.00	0.00	0.04	0.15	8.72	0.97	9.91
10	0.00	0.00	0.00	0.03	0.08	7.92	0.88	8.93
20	0.00	0.00	0.00	0.01	0.02	5.67	0.63	6.35
30	0.00	0.00	0.00	0.01	0.01	4.79	0.53	5.34

Table A-12 (continued)

Time (d)	Stomach	SI	Blood	ULI	LLI	Other	Liver	Retained
				10-y-old				
0.042	36.49	51.76	3.45	8.00	0.22	0.03	0.00	99.99
0.083	13.64	55.15	8.94	20.59	1.25	0.19	0.02	99.92
0.167	1.82	34.34	17.15	38.88	5.65	0.90	0.10	99.33
0.333	0.03	8.91	20.74	45.06	16.97	2.93	0.33	95.91
0.5	0.00	2.14	18.22	37.61	25.87	4.94	0.55	90.30
1	0.00	0.03	9.48	16.48	33.41	8.90	0.99	69.87
2	0.00	0.00	2.37	2.98	20.06	11.37	1.26	38.24
4	0.00	0.00	0.15	0.16	3.58	10.88	1.21	16.04
8	0.00	0.00	0.00	0.04	0.15	8.72	0.97	9.91
10	0.00	0.00	0.00	0.03	0.08	7.92	0.88	8.93
20	0.00	0.00	0.00	0.01	0.02	5.67	0.63	6.35
30	0.00	0.00	0.00	0.01	0.01	4.79	0.53	5.34
				15-y-old				
0.042	36.49	51.76	3.45	8.00	0.22	0.03	0.00	99.99
0.083	13.64	55.15	8.94	20.59	1.25	0.19	0.02	99.92
0.167	1.82	34.34	17.15	38.88	5.65	0.90	0.10	99.33
0.333	0.03	8.91	20.73	45.06	16.97	2.93	0.33	95.91
0.5	0.00	2.14	18.22	37.61	25.87	4.94	0.55	90.30
1	0.00	0.03	9.48	16.48	33.41	8.90	0.99	69.87
2	0.00	0.00	2.37	2.98	20.06	11.37	1.26	38.24
4	0.00	0.00	0.15	0.16	3.58	10.88	1.21	16.04
8	0.00	0.00	0.00	0.04	0.15	8.72	0.97	9.91
10	0.00	0.00	0.00	0.03	0.08	7.92	0.88	8.93
20	0.00	0.00	0.00	0.01	0.02	5.67	0.63	6.35
30	0.00	0.00	0.00	0.01	0.01	4.79	0.53	5.34
				Adult				
0.042	36.49	54.12	0.92	8.22	0.23	0.01	0.00	100.00
0.083	13.64	60.73	2.45	21.74	1.30	0.05	0.01	99.96
0.167	1.82	42.96	4.96	43.32	6.09	0.25	0.03	99.57
0.333	0.03	14.99	6.55	54.77	19.41	0.87	0.10	97.01
0.5	0.00	4.94	6.08	48.27	30.84	1.52	0.17	92.13
1	0.00	0.18	3.33	22.03	42.13	2.89	0.32	71.07
2	0.00	0.00	0.84	3.76	25.69	3.78	0.42	34.56
4	0.00	0.00	0.05	0.13	4.44	3.63	0.40	8.68
8	0.00	0.00	0.00	0.01	0.11	2.91	0.32	3.37
10	0.00	0.00	0.00	0.01	0.03	2.64	0.29	2.99
20	0.00	0.00	0.00	0.00	0.01	1.89	0.21	2.12
30	0.00	0.00	0.00	0.00	0.00	1.60	0.18	1.78

Table A-13. Activity of ^{90}Sr in DCAL Source Regions at Selected Times after Ingestion (%)

Time (d)	Stomach	SI	Blood	ULI	LLI	UB_Cont	C_Bone	T_Bone	Other	Retained
					Infant					
0.042	36.49	44.71	8.99	7.33	0.21		0.34	1.37	0.46	99.96
0.083	13.64	40.41	17.07	17.37	1.11		1.57	6.29	2.09	99.74
0.167	1.82	16.94	16.49	28.14	4.50		4.83	19.32	6.40	98.69
0.333	0.03	1.72	5.50	26.70	11.67		8.00	31.98	10.48	96.17
0.5	0.00	0.15	2.65	20.38	16.36		8.55	34.20	11.05	93.38
1	0.00	0.00	2.08	8.44	19.18		8.59	34.34	10.69	83.35
2	0.00	0.00	1.84	1.55	11.03		8.42	33.70	10.03	66.60
4	0.00	0.00	1.47	0.19	2.08		8.16	32.65	9.24	53.82
8	0.00	0.00	0.97	0.10	0.24		7.82	31.26	7.83	48.23
10	0.00	0.00	0.80	0.09	0.18		7.72	30.88	7.11	46.78
20	0.00	0.00	0.35	0.04	0.08		7.56	30.24	4.11	42.38
30	0.00	0.00	0.19	0.02	0.04		7.51	30.05	2.35	40.17
					1-y-old					
0.042	36.49	50.08	4.30	7.86	0.22		0.10	0.39	0.47	99.97
0.083	13.64	51.36	8.86	19.88	1.22		0.47	1.86	2.23	99.75
0.167	1.82	29.16	10.34	36.21	5.38		1.58	6.33	7.33	98.55
0.333	0.03	6.08	5.10	39.69	15.56		3.06	12.23	13.03	95.01
0.5	0.00	1.15	2.76	32.06	23.12		3.56	14.24	13.81	90.83
1	0.00	0.01	1.75	13.62	28.84		3.87	15.48	12.02	75.68
2	0.00	0.00	1.30	2.51	17.04		3.81	15.23	10.17	50.11
4	0.00	0.00	0.88	0.27	3.22		3.38	13.52	9.25	30.55
8	0.00	0.00	0.49	0.11	0.29		2.89	11.55	7.81	23.16
10	0.00	0.00	0.38	0.09	0.19		2.78	11.12	7.02	21.60
20	0.00	0.00	0.16	0.04	0.07		2.66	10.62	3.81	17.36
30	0.00	0.00	0.09	0.02	0.04		2.64	10.53	2.05	15.36
					5-y-old					
0.042	36.49	50.08	4.31	7.86	0.22	0.09	0.09	0.33	0.51	99.98
0.083	13.64	51.36	8.87	19.89	1.22	0.37	0.46	1.61	2.42	99.84
0.167	1.82	29.16	10.40	36.25	5.38	0.90	1.56	5.49	7.95	98.90
0.333	0.03	6.08	5.24	39.76	15.58	0.81	3.04	10.67	14.07	95.27
0.5	0.00	1.15	2.92	32.14	23.16	0.46	3.56	12.51	14.84	90.75
1	0.00	0.01	1.83	13.70	28.92	0.22	3.92	13.77	12.82	75.19
2	0.00	0.00	1.31	2.55	17.13	0.15	3.85	13.50	10.79	49.28
4	0.00	0.00	0.85	0.28	3.26	0.10	3.34	11.74	9.79	29.37
8	0.00	0.00	0.46	0.12	0.30	0.05	2.80	9.82	8.20	21.74
10	0.00	0.00	0.36	0.09	0.19	0.04	2.69	9.43	7.35	20.15
20	0.00	0.00	0.15	0.04	0.07	0.02	2.57	9.01	3.95	15.81
30	0.00	0.00	0.08	0.02	0.04	0.01	2.55	8.95	2.11	13.75

Table A-13 (continued)

Time (d)	Stomach	SI	Blood	ULI	LLI	UB_Cont	C_Bone	T_Bone	Other	Retained
					10-y-old					
0.042	36.49	50.08	4.30	7.86	0.22		0.15	0.45	0.37	99.99
0.083	13.64	51.36	8.84	19.85	1.22		0.73	2.17	1.79	99.88
0.167	1.82	29.16	10.24	36.13	5.37		2.48	7.33	5.94	99.11
0.333	0.03	6.08	4.84	39.54	15.51		4.73	14.01	10.70	96.01
0.5	0.00	1.15	2.49	31.89	23.04		5.43	16.09	11.49	91.89
1	0.00	0.01	1.60	13.48	28.68		5.76	17.08	10.30	77.05
2	0.00	0.00	1.29	2.43	16.87		5.69	16.86	8.86	52.10
4	0.00	0.00	0.93	0.23	3.12		5.26	15.59	8.06	33.28
8	0.00	0.00	0.55	0.10	0.26		4.71	13.94	6.88	26.49
10	0.00	0.00	0.44	0.08	0.17		4.58	13.55	6.23	25.08
20	0.00	0.00	0.18	0.03	0.06		4.40	13.02	3.45	21.17
30	0.00	0.00	0.10	0.02	0.03		4.37	12.95	1.87	19.35
					15-y-old					
0.042	36.49	50.08	4.30	7.85	0.22		0.22	0.57	0.22	99.99
0.083	13.64	51.36	8.82	19.81	1.22		1.07	2.76	1.07	99.91
0.167	1.82	29.16	10.14	35.99	5.35		3.61	9.31	3.60	99.36
0.333	0.03	6.08	4.57	39.30	15.44		6.81	17.56	6.71	96.83
0.5	0.00	1.15	2.18	31.64	22.92		7.70	19.87	7.47	93.10
1	0.00	0.01	1.41	13.30	28.46		7.91	20.41	7.33	78.89
2	0.00	0.00	1.24	2.31	16.62		7.77	20.05	6.82	54.86
4	0.00	0.00	0.98	0.17	2.96		7.53	19.42	6.25	37.35
8	0.00	0.00	0.65	0.07	0.19		7.21	18.58	5.28	32.01
10	0.00	0.00	0.53	0.06	0.12		7.12	18.37	4.79	31.01
20	0.00	0.00	0.23	0.02	0.05		7.01	18.07	2.72	28.12
30	0.00	0.00	0.12	0.01	0.02		7.00	18.05	1.52	26.74
					Adult					
0.042	36.49	51.76	2.83	8.02	0.22	0.07	0.10	0.08	0.41	99.98
0.083	13.64	55.15	5.98	20.68	1.26	0.30	0.48	0.38	1.99	99.86
0.167	1.82	34.35	7.51	39.14	5.68	0.78	1.69	1.35	6.69	99.01
0.333	0.03	8.91	4.46	45.42	17.09	0.79	3.51	2.82	12.35	95.38
0.5	0.00	2.14	2.72	37.86	26.06	0.51	4.34	3.48	13.34	90.44
1	0.00	0.03	1.57	16.46	33.58	0.24	5.08	4.08	11.58	72.61
2	0.00	0.00	0.95	3.00	20.11	0.14	5.00	4.01	9.52	42.74
4	0.00	0.00	0.53	0.25	3.72	0.08	4.16	3.34	8.34	20.42
8	0.00	0.00	0.26	0.08	0.24	0.04	3.43	2.75	6.67	13.47
10	0.00	0.00	0.20	0.06	0.14	0.03	3.34	2.68	5.88	12.33
20	0.00	0.00	0.09	0.03	0.05	0.01	3.32	2.67	3.03	9.20
30	0.00	0.00	0.05	0.01	0.03	0.01	3.33	2.67	1.58	7.67

Table A-14. Activity of ^{131}I in DCAL Source Regions at Selected Times after Ingestion (%)

Time (d)	Stomach	SI	Blood	LLI	Thyroid	UB_Cont	Other	Retained
				Infant				
0.042	36.36	1.52	57.33	0.02	1.14	1.60	0.00	98.57
0.083	13.54	0.57	72.90	0.07	3.42	3.01	0.01	94.30
0.167	1.79	0.07	67.68	0.18	8.38	3.39	0.04	82.31
0.333	0.03	0.00	43.37	0.34	15.68	2.26	0.15	62.41
0.5	0.00	0.00	26.95	0.42	20.03	1.41	0.31	49.53
1	0.00	0.00	6.54	0.44	24.31	0.34	0.82	32.63
2	0.00	0.00	0.59	0.28	22.68	0.03	1.46	25.13
4	0.00	0.00	0.29	0.19	17.34	0.01	1.64	19.58
8	0.00	0.00	0.20	0.14	10.21	0.01	1.09	11.72
10	0.00	0.00	0.15	0.11	7.85	0.01	0.84	9.02
20	0.00	0.00	0.04	0.03	2.11	0.00	0.23	2.43
30	0.00	0.00	0.01	0.01	0.57	0.00	0.06	0.658
				1-y-old				
0.042	36.36	1.52	57.33	0.02	1.14	1.75	0.00	98.72
0.083	13.54	0.57	72.90	0.07	3.42	3.51	0.00	94.80
0.167	1.79	0.07	67.68	0.18	8.39	4.22	0.03	83.14
0.333	0.03	0.00	43.37	0.34	15.72	2.87	0.12	63.03
0.5	0.00	0.00	26.94	0.42	20.11	1.79	0.24	49.92
1	0.00	0.00	6.50	0.43	24.56	0.43	0.65	32.75
2	0.00	0.00	0.51	0.25	23.20	0.03	1.23	25.29
4	0.00	0.00	0.20	0.13	18.15	0.01	1.54	20.11
8	0.00	0.00	0.16	0.11	11.15	0.01	1.16	12.65
10	0.00	0.00	0.13	0.09	8.76	0.01	0.93	9.97
20	0.00	0.00	0.04	0.03	2.63	0.00	0.28	3.00
30	0.00	0.00	0.01	0.01	0.79	0.00	0.09	0.903
				5-y-old				
0.042	36.36	1.52	57.33	0.02	1.14	2.25	0.00	99.22
0.083	13.54	0.57	72.90	0.07	3.42	5.63	0.00	96.92
0.167	1.79	0.07	67.68	0.18	8.40	9.36	0.02	88.28
0.333	0.03	0.00	43.37	0.34	15.76	8.38	0.08	68.53
0.5	0.00	0.00	26.93	0.42	20.20	5.56	0.16	53.70
1	0.00	0.00	6.47	0.43	24.81	1.36	0.45	33.69
2	0.00	0.00	0.43	0.23	23.75	0.09	0.92	25.47
4	0.00	0.00	0.11	0.08	19.05	0.02	1.31	20.60
8	0.00	0.00	0.10	0.07	12.25	0.02	1.17	13.64
10	0.00	0.00	0.09	0.06	9.85	0.01	0.99	11.03
20	0.00	0.00	0.03	0.02	3.33	0.01	0.36	3.75
30	0.00	0.00	0.01	0.01	1.13	0.00	0.12	1.272

Table A-14 (continued)

Time (d)	Stomach	SI	Blood	LLI	Thyroid	UB_Cont	Other	Retained
				10-y-old				
0.042	36.36	1.52	57.33	0.02	1.14	2.25	0.00	99.22
0.083	13.54	0.57	72.90	0.07	3.42	5.63	0.00	96.92
0.167	1.79	0.07	67.67	0.18	8.41	9.36	0.01	88.28
0.333	0.03	0.00	43.36	0.34	15.81	8.38	0.03	68.53
0.5	0.00	0.00	26.93	0.42	20.30	5.56	0.07	53.70
1	0.00	0.00	6.45	0.42	25.11	1.36	0.19	33.70
2	0.00	0.00	0.38	0.21	24.42	0.08	0.43	25.55
4	0.00	0.00	0.02	0.04	20.18	0.00	0.72	20.98
8	0.00	0.00	0.03	0.02	13.70	0.00	0.85	14.61
10	0.00	0.00	0.03	0.02	11.30	0.00	0.80	12.17
20	0.00	0.00	0.01	0.01	4.34	0.00	0.42	4.79
30	0.00	0.00	0.01	0.00	1.67	0.00	0.17	1.863
				15-y-old				
0.042	36.36	1.52	57.33	0.02	1.14	2.25	0.00	99.22
0.083	13.54	0.57	72.90	0.07	3.43	5.63	0.00	96.92
0.167	1.79	0.07	67.67	0.18	8.41	9.36	0.01	88.28
0.333	0.03	0.00	43.36	0.34	15.81	8.38	0.03	68.53
0.5	0.00	0.00	26.93	0.42	20.31	5.56	0.06	53.70
1	0.00	0.00	6.45	0.42	25.14	1.36	0.17	33.70
2	0.00	0.00	0.38	0.21	24.48	0.08	0.38	25.56
4	0.00	0.00	0.02	0.04	20.29	0.00	0.64	21.00
8	0.00	0.00	0.02	0.01	13.85	0.00	0.78	14.68
10	0.00	0.00	0.02	0.01	11.45	0.00	0.75	12.25
20	0.00	0.00	0.01	0.01	4.45	0.00	0.41	4.89
30	0.00	0.00	0.01	0.00	1.74	0.00	0.18	1.925
				Adult				
0.042	36.36	1.52	57.33	0.02	1.14	2.25	0.00	99.22
0.083	13.54	0.57	72.90	0.07	3.43	5.63	0.00	96.92
0.167	1.79	0.07	67.67	0.18	8.41	9.36	0.01	88.28
0.333	0.03	0.00	43.36	0.34	15.82	8.38	0.02	68.53
0.5	0.00	0.00	26.93	0.42	20.32	5.56	0.05	53.70
1	0.00	0.00	6.45	0.42	25.17	1.36	0.14	33.70
2	0.00	0.00	0.37	0.21	24.54	0.08	0.33	25.56
4	0.00	0.00	0.01	0.03	20.40	0.00	0.58	21.04
8	0.00	0.00	0.01	0.01	13.99	0.00	0.77	14.78
10	0.00	0.00	0.01	0.01	11.59	0.00	0.77	12.38
20	0.00	0.00	0.01	0.01	4.54	0.00	0.49	5.05
30	0.00	0.00	0.00	0.00	1.79	0.00	0.24	2.036

Table A-15. Activity of ^{137}Cs in DCAL Source Regions at Selected Times after Ingestion (%)

Time (d)	Stomach	SI	Blood	LLI	Body tissues	Retained
			Infant			
0.042	36.49	1.52	57.54	0.03	3.82	100.00
0.083	13.64	0.57	73.43	0.08	11.49	99.99
0.167	1.82	0.08	68.66	0.19	28.38	99.94
0.333	0.03	0.00	44.63	0.36	53.94	99.67
0.5	0.00	0.00	28.11	0.47	70.04	99.25
1	0.00	0.00	7.03	0.64	89.34	97.56
2	0.00	0.00	0.44	0.75	91.93	93.65
4	0.00	0.00	0.00	0.77	84.68	85.95
8	0.00	0.00	0.00	0.66	71.13	72.21
10	0.00	0.00	0.00	0.61	65.17	66.16
20	0.00	0.00	0.00	0.40	41.99	42.64
30	0.00	0.00	0.00	0.26	26.957	27.375
			1-y-old			
0.042	36.49	1.52	57.54	0.03	3.82	100.00
0.083	13.64	0.57	73.43	0.08	11.48	99.99
0.167	1.82	0.08	68.66	0.19	28.36	99.93
0.333	0.03	0.00	44.63	0.36	53.86	99.62
0.5	0.00	0.00	28.11	0.48	69.85	99.12
1	0.00	0.00	7.03	0.68	88.75	97.11
2	0.00	0.00	0.44	0.86	90.48	92.44
4	0.00	0.00	0.00	0.92	81.72	83.25
8	0.00	0.00	0.00	0.77	66.01	67.27
10	0.00	0.00	0.00	0.69	59.33	60.46
20	0.00	0.00	0.00	0.40	34.80	35.47
30	0.00	0.00	0.00	0.24	20.421	20.81
			5-y-old			
0.042	36.49	1.52	57.54	0.03	3.82	100.00
0.083	13.64	0.57	73.43	0.08	11.49	99.99
0.167	1.82	0.08	68.66	0.19	28.37	99.96
0.333	0.03	0.00	44.63	0.36	53.91	99.73
0.5	0.00	0.00	28.11	0.47	69.97	99.33
1	0.00	0.00	7.03	0.65	89.14	97.58
2	0.00	0.00	0.44	0.78	91.49	93.46
4	0.00	0.00	0.00	0.80	83.97	85.46
8	0.00	0.00	0.00	0.65	70.63	71.82
10	0.00	0.00	0.00	0.58	65.03	66.09
20	0.00	0.00	0.00	0.34	44.57	45.20
30	0.00	0.00	0.00	0.21	32.11	32.50

Table A-15 (continued)

Time (d)	Stomach	SI	Blood	LLI	Body tissues	Retained
			10-y-old			
0.042	36.49	1.52	57.54	0.03	3.82	100.00
0.083	13.64	0.57	73.43	0.08	11.49	99.99
0.167	1.82	0.08	68.66	0.19	28.38	99.96
0.333	0.03	0.00	44.63	0.36	53.93	99.74
0.5	0.00	0.00	28.11	0.47	70.00	99.35
1	0.00	0.00	7.03	0.65	89.26	97.67
2	0.00	0.00	0.44	0.75	91.89	93.78
4	0.00	0.00	0.00	0.73	85.24	86.56
8	0.00	0.00	0.00	0.53	74.30	75.25
10	0.00	0.00	0.00	0.45	70.03	70.84
20	0.00	0.00	0.00	0.23	55.58	56.01
30	0.00	0.00	0.00	0.15	46.789	47.075
			15-y-old			
0.042	36.49	1.52	57.54		3.82	100.00
0.083	13.64	0.57	73.43		11.49	99.99
0.167	1.82	0.08	68.66		28.38	99.96
0.333	0.03	0.00	44.63		53.92	99.73
0.5	0.00	0.00	28.11		69.99	99.34
1	0.00	0.00	7.03		89.32	97.70
2	0.00	0.00	0.44		92.49	94.24
4	0.00	0.00	0.00		88.00	88.93
8	0.00	0.00	0.00		82.53	82.97
10	0.00	0.00	0.00		80.77	81.10
20	0.00	0.00	0.00		74.37	74.58
30	0.00	0.00	0.00		68.971	69.166
			Adult			
0.042	36.49	1.52	57.54		3.82	100.00
0.083	13.64	0.57	73.43		11.49	99.99
0.167	1.82	0.08	68.66		28.39	99.96
0.333	0.03	0.00	44.63		53.98	99.76
0.5	0.00	0.00	28.11		70.13	99.42
1	0.00	0.00	7.03		89.74	98.01
2	0.00	0.00	0.44		93.49	95.06
4	0.00	0.00	0.00		89.95	90.71
8	0.00	0.00	0.00		85.61	85.96
10	0.00	0.00	0.00		84.18	84.45
20	0.00	0.00	0.00		78.66	78.85
30	0.00	0.00	0.00		73.801	73.978

Table A-16. Activity of ^{192}Ir in DCAL Source Regions at Selected Times after Ingestion (%)

Time (d)	Stomach	SI	Blood	ULI	LLI	Liver	Kidneys	Spleen	Other	Retained
					Infant					
0.042	36.48	54.79	0.17	8.28	0.23	0.00	0.00	0.00	0.00	99.96
0.083	13.63	62.40	0.44	22.07	1.32	0.01	0.00	0.00	0.02	99.89
0.167	1.81	45.78	0.85	44.68	6.22	0.04	0.01	0.00	0.11	99.50
0.333	0.03	17.38	1.00	58.03	20.17	0.13	0.03	0.01	0.35	97.14
0.5	0.00	6.26	0.80	52.12	32.46	0.21	0.04	0.02	0.57	92.49
1	0.00	0.29	0.25	24.24	45.15	0.34	0.07	0.03	0.92	71.30
2	0.00	0.00	0.02	4.05	27.55	0.38	0.08	0.04	1.02	33.13
4	0.00	0.00	0.00	0.12	4.64	0.36	0.07	0.04	0.98	6.20
8	0.00	0.00	0.00	0.01	0.10	0.33	0.07	0.03	0.89	1.41
10	0.00	0.00	0.00	0.00	0.02	0.31	0.06	0.03	0.85	1.28
20	0.00	0.00	0.00	0.00	0.00	0.26	0.05	0.03	0.70	1.05
30	0.00	0.00	0.00	0.00	0.00	0.22	0.04	0.02	0.60	0.90
					1-y-old					
0.042	36.48	54.87	0.08	8.29	0.23	0.00	0.00	0.00	0.00	99.96
0.083	13.63	62.60	0.22	22.11	1.32	0.00	0.00	0.00	0.01	99.89
0.167	1.81	46.12	0.42	44.84	6.23	0.02	0.00	0.00	0.05	99.51
0.333	0.03	17.68	0.50	58.42	20.26	0.06	0.01	0.01	0.17	97.16
0.5	0.00	6.43	0.40	52.59	32.66	0.11	0.02	0.01	0.29	92.51
1	0.00	0.31	0.12	24.53	45.55	0.17	0.03	0.02	0.46	71.20
2	0.00	0.00	0.01	4.09	27.83	0.19	0.04	0.02	0.51	32.69
4	0.00	0.00	0.00	0.11	4.68	0.18	0.04	0.02	0.49	5.52
8	0.00	0.00	0.00	0.00	0.09	0.16	0.03	0.02	0.44	0.75
10	0.00	0.00	0.00	0.00	0.02	0.16	0.03	0.02	0.42	0.65
20	0.00	0.00	0.00	0.00	0.00	0.13	0.03	0.01	0.35	0.52
30	0.00	0.00	0.00	0.00	0.00	0.11	0.02	0.01	0.30	0.45
					5-y-old					
0.042	36.48	54.87	0.08	8.29	0.23	0.00	0.00	0.00	0.00	99.96
0.083	13.63	62.60	0.22	22.11	1.32	0.00	0.00	0.00	0.01	99.89
0.167	1.81	46.12	0.42	44.84	6.23	0.02	0.00	0.00	0.05	99.51
0.333	0.03	17.68	0.50	58.42	20.26	0.06	0.01	0.01	0.17	97.16
0.5	0.00	6.43	0.40	52.59	32.66	0.11	0.02	0.01	0.29	92.52
1	0.00	0.31	0.12	24.53	45.55	0.17	0.03	0.02	0.46	71.20
2	0.00	0.00	0.01	4.09	27.83	0.19	0.04	0.02	0.51	32.69
4	0.00	0.00	0.00	0.11	4.68	0.18	0.04	0.02	0.49	5.52
8	0.00	0.00	0.00	0.00	0.09	0.16	0.03	0.02	0.44	0.75
10	0.00	0.00	0.00	0.00	0.02	0.16	0.03	0.02	0.42	0.65
20	0.00	0.00	0.00	0.00	0.00	0.13	0.03	0.01	0.35	0.52
30	0.00	0.00	0.00	0.00	0.00	0.11	0.02	0.01	0.30	0.45

Table A-16 (continued)

Time (d)	Stomach	SI	Blood	ULI	LLI	Liver	Kidneys	Spleen	Other	Retained
					10-y-old					
0.042	36.48	54.87	0.08	8.29	0.23	0.00	0.00	0.00	0.00	99.96
0.083	13.63	62.60	0.22	22.11	1.32	0.00	0.00	0.00	0.01	99.89
0.167	1.81	46.12	0.42	44.84	6.23	0.02	0.00	0.00	0.05	99.51
0.333	0.03	17.68	0.50	58.42	20.26	0.06	0.01	0.01	0.17	97.16
0.5	0.00	6.43	0.40	52.59	32.66	0.11	0.02	0.01	0.29	92.52
1	0.00	0.31	0.12	24.53	45.55	0.17	0.03	0.02	0.46	71.20
2	0.00	0.00	0.01	4.09	27.83	0.19	0.04	0.02	0.51	32.69
4	0.00	0.00	0.00	0.11	4.68	0.18	0.04	0.02	0.49	5.52
8	0.00	0.00	0.00	0.00	0.09	0.16	0.03	0.02	0.44	0.75
10	0.00	0.00	0.00	0.00	0.02	0.16	0.03	0.02	0.42	0.65
20	0.00	0.00	0.00	0.00	0.00	0.13	0.03	0.01	0.35	0.52
30	0.00	0.00	0.00	0.00	0.00	0.11	0.02	0.01	0.30	0.45
					15-y-old					
0.042	36.48	54.87	0.08	8.29	0.23	0.00	0.00	0.00	0.00	99.96
0.083	13.63	62.60	0.22	22.11	1.32	0.00	0.00	0.00	0.01	99.89
0.167	1.81	46.12	0.42	44.84	6.23	0.02	0.00	0.00	0.05	99.51
0.333	0.03	17.68	0.50	58.42	20.26	0.06	0.01	0.01	0.17	97.16
0.5	0.00	6.43	0.40	52.59	32.66	0.11	0.02	0.01	0.29	92.52
1	0.00	0.31	0.12	24.53	45.55	0.17	0.03	0.02	0.46	71.20
2	0.00	0.00	0.01	4.09	27.83	0.19	0.04	0.02	0.51	32.69
4	0.00	0.00	0.00	0.11	4.68	0.18	0.04	0.02	0.49	5.52
8	0.00	0.00	0.00	0.00	0.09	0.16	0.03	0.02	0.44	0.75
10	0.00	0.00	0.00	0.00	0.02	0.16	0.03	0.02	0.42	0.65
20	0.00	0.00	0.00	0.00	0.00	0.13	0.03	0.01	0.35	0.52
30	0.00	0.00	0.00	0.00	0.00	0.11	0.02	0.01	0.30	0.45
					Adult					
0.042	36.48	54.87	0.08	8.29	0.23	0.00	0.00	0.00	0.00	99.96
0.083	13.63	62.60	0.22	22.11	1.32	0.00	0.00	0.00	0.01	99.89
0.167	1.81	46.12	0.42	44.84	6.23	0.02	0.00	0.00	0.05	99.51
0.333	0.03	17.68	0.50	58.42	20.26	0.06	0.01	0.01	0.17	97.16
0.5	0.00	6.43	0.40	52.59	32.66	0.11	0.02	0.01	0.29	92.52
1	0.00	0.31	0.12	24.53	45.55	0.17	0.03	0.02	0.46	71.20
2	0.00	0.00	0.01	4.09	27.83	0.19	0.04	0.02	0.51	32.69
4	0.00	0.00	0.00	0.11	4.68	0.18	0.04	0.02	0.49	5.52
8	0.00	0.00	0.00	0.00	0.09	0.16	0.03	0.02	0.44	0.75
10	0.00	0.00	0.00	0.00	0.02	0.16	0.03	0.02	0.42	0.65
20	0.00	0.00	0.00	0.00	0.00	0.13	0.03	0.01	0.35	0.52
30	0.00	0.00	0.00	0.00	0.00	0.11	0.02	0.01	0.30	0.45

Table A-17. Activity of ^{241}Am in DCAL Source Regions at Selected Times after Ingestion (%)

Time (d)	Stomach	SI	Blood	ULI	LLI	Liver	Other	C_Bone	T_Bone	Marrow	Retained
					Infant						
0.042	36.49	54.93	0.03	8.30	0.23	0.00	0.01	0.00	0.00	0.00	100.00
0.083	13.64	62.75	0.05	22.14	1.32	0.00	0.02	0.02	0.02	0.00	99.97
0.167	1.82	46.36	0.05	44.98	6.25	0.02	0.07	0.05	0.05	0.00	99.66
0.333	0.03	17.89	0.02	58.79	20.37	0.03	0.13	0.10	0.10	0.00	97.46
0.5	0.00	6.55	0.01	53.06	32.91	0.04	0.14	0.12	0.12	0.00	92.96
1	0.00	0.32	0.00	24.89	46.16	0.04	0.11	0.15	0.15	0.00	71.84
2	0.00	0.00	0.00	4.19	28.48	0.05	0.07	0.16	0.16	0.00	33.12
4	0.00	0.00	0.00	0.11	4.87	0.05	0.05	0.17	0.17	0.00	5.44
8	0.00	0.00	0.00	0.00	0.09	0.05	0.04	0.18	0.17	0.01	0.55
10	0.00	0.00	0.00	0.00	0.01	0.05	0.04	0.18	0.16	0.01	0.46
20	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.18	0.15	0.02	0.45
30	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.18	0.15	0.03	0.45
					1-y-old						
0.042	36.49	54.97	0.00	8.30	0.23	0.00	0.00	0.00	0.00	0.00	100.00
0.083	13.64	62.83	0.00	22.16	1.32	0.00	0.00	0.00	0.00	0.00	99.97
0.167	1.82	46.51	0.00	45.06	6.26	0.00	0.01	0.01	0.01	0.00	99.67
0.333	0.03	18.02	0.00	58.97	20.41	0.00	0.01	0.01	0.01	0.00	97.48
0.5	0.00	6.63	0.00	53.28	33.01	0.00	0.01	0.01	0.01	0.00	92.96
1	0.00	0.33	0.00	25.04	46.35	0.00	0.01	0.01	0.01	0.00	71.77
2	0.00	0.00	0.00	4.22	28.62	0.00	0.01	0.02	0.02	0.00	32.88
4	0.00	0.00	0.00	0.12	4.90	0.00	0.00	0.02	0.02	0.00	5.06
8	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.02	0.02	0.00	0.14
10	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.02	0.00	0.06
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.04
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.04
					5-y-old						
0.042	36.49	54.97	0.00	8.30	0.23	0.00	0.00	0.00	0.00	0.00	100.00
0.083	13.64	62.83	0.00	22.16	1.32	0.00	0.00	0.00	0.00	0.00	99.97
0.167	1.82	46.51	0.00	45.06	6.26	0.00	0.01	0.00	0.00	0.00	99.67
0.333	0.03	18.02	0.00	58.97	20.41	0.01	0.01	0.01	0.01	0.00	97.48
0.5	0.00	6.63	0.00	53.28	33.01	0.01	0.01	0.01	0.01	0.00	92.96
1	0.00	0.33	0.00	25.04	46.35	0.01	0.01	0.01	0.01	0.00	71.77
2	0.00	0.00	0.00	4.22	28.62	0.01	0.01	0.01	0.01	0.00	32.88
4	0.00	0.00	0.00	0.12	4.90	0.01	0.00	0.01	0.01	0.00	5.06
8	0.00	0.00	0.00	0.00	0.09	0.01	0.00	0.01	0.01	0.00	0.14
10	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.06
20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.04
30	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.04

Table A-17 (continued)

Time (d)	Stomach	SI	Blood	ULI	LLI	Liver	Other	C_Bone	T_Bone	Marrow	Retained
					10-y-old						
0.042	36.49	54.97	0.00	8.30	0.23	0.00	0.00	0.00	0.00	0.00	100.00
0.083	13.64	62.83	0.00	22.16	1.32	0.00	0.00	0.00	0.00	0.00	99.97
0.167	1.82	46.51	0.00	45.06	6.26	0.00	0.01	0.00	0.00	0.00	99.67
0.333	0.03	18.02	0.00	58.97	20.41	0.01	0.01	0.01	0.01	0.00	97.48
0.5	0.00	6.63	0.00	53.28	33.01	0.01	0.01	0.01	0.01	0.00	92.96
1	0.00	0.33	0.00	25.04	46.35	0.01	0.01	0.01	0.01	0.00	71.77
2	0.00	0.00	0.00	4.22	28.62	0.01	0.01	0.01	0.01	0.00	32.88
4	0.00	0.00	0.00	0.12	4.90	0.01	0.00	0.01	0.01	0.00	5.06
8	0.00	0.00	0.00	0.00	0.09	0.01	0.00	0.01	0.01	0.00	0.14
10	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.06
20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.04
30	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.04
					15-y-old						
0.042	36.49	54.97	0.00	8.30	0.23	0.00	0.00	0.00	0.00		100.00
0.083	13.64	62.83	0.00	22.16	1.32	0.00	0.00	0.00	0.00		99.97
0.167	1.82	46.51	0.00	45.06	6.26	0.00	0.01	0.00	0.00		99.67
0.333	0.03	18.02	0.00	58.97	20.41	0.01	0.01	0.01	0.01		97.48
0.5	0.00	6.63	0.00	53.28	33.01	0.01	0.01	0.01	0.01		92.96
1	0.00	0.33	0.00	25.04	46.35	0.01	0.01	0.01	0.01		71.77
2	0.00	0.00	0.00	4.22	28.62	0.01	0.01	0.01	0.01		32.88
4	0.00	0.00	0.00	0.12	4.90	0.01	0.00	0.01	0.01		5.06
8	0.00	0.00	0.00	0.00	0.09	0.01	0.00	0.01	0.01		0.14
10	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01		0.06
20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01		0.04
30	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01		0.04
					Adult						
0.042	36.49	54.97	0.00	8.30	0.23	0.00	0.00	0.00	0.00		100.00
0.083	13.64	62.83	0.00	22.16	1.32	0.00	0.00	0.00	0.00		99.97
0.167	1.82	46.51	0.00	45.06	6.26	0.01	0.01	0.00	0.00		99.67
0.333	0.03	18.02	0.00	58.97	20.41	0.01	0.01	0.00	0.00		97.48
0.5	0.00	6.63	0.00	53.28	33.01	0.02	0.01	0.01	0.01		92.96
1	0.00	0.33	0.00	25.04	46.35	0.02	0.01	0.01	0.01		71.77
2	0.00	0.00	0.00	4.22	28.62	0.02	0.01	0.01	0.01		32.88
4	0.00	0.00	0.00	0.12	4.90	0.02	0.00	0.01	0.01		5.06
8	0.00	0.00	0.00	0.00	0.09	0.02	0.00	0.01	0.01		0.14
10	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01	0.01		0.06
20	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.01		0.04
30	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.01		0.04

Appendix B

POSITIONS OF PHANTOMS WITH RESPECT TO GAMMA CAMERAS

The position of each phantom with respect to the Siemens e.cam or the Philips SKYLight camera is illustrated in figures B-1 to B-14. These figures are sagittal sections in the median plane of each phantom-camera combination, produced by MCNPX. In each case, a distance of 5 cm is maintained between the camera and the nearest portion of the body.[7] The position of the infant was adjusted so that the entire body was centered on the field of view (FOV) of each camera.[8] The one-year-old was positioned with the top of the head at the top of the FOV, which encompassed all but the lower legs.[9] The 5-year-old was positioned with the base of the trunk at the bottom edge of the FOV. The detector of the Siemens camera was centered on the region of the 10-year-old extending from the nose[10] to the base of the trunk. The two heads of the Philips SKYLight were positioned so that the nasal cavity of the 10-year-old fell into the anterior FOV, while the posterior camera viewed all the major organs in the trunk. The 15-year-old and the adult phantoms were placed in typical positions of adults undergoing lung scans, as discussed in section 3.1.3.

The apparent anomaly of the NORMAN nose touching the camera in figures B-11 and B-12 is due to the rigidity of the phantom model. The real patient would tilt his head back. In the sagittal sections of NAOMI shown in figures B-13 and B-14, the buttocks are flattened due to the supine position of the subject during the MRI scan (NORMAN had been adjusted to correct this artifact). In addition, the breasts do not appear in this medial view. The spacing of the camera heads maintains a 5-cm distance from the natural shape of the body in a patient standing erect. Because the median plane lies between the lower legs of both phantoms, only the upper portions of the legs are shown in figures B-11 to B-14.

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[7] Such a separation is needed because, without a collimator, there is no pressure-sensitive alarm to protect the patient from potential injury by contact with the detector, nor is the detector protected from being damaged by contact with the patient.

[8] The field of view of each camera is described in parts II and III of the present series (Anigstein et al. 2007b, section 2.1.3; Anigstein et al. 2007c, section 2.1.2), respectively.

[9] Note that with the collimator removed, counts are registered from regions of the body outside the normal field of view, but with reduced efficiencies.

[10] As shown in appendix A, a significant fraction of inhaled activity is contained in the anterior nasal cavity during the first day following exposure.

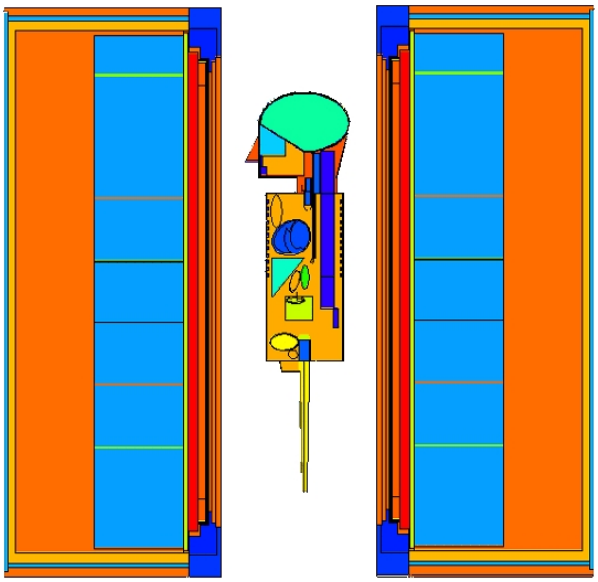

Figure B-1. Infant–Siemens e.cam

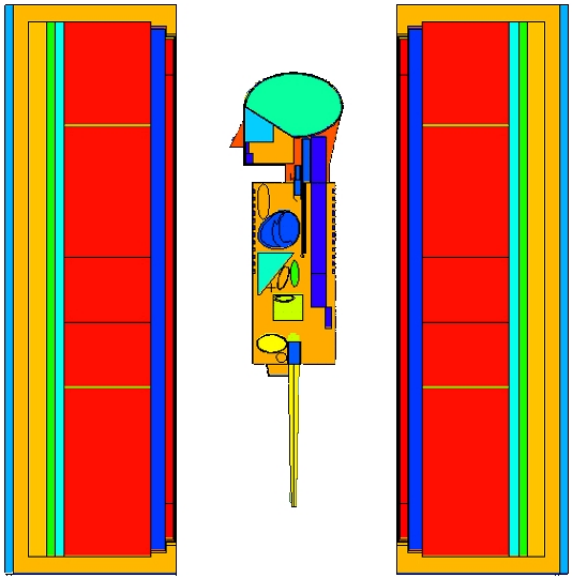

Figure B-2. Infant–Philips SKYLight

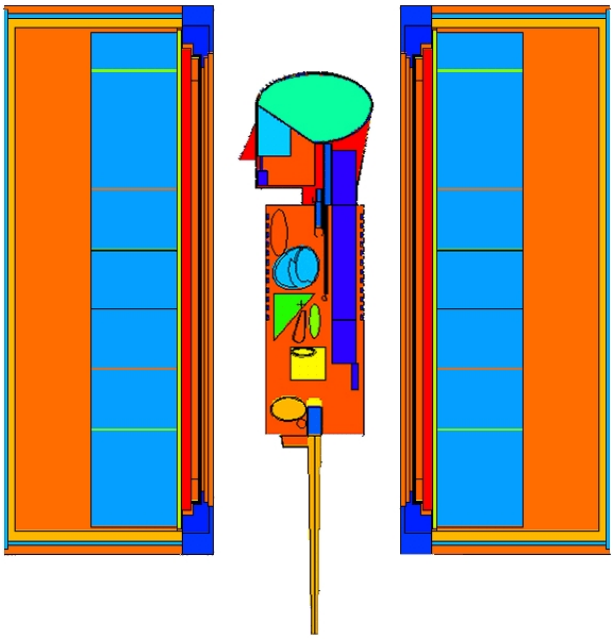

Figure B-3. 1-y-old–Siemens e.cam

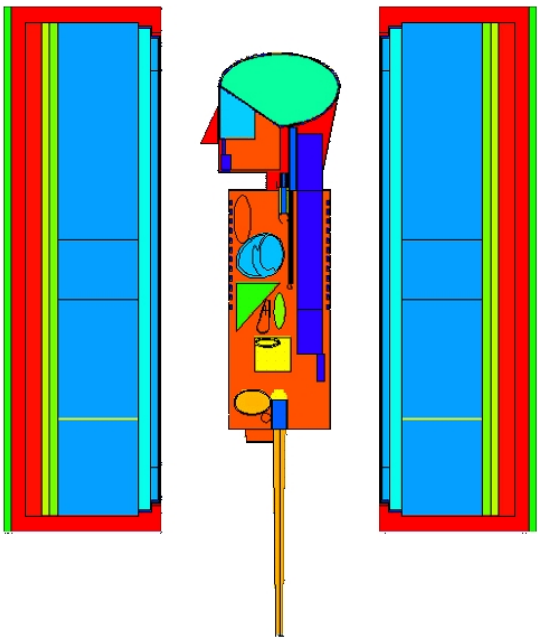

Figure B-4. 1-y-old–Philips SKYLight

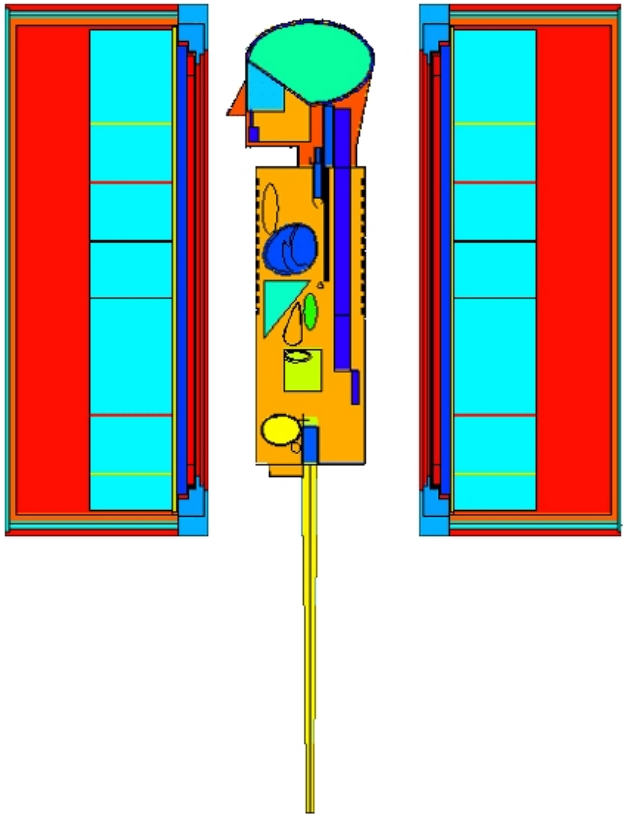

Figure B-5. 5-y-old–Siemens e.cam

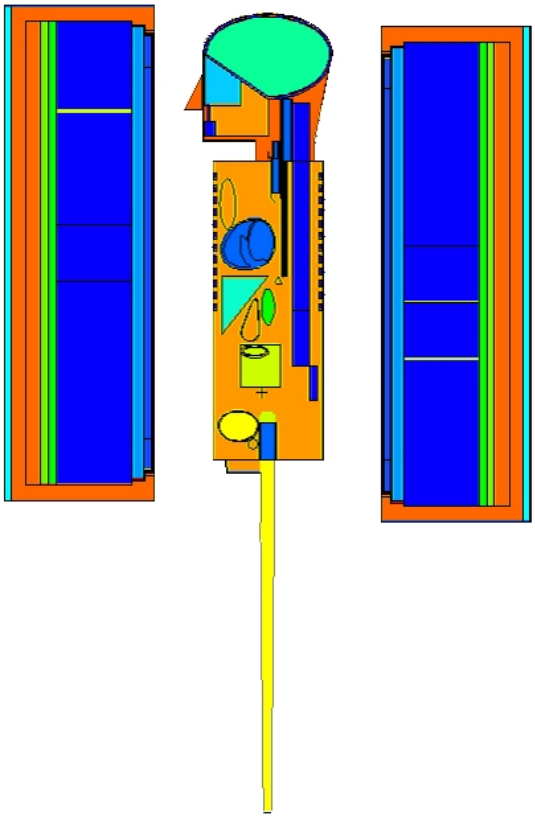

Figure B-6. 5-y-old–Philips SKYLight

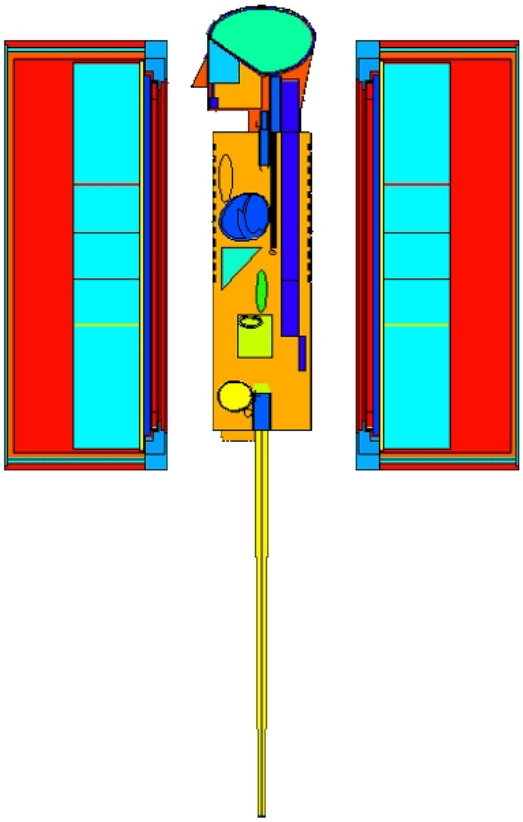

Figure B-7. 10-y-old–Siemens e.cam

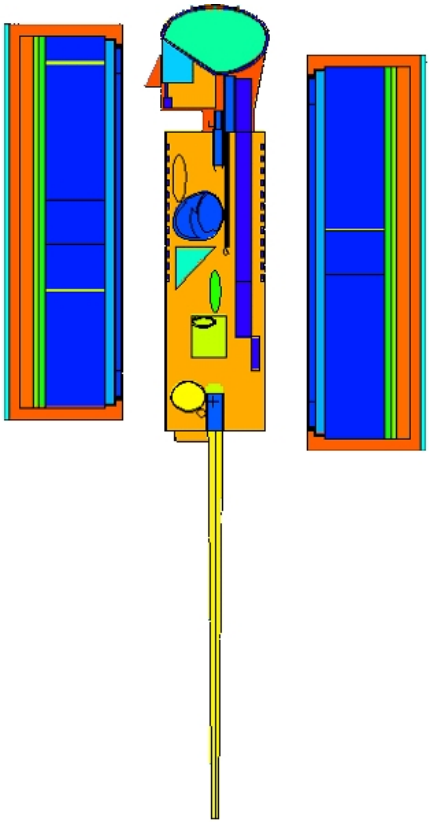

Figure B-8. 10-y-old–Philips SKYLight

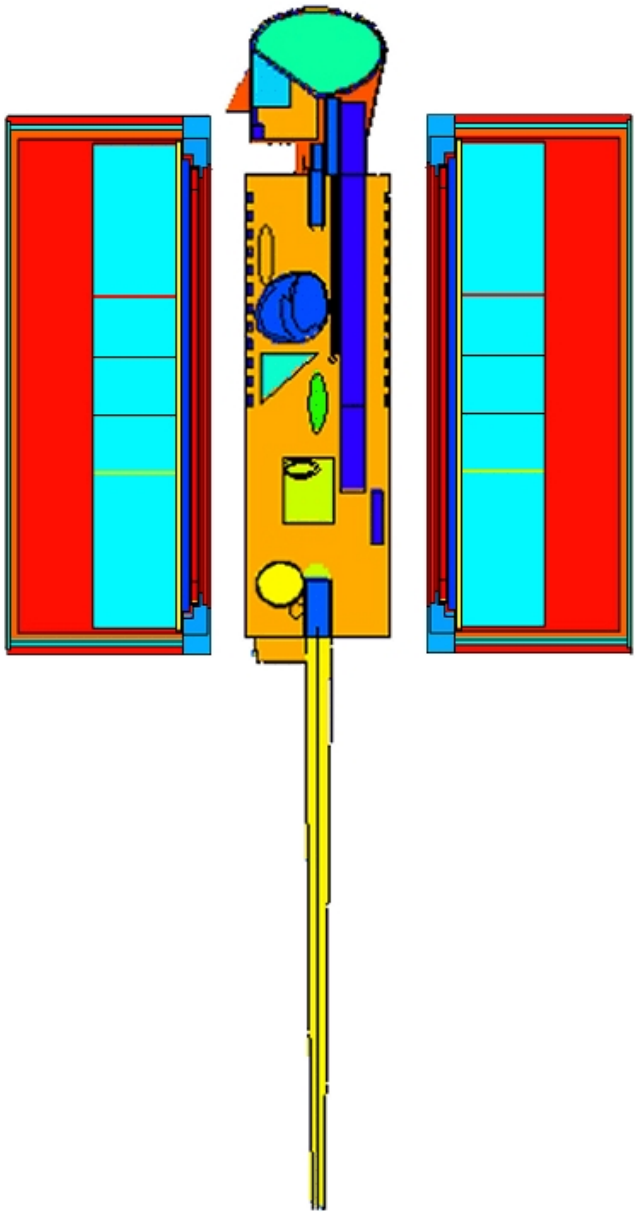

Figure B-9. 15-y-old–Siemens e.cam

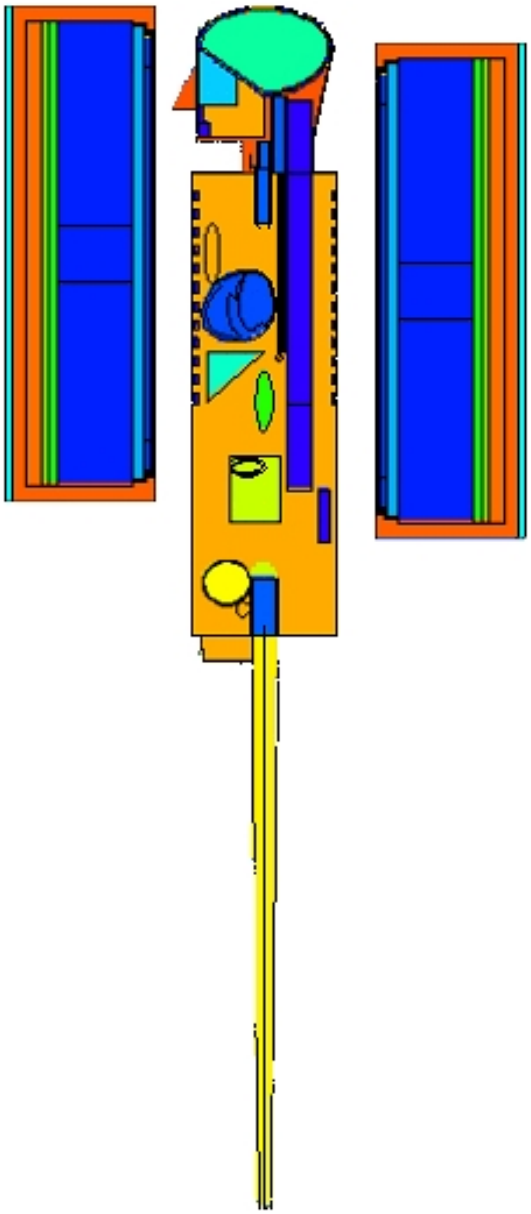

Figure B-10. 15-y-old–Philips SKYLight

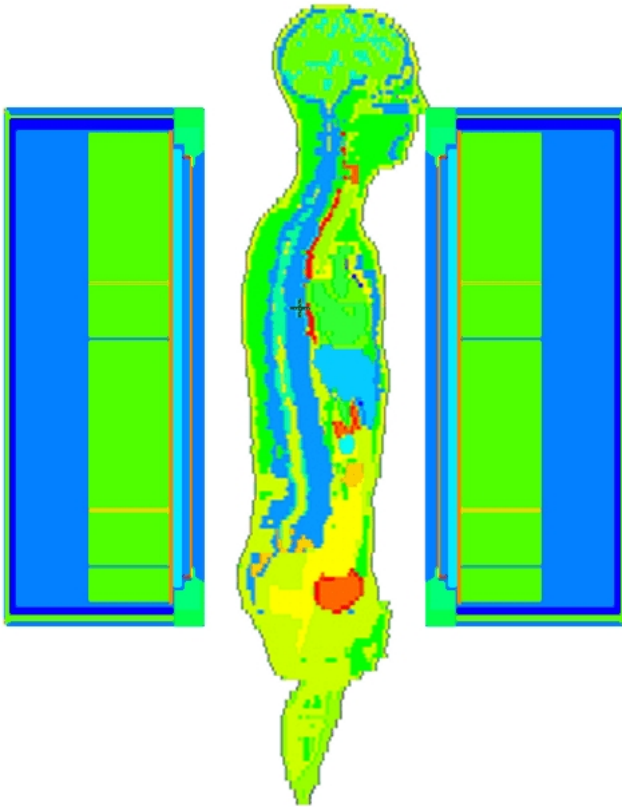

Figure B-11. NORMAN–Siemens e.cam

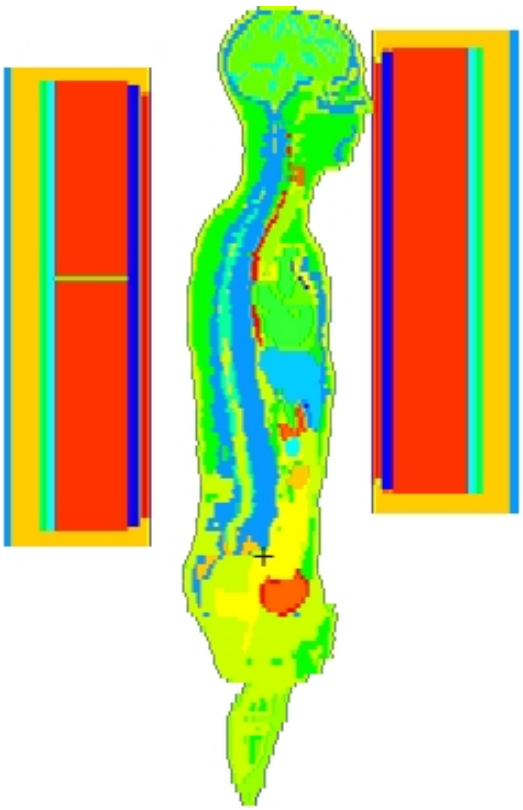

Figure B-12. NORMAN–Philips SKYLight

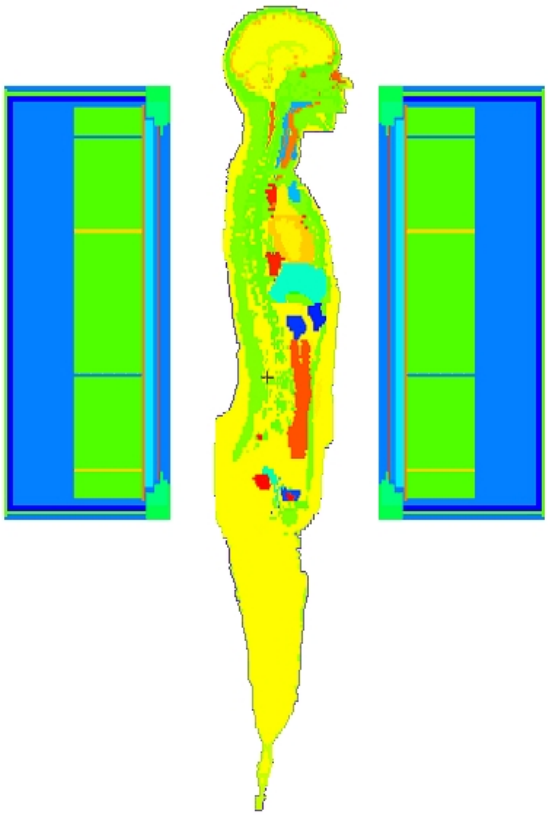

Figure B-13. NAOMI–Siemens e.cam

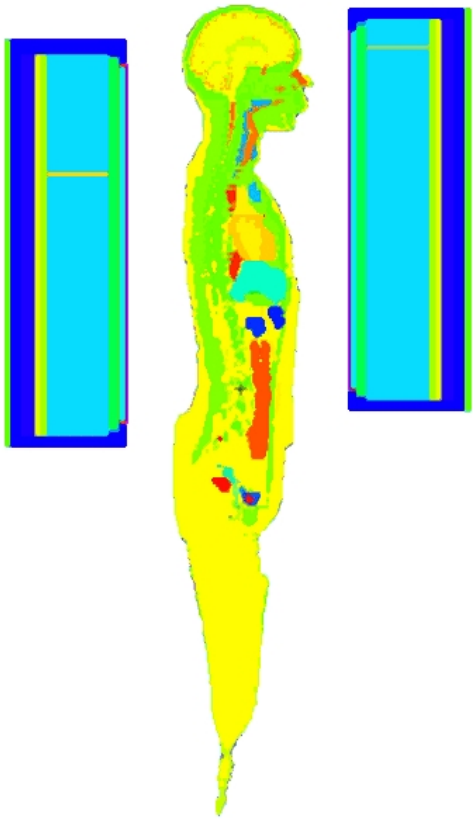

Figure B-14. NAOMI–Philips SKYLight

Appendix C

NORMALIZED COUNT RATES FROM RADIONUCLIDES IN VARIOUS ANATOMICAL REGIONS

Tables C-1 to C-6 list the calculated count rates from each of six radionuclides in various anatomical regions of each of the seven anthropomorphic phantoms used in the present analysis. These regions are identified by the same names as the corresponding source regions in the DCAL model, described in chapter 2, with additional details presented tables 2-3 and A-1. All count rates are normalized to a total activity of 1 Bq uniformly distributed in each region. Bone is treated as a single region in the pediatric Han phantoms (see section 3.1.1). Because ^{241}Am is distributed almost equally between the cortical and trabecular bone regions, the activity was distributed equally between the two bone regions in the MCNP simulations of bone in the adult voxel phantoms, and the count rates are listed as a single region called "bone." Because of significant differences in the distribution of ^{90}Sr in cortical and trabecular bone, separate MCNP analyses were performed of this nuclide in the two bone regions.

As discussed in section 3.2, the simulated count rates on the Siemens e.cam camera from all nuclides except ^{241}Am were summed over two sets of energy windows: one set consisted of six 50% windows, while the second, narrower set consisted of three such windows. The count rates from these five nuclides in the first set of windows are listed in tables C-1 to C-5 under the column heading "6 Windows," while those in the second set are under the heading "3 Windows." A single set of two 50% windows was used to sum the count rates from ^{241}Am on the Siemens camera, which are listed in table C-6. Count rates of the two detectors, in the anterior and posterior positions, were calculated separately.

These count rates were used to calculate the calibration factors used by the Assess computer code (Anigstein et al. 2009). They were also used to calculate the alternate calibration factors listed in appendix D.

Table C-1. Normalized Count Rates from ^{60}Co in Various Anatomical Regions (cps/Bq)

Anatomical region	Camera					
	Siemens e.cam				Philips SKYLight	
	6 Windows		3 Windows			
	AP	Posterior	Anterior	Posterior	Anterior	Posterior
			Infant			
Lung	1.44e-01	1.62e-01	1.02e-01	1.14e-01	1.03e-01	1.17e-01
BBi	1.45e-01	1.67e-01	1.04e-01	1.19e-01	1.04e-01	1.21e-01
ET1	1.64e-01	7.80e-02	1.11e-01	5.51e-02	1.10e-01	5.36e-02
Stomach	1.88e-01	1.53e-01	1.36e-01	1.10e-01	1.37e-01	1.12e-01
SI	1.77e-01	1.77e-01	1.28e-01	1.27e-01	1.29e-01	1.30e-01
Blood	1.54e-01	1.59e-01	1.10e-01	1.13e-01	1.11e-01	1.16e-01
ULI	1.82e-01	1.68e-01	1.32e-01	1.20e-01	1.33e-01	1.23e-01
LLI	1.69e-01	1.74e-01	1.22e-01	1.25e-01	1.23e-01	1.27e-01
Other	1.38e-01	1.51e-01	9.83e-02	1.07e-01	9.83e-02	1.08e-01
Liver	1.77e-01	1.61e-01	1.27e-01	1.15e-01	1.29e-01	1.17e-01
			1-y-old			
Lung	1.38e-01	1.59e-01	9.97e-02	1.14e-01	1.10e-01	1.29e-01
BBi	1.42e-01	1.70e-01	1.04e-01	1.23e-01	1.14e-01	1.38e-01
ET1	1.69e-01	6.52e-02	1.16e-01	4.67e-02	1.29e-01	5.09e-02
Stomach	1.86e-01	1.44e-01	1.37e-01	1.05e-01	1.50e-01	1.17e-01
SI	1.64e-01	1.65e-01	1.20e-01	1.21e-01	1.30e-01	1.33e-01
Blood	1.44e-01	1.49e-01	1.04e-01	1.07e-01	1.14e-01	1.20e-01
ULI	1.71e-01	1.53e-01	1.25e-01	1.12e-01	1.37e-01	1.23e-01
LLI	1.47e-01	1.52e-01	1.08e-01	1.11e-01	1.16e-01	1.21e-01
Other	1.19e-01	1.34e-01	8.58e-02	9.61e-02	9.26e-02	1.06e-01
Liver	1.71e-01	1.54e-01	1.25e-01	1.12e-01	1.37e-01	1.25e-01
			5-y-old			
Lung	1.44e-01	1.42e-01	1.04e-01	1.03e-01	1.16e-01	1.20e-01
BBi	1.45e-01	1.56e-01	1.06e-01	1.15e-01	1.18e-01	1.32e-01
ET1	1.55e-01	4.84e-02	1.07e-01	3.48e-02	1.25e-01	3.76e-02
Stomach	2.03e-01	1.28e-01	1.49e-01	9.41e-02	1.62e-01	1.08e-01
SI	1.70e-01	1.45e-01	1.25e-01	1.07e-01	1.29e-01	1.23e-01
Blood	1.43e-01	1.27e-01	1.04e-01	9.24e-02	1.13e-01	1.06e-01
ULI	1.79e-01	1.35e-01	1.32e-01	9.88e-02	1.38e-01	1.14e-01
LLI	1.44e-01	1.26e-01	1.06e-01	9.28e-02	1.06e-01	1.07e-01
Other	1.04e-01	1.03e-01	7.46e-02	7.44e-02	8.00e-02	8.43e-02
Liver	1.83e-01	1.41e-01	1.34e-01	1.03e-01	1.46e-01	1.19e-01

Table C-1 (continued)

Anatomical region	Camera					
	Siemens e.cam				Philips SKYLight	
	6 Windows		3 Windows			
	AP	Posterior	Anterior	Posterior	Anterior	Posterior
			10-y-old			
Lung	1.34e-01	1.39e-01	9.75e-02	1.01e-01	1.21e-01	1.21e-01
BBi	1.36e-01	1.43e-01	1.00e-01	1.06e-01	1.27e-01	1.26e-01
ET1	9.46e-02	3.67e-02	6.53e-02	2.62e-02	1.08e-01	3.07e-02
Stomach	2.01e-01	1.29e-01	1.47e-01	9.40e-02	1.67e-01	1.11e-01
SI	1.66e-01	1.48e-01	1.22e-01	1.08e-01	1.20e-01	1.24e-01
Blood	1.31e-01	1.21e-01	9.57e-02	8.80e-02	1.10e-01	1.03e-01
ULI	1.76e-01	1.35e-01	1.29e-01	9.85e-02	1.30e-01	1.13e-01
LLI	1.37e-01	1.23e-01	9.99e-02	8.96e-02	8.85e-02	1.00e-01
Other	8.78e-02	9.04e-02	6.34e-02	6.54e-02	6.85e-02	7.50e-02
Liver	1.76e-01	1.43e-01	1.29e-01	1.05e-01	1.47e-01	1.24e-01
			15-y-old			
Lung	1.45e-01	1.50e-01	1.05e-01	1.08e-01	1.32e-01	1.39e-01
BBi	1.47e-01	1.43e-01	1.06e-01	1.04e-01	1.54e-01	1.47e-01
ET1	5.57e-02	2.78e-02	3.77e-02	1.95e-02	1.44e-01	3.76e-02
Stomach	2.33e-01	1.43e-01	1.69e-01	1.03e-01	1.43e-01	1.01e-01
SI	1.86e-01	1.62e-01	1.34e-01	1.17e-01	6.47e-02	8.12e-02
Blood	1.43e-01	1.29e-01	1.03e-01	9.36e-02	1.05e-01	1.02e-01
ULI	2.00e-01	1.46e-01	1.45e-01	1.05e-01	7.35e-02	7.73e-02
LLI	1.42e-01	1.24e-01	1.02e-01	8.87e-02	3.73e-02	4.80e-02
Other	8.95e-02	9.17e-02	6.41e-02	6.60e-02	5.75e-02	6.45e-02
			Adult male			
Lung	1.44e-01	1.48e-01	1.05e-01	1.08e-01	1.28e-01	1.31e-01
ET1	4.79e-02	2.60e-02	3.38e-02	1.88e-02	1.68e-01	3.13e-02
Stomach	2.09e-01	1.48e-01	1.53e-01	1.08e-01	1.40e-01	1.11e-01
SI	1.73e-01	1.24e-01	1.27e-01	9.05e-02	7.04e-02	7.11e-02
Blood	1.15e-01	1.01e-01	8.41e-02	7.38e-02	8.64e-02	7.95e-02
ULI	1.83e-01	1.29e-01	1.34e-01	9.41e-02	8.58e-02	8.04e-02
LLI	1.14e-01	1.20e-01	8.30e-02	8.75e-02	4.06e-02	6.13e-02
Other	6.84e-02	7.63e-02	4.93e-02	5.53e-02	4.61e-02	5.40e-02
			Adult female			
Lung	1.33e-01	1.37e-01	9.67e-02	1.00e-01	1.14e-01	1.22e-01
ET1	6.12e-02	2.99e-02	4.25e-02	2.14e-02	1.15e-01	3.32e-02
Stomach	1.83e-01	1.48e-01	1.34e-01	1.09e-01	1.35e-01	1.22e-01
SI	1.81e-01	1.25e-01	1.32e-01	9.07e-02	7.80e-02	7.62e-02
Blood	1.24e-01	1.08e-01	9.05e-02	7.88e-02	8.80e-02	8.46e-02
ULI	2.18e-01	1.15e-01	1.60e-01	8.36e-02	1.28e-01	8.13e-02
LLI	1.51e-01	1.13e-01	1.10e-01	8.16e-02	6.87e-02	7.13e-02
Other	7.33e-02	7.55e-02	5.29e-02	5.47e-02	4.64e-02	0.053

Table C-2. Normalized Count Rates from ^{90}Sr in Various Anatomical Regions (cps/Bq)

Anatomical region	Camera					
	Siemens e.cam				Philips SKYLight	
	6 Windows		3 Windows			
	AP	Posterior	Anterior	Posterior	Anterior	Posterior
			Infant			
Lung	5.28e-03	6.19e-03	4.17e-03	4.87e-03	4.28e-03	5.00e-03
BBi	4.73e-03	5.60e-03	3.77e-03	4.47e-03	3.73e-03	4.57e-03
ET1	1.12e-02	2.13e-03	8.01e-03	1.63e-03	8.27e-03	1.43e-03
Stomach	7.17e-03	4.20e-03	5.67e-03	3.35e-03	5.92e-03	3.44e-03
SI	5.84e-03	5.21e-03	4.67e-03	4.21e-03	4.77e-03	4.33e-03
Blood	5.79e-03	5.64e-03	4.54e-03	4.42e-03	4.69e-03	4.56e-03
ULI	6.47e-03	4.61e-03	5.15e-03	3.71e-03	5.27e-03	3.83e-03
LLI	5.64e-03	5.33e-03	4.50e-03	4.25e-03	4.63e-03	4.41e-03
Bone	6.39e-03	4.92e-03	4.97e-03	3.79e-03	5.05e-03	3.88e-03
Other	5.37e-03	5.76e-03	4.16e-03	4.45e-03	4.23e-03	4.60e-03
			1-y-old			
Lung	4.45e-03	5.20e-03	3.57e-03	4.14e-03	3.89e-03	4.61e-03
BBi	3.79e-03	4.61e-03	3.09e-03	3.75e-03	3.32e-03	4.14e-03
ET1	1.04e-02	1.13e-03	7.62e-03	8.90e-04	8.38e-03	8.62e-04
Stomach	6.22e-03	3.05e-03	5.03e-03	2.50e-03	5.57e-03	2.73e-03
SI	4.52e-03	3.91e-03	3.73e-03	3.23e-03	3.99e-03	3.47e-03
Blood	4.56e-03	4.34e-03	3.65e-03	3.48e-03	3.92e-03	3.77e-03
ULI	5.15e-03	3.42e-03	4.17e-03	2.82e-03	4.57e-03	3.10e-03
LLI	4.07e-03	3.67e-03	3.32e-03	3.00e-03	3.47e-03	3.17e-03
Bone	4.11e-03	4.52e-03	3.30e-03	3.59e-03	3.44e-03	3.87e-03
Other	3.81e-03	4.19e-03	3.03e-03	3.30e-03	3.22e-03	3.58e-03
			5-y-old			
Lung	4.22e-03	4.24e-03	3.43e-03	3.45e-03	3.71e-03	3.90e-03
BBi	3.27e-03	3.78e-03	2.70e-03	3.13e-03	2.96e-03	3.40e-03
ET1	9.19e-03	7.56e-04	6.68e-03	5.80e-04	7.95e-03	5.41e-04
Stomach	5.99e-03	2.36e-03	4.91e-03	1.98e-03	5.32e-03	2.16e-03
SI	4.16e-03	2.99e-03	3.42e-03	2.49e-03	3.47e-03	2.80e-03
Blood	3.93e-03	3.27e-03	3.19e-03	2.63e-03	3.43e-03	2.97e-03
ULI	4.70e-03	2.53e-03	3.87e-03	2.11e-03	4.01e-03	2.40e-03
LLI	3.36e-03	2.54e-03	2.79e-03	2.11e-03	2.69e-03	2.39e-03
UB_Cont	5.05e-03	1.45e-03	4.10e-03	1.21e-03	3.78e-03	1.32e-03
Bone	2.69e-03	3.11e-03	2.15e-03	2.51e-03	2.31e-03	2.73e-03
Other	2.90e-03	2.76e-03	2.32e-03	2.21e-03	2.43e-03	2.50e-03

Table C-2 (continued)

Anatomical region	Camera					
	Siemens e.cam				Philips SKYLight	
	6 Windows		3 Windows			
	AP	Posterior	Anterior	Posterior	Anterior	Posterior
			10-y-old			
Lung	3.66e-03	3.77e-03	3.00e-03	3.08e-03	3.57e-03	3.59e-03
BBi	2.86e-03	2.97e-03	2.39e-03	2.50e-03	2.92e-03	2.89e-03
ET1	4.94e-03	4.92e-04	3.56e-03	3.85e-04	6.28e-03	3.74e-04
Stomach	5.49e-03	2.02e-03	4.51e-03	1.70e-03	5.10e-03	1.92e-03
SI	3.73e-03	2.66e-03	3.12e-03	2.23e-03	2.83e-03	2.49e-03
Blood	3.26e-03	2.81e-03	2.66e-03	2.29e-03	3.00e-03	2.60e-03
ULI	4.22e-03	2.22e-03	3.50e-03	1.87e-03	3.36e-03	2.07e-03
LLI	2.80e-03	2.13e-03	2.33e-03	1.78e-03	1.90e-03	1.92e-03
Bone	1.77e-03	2.44e-03	1.44e-03	1.98e-03	1.63e-03	2.22e-03
Other	2.30e-03	2.21e-03	1.85e-03	1.78e-03	1.93e-03	1.96e-03
			15-y-old			
Lung	3.29e-03	3.43e-03	2.73e-03	2.81e-03	3.35e-03	3.53e-03
BBi	2.51e-03	2.30e-03	2.11e-03	1.95e-03	3.04e-03	2.65e-03
ET1	1.93e-03	2.44e-04	1.42e-03	1.96e-04	8.51e-03	3.96e-04
Stomach	5.36e-03	1.82e-03	4.45e-03	1.54e-03	3.57e-03	1.46e-03
SI	3.42e-03	2.41e-03	2.87e-03	2.04e-03	9.08e-04	1.15e-03
Blood	2.98e-03	2.43e-03	2.47e-03	2.00e-03	2.45e-03	2.18e-03
ULI	3.96e-03	1.94e-03	3.31e-03	1.64e-03	1.20e-03	1.06e-03
LLI	2.44e-03	1.72e-03	2.04e-03	1.45e-03	4.18e-04	5.30e-04
Bone	1.34e-03	2.09e-03	1.09e-03	1.71e-03	1.39e-03	1.86e-03
Other	1.99e-03	1.91e-03	1.61e-03	1.55e-03	1.39e-03	1.47e-03
			Adult male			
Lung	3.28e-03	3.13e-03	2.70e-03	2.59e-03	3.32e-03	3.11e-03
ET1	8.05e-04	2.21e-04	6.47e-04	1.76e-04	8.32e-03	3.03e-04
Stomach	4.13e-03	2.00e-03	3.44e-03	1.68e-03	2.96e-03	1.67e-03
SI	3.94e-03	1.51e-03	3.26e-03	1.27e-03	1.19e-03	8.79e-04
Blood	2.43e-03	1.82e-03	2.01e-03	1.51e-03	2.00e-03	1.59e-03
ULI	4.35e-03	1.77e-03	3.57e-03	1.48e-03	1.64e-03	1.16e-03
LLI	1.92e-03	1.86e-03	1.60e-03	1.54e-03	4.83e-04	9.32e-04
UB_Cont	2.19e-03	6.94e-04	1.80e-03	5.73e-04	2.91e-04	2.33e-04
T_Bone	8.81e-04	1.50e-03	7.26e-04	1.24e-03	3.49e-04	7.37e-04
C_Bone	1.82e-03	2.16e-03	1.50e-03	1.79e-03	1.55e-03	1.74e-03
Other	1.46e-03	1.60e-03	1.18e-03	1.29e-03	1.09e-03	1.26e-03
			Adult female			
Lung	2.85e-03	3.23e-03	2.36e-03	2.67e-03	2.91e-03	3.25e-03
ET1	1.53e-03	2.98e-04	1.20e-03	2.40e-04	5.62e-03	3.80e-04
Stomach	3.50e-03	2.54e-03	2.93e-03	2.15e-03	3.00e-03	2.37e-03
SI	4.24e-03	1.84e-03	3.48e-03	1.55e-03	1.63e-03	1.23e-03
Blood	2.84e-03	2.23e-03	2.35e-03	1.83e-03	2.27e-03	1.96e-03
ULI	5.96e-03	1.64e-03	4.85e-03	1.38e-03	3.75e-03	1.27e-03
LLI	3.49e-03	1.80e-03	2.86e-03	1.51e-03	1.40e-03	1.27e-03
UB_Cont	1.76e-03	8.91e-04	1.44e-03	7.43e-04	2.34e-04	2.95e-04
T_Bone	1.19e-03	1.05e-03	9.69e-04	8.51e-04	1.15e-03	9.12e-04
C_Bone	1.72e-03	1.84e-03	1.41e-03	1.51e-03	1.65e-03	1.67e-03
Other	1.70e-03	1.75e-03	1.36e-03	1.41e-03	1.17e-03	1.35e-03

Table C-3. Normalized Count Rates from ^{131}I in Various Anatomical Regions (cps/Bq)

Anatomical region	Camera					
	Siemens e.cam				Philips SKYLight	
	6 Windows		3 Windows			
	AP	Posterior	Anterior	Posterior	Anterior	Posterior
			Infant			
ET1	2.37e-01	7.24e-02	2.01e-01	6.24e-02	1.91e-01	5.88e-02
Stomach	2.29e-01	1.63e-01	1.95e-01	1.39e-01	1.97e-01	1.41e-01
SI	2.02e-01	1.94e-01	1.71e-01	1.65e-01	1.74e-01	1.70e-01
Blood	1.83e-01	1.85e-01	1.55e-01	1.58e-01	1.55e-01	1.59e-01
LLI	1.94e-01	1.94e-01	1.65e-01	1.65e-01	1.67e-01	1.69e-01
Thyroid	1.70e-01	1.80e-01	1.44e-01	1.54e-01	1.42e-01	1.53e-01
UB_Cont	2.38e-01	1.49e-01	2.02e-01	1.26e-01	2.03e-01	1.28e-01
Other	1.66e-01	1.81e-01	1.41e-01	1.54e-01	1.39e-01	1.54e-01
			1-y-old			
ET1	2.38e-01	5.21e-02	2.00e-01	4.39e-02	2.15e-01	4.73e-02
Stomach	2.15e-01	1.39e-01	1.79e-01	1.15e-01	2.01e-01	1.32e-01
SI	1.75e-01	1.67e-01	1.44e-01	1.37e-01	1.62e-01	1.58e-01
Blood	1.60e-01	1.61e-01	1.34e-01	1.35e-01	1.48e-01	1.52e-01
LLI	1.56e-01	1.55e-01	1.29e-01	1.28e-01	1.43e-01	1.44e-01
Thyroid	1.56e-01	1.73e-01	1.30e-01	1.45e-01	1.44e-01	1.64e-01
UB_Cont	1.97e-01	1.07e-01	1.64e-01	8.79e-02	1.78e-01	9.82e-02
Other	1.32e-01	1.48e-01	1.11e-01	1.24e-01	1.20e-01	1.37e-01
			5-y-old			
ET1	2.13e-01	3.55e-02	1.79e-01	2.94e-02	2.05e-01	3.15e-02
Stomach	2.23e-01	1.16e-01	1.82e-01	9.26e-02	2.07e-01	1.15e-01
SI	1.71e-01	1.38e-01	1.37e-01	1.10e-01	1.52e-01	1.38e-01
Blood	1.50e-01	1.29e-01	1.23e-01	1.06e-01	1.40e-01	1.26e-01
LLI	1.42e-01	1.19e-01	1.14e-01	9.53e-02	1.21e-01	1.18e-01
Thyroid	1.42e-01	1.42e-01	1.16e-01	1.17e-01	1.36e-01	1.33e-01
UB_Cont	1.77e-01	7.77e-02	1.45e-01	6.13e-02	1.45e-01	7.59e-02
Other	1.09e-01	1.06e-01	8.96e-02	8.75e-02	9.82e-02	1.02e-01

Table C-3 (continued)

Anatomical region	Camera					
	Siemens e.cam				Philips SKYLight	
	6 Windows		3 Windows			
	AP	Posterior	Anterior	Posterior	Anterior	Posterior
			10-y-old			
ET1	1.17e-01	2.51e-02	9.84e-02	2.04e-02	1.69e-01	2.39e-02
Stomach	2.12e-01	1.10e-01	1.71e-01	8.51e-02	2.06e-01	1.11e-01
SI	1.60e-01	1.33e-01	1.25e-01	1.03e-01	1.33e-01	1.31e-01
Blood	1.32e-01	1.17e-01	1.06e-01	9.37e-02	1.30e-01	1.17e-01
LLI	1.27e-01	1.09e-01	9.97e-02	8.48e-02	9.37e-02	1.02e-01
Thyroid	1.13e-01	9.84e-02	9.14e-02	7.99e-02	1.35e-01	9.67e-02
UB_Cont	1.57e-01	6.75e-02	1.26e-01	5.15e-02	9.87e-02	6.18e-02
Other	8.76e-02	8.96e-02	7.06e-02	7.26e-02	8.06e-02	8.71e-02
			15-y-old			
ET1	5.52e-02	1.60e-02	4.61e-02	1.25e-02	2.29e-01	2.84e-02
Stomach	2.28e-01	1.10e-01	1.79e-01	8.22e-02	1.62e-01	9.29e-02
SI	1.66e-01	1.33e-01	1.25e-01	1.00e-01	5.81e-02	7.38e-02
Blood	1.32e-01	1.15e-01	1.03e-01	8.94e-02	1.16e-01	1.07e-01
Thyroid	7.27e-02	6.08e-02	5.70e-02	4.74e-02	1.66e-01	1.12e-01
UB_Cont	1.41e-01	5.74e-02	1.11e-01	4.17e-02	2.01e-02	1.91e-02
Other	8.26e-02	8.44e-02	6.47e-02	6.67e-02	6.36e-02	7.07e-02
			Adult male			
ET1	3.91e-02	1.55e-02	3.24e-02	1.22e-02	2.62e-01	2.23e-02
Stomach	1.95e-01	1.18e-01	1.54e-01	9.02e-02	1.51e-01	1.05e-01
SI	1.66e-01	9.45e-02	1.30e-01	7.17e-02	6.78e-02	6.08e-02
Blood	1.09e-01	8.94e-02	8.65e-02	7.05e-02	9.73e-02	8.44e-02
Thyroid	1.36e-01	5.27e-02	1.12e-01	4.20e-02	2.09e-01	7.44e-02
UB_Cont	9.61e-02	5.06e-02	7.55e-02	3.81e-02	2.12e-02	2.17e-02
Other	6.38e-02	7.02e-02	5.08e-02	5.63e-02	5.17e-02	5.89e-02
			Adult female			
ET1	6.20e-02	1.94e-02	5.23e-02	1.55e-02	1.73e-01	2.67e-02
Stomach	1.70e-01	1.32e-01	1.33e-01	1.01e-01	1.50e-01	1.29e-01
SI	1.78e-01	1.04e-01	1.40e-01	7.79e-02	8.26e-02	7.31e-02
Blood	1.20e-01	1.00e-01	9.57e-02	7.86e-02	1.01e-01	9.32e-02
Thyroid	1.29e-01	6.70e-02	1.05e-01	5.35e-02	1.79e-01	8.70e-02
UB_Cont	8.09e-02	5.38e-02	6.29e-02	3.96e-02	1.71e-02	2.33e-02
Other	7.11e-02	7.25e-02	5.66e-02	5.75e-02	5.37e-02	6.01e-02

Table C-4. Normalized Count Rates from ^{137}Cs in Various Anatomical Regions (cps/Bq)

Anatomical region	Camera					
	Siemens e.cam				Philips SKYLight	
	6 Windows		3 Windows			
	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
			Infant			
ET1	1.52e-01	5.24e-02	8.11e-02	3.34e-02	1.09e-01	3.80e-02
Stomach	1.47e-01	1.09e-01	9.29e-02	7.19e-02	1.09e-01	8.14e-02
SI	1.32e-01	1.28e-01	8.57e-02	8.44e-02	9.67e-02	9.59e-02
Blood	1.19e-01	1.22e-01	7.47e-02	7.61e-02	8.76e-02	9.04e-02
LLI	1.26e-01	1.28e-01	8.21e-02	8.32e-02	9.27e-02	9.51e-02
Body tissues	1.09e-01	1.19e-01	6.74e-02	7.29e-02	7.95e-02	8.83e-02
			1-y-old			
ET1	1.52e-01	3.98e-02	8.40e-02	2.67e-02	1.22e-01	3.08e-02
Stomach	1.39e-01	9.55e-02	9.19e-02	6.59e-02	1.09e-01	7.44e-02
SI	1.15e-01	1.12e-01	7.85e-02	7.74e-02	8.72e-02	8.68e-02
Blood	1.05e-01	1.07e-01	6.91e-02	7.03e-02	8.17e-02	8.52e-02
LLI	1.03e-01	1.04e-01	7.01e-02	7.15e-02	7.73e-02	7.98e-02
Body tissues	8.85e-02	9.92e-02	5.75e-02	6.41e-02	6.81e-02	7.82e-02
			5-y-old			
ET1	1.37e-01	2.81e-02	7.65e-02	1.93e-02	1.17e-01	2.08e-02
Stomach	1.45e-01	8.12e-02	9.81e-02	5.74e-02	1.10e-01	6.25e-02
SI	1.14e-01	9.44e-02	7.92e-02	6.67e-02	8.01e-02	7.34e-02
Blood	9.99e-02	8.67e-02	6.73e-02	5.89e-02	7.59e-02	6.89e-02
LLI	9.59e-02	8.23e-02	6.63e-02	5.79e-02	6.49e-02	6.38e-02
Body tissues	7.56e-02	7.22e-02	5.02e-02	4.81e-02	5.58e-02	5.78e-02
			10-y-old			
ET1	7.77e-02	2.03e-02	4.48e-02	1.40e-02	9.78e-02	1.59e-02
Stomach	1.39e-01	7.84e-02	9.55e-02	5.56e-02	1.08e-01	5.94e-02
SI	1.09e-01	9.27e-02	7.58e-02	6.56e-02	7.00e-02	6.89e-02
Blood	8.86e-02	7.99e-02	6.05e-02	5.49e-02	7.02e-02	6.36e-02
LLI	8.76e-02	7.69e-02	6.12e-02	5.43e-02	5.05e-02	5.51e-02
Body tissues	6.22e-02	6.23e-02	4.19e-02	4.19e-02	4.58e-02	4.87e-02
			15-y-old			
ET1	4.00e-02	1.41e-02	2.36e-02	9.70e-03	1.31e-01	1.85e-02
Stomach	1.54e-01	8.26e-02	1.06e-01	5.85e-02	8.54e-02	4.92e-02
SI	1.16e-01	9.67e-02	8.10e-02	6.83e-02	3.23e-02	4.00e-02
Blood	9.18e-02	8.12e-02	6.30e-02	5.62e-02	6.24e-02	5.78e-02
Body tissues	6.07e-02	6.10e-02	4.10e-02	4.14e-02	3.57e-02	3.91e-02
			Adult male			
ET1	3.00e-02	1.32e-02	1.97e-02	9.39e-03	1.56e-01	1.46e-02
Stomach	1.35e-01	8.71e-02	9.40e-02	6.25e-02	8.06e-02	5.57e-02
SI	1.14e-01	7.16e-02	7.88e-02	5.15e-02	3.79e-02	3.38e-02
Blood	7.58e-02	6.40e-02	5.24e-02	4.49e-02	5.23e-02	4.52e-02
Body tissues	4.64e-02	5.05e-02	3.15e-02	3.43e-02	2.96e-02	3.36e-02
			Adult female			
ET1	4.40e-02	1.60e-02	2.71e-02	1.12e-02	9.69e-02	1.69e-02
Stomach	1.17e-01	9.14e-02	8.26e-02	6.54e-02	7.76e-02	6.65e-02
SI	1.20e-01	7.50e-02	8.36e-02	5.33e-02	4.46e-02	3.86e-02
Blood	8.23e-02	6.95e-02	5.65e-02	4.85e-02	5.37e-02	4.93e-02
Body tissues	5.14e-02	5.20e-02	3.48e-02	3.52e-02	3.03e-02	3.39e-02

Table C-5. Normalized Count Rates from ^{192}Ir in Various Anatomical Regions (cps/Bq)

Anatomical region	Camera					
	Siemens e.cam				Philips SKYLight	
	6 Windows		3 Windows			
	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
			Infant			
Lung	4.01e-01	4.61e-01	3.25e-01	3.74e-01	3.17e-01	3.70e-01
BBi	3.85e-01	4.57e-01	3.15e-01	3.73e-01	3.01e-01	3.63e-01
ET1	5.52e-01	1.66e-01	4.38e-01	1.37e-01	4.15e-01	1.24e-01
Stomach	5.34e-01	3.77e-01	4.34e-01	3.09e-01	4.29e-01	3.04e-01
SI	4.71e-01	4.50e-01	3.84e-01	3.68e-01	3.78e-01	3.66e-01
Blood	4.26e-01	4.31e-01	3.47e-01	3.51e-01	3.37e-01	3.45e-01
ULI	4.99e-01	4.16e-01	4.07e-01	3.40e-01	4.02e-01	3.36e-01
LLI	4.53e-01	4.52e-01	3.70e-01	3.70e-01	3.62e-01	3.63e-01
Other	3.83e-01	4.20e-01	3.10e-01	3.40e-01	2.98e-01	3.32e-01
Liver	4.96e-01	4.10e-01	4.04e-01	3.35e-01	3.98e-01	3.31e-01
Kidneys	3.07e-01	6.32e-01	2.52e-01	5.12e-01	2.43e-01	5.16e-01
Spleen	3.63e-01	5.35e-01	2.98e-01	4.36e-01	2.90e-01	4.35e-01
			1-y-old			
Lung	3.66e-01	4.28e-01	2.97e-01	3.48e-01	3.17e-01	3.78e-01
BBi	3.51e-01	4.30e-01	2.86e-01	3.51e-01	3.03e-01	3.81e-01
ET1	5.53e-01	1.18e-01	4.40e-01	9.73e-02	4.67e-01	9.89e-02
Stomach	5.00e-01	3.19e-01	4.05e-01	2.60e-01	4.35e-01	2.81e-01
SI	4.05e-01	3.84e-01	3.27e-01	3.12e-01	3.48e-01	3.36e-01
Blood	3.70e-01	3.72e-01	3.01e-01	3.03e-01	3.19e-01	3.27e-01
ULI	4.37e-01	3.47e-01	3.54e-01	2.81e-01	3.77e-01	3.04e-01
LLI	3.63e-01	3.56e-01	2.93e-01	2.89e-01	3.07e-01	3.08e-01
Other	3.02e-01	3.40e-01	2.45e-01	2.77e-01	2.55e-01	2.92e-01
Liver	4.51e-01	3.64e-01	3.65e-01	2.96e-01	3.92e-01	3.22e-01
Kidneys	2.49e-01	6.17e-01	2.03e-01	5.00e-01	2.15e-01	5.49e-01
Spleen	3.09e-01	4.99e-01	2.52e-01	4.06e-01	2.67e-01	4.43e-01
			5-y-old			
Lung	3.59e-01	3.65e-01	2.89e-01	2.95e-01	3.17e-01	3.32e-01
BBi	3.31e-01	3.75e-01	2.68e-01	3.05e-01	2.94e-01	3.42e-01
ET1	4.94e-01	7.99e-02	3.93e-01	6.55e-02	4.43e-01	6.55e-02
Stomach	5.15e-01	2.65e-01	4.14e-01	2.12e-01	4.46e-01	2.43e-01
SI	3.94e-01	3.17e-01	3.14e-01	2.54e-01	3.24e-01	2.93e-01
Blood	3.46e-01	2.97e-01	2.79e-01	2.40e-01	2.99e-01	2.69e-01
ULI	4.30e-01	2.83e-01	3.44e-01	2.26e-01	3.56e-01	2.60e-01
LLI	3.27e-01	2.73e-01	2.61e-01	2.19e-01	2.57e-01	2.50e-01
Other	2.45e-01	2.41e-01	1.97e-01	1.94e-01	2.04e-01	2.15e-01
Liver	4.53e-01	3.10e-01	3.63e-01	2.49e-01	3.92e-01	2.86e-01
Kidneys	2.32e-01	5.45e-01	1.85e-01	4.40e-01	1.95e-01	5.10e-01
Spleen	3.01e-01	4.33e-01	2.41e-01	3.49e-01	2.57e-01	4.01e-01

Table C-5 (continued)

Anatomical region	Camera					
	Siemens e.cam				Philips SKYLight	
	6 Windows		3 Windows			
	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
			10-y-old			
Lung	3.24e-01	3.40e-01	2.59e-01	2.73e-01	3.18e-01	3.22e-01
BBi	2.99e-01	3.22e-01	2.39e-01	2.60e-01	3.06e-01	3.06e-01
ET1	2.69e-01	5.63e-02	2.15e-01	4.58e-02	3.64e-01	4.93e-02
Stomach	4.90e-01	2.49e-01	3.90e-01	1.97e-01	4.42e-01	2.32e-01
SI	3.67e-01	3.03e-01	2.89e-01	2.39e-01	2.82e-01	2.76e-01
Blood	3.03e-01	2.68e-01	2.41e-01	2.14e-01	2.78e-01	2.50e-01
ULI	4.02e-01	2.67e-01	3.18e-01	2.10e-01	3.17e-01	2.44e-01
LLI	2.93e-01	2.48e-01	2.31e-01	1.96e-01	1.97e-01	2.15e-01
Other	1.95e-01	2.00e-01	1.56e-01	1.60e-01	1.65e-01	1.80e-01
Liver	4.13e-01	3.03e-01	3.30e-01	2.41e-01	3.76e-01	2.85e-01
Kidneys	2.10e-01	5.53e-01	1.64e-01	4.43e-01	1.81e-01	5.28e-01
Spleen	2.66e-01	4.29e-01	2.11e-01	3.44e-01	2.38e-01	4.08e-01
			15-y-old			
Lung	3.21e-01	3.35e-01	2.52e-01	2.66e-01	3.24e-01	3.42e-01
BBi	2.98e-01	2.84e-01	2.32e-01	2.24e-01	3.49e-01	3.25e-01
ET1	1.26e-01	3.53e-02	1.00e-01	2.81e-02	4.93e-01	5.85e-02
Stomach	5.24e-01	2.48e-01	4.12e-01	1.91e-01	3.43e-01	1.91e-01
SI	3.77e-01	3.01e-01	2.91e-01	2.33e-01	1.19e-01	1.52e-01
Blood	3.01e-01	2.62e-01	2.36e-01	2.06e-01	2.44e-01	2.26e-01
ULI	4.18e-01	2.63e-01	3.25e-01	2.02e-01	1.45e-01	1.42e-01
LLI	2.76e-01	2.25e-01	2.13e-01	1.74e-01	5.97e-02	7.98e-02
Other	1.82e-01	1.87e-01	1.42e-01	1.48e-01	1.30e-01	1.45e-01
Liver	4.28e-01	3.07e-01	3.36e-01	2.40e-01	3.04e-01	2.53e-01
Kidneys	2.06e-01	6.17e-01	1.56e-01	4.91e-01	1.21e-01	4.73e-01
Spleen	2.62e-01	4.49e-01	2.02e-01	3.55e-01	1.81e-01	3.71e-01
			Adult male			
Lung	3.23e-01	3.26e-01	2.58e-01	2.62e-01	3.22e-01	3.21e-01
ET1	8.86e-02	3.42e-02	7.19e-02	2.78e-02	5.61e-01	4.61e-02
Stomach	4.47e-01	2.67e-01	3.54e-01	2.09e-01	3.20e-01	2.18e-01
SI	3.80e-01	2.13e-01	2.99e-01	1.67e-01	1.41e-01	1.26e-01
Blood	2.50e-01	2.04e-01	1.99e-01	1.62e-01	2.05e-01	1.76e-01
ULI	4.09e-01	2.30e-01	3.24e-01	1.80e-01	1.81e-01	1.51e-01
LLI	2.18e-01	2.27e-01	1.71e-01	1.79e-01	6.78e-02	1.17e-01
Other	1.38e-01	1.56e-01	1.10e-01	1.25e-01	1.05e-01	1.22e-01
Liver	4.34e-01	2.69e-01	3.45e-01	2.12e-01	3.37e-01	2.30e-01
Kidneys	2.66e-01	4.46e-01	2.07e-01	3.54e-01	1.78e-01	3.61e-01
Spleen	2.75e-01	3.77e-01	2.17e-01	3.00e-01	2.01e-01	3.16e-01
			Adult female			
Lung	2.93e-01	3.18e-01	2.33e-01	2.54e-01	2.84e-01	3.13e-01
ET1	1.41e-01	4.33e-02	1.14e-01	3.51e-02	3.75e-01	5.54e-02
Stomach	3.89e-01	3.01e-01	3.07e-01	2.37e-01	3.16e-01	2.72e-01
SI	4.09e-01	2.35e-01	3.22e-01	1.82e-01	1.73e-01	1.53e-01
Blood	2.76e-01	2.28e-01	2.19e-01	1.81e-01	2.14e-01	1.97e-01
ULI	5.32e-01	2.11e-01	4.22e-01	1.64e-01	3.33e-01	1.60e-01
LLI	3.35e-01	2.16e-01	2.64e-01	1.68e-01	1.50e-01	1.46e-01
Other	1.55e-01	1.61e-01	1.23e-01	1.28e-01	1.08e-01	1.23e-01
Liver	4.24e-01	2.87e-01	3.36e-01	2.25e-01	3.15e-01	2.39e-01
Kidneys	2.92e-01	4.22e-01	2.27e-01	3.34e-01	1.81e-01	3.32e-01
Spleen	2.62e-01	3.81e-01	2.06e-01	3.04e-01	2.08e-01	3.40e-01

Table C-6. Normalized Count Rates from ^{241}Am in Various Anatomical Regions (cps/Bq)

Anatomical region	Camera			
	Siemens e.cam		Philips SKYLight	
	Anterior	Posterior	Anterior	Posterior
	Infant			
Lung	6.84e-02	7.89e-02	6.05e-02	7.06e-02
BBi	6.04e-02	7.12e-02	5.25e-02	6.30e-02
ET1	1.17e-01	1.81e-02	9.88e-02	1.44e-02
Stomach	9.18e-02	4.99e-02	8.28e-02	4.47e-02
SI	7.29e-02	6.26e-02	6.57e-02	5.68e-02
Blood	7.14e-02	6.85e-02	6.29e-02	6.10e-02
ULI	8.07e-02	5.58e-02	7.26e-02	5.04e-02
LLI	7.06e-02	6.51e-02	6.33e-02	5.86e-02
Other	6.58e-02	7.09e-02	5.69e-02	6.22e-02
Liver	8.38e-02	5.86e-02	7.52e-02	5.26e-02
Bone	7.84e-02	5.81e-02	6.86e-02	5.09e-02
Marrow	5.48e-02	7.32e-02	4.63e-02	6.36e-02
	1-y-old			
Lung	5.61e-02	6.46e-02	5.33e-02	6.22e-02
BBi	4.60e-02	5.55e-02	4.37e-02	5.37e-02
ET1	1.14e-01	8.27e-03	1.05e-01	7.27e-03
Stomach	7.75e-02	3.28e-02	7.41e-02	3.16e-02
SI	5.38e-02	4.25e-02	5.09e-02	4.09e-02
Blood	5.41e-02	5.01e-02	5.10e-02	4.78e-02
ULI	6.15e-02	3.67e-02	5.82e-02	3.50e-02
LLI	4.77e-02	4.08e-02	4.43e-02	3.84e-02
Other	4.49e-02	4.99e-02	4.11e-02	4.64e-02
Liver	6.77e-02	4.33e-02	6.46e-02	4.19e-02
Bone	4.05e-02	4.43e-02	3.70e-02	4.14e-02
Marrow	3.16e-02	5.14e-02	2.84e-02	4.79e-02
	5-y-old			
Lung	4.98e-02	5.11e-02	4.82e-02	5.04e-02
BBi	3.68e-02	4.24e-02	3.59e-02	4.21e-02
ET1	9.92e-02	4.43e-03	9.74e-02	3.78e-03
Stomach	7.27e-02	2.24e-02	6.95e-02	2.24e-02
SI	4.64e-02	3.01e-02	4.20e-02	3.04e-02
Blood	4.53e-02	3.59e-02	4.27e-02	3.55e-02
ULI	5.40e-02	2.48e-02	4.94e-02	2.50e-02
LLI	3.73e-02	2.63e-02	3.18e-02	2.63e-02
Other	3.34e-02	3.19e-02	3.00e-02	3.07e-02
Liver	6.06e-02	3.23e-02	5.79e-02	3.24e-02
Bone	2.50e-02	2.92e-02	2.33e-02	2.78e-02
Marrow	2.20e-02	3.84e-02	2.01e-02	3.73e-02

Table C-6 (continued)

Anatomical region	Camera			
	Siemens e.cam		Philips SKYLight	
	Anterior	Posterior	Anterior	Posterior
	10-y-old			
Lung	4.24e-02	4.45e-02	4.50e-02	4.54e-02
BBi	3.07e-02	3.12e-02	3.43e-02	3.24e-02
ET1	4.58e-02	2.56e-03	7.53e-02	2.36e-03
Stomach	6.49e-02	1.80e-02	6.40e-02	1.84e-02
SI	3.91e-02	2.47e-02	3.24e-02	2.47e-02
Blood	3.67e-02	2.95e-02	3.66e-02	2.96e-02
ULI	4.60e-02	2.00e-02	3.93e-02	1.99e-02
LLI	2.96e-02	2.03e-02	2.06e-02	1.90e-02
Other	2.52e-02	2.43e-02	2.27e-02	2.33e-02
Liver	5.10e-02	2.90e-02	5.07e-02	2.98e-02
Bone	1.51e-02	2.20e-02	1.58e-02	2.16e-02
Marrow	1.72e-02	3.59e-02	1.65e-02	3.55e-02
	15-y-old			
Lung	3.58e-02	3.73e-02	3.95e-02	4.11e-02
BBi	2.53e-02	2.10e-02	3.28e-02	2.64e-02
ET1	1.49e-02	1.04e-03	1.05e-01	2.57e-03
Stomach	5.89e-02	1.40e-02	4.22e-02	1.22e-02
SI	3.41e-02	1.98e-02	8.14e-03	9.72e-03
Blood	3.11e-02	2.40e-02	2.82e-02	2.28e-02
ULI	4.13e-02	1.53e-02	1.17e-02	8.34e-03
LLI	2.32e-02	1.41e-02	3.33e-03	3.83e-03
Other	2.08e-02	1.99e-02	1.57e-02	1.65e-02
Liver	4.48e-02	2.46e-02	3.52e-02	2.27e-02
Bone	1.06e-02	1.77e-02	1.30e-02	1.71e-02
	Adult male			
Lung	3.47e-02	3.13e-02	3.80e-02	3.32e-02
ET1	6.52e-03	9.42e-04	1.10e-01	1.70e-03
Stomach	4.25e-02	1.60e-02	3.22e-02	1.44e-02
SI	4.35e-02	1.08e-02	1.21e-02	6.69e-03
Blood	3.00e-02	1.75e-02	2.72e-02	1.67e-02
ULI	4.96e-02	1.51e-02	1.81e-02	1.03e-02
LLI	1.92e-02	1.69e-02	4.07e-03	8.92e-03
Other	1.48e-02	1.72e-02	1.20e-02	1.47e-02
Liver	4.23e-02	1.75e-02	3.56e-02	1.62e-02
Bone	7.05e-03	9.78e-03	5.82e-03	7.15e-03
	Adult female			
Lung	3.02e-02	3.47e-02	3.38e-02	3.77e-02
ET1	1.53e-02	1.34e-03	7.24e-02	2.16e-03
Stomach	3.49e-02	2.33e-02	3.23e-02	2.38e-02
SI	4.77e-02	1.59e-02	1.84e-02	1.11e-02
Blood	3.61e-02	2.30e-02	3.10e-02	2.31e-02
ULI	7.08e-02	1.39e-02	4.72e-02	1.13e-02
LLI	4.00e-02	1.73e-02	1.58e-02	1.30e-02
Other	1.88e-02	1.99e-02	1.38e-02	1.63e-02
Liver	4.53e-02	2.46e-02	3.69e-02	2.21e-02
Bone	8.83e-03	8.55e-03	9.61e-03	8.48e-03

Appendix D

CALIBRATION FACTORS FOR CONVERTING COUNT RATES TO INTAKES

Tables D-1 to D-16 list an alternate set of calibration factors that was calculated to provide a simple method of estimating intakes without using the Assess computer code (Anigstein et al. 2009), as described in chapter 4. Factors that relate the count rate measured by a gamma camera to the inhaled activity of a given radionuclide with a given lung absorption type are listed in tables D-1 to D-10. Corresponding factors for assessing ingested activities are listed in tables D-11 to D-16.

Calibration factors for assessing all nuclides except ^{241}Am with the Siemens e.cam camera were calculated for two sets of energy windows: one set consisted of six 50% windows, while the second, narrower set consisted of three such windows. These windows are described in tables 3-3 and 3-4. The calibration factors for these five nuclides using the first set of windows with the Siemens camera are listed in tables D-1 to D-9 and D-11 to D-15 under the column heading "6 Windows," while those using the second set are under the heading "3 Windows." Calibration factors for assessing intakes of ^{241}Am with the Siemens camera, listed in tables D-10 and D-16, are based on a single set of two 50% windows. Calibration factors for the Philips SKYLight camera are based on a single set of energy windows for each radionuclide, specified in table 3-5. Section 3.2 presents a discussion of the calculation of count rates using various energy windows, which form a basis for these calibration factors. The derivation of these factors is presented in chapter 4. Separate calibration factors were calculated for the detectors in a two-headed camera system: one with an anterior view of the phantom, the other with a posterior view.

To use these tables to assess the initial activity taken in by an exposed individual, first determine the most likely pathway: inhalation or ingestion. For inhalation, determine the lung absorption type of the radionuclide. (The lung absorption types of elements whose isotopes are included in the present analysis are listed in table 2-1.) When assessing a juvenile, use the calibration factors for an age nearest to that of the exposed individual. The adult factors are for individuals age 20 or older, except for the bone-seeking elements strontium and americium, in which case adults are defined as age 25 or older. Use the calibration factors appropriate to the sex of an adult. Next, in the column corresponding to the gamma camera and set of energy windows used in measuring the count rate, find the factor for the time post intake closest to the elapsed time between the peak exposure and the time the counts were taken. The time steps are listed in both days and hours—linear interpolation may be used for times between two consecutive time steps. Multiply the count rate, in thousands of counts per minute (kcpm), by the appropriate calibration factor to determine the intake in becquerels (Bq). Calculate the activity separately for the detectors with anterior and posterior views, using the count rates and corresponding calibration factors for the two detectors, and take the average of the two values. To obtain a value in microcuries (μCi), divide the calculated activity by 37,000.

Note that, for the inhalation pathway, the assessment yields the total inhaled activity, and includes a fraction, which ranges from about 40% to 50% in the case of 1 μm AMAD particles (the particle size distribution assumed in the present analysis), that was promptly expelled. The total inhaled activity is the relevant quantity for estimating doses from intakes via this pathway.

A more convenient assessment tool is the Assess code, which utilizes the calculation described in the present report to enable the user to compute the intake activity and resulting doses to an exposed individual. Assess has the further advantages of allowing the use of energy windows other than those described in tables 3-3 to 3-5, as well as taking into account the weight as well as the age of children under the age of 15. With 50 time steps instead of 12, as in tables D-1 to D-16, Assess produces more precise assessments, especially in the case of nuclides that are rapidly cleared from the body, such as ^{131}I or ^{137}Cs. As cited in the Preface, instructions for using this program, which runs under Microsoft Windows, and a technical description, are presented by Anigstein et al. (2010b).

Table D-1. Inhaled Activity of Type *M* ^{60}Co vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	169	211	239	295	238	291
0.083	2	172	209	244	292	243	289
0.167	4	179	213	253	298	252	294
0.333	8	192	225	272	316	271	311
0.5	12	209	239	295	336	293	331
1	24	273	297	385	417	384	411
2	48	461	465	648	653	645	642
4	96	829	768	1,165	1,085	1,160	1,063
8	192	1,045	943	1,468	1,334	1,461	1,305
10	240	1,092	985	1,534	1,393	1,526	1,363
20	480	1,288	1,160	1,809	1,641	1,800	1,605
30	720	1,456	1,311	2,045	1,855	2,035	1,814
1-y-old							
0.042	1	169	223	236	308	215	277
0.083	2	174	221	243	305	222	276
0.167	4	182	226	253	311	231	281
0.333	8	196	239	272	330	249	298
0.5	12	213	254	296	350	270	317
1	24	282	314	392	434	358	393
2	48	486	491	673	679	616	612
4	96	892	809	1,236	1,123	1,126	1,003
8	192	1,115	977	1,544	1,358	1,403	1,208
10	240	1,157	1,014	1,603	1,409	1,457	1,253
20	480	1,340	1,172	1,856	1,630	1,686	1,449
30	720	1,506	1,318	2,086	1,833	1,895	1,629
5-y-old							
0.042	1	196	296	272	405	246	354
0.083	2	203	294	282	402	256	352
0.167	4	211	300	293	411	268	359
0.333	8	227	317	314	434	288	379
0.5	12	246	337	341	461	314	403
1	24	323	413	447	566	414	493
2	48	534	619	737	848	681	737
4	96	904	944	1,248	1,297	1,132	1,124
8	192	1,093	1,109	1,507	1,525	1,357	1,320
10	240	1,132	1,148	1,561	1,578	1,405	1,366
20	480	1,304	1,323	1,799	1,819	1,619	1,574
30	720	1,466	1,487	2,022	2,045	1,820	1,770
10-y-old							
0.042	1	226	306	313	421	254	358
0.083	2	234	304	324	417	268	356
0.167	4	243	310	337	426	283	365
0.333	8	259	329	359	452	305	388
0.5	12	280	350	388	481	334	413
1	24	365	431	504	593	444	511
2	48	598	651	824	895	723	766
4	96	1,006	1,005	1,383	1,381	1,157	1,162
8	192	1,213	1,183	1,668	1,627	1,368	1,361
10	240	1,257	1,225	1,727	1,684	1,416	1,408
20	480	1,449	1,412	1,992	1,941	1,631	1,623
30	720	1,631	1,589	2,242	2,184	1,836	1,826

Table D-1 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	255	320	355	444	295	408
0.083	2	264	318	368	441	321	423
0.167	4	273	325	381	451	346	442
0.333	8	288	344	401	477	378	472
0.5	12	308	365	429	507	414	505
1	24	389	440	542	612	538	611
2	48	587	622	818	863	777	803
4	96	874	870	1,213	1,204	1,030	995
8	192	1,013	994	1,406	1,375	1,152	1,099
10	240	1,048	1,027	1,454	1,421	1,189	1,134
20	480	1,206	1,181	1,674	1,634	1,367	1,303
30	720	1,359	1,330	1,886	1,840	1,543	1,469
Adult male							
0.042	1	265	334	364	458	270	417
0.083	2	274	343	375	470	290	441
0.167	4	284	351	389	482	310	458
0.333	8	302	363	414	498	339	477
0.5	12	326	379	447	520	373	502
1	24	415	447	570	614	496	597
2	48	617	620	848	850	746	790
4	96	877	855	1,205	1,174	1,023	1,003
8	192	1,000	972	1,373	1,334	1,149	1,112
10	240	1,032	1,003	1,417	1,377	1,184	1,147
20	480	1,182	1,149	1,623	1,576	1,354	1,311
30	720	1,328	1,291	1,824	1,771	1,522	1,474
Adult female							
0.042	1	267	339	369	464	314	411
0.083	2	266	351	366	481	330	439
0.167	4	265	365	365	501	337	460
0.333	8	275	383	378	527	351	480
0.5	12	294	403	404	553	380	504
1	24	376	476	516	654	500	599
2	48	587	662	807	907	774	809
4	96	911	918	1,252	1,255	1,119	1,064
8	192	1,067	1,046	1,465	1,428	1,276	1,192
10	240	1,102	1,079	1,513	1,474	1,316	1,229
20	480	1,263	1,236	1,735	1,688	1,506	1,406
30	720	1,420	1,388	1,951	1,897	1,694	1,580

Table D-2. Inhaled Activity of Type *S* ^{60}Co vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	168	210	238	294	237	291
0.083	2	171	207	242	290	241	287
0.167	4	176	210	249	294	248	290
0.333	8	187	220	265	308	263	304
0.5	12	202	232	284	325	283	320
1	24	263	287	370	401	368	395
2	48	465	470	653	660	649	648
4	96	939	865	1,318	1,222	1,308	1,193
8	192	1,186	1,058	1,665	1,497	1,651	1,459
10	240	1,215	1,083	1,706	1,533	1,692	1,494
20	480	1,334	1,188	1,872	1,682	1,858	1,640
30	720	1,443	1,286	2,026	1,820	2,010	1,774
1-y-old							
0.042	1	168	222	235	306	214	276
0.083	2	173	220	242	303	221	274
0.167	4	180	223	251	308	229	278
0.333	8	192	235	268	324	244	293
0.5	12	208	248	289	342	264	310
1	24	275	306	381	422	349	382
2	48	482	487	667	673	611	607
4	96	928	836	1,285	1,161	1,168	1,034
8	192	1,141	992	1,580	1,380	1,432	1,223
10	240	1,166	1,013	1,615	1,409	1,464	1,249
20	480	1,271	1,104	1,761	1,536	1,595	1,361
30	720	1,368	1,189	1,896	1,653	1,718	1,466
5-y-old							
0.042	1	195	294	271	403	245	352
0.083	2	201	291	280	399	255	348
0.167	4	209	296	290	405	265	354
0.333	8	222	311	308	426	283	371
0.5	12	240	328	332	450	307	392
1	24	313	400	432	548	401	477
2	48	523	606	721	830	667	720
4	96	909	946	1,254	1,300	1,134	1,124
8	192	1,077	1,088	1,485	1,496	1,331	1,292
10	240	1,100	1,111	1,517	1,527	1,360	1,319
20	480	1,198	1,210	1,652	1,664	1,481	1,437
30	720	1,290	1,303	1,779	1,792	1,594	1,548
10-y-old							
0.042	1	224	304	310	417	252	355
0.083	2	232	300	321	412	266	352
0.167	4	239	305	331	419	280	359
0.333	8	253	321	349	441	300	378
0.5	12	271	340	375	467	326	401
1	24	351	415	484	571	430	492
2	48	582	634	802	872	706	745
4	96	1,007	1,002	1,384	1,377	1,146	1,154
8	192	1,191	1,156	1,636	1,588	1,324	1,323
10	240	1,216	1,180	1,671	1,621	1,352	1,350
20	480	1,326	1,286	1,822	1,767	1,473	1,471
30	720	1,428	1,385	1,963	1,903	1,586	1,584

Table D-2 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	252	317	351	440	293	404
0.083	2	261	314	364	435	321	419
0.167	4	268	319	373	442	346	438
0.333	8	279	335	389	465	377	466
0.5	12	297	353	414	490	411	496
1	24	372	423	518	587	528	595
2	48	567	600	789	833	754	775
4	96	855	848	1,187	1,174	985	952
8	192	971	948	1,346	1,311	1,073	1,026
10	240	991	967	1,374	1,338	1,095	1,046
20	480	1,082	1,055	1,501	1,460	1,196	1,141
30	720	1,168	1,138	1,621	1,574	1,290	1,231
Adult male							
0.042	1	260	327	357	448	266	408
0.083	2	268	335	367	460	287	432
0.167	4	275	342	378	469	307	448
0.333	8	290	350	398	480	333	463
0.5	12	311	363	426	498	366	485
1	24	393	424	540	582	481	570
2	48	586	590	806	810	715	751
4	96	839	821	1,151	1,126	967	951
8	192	935	913	1,283	1,252	1,058	1,031
10	240	953	931	1,308	1,277	1,078	1,050
20	480	1,036	1,012	1,422	1,388	1,171	1,141
30	720	1,114	1,088	1,529	1,492	1,258	1,226
Adult female							
0.042	1	264	334	364	457	311	404
0.083	2	262	345	360	474	326	432
0.167	4	258	358	355	491	332	452
0.333	8	264	373	363	513	343	468
0.5	12	280	389	384	535	368	489
1	24	355	455	487	625	479	573
2	48	558	633	767	868	738	771
4	96	878	886	1,206	1,210	1,063	1,012
8	192	1,007	987	1,382	1,347	1,183	1,108
10	240	1,027	1,006	1,410	1,373	1,206	1,129
20	480	1,118	1,093	1,534	1,492	1,311	1,227
30	720	1,202	1,176	1,651	1,604	1,409	1,318

Table D-3. Inhaled Activity of Type *F* ^{90}Sr vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	3,607	6,841	4,804	8,737	4,660	8,712
0.083	2	3,704	6,956	4,935	8,909	4,799	8,882
0.167	4	3,868	7,200	5,153	9,262	5,021	9,229
0.333	8	4,186	7,531	5,564	9,716	5,429	9,657
0.5	12	4,518	7,786	5,988	10,049	5,846	9,962
1	24	5,525	8,529	7,262	11,016	7,100	10,854
2	48	7,287	9,833	9,469	12,720	9,280	12,452
4	96	9,031	11,161	11,635	14,459	11,427	14,102
8	192	10,011	12,257	12,877	15,887	12,653	15,489
10	240	10,297	12,657	13,245	16,408	13,016	16,000
20	480	11,249	14,113	14,467	18,300	14,219	17,861
30	720	11,787	14,990	15,156	19,440	14,897	18,984
1-y-old							
0.042	1	4,231	9,160	5,509	11,415	5,060	10,679
0.083	2	4,462	9,228	5,813	11,518	5,355	10,779
0.167	4	4,806	9,476	6,263	11,858	5,781	11,088
0.333	8	5,362	9,878	6,974	12,383	6,455	11,569
0.5	12	5,925	10,235	7,685	12,836	7,131	11,988
1	24	7,788	11,401	10,014	14,307	9,356	13,348
2	48	11,902	13,836	15,095	17,393	14,237	16,178
4	96	17,906	17,194	22,415	21,659	21,309	20,081
8	192	22,847	20,957	28,513	26,418	27,167	24,475
10	240	24,445	22,375	30,501	28,204	29,076	26,134
20	480	30,175	27,531	37,606	34,664	35,947	32,160
30	720	33,885	30,877	42,190	38,840	40,409	36,070
5-y-old							
0.042	1	5,685	14,347	7,400	17,745	6,580	16,128
0.083	2	6,077	14,752	7,930	18,256	7,072	16,612
0.167	4	6,667	15,482	8,714	19,181	7,778	17,478
0.333	8	7,604	16,427	9,928	20,366	8,879	18,564
0.5	12	8,508	17,118	11,079	21,221	9,947	19,331
1	24	11,476	19,166	14,813	23,750	13,459	21,599
2	48	18,333	23,406	23,318	29,022	21,554	26,348
4	96	29,157	29,483	36,537	36,607	34,285	33,191
8	192	38,594	36,637	48,206	45,517	45,351	41,286
10	240	41,755	39,349	52,162	48,884	49,037	44,376
20	480	53,982	49,319	67,467	61,222	63,160	55,858
30	720	62,664	55,996	78,333	69,461	73,100	63,620
10-y-old							
0.042	1	8,258	17,068	10,608	20,892	7,887	18,751
0.083	2	9,039	17,624	11,644	21,582	8,663	19,467
0.167	4	10,103	18,628	13,048	22,838	9,699	20,690
0.333	8	11,551	19,819	14,906	24,324	11,175	22,077
0.5	12	12,837	20,579	16,517	25,263	12,563	22,923
1	24	16,856	22,671	21,491	27,850	17,056	25,204
2	48	25,408	26,779	31,911	32,948	26,996	29,671
4	96	36,929	31,982	45,738	39,412	40,952	35,347
8	192	45,571	37,419	56,273	46,134	50,916	41,335
10	240	48,441	39,417	59,811	48,598	54,031	43,533
20	480	59,322	46,290	73,201	57,046	65,479	51,026
30	720	66,380	50,313	81,858	61,980	72,702	55,378

Table D-3 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	13,811	21,981	17,070	26,617	9,209	25,897
0.083	2	15,850	22,712	19,670	27,532	10,147	27,469
0.167	4	18,382	23,916	22,915	29,054	11,340	28,958
0.333	8	20,941	25,182	26,139	30,653	13,055	30,325
0.5	12	22,755	25,890	28,363	31,538	14,741	31,278
1	24	27,724	27,694	34,386	33,777	20,283	33,536
2	48	36,540	30,938	45,026	37,799	32,251	36,743
4	96	45,786	34,392	56,170	42,074	47,290	39,888
8	192	51,997	37,533	63,755	45,928	54,812	43,180
10	240	54,105	38,659	66,345	47,305	56,640	44,387
20	480	61,982	42,428	76,014	51,900	62,708	48,288
30	720	66,754	44,479	81,860	54,395	66,055	50,339
Adult male							
0.042	1	16,633	27,181	20,218	32,926	9,444	33,094
0.083	2	18,102	28,726	22,070	34,925	10,352	36,752
0.167	4	20,272	30,023	24,794	36,632	11,556	39,766
0.333	8	23,258	31,207	28,489	38,141	13,468	42,209
0.5	12	25,805	32,336	31,607	39,529	15,532	44,443
1	24	33,412	36,543	40,888	44,676	23,196	51,703
2	48	48,915	46,589	59,866	57,015	45,090	66,372
4	96	71,933	62,819	88,210	77,036	93,099	87,842
8	192	97,024	81,746	119,084	100,305	137,375	113,665
10	240	106,463	88,728	130,627	108,815	150,909	123,831
20	480	146,587	116,554	179,332	142,393	209,639	167,054
30	720	179,342	137,659	218,830	167,658	259,034	201,674
Adult female							
0.042	1	14,093	23,114	17,268	28,022	11,300	26,780
0.083	2	14,797	25,638	18,212	31,174	12,217	30,770
0.167	4	15,842	28,464	19,574	34,722	13,214	34,694
0.333	8	17,480	30,951	21,629	37,826	14,816	37,628
0.5	12	19,151	32,607	23,690	39,857	16,726	39,685
1	24	24,828	37,641	30,666	46,015	23,801	46,108
2	48	38,050	48,843	46,940	59,813	41,883	59,925
4	96	60,504	66,285	74,679	81,418	75,508	81,077
8	192	84,353	87,041	104,180	107,041	106,793	105,975
10	240	92,967	95,350	114,789	117,248	116,404	115,633
20	480	129,788	132,352	159,833	162,502	153,217	156,666
30	720	160,372	163,527	197,020	200,491	180,784	189,658

Table D-4. Inhaled Activity of Type *S* ^{90}Sr vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	3,590	6,895	4,758	8,701	4,611	8,688
0.083	2	3,733	6,779	4,939	8,536	4,799	8,501
0.167	4	3,903	6,874	5,152	8,650	5,013	8,592
0.333	8	4,223	7,186	5,554	9,051	5,403	8,956
0.5	12	4,627	7,516	6,065	9,473	5,899	9,345
1	24	6,297	8,985	8,199	11,338	7,970	11,120
2	48	11,656	13,831	15,036	17,491	14,624	17,076
4	96	24,467	23,085	31,178	29,292	30,393	28,536
8	192	31,101	27,187	39,455	34,536	38,500	33,634
10	240	31,806	27,763	40,347	35,269	39,369	34,348
20	480	34,592	30,214	43,886	38,389	42,813	37,388
30	720	37,120	32,461	47,100	41,249	45,940	40,174
1-y-old							
0.042	1	4,055	9,194	5,251	11,368	4,794	10,537
0.083	2	4,264	8,992	5,516	11,100	5,050	10,292
0.167	4	4,496	9,097	5,809	11,221	5,324	10,384
0.333	8	4,906	9,523	6,326	11,750	5,799	10,851
0.5	12	5,417	9,969	6,969	12,308	6,400	11,367
1	24	7,499	11,828	9,586	14,635	8,856	13,526
2	48	13,944	17,420	17,655	21,659	16,377	19,889
4	96	28,351	26,669	35,463	33,394	32,743	30,206
8	192	35,378	30,479	44,072	38,247	40,565	34,424
10	240	36,138	31,078	45,017	39,001	41,430	35,099
20	480	39,199	33,685	48,834	42,280	44,937	38,045
30	720	42,008	36,086	52,338	45,300	48,158	40,760
5-y-old							
0.042	1	5,221	13,291	6,740	16,232	6,015	14,735
0.083	2	5,510	13,084	7,114	15,974	6,385	14,431
0.167	4	5,824	13,312	7,506	16,246	6,770	14,617
0.333	8	6,362	14,012	8,163	17,092	7,407	15,324
0.5	12	7,027	14,694	8,981	17,922	8,197	16,036
1	24	9,651	17,220	12,231	21,017	11,314	18,739
2	48	17,091	23,839	21,394	29,178	19,981	25,923
4	96	30,936	33,067	38,172	40,641	35,497	36,008
8	192	36,891	36,729	45,331	45,194	42,013	40,013
10	240	37,642	37,428	46,251	46,057	42,862	40,774
20	480	40,802	40,561	50,139	49,919	46,459	44,183
30	720	43,722	43,462	53,733	53,496	49,785	47,341
10-y-old							
0.042	1	7,137	15,541	9,065	18,833	6,932	16,696
0.083	2	7,577	15,204	9,610	18,405	7,497	16,358
0.167	4	7,986	15,447	10,108	18,679	8,031	16,643
0.333	8	8,624	16,310	10,878	19,710	8,813	17,602
0.5	12	9,450	17,147	11,889	20,725	9,785	18,528
1	24	12,773	20,165	15,966	24,420	13,578	21,789
2	48	21,889	27,935	27,099	33,983	23,478	29,931
4	96	37,544	38,631	45,976	47,255	39,113	40,798
8	192	43,975	42,832	53,691	52,474	45,230	45,057
10	240	44,851	43,635	54,759	53,461	46,116	45,898
20	480	48,615	47,243	59,363	57,896	49,972	49,698
30	720	52,096	50,580	63,622	61,999	53,540	53,214

Table D-4 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	11,046	18,858	13,548	22,644	8,298	21,534
0.083	2	11,794	18,511	14,447	22,212	9,158	22,297
0.167	4	12,316	18,829	15,067	22,593	10,062	23,195
0.333	8	12,948	19,865	15,813	23,855	11,311	24,556
0.5	12	13,884	20,820	16,932	25,024	12,676	25,892
1	24	17,706	23,914	21,520	28,813	17,418	29,603
2	48	26,815	30,796	32,453	37,262	27,437	34,843
4	96	38,815	38,840	46,813	47,188	38,814	38,916
8	192	43,349	42,076	52,245	51,173	42,854	40,982
10	240	44,183	42,844	53,251	52,110	43,667	41,710
20	480	47,939	46,379	57,785	56,425	47,369	45,155
30	720	51,433	49,661	62,004	60,432	50,811	48,359
Adult male							
0.042	1	12,229	20,304	14,809	24,369	8,053	22,586
0.083	2	12,265	20,899	14,879	25,095	8,657	23,959
0.167	4	12,396	21,076	15,064	25,331	9,318	24,651
0.333	8	13,111	21,073	15,948	25,362	10,402	25,017
0.5	12	14,244	21,434	17,323	25,819	11,669	25,728
1	24	18,589	23,908	22,573	28,837	16,195	28,808
2	48	27,629	30,797	33,505	37,164	25,918	34,902
4	96	37,421	39,557	45,389	47,719	37,029	40,890
8	192	40,957	43,105	49,688	51,991	40,909	43,543
10	240	41,721	43,901	50,615	52,951	41,666	44,323
20	480	45,216	47,548	54,854	57,349	45,101	47,977
30	720	48,468	50,937	58,800	61,436	48,295	51,376
Adult female							
0.042	1	11,972	18,061	14,576	21,648	9,886	19,275
0.083	2	11,333	19,022	13,843	22,835	10,250	20,893
0.167	4	10,748	19,891	13,163	23,918	10,316	22,054
0.333	8	10,773	20,599	13,208	24,799	10,737	22,723
0.5	12	11,455	21,211	14,039	25,545	11,740	23,386
1	24	14,976	23,728	18,307	28,590	16,243	26,073
2	48	24,723	30,279	30,076	36,525	27,171	32,122
4	96	40,361	38,483	48,830	46,494	41,248	38,791
8	192	46,620	41,828	56,317	50,556	46,286	41,623
10	240	47,552	42,599	57,441	51,488	47,167	42,376
20	480	51,615	46,142	62,345	55,770	51,102	45,877
30	720	55,391	49,434	66,903	59,750	54,761	49,134

Table D-5. Inhaled Activity of Type *F* ^{131}I vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	139	201	164	236	167	236
0.083	2	149	212	175	248	179	248
0.167	4	170	242	200	283	205	284
0.333	8	216	313	255	366	262	369
0.5	12	267	390	316	456	324	460
1	24	434	602	512	703	526	712
2	48	748	863	881	1,009	901	1,020
4	96	1,222	1,193	1,438	1,395	1,460	1,404
8	192	2,137	2,017	2,515	2,360	2,548	2,374
10	240	2,779	2,621	3,270	3,067	3,313	3,085
20	480	10,312	9,726	12,136	11,380	12,294	11,445
30	720	38,114	35,949	44,857	42,059	45,441	42,303
1-y-old							
0.042	1	147	235	175	280	160	250
0.083	2	157	245	187	293	171	262
0.167	4	179	279	213	333	195	297
0.333	8	226	357	270	426	248	381
0.5	12	279	440	333	524	305	469
1	24	451	656	538	782	492	699
2	48	785	903	938	1,075	854	958
4	96	1,283	1,203	1,535	1,433	1,387	1,274
8	192	2,148	1,935	2,572	2,305	2,320	2,050
10	240	2,729	2,457	3,267	2,927	2,948	2,603
20	480	9,064	8,161	10,853	9,722	9,791	8,646
30	720	30,117	27,119	36,063	32,305	32,535	28,728
5-y-old							
0.042	1	183	339	221	415	195	350
0.083	2	194	351	235	430	207	364
0.167	4	217	392	262	479	232	408
0.333	8	274	499	331	608	292	521
0.5	12	342	617	413	751	363	648
1	24	570	930	688	1,128	599	988
2	48	992	1,263	1,203	1,529	1,039	1,345
4	96	1,567	1,633	1,909	1,979	1,644	1,735
8	192	2,486	2,499	3,033	3,028	2,613	2,652
10	240	3,080	3,095	3,756	3,749	3,238	3,283
20	480	9,063	9,109	11,055	11,037	9,532	9,663
30	720	26,758	26,895	32,641	32,587	28,144	28,530
10-y-old							
0.042	1	239	382	293	478	216	383
0.083	2	256	400	314	500	232	403
0.167	4	290	456	355	569	262	460
0.333	8	373	600	456	748	329	608
0.5	12	473	769	578	956	406	781
1	24	802	1,258	979	1,555	651	1,281
2	48	1,331	1,779	1,632	2,191	1,076	1,813
4	96	1,937	2,266	2,390	2,790	1,618	2,307
8	192	2,881	3,283	3,560	4,042	2,435	3,341
10	240	3,468	3,946	4,286	4,859	2,936	4,016
20	480	8,850	10,040	10,938	12,364	7,526	10,222
30	720	22,793	25,835	28,171	31,816	19,410	26,306

Table D-5 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	315	445	398	574	244	459
0.083	2	343	474	435	610	260	483
0.167	4	400	554	507	714	290	550
0.333	8	545	772	689	994	353	706
0.5	12	732	1,048	923	1,349	419	871
1	24	1,403	1,995	1,765	2,561	620	1,296
2	48	2,378	3,091	3,009	3,963	972	1,724
4	96	3,261	3,919	4,153	5,023	1,440	2,176
8	192	4,734	5,587	6,037	7,160	2,164	3,158
10	240	5,666	6,674	7,227	8,551	2,609	3,797
20	480	14,150	16,575	18,047	21,229	6,646	9,608
30	720	35,855	41,916	45,730	53,679	16,963	24,466
Adult male							
0.042	1	367	515	460	657	233	534
0.083	2	399	562	499	715	247	581
0.167	4	452	661	563	840	270	675
0.333	8	566	909	702	1,156	315	888
0.5	12	691	1,219	853	1,547	361	1,124
1	24	1,017	2,242	1,241	2,831	502	1,776
2	48	1,359	3,420	1,650	4,299	757	2,465
4	96	1,728	4,356	2,098	5,470	1,106	3,134
8	192	2,508	6,187	3,047	7,769	1,657	4,513
10	240	3,011	7,361	3,658	9,242	1,995	5,400
20	480	7,529	17,824	9,154	22,373	5,037	13,339
30	720	18,897	43,933	22,983	55,138	12,710	33,244
Adult female							
0.042	1	331	459	413	586	280	475
0.083	2	354	497	441	634	298	517
0.167	4	402	582	500	742	330	602
0.333	8	511	791	633	1,006	392	786
0.5	12	633	1,044	781	1,325	454	987
1	24	973	1,836	1,192	2,313	633	1,532
2	48	1,378	2,714	1,686	3,401	921	2,109
4	96	1,807	3,455	2,217	4,326	1,295	2,688
8	192	2,631	4,938	3,230	6,184	1,922	3,881
10	240	3,156	5,889	3,875	7,377	2,313	4,648
20	480	7,866	14,390	9,663	18,031	5,825	11,525
30	720	19,704	35,647	24,214	44,672	14,679	28,786

Table D-6. Inhaled Activity of Type *F* ^{137}Cs vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	213	293	361	465	293	396
0.083	2	221	293	374	467	303	396
0.167	4	232	297	392	476	318	401
0.333	8	250	307	422	494	344	414
0.5	12	267	316	449	510	367	426
1	24	312	339	520	550	429	457
2	48	377	371	618	604	518	500
4	96	447	415	725	677	614	559
8	192	540	497	874	809	741	669
10	240	590	542	954	883	809	730
20	480	915	841	1,481	1,371	1,256	1,133
30	720	1,425	1,310	2,306	2,135	1,956	1,764
1-y-old							
0.042	1	226	337	367	508	286	426
0.083	2	235	338	383	512	299	426
0.167	4	250	345	407	524	318	435
0.333	8	274	359	446	548	350	454
0.5	12	298	371	482	569	380	470
1	24	359	401	574	618	461	509
2	48	450	442	705	683	583	562
4	96	555	503	856	778	721	639
8	192	700	625	1,076	967	910	794
10	240	779	696	1,198	1,076	1,013	883
20	480	1,328	1,186	2,042	1,835	1,727	1,505
30	720	2,263	2,022	3,481	3,127	2,944	2,566
5-y-old							
0.042	1	280	485	446	710	353	618
0.083	2	295	491	471	722	372	624
0.167	4	318	508	506	750	401	644
0.333	8	353	540	563	800	449	682
0.5	12	387	566	614	841	495	714
1	24	472	620	741	927	615	780
2	48	591	682	908	1,021	788	854
4	96	716	762	1,082	1,142	969	953
8	192	868	910	1,308	1,364	1,178	1,138
10	240	944	989	1,422	1,483	1,281	1,237
20	480	1,380	1,446	2,080	2,168	1,873	1,808
30	720	1,920	2,011	2,892	3,015	2,604	2,515
10-y-old							
0.042	1	361	537	553	780	391	681
0.083	2	385	548	591	799	416	693
0.167	4	417	572	642	837	454	724
0.333	8	467	615	719	904	518	781
0.5	12	510	649	785	958	577	827
1	24	613	717	935	1,063	732	918
2	48	737	785	1,108	1,166	947	1,007
4	96	859	867	1,278	1,288	1,159	1,111
8	192	1,001	1,001	1,486	1,486	1,362	1,282
10	240	1,064	1,063	1,579	1,579	1,448	1,362
20	480	1,346	1,345	1,999	1,998	1,831	1,723
30	720	1,602	1,600	2,380	2,378	2,179	2,050

Table D-6 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	454	601	676	868	438	817
0.083	2	489	616	728	891	464	834
0.167	4	534	646	798	939	508	883
0.333	8	598	698	895	1,018	589	978
0.5	12	651	738	975	1,080	670	1,057
1	24	758	812	1,134	1,195	894	1,212
2	48	858	876	1,276	1,291	1,236	1,347
4	96	940	939	1,393	1,383	1,558	1,462
8	192	1,013	1,008	1,499	1,485	1,721	1,573
10	240	1,036	1,031	1,534	1,519	1,762	1,609
20	480	1,127	1,121	1,668	1,652	1,916	1,749
30	720	1,215	1,208	1,799	1,781	2,066	1,886
Adult male							
0.042	1	530	693	771	984	411	952
0.083	2	577	726	841	1,037	437	995
0.167	4	638	767	933	1,101	479	1,056
0.333	8	726	822	1,065	1,188	559	1,150
0.5	12	798	864	1,174	1,255	640	1,225
1	24	944	941	1,394	1,378	883	1,370
2	48	1,070	1,009	1,580	1,483	1,310	1,500
4	96	1,161	1,071	1,712	1,575	1,748	1,608
8	192	1,232	1,132	1,816	1,665	1,928	1,702
10	240	1,254	1,152	1,848	1,695	1,964	1,732
20	480	1,343	1,234	1,979	1,815	2,104	1,855
30	720	1,431	1,316	2,110	1,935	2,242	1,977
Adult female							
0.042	1	482	640	713	915	515	865
0.083	2	512	669	760	960	548	911
0.167	4	558	710	831	1,025	601	980
0.333	8	632	770	944	1,119	699	1,085
0.5	12	696	817	1,039	1,193	793	1,171
1	24	829	903	1,237	1,330	1,050	1,338
2	48	954	977	1,417	1,443	1,421	1,482
4	96	1,046	1,040	1,548	1,537	1,741	1,594
8	192	1,112	1,099	1,643	1,625	1,888	1,688
10	240	1,131	1,119	1,673	1,654	1,922	1,718
20	480	1,212	1,198	1,791	1,771	2,059	1,840
30	720	1,292	1,277	1,910	1,888	2,195	1,962

Table D-7. Inhaled Activity of Type *F* ^{192}Ir vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	58	84	72	103	75	106
0.083	2	60	84	74	103	77	106
0.167	4	63	86	78	106	80	109
0.333	8	68	91	84	111	87	114
0.5	12	73	95	91	117	94	120
1	24	93	111	115	136	119	139
2	48	139	148	172	181	177	185
4	96	204	197	251	242	259	247
8	192	242	229	298	281	307	287
10	240	253	240	312	295	321	300
20	480	307	290	378	357	389	364
30	720	359	339	442	417	456	425
1-y-old							
0.042	1	62	99	77	121	73	114
0.083	2	64	99	80	122	75	114
0.167	4	68	102	84	125	79	117
0.333	8	74	108	92	132	87	124
0.5	12	81	114	100	139	95	131
1	24	105	132	130	163	124	153
2	48	161	174	199	214	189	201
4	96	240	229	296	281	281	263
8	192	285	264	351	325	334	304
10	240	298	277	368	340	349	318
20	480	361	335	446	412	423	385
30	720	423	392	522	481	495	451
5-y-old							
0.042	1	78	143	97	177	89	159
0.083	2	81	144	101	178	93	160
0.167	4	85	148	106	184	98	164
0.333	8	93	158	117	196	108	175
0.5	12	102	167	128	207	120	185
1	24	134	195	167	242	158	216
2	48	203	254	254	315	241	281
4	96	297	327	370	406	352	361
8	192	351	377	437	467	415	416
10	240	368	394	458	489	435	435
20	480	445	477	554	592	527	527
30	720	521	558	649	692	616	616
10-y-old							
0.042	1	101	159	127	200	100	173
0.083	2	105	160	132	200	105	174
0.167	4	110	164	138	206	112	179
0.333	8	120	175	151	220	124	191
0.5	12	131	185	164	233	138	203
1	24	168	218	212	273	185	240
2	48	248	284	312	356	282	312
4	96	353	367	444	459	405	400
8	192	415	422	521	528	476	459
10	240	435	442	546	552	499	480
20	480	527	535	662	669	604	581
30	720	617	626	775	783	707	680

Table D-7 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	132	184	168	235	118	222
0.083	2	137	184	175	236	127	230
0.167	4	144	190	183	243	139	243
0.333	8	155	202	198	258	159	267
0.5	12	167	214	214	273	181	289
1	24	208	247	266	316	252	346
2	48	286	311	366	396	386	424
4	96	376	384	480	488	533	495
8	192	434	438	553	556	619	556
10	240	454	458	579	581	647	581
20	480	550	555	702	704	782	703
30	720	644	649	822	823	914	821
Adult male							
0.042	1	149	217	187	274	111	257
0.083	2	153	222	192	280	118	269
0.167	4	158	227	198	286	127	280
0.333	8	169	233	213	294	144	296
0.5	12	183	242	230	305	163	312
1	24	229	274	289	345	228	364
2	48	314	348	396	438	363	455
4	96	405	441	511	555	526	553
8	192	465	506	586	637	616	627
10	240	487	530	613	667	645	656
20	480	590	642	743	807	779	793
30	720	691	751	870	945	911	927
Adult female							
0.042	1	133	194	167	246	130	224
0.083	2	132	202	167	256	135	238
0.167	4	133	211	168	267	141	252
0.333	8	140	224	176	284	153	271
0.5	12	150	235	189	299	170	289
1	24	190	270	239	343	232	341
2	48	274	341	346	433	366	434
4	96	380	429	480	543	530	540
8	192	444	491	561	621	622	617
10	240	465	514	587	650	652	645
20	480	564	622	713	787	790	781
30	720	661	728	836	921	925	913

Table D-8. Inhaled Activity of Type *M* ^{192}Ir vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	57	84	71	102	73	105
0.083	2	59	83	73	101	75	103
0.167	4	61	84	75	102	77	105
0.333	8	65	87	80	107	83	109
0.5	12	70	92	87	112	90	115
1	24	93	111	115	136	118	139
2	48	164	174	202	213	208	217
4	96	322	298	396	367	407	372
8	192	414	368	510	453	524	459
10	240	432	384	533	473	547	479
20	480	523	465	644	573	662	581
30	720	622	555	766	684	787	693
1-y-old							
0.042	1	60	97	74	119	70	111
0.083	2	62	96	77	117	73	109
0.167	4	65	97	81	119	76	111
0.333	8	70	102	87	125	82	117
0.5	12	76	107	95	132	89	123
1	24	103	130	127	159	120	149
2	48	181	197	224	242	212	225
4	96	345	316	426	388	400	359
8	192	436	380	539	468	505	432
10	240	455	396	562	488	527	450
20	480	550	480	679	590	637	545
30	720	654	572	808	704	758	650
5-y-old							
0.042	1	73	135	92	167	84	149
0.083	2	77	133	96	165	88	147
0.167	4	80	135	100	168	93	149
0.333	8	86	142	108	177	101	157
0.5	12	94	150	118	187	110	165
1	24	125	179	157	223	147	198
2	48	212	260	264	322	249	285
4	96	368	384	458	475	424	421
8	192	451	451	561	559	516	496
10	240	471	471	585	583	538	517
20	480	570	571	709	708	653	628
30	720	681	684	847	847	780	751
10-y-old							
0.042	1	92	147	116	185	92	159
0.083	2	96	145	121	182	98	157
0.167	4	101	147	127	185	104	160
0.333	8	107	156	135	196	113	169
0.5	12	116	164	146	207	124	179
1	24	152	198	192	248	168	216
2	48	252	287	317	360	279	312
4	96	427	427	536	533	452	455
8	192	521	503	652	627	541	533
10	240	543	524	681	654	565	556
20	480	659	637	826	794	687	676
30	720	789	763	988	951	824	810

Table D-8 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	117	166	150	213	109	195
0.083	2	123	164	158	210	121	202
0.167	4	128	167	164	213	132	211
0.333	8	134	175	172	224	146	225
0.5	12	143	185	183	236	162	240
1	24	181	218	232	278	215	282
2	48	273	296	350	376	319	352
4	96	405	401	515	507	431	419
8	192	474	461	603	582	493	468
10	240	495	481	629	607	515	488
20	480	602	584	766	737	631	597
30	720	722	701	918	885	763	720
Adult male							
0.042	1	123	174	155	219	99	199
0.083	2	126	179	158	225	107	211
0.167	4	129	182	162	229	115	219
0.333	8	137	185	172	233	127	225
0.5	12	147	190	186	239	141	234
1	24	189	218	238	274	191	270
2	48	281	292	353	366	294	342
4	96	393	396	493	494	412	422
8	192	454	456	568	568	473	475
10	240	473	475	592	593	494	496
20	480	575	579	720	722	603	606
30	720	690	696	864	868	727	730
Adult female							
0.042	1	120	165	152	209	118	182
0.083	2	117	172	148	218	124	197
0.167	4	114	180	144	228	125	207
0.333	8	116	188	147	238	130	215
0.5	12	124	195	156	247	141	224
1	24	160	225	201	284	190	258
2	48	256	300	323	378	304	334
4	96	408	404	514	508	451	427
8	192	488	465	614	583	526	485
10	240	509	485	641	608	549	506
20	480	617	589	777	740	670	618
30	720	738	708	930	888	807	745

Table D-9. Inhaled Activity of Type *S* ^{192}Ir vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	57	84	70	102	72	105
0.083	2	58	82	72	101	75	103
0.167	4	60	83	75	102	77	104
0.333	8	65	87	80	106	82	109
0.5	12	70	91	87	112	89	114
1	24	93	111	115	136	118	139
2	48	167	177	206	217	211	221
4	96	343	315	422	388	434	393
8	192	446	391	550	482	565	487
10	240	465	407	573	501	588	507
20	480	556	486	685	599	703	606
30	720	656	573	808	707	829	715
1-y-old							
0.042	1	59	97	74	119	69	111
0.083	2	62	95	77	117	72	109
0.167	4	65	96	80	119	76	111
0.333	8	70	101	87	124	81	116
0.5	12	76	107	94	131	89	122
1	24	102	129	127	159	120	148
2	48	184	199	227	245	214	228
4	96	361	328	446	404	418	372
8	192	459	395	567	486	530	447
10	240	477	410	589	505	551	464
20	480	568	488	701	600	656	552
30	720	667	573	824	706	771	649
5-y-old							
0.042	1	73	134	91	166	83	148
0.083	2	76	132	95	164	88	146
0.167	4	80	134	100	167	92	148
0.333	8	86	141	107	175	100	155
0.5	12	93	148	117	185	109	163
1	24	124	178	155	221	146	196
2	48	213	260	265	322	249	285
4	96	376	389	468	482	431	427
8	192	461	455	572	563	523	499
10	240	479	472	595	585	544	518
20	480	569	561	707	695	646	616
30	720	669	660	831	818	760	725
10-y-old							
0.042	1	91	146	114	183	91	158
0.083	2	96	144	120	180	97	155
0.167	4	100	146	126	183	103	158
0.333	8	106	154	133	193	112	167
0.5	12	114	162	144	204	123	177
1	24	150	195	189	245	166	214
2	48	252	287	317	360	278	312
4	96	435	432	546	539	454	459
8	192	529	506	662	630	541	534
10	240	549	525	687	654	561	554
20	480	653	624	818	778	668	659
30	720	769	734	962	915	786	775

Table D-9 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	116	165	148	210	109	192
0.083	2	122	162	156	207	120	199
0.167	4	126	164	162	210	131	208
0.333	8	132	173	169	221	145	221
0.5	12	141	182	180	233	160	235
1	24	178	215	228	274	212	276
2	48	272	294	347	373	312	344
4	96	406	400	516	505	418	408
8	192	473	457	601	576	472	450
10	240	491	474	624	598	490	467
20	480	586	564	744	711	584	556
30	720	690	665	877	838	689	655
Adult male							
0.042	1	121	170	152	214	98	194
0.083	2	124	175	155	221	106	206
0.167	4	127	178	159	224	113	214
0.333	8	134	181	168	228	125	220
0.5	12	144	186	182	234	139	228
1	24	186	213	234	267	188	262
2	48	277	286	348	359	287	331
4	96	389	388	488	484	398	407
8	192	445	442	557	551	451	453
10	240	462	459	578	572	468	469
20	480	548	545	686	679	556	557
30	720	645	641	806	798	653	654
Adult female							
0.042	1	119	162	150	205	117	179
0.083	2	116	170	146	215	122	193
0.167	4	113	177	142	224	124	203
0.333	8	114	185	144	234	128	211
0.5	12	122	192	153	243	139	219
1	24	157	220	198	279	186	251
2	48	254	295	320	372	298	325
4	96	410	399	516	500	440	414
8	192	487	454	613	569	507	464
10	240	505	471	636	590	527	481
20	480	601	560	757	701	626	571
30	720	707	657	890	824	735	671

Table D-10. Inhaled Activity of Type *M* ^{241}Am vs. Count Rate (Bq/kcpm)

Time post intake		Camera			
		Siemens e.cam		Philips SKYLight	
d	h	Anterior	Posterior	Anterior	Posterior
Infant					
0.042	1	310	597	355	675
0.083	2	323	586	370	661
0.167	4	337	592	386	666
0.333	8	362	614	414	691
0.5	12	393	638	449	717
1	24	524	749	597	841
2	48	926	1,116	1,052	1,251
4	96	1,767	1,773	2,006	1,988
8	192	2,145	2,050	2,434	2,299
10	240	2,182	2,090	2,476	2,344
20	480	2,320	2,258	2,635	2,534
30	720	2,438	2,407	2,770	2,704
1-y-old					
0.042	1	351	846	375	887
0.083	2	372	829	397	870
0.167	4	393	838	420	880
0.333	8	427	872	457	917
0.5	12	470	906	503	954
1	24	645	1,049	690	1,105
2	48	1,161	1,473	1,241	1,548
4	96	2,201	2,120	2,337	2,215
8	192	2,666	2,379	2,824	2,482
10	240	2,718	2,424	2,880	2,529
20	480	2,929	2,621	3,108	2,738
30	720	3,118	2,801	3,313	2,928
5-y-old					
0.042	1	467	1,302	485	1,319
0.083	2	497	1,281	519	1,295
0.167	4	527	1,300	553	1,313
0.333	8	574	1,359	605	1,373
0.5	12	632	1,412	669	1,427
1	24	863	1,609	919	1,627
2	48	1,492	2,119	1,587	2,147
4	96	2,572	2,787	2,693	2,827
8	192	3,012	3,060	3,134	3,106
10	240	3,070	3,121	3,195	3,168
20	480	3,316	3,398	3,454	3,452
30	720	3,537	3,654	3,687	3,714
10-y-old					
0.042	1	685	1,593	578	1,576
0.083	2	739	1,563	631	1,552
0.167	4	782	1,587	679	1,580
0.333	8	838	1,666	747	1,665
0.5	12	913	1,735	829	1,741
1	24	1,216	1,980	1,148	1,995
2	48	2,008	2,589	1,945	2,589
4	96	3,241	3,362	3,109	3,312
8	192	3,729	3,681	3,554	3,612
10	240	3,803	3,754	3,626	3,685
20	480	4,128	4,093	3,942	4,021
30	720	4,426	4,409	4,234	4,335

Table D-10 (continued)

Time post intake		Camera			
		Siemens e.cam		Philips SKYLight	
d	h	Anterior	Posterior	Anterior	Posterior
15-y-old					
0.042	1	1,111	2,065	702	2,165
0.083	2	1,204	2,035	780	2,245
0.167	4	1,262	2,070	861	2,336
0.333	8	1,318	2,175	971	2,465
0.5	12	1,409	2,264	1,090	2,580
1	24	1,784	2,534	1,504	2,870
2	48	2,623	3,095	2,376	3,230
4	96	3,624	3,705	3,366	3,498
8	192	4,004	3,982	3,733	3,684
10	240	4,084	4,062	3,813	3,760
20	480	4,448	4,437	4,179	4,129
30	720	4,783	4,789	4,523	4,478
Adult male					
0.042	1	1,196	2,358	660	2,434
0.083	2	1,185	2,434	708	2,584
0.167	4	1,184	2,428	762	2,641
0.333	8	1,246	2,379	854	2,645
0.5	12	1,355	2,390	963	2,693
1	24	1,779	2,611	1,354	2,952
2	48	2,623	3,273	2,213	3,488
4	96	3,461	4,107	3,225	4,025
8	192	3,756	4,477	3,588	4,307
10	240	3,823	4,574	3,660	4,403
20	480	4,128	5,027	3,988	4,863
30	720	4,403	5,458	4,292	5,306
Adult female					
0.042	1	1,138	1,914	823	1,897
0.083	2	1,058	2,029	847	2,074
0.167	4	985	2,125	847	2,197
0.333	8	976	2,185	880	2,250
0.5	12	1,034	2,227	965	2,293
1	24	1,352	2,425	1,348	2,488
2	48	2,226	2,980	2,281	2,959
4	96	3,586	3,673	3,474	3,487
8	192	4,103	3,983	3,897	3,748
10	240	4,173	4,065	3,971	3,828
20	480	4,468	4,451	4,297	4,212
30	720	4,724	4,815	4,592	4,579

Table D-11. Ingested Activity of ^{60}Co vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	93	101	129	140	128	137
0.083	2	97	100	134	139	133	137
0.167	4	102	103	141	144	140	141
0.333	8	110	111	153	155	152	152
0.5	12	120	119	166	167	165	164
1	24	155	151	215	212	215	208
2	48	248	237	346	333	345	328
4	96	425	400	596	564	595	555
8	192	595	557	835	787	835	775
10	240	658	616	924	870	923	856
20	480	924	865	1,298	1,222	1,297	1,202
30	720	1,097	1,027	1,541	1,451	1,540	1,428
1-y-old							
0.042	1	97	107	132	147	122	133
0.083	2	100	106	137	145	126	131
0.167	4	104	108	141	148	130	134
0.333	8	110	115	151	157	139	143
0.5	12	120	123	164	169	151	153
1	24	161	160	220	220	204	201
2	48	310	298	425	411	394	374
4	96	802	746	1,106	1,032	1,023	937
8	192	1,351	1,239	1,869	1,720	1,727	1,558
10	240	1,501	1,376	2,077	1,910	1,919	1,730
20	480	2,114	1,936	2,925	2,687	2,701	2,433
30	720	2,512	2,300	3,476	3,193	3,211	2,891
5-y-old							
0.042	1	92	121	125	165	118	143
0.083	2	96	120	131	164	125	142
0.167	4	100	123	137	168	130	146
0.333	8	107	132	147	180	140	157
0.5	12	117	143	160	195	154	169
1	24	162	190	221	259	213	226
2	48	321	362	439	495	426	431
4	96	867	932	1,196	1,281	1,134	1,123
8	192	1,497	1,571	2,073	2,165	1,930	1,906
10	240	1,665	1,746	2,307	2,407	2,146	2,119
20	480	2,349	2,460	3,254	3,392	3,026	2,986
30	720	2,795	2,926	3,872	4,033	3,600	3,551
10-y-old							
0.042	1	93	120	128	165	121	142
0.083	2	98	120	135	164	131	141
0.167	4	103	124	141	169	139	147
0.333	8	112	134	153	184	150	160
0.5	12	123	146	168	200	167	175
1	24	171	196	234	269	239	237
2	48	345	380	474	522	489	461
4	96	973	1,015	1,340	1,398	1,299	1,223
8	192	1,723	1,747	2,378	2,409	2,189	2,092
10	240	1,918	1,943	2,648	2,680	2,433	2,327
20	480	2,708	2,739	3,739	3,778	3,430	3,280
30	720	3,223	3,258	4,450	4,494	4,080	3,901

Table D-11 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	82	109	114	151	175	188
0.083	2	88	109	121	151	207	197
0.167	4	92	114	128	158	224	206
0.333	8	101	126	140	174	239	224
0.5	12	112	138	155	192	269	252
1	24	159	189	221	263	403	365
2	48	328	371	457	516	815	716
4	96	936	991	1,304	1,377	1,759	1,589
8	192	1,658	1,699	2,310	2,357	2,612	2,415
10	240	1,846	1,889	2,572	2,620	2,891	2,675
20	480	2,607	2,664	3,633	3,695	4,060	3,758
30	720	3,104	3,169	4,325	4,395	4,821	4,464
Adult male							
0.042	1	89	125	122	172	172	193
0.083	2	94	130	127	179	200	212
0.167	4	98	134	133	183	216	221
0.333	8	106	138	145	190	232	230
0.5	12	118	147	161	202	261	248
1	24	175	195	239	267	407	345
2	48	410	415	563	570	995	758
4	96	1,921	1,865	2,644	2,562	3,947	3,145
8	192	5,942	5,831	8,204	8,021	8,909	8,220
10	240	6,763	6,642	9,340	9,137	9,989	9,276
20	480	9,601	9,420	13,261	12,959	14,090	13,110
30	720	11,436	11,214	15,795	15,427	16,750	15,591
Adult female							
0.042	1	91	126	124	172	162	178
0.083	2	89	133	121	183	172	199
0.167	4	87	140	119	193	166	211
0.333	8	90	149	123	205	163	219
0.5	12	98	159	134	219	178	234
1	24	140	209	191	289	268	315
2	48	323	442	441	610	652	678
4	96	1,588	1,950	2,178	2,691	3,039	2,930
8	192	5,634	5,930	7,772	8,173	8,899	8,368
10	240	6,466	6,743	8,922	9,294	10,099	9,484
20	480	9,211	9,556	12,712	13,171	14,323	13,424
30	720	10,982	11,373	15,158	15,675	17,058	15,972

Table D-12. Ingested Activity of ^{90}Sr vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	2,614	3,451	3,293	4,307	3,192	4,187
0.083	2	2,715	3,323	3,424	4,165	3,334	4,045
0.167	4	2,755	3,337	3,492	4,222	3,412	4,098
0.333	8	2,812	3,452	3,578	4,399	3,503	4,272
0.5	12	2,909	3,539	3,706	4,519	3,628	4,387
1	24	3,290	3,915	4,199	5,014	4,111	4,868
2	48	4,106	4,882	5,258	6,285	5,156	6,111
4	96	5,021	6,074	6,454	7,862	6,338	7,659
8	192	5,568	6,813	7,162	8,830	7,037	8,609
10	240	5,728	7,039	7,368	9,125	7,240	8,898
20	480	6,261	7,854	8,052	10,184	7,914	9,939
30	720	6,561	8,344	8,437	10,821	8,293	10,567
1-y-old							
0.042	1	3,214	4,655	3,942	5,668	3,623	5,236
0.083	2	3,444	4,453	4,220	5,432	3,905	5,019
0.167	4	3,616	4,430	4,452	5,432	4,131	5,010
0.333	8	3,857	4,586	4,770	5,655	4,443	5,219
0.5	12	4,133	4,766	5,115	5,889	4,787	5,449
1	24	5,188	5,591	6,420	6,932	6,067	6,447
2	48	8,114	8,110	10,061	10,114	9,574	9,418
4	96	13,514	12,646	16,835	15,899	16,040	14,751
8	192	17,895	16,406	22,330	20,681	21,277	19,160
10	240	19,175	17,551	23,925	22,123	22,807	20,499
20	480	23,713	21,635	29,553	27,241	28,248	25,273
30	720	26,647	24,282	33,178	30,545	31,777	28,366
5-y-old							
0.042	1	3,441	6,100	4,191	7,324	3,991	6,569
0.083	2	3,769	5,915	4,592	7,129	4,427	6,355
0.167	4	4,084	6,040	4,985	7,314	4,825	6,502
0.333	8	4,539	6,457	5,550	7,848	5,385	6,983
0.5	12	4,992	6,811	6,105	8,290	5,950	7,385
1	24	6,543	8,138	8,005	9,933	7,866	8,872
2	48	10,865	12,059	13,359	14,808	13,055	13,298
4	96	19,595	19,394	24,357	24,022	23,189	21,726
8	192	27,192	25,811	33,958	32,065	31,960	29,081
10	240	29,473	27,783	36,817	34,515	34,615	31,330
20	480	38,179	34,892	47,716	43,314	44,672	39,516
30	720	44,360	39,648	55,452	49,182	51,750	45,045
10-y-old							
0.042	1	3,812	6,959	4,604	8,310	4,510	7,423
0.083	2	4,243	6,736	5,113	8,060	5,216	7,222
0.167	4	4,724	6,937	5,702	8,327	5,882	7,493
0.333	8	5,406	7,532	6,546	9,071	6,753	8,212
0.5	12	6,023	7,994	7,301	9,645	7,591	8,758
1	24	8,060	9,561	9,784	11,578	10,288	10,536
2	48	13,649	13,920	16,648	16,972	16,979	15,386
4	96	24,402	21,206	30,027	26,077	28,113	23,434
8	192	32,153	26,417	39,698	32,568	35,960	29,182
10	240	34,242	27,878	42,279	34,371	38,204	30,789
20	480	42,008	32,793	51,836	40,413	46,373	36,149
30	720	47,038	35,662	58,007	43,932	51,522	39,253

Table D-12 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	4,037	7,741	4,838	9,152	8,456	12,755
0.083	2	4,577	7,545	5,475	8,943	11,248	12,933
0.167	4	5,196	7,870	6,224	9,375	13,162	12,915
0.333	8	6,069	8,644	7,291	10,350	14,617	13,629
0.5	12	6,838	9,211	8,224	11,054	16,204	14,611
1	24	9,319	11,005	11,226	13,258	20,573	17,421
2	48	15,992	15,532	19,360	18,835	27,286	22,010
4	96	28,090	21,912	34,321	26,764	33,215	26,368
8	192	34,944	25,261	42,842	30,909	36,960	29,087
10	240	36,436	26,053	44,678	31,879	38,176	29,920
20	480	41,795	28,622	51,257	35,011	42,299	32,577
30	720	45,036	30,015	55,228	36,707	44,573	33,971
Adult male							
0.042	1	4,190	9,698	5,054	11,527	8,797	13,756
0.083	2	4,328	10,077	5,236	12,009	10,696	15,212
0.167	4	4,662	10,047	5,660	12,038	12,013	15,407
0.333	8	5,478	10,058	6,665	12,120	13,667	15,586
0.5	12	6,401	10,443	7,789	12,613	15,948	16,557
1	24	9,843	12,842	11,957	15,555	24,762	21,261
2	48	20,854	21,917	25,327	26,643	47,644	35,923
4	96	52,684	47,315	64,382	57,885	87,482	69,527
8	192	86,345	72,865	105,967	89,403	123,112	101,443
10	240	95,290	79,484	116,920	97,482	135,214	110,921
20	480	131,621	104,713	161,029	127,934	188,208	150,031
30	720	161,224	123,801	196,728	150,785	232,839	181,328
Adult female							
0.042	1	4,119	7,986	4,987	9,461	7,209	9,981
0.083	2	3,865	8,744	4,707	10,405	7,341	11,607
0.167	4	3,758	9,480	4,600	11,350	6,799	12,695
0.333	8	4,042	10,219	4,961	12,294	6,885	13,438
0.5	12	4,528	10,824	5,558	13,039	7,776	14,233
1	24	6,585	13,393	8,074	16,154	12,045	17,769
2	48	13,879	22,925	17,010	27,756	25,633	30,113
4	96	40,644	49,813	50,007	60,923	60,884	62,383
8	192	74,815	77,535	92,391	95,339	95,337	94,489
10	240	83,151	85,357	102,669	104,959	104,290	103,555
20	480	116,518	118,822	143,497	145,893	137,653	140,695
30	720	144,154	146,990	177,101	180,220	162,586	170,519

Table D-13. Ingested Activity of ^{131}I vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	84	96	99	112	99	111
0.083	2	93	98	109	115	109	114
0.167	4	110	111	129	130	129	129
0.333	8	147	146	173	171	174	170
0.5	12	188	185	221	216	222	216
1	24	294	282	346	330	350	331
2	48	389	368	458	430	464	433
4	96	501	472	589	552	597	556
8	192	836	788	984	922	996	928
10	240	1,086	1,024	1,278	1,198	1,295	1,205
20	480	4,029	3,800	4,741	4,446	4,803	4,471
30	720	14,890	14,044	17,524	16,431	17,753	16,527
1-y-old							
0.042	1	93	111	112	133	100	117
0.083	2	104	113	124	135	112	119
0.167	4	123	126	148	151	133	134
0.333	8	165	164	197	196	178	174
0.5	12	210	204	251	243	226	216
1	24	325	301	389	359	351	319
2	48	426	384	510	458	460	407
4	96	539	485	645	577	582	513
8	192	858	773	1,028	921	927	819
10	240	1,089	981	1,305	1,169	1,177	1,039
20	480	3,618	3,258	4,332	3,881	3,909	3,451
30	720	12,023	10,826	14,397	12,897	12,988	11,469
5-y-old							
0.042	1	95	136	116	168	102	139
0.083	2	106	138	130	169	115	141
0.167	4	123	152	150	186	134	156
0.333	8	161	194	196	237	175	200
0.5	12	208	242	253	295	224	251
1	24	343	364	418	442	364	383
2	48	464	468	566	567	487	496
4	96	579	580	706	703	607	616
8	192	878	882	1,071	1,069	923	936
10	240	1,087	1,092	1,326	1,323	1,143	1,159
20	480	3,198	3,214	3,901	3,894	3,363	3,410
30	720	9,441	9,490	11,517	11,498	9,930	10,067
10-y-old							
0.042	1	104	149	129	188	106	148
0.083	2	119	153	149	192	123	153
0.167	4	141	172	175	215	147	173
0.333	8	186	229	232	285	191	230
0.5	12	244	297	303	370	242	300
1	24	418	491	517	607	375	498
2	48	577	662	713	816	488	674
4	96	709	810	876	997	596	824
8	192	1,023	1,165	1,264	1,434	864	1,186
10	240	1,231	1,400	1,521	1,724	1,042	1,425
20	480	3,140	3,562	3,880	4,386	2,670	3,627
30	720	8,086	9,165	9,994	11,287	6,886	9,332

Table D-13 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	100	151	128	197	129	169
0.083	2	119	158	152	204	145	172
0.167	4	146	183	187	236	169	193
0.333	8	204	256	261	330	211	250
0.5	12	282	353	360	455	249	312
1	24	565	691	722	888	333	465
2	48	878	1,048	1,120	1,344	402	589
4	96	1,086	1,288	1,384	1,651	488	716
8	192	1,548	1,827	1,975	2,341	708	1,033
10	240	1,853	2,182	2,363	2,796	853	1,241
20	480	4,626	5,419	5,900	6,941	2,173	3,141
30	720	11,722	13,704	14,951	17,550	5,546	7,999
Adult male							
0.042	1	118	170	150	219	145	187
0.083	2	141	191	178	244	165	207
0.167	4	168	229	211	291	187	245
0.333	8	213	319	266	405	215	328
0.5	12	262	433	325	550	237	421
1	24	384	817	470	1,031	280	669
2	48	485	1,209	589	1,520	321	880
4	96	591	1,487	717	1,867	388	1,071
8	192	851	2,100	1,034	2,636	562	1,531
10	240	1,022	2,498	1,241	3,136	677	1,832
20	480	2,554	6,047	3,106	7,591	1,709	4,525
30	720	6,411	14,905	7,797	18,707	4,312	11,279
Adult female							
0.042	1	121	152	154	196	143	161
0.083	2	137	171	173	219	163	183
0.167	4	160	204	201	260	188	220
0.333	8	206	281	259	358	224	293
0.5	12	259	376	323	478	255	372
1	24	394	676	486	852	317	580
2	48	508	963	623	1,207	372	754
4	96	621	1,180	762	1,477	451	919
8	192	893	1,676	1,096	2,099	652	1,317
10	240	1,071	1,998	1,315	2,503	785	1,577
20	480	2,669	4,882	3,278	6,117	1,976	3,910
30	720	6,685	12,094	8,215	15,156	4,980	9,766

Table D-14. Ingested Activity of ^{137}Cs vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	129	142	205	223	175	191
0.083	2	137	139	218	222	186	187
0.167	4	143	138	229	222	195	186
0.333	8	147	139	236	225	201	187
0.5	12	150	140	241	227	205	189
1	24	155	143	251	233	213	193
2	48	163	150	263	244	223	202
4	96	177	163	287	266	243	220
8	192	211	194	342	316	290	261
10	240	230	212	373	345	316	285
20	480	358	329	579	536	491	443
30	720	557	512	901	834	764	689
1-y-old							
0.042	1	143	163	216	243	183	206
0.083	2	155	160	235	241	199	201
0.167	4	165	160	252	244	213	201
0.333	8	174	163	266	250	225	206
0.5	12	180	166	276	255	234	210
1	24	191	172	294	266	248	218
2	48	203	182	313	281	264	230
4	96	226	202	347	312	294	256
8	192	279	250	430	386	363	317
10	240	311	278	478	429	404	352
20	480	530	473	815	732	689	601
30	720	903	807	1,389	1,248	1,175	1,024
5-y-old							
0.042	1	144	198	213	287	190	252
0.083	2	161	198	239	290	213	250
0.167	4	178	202	265	299	236	254
0.333	8	193	212	288	315	257	266
0.5	12	203	220	304	327	273	275
1	24	220	233	332	349	298	291
2	48	235	246	354	369	319	308
4	96	257	270	388	404	349	337
8	192	306	321	461	481	416	401
10	240	333	349	501	523	452	436
20	480	487	510	734	765	661	638
30	720	677	709	1,020	1,064	919	887
10-y-old							
0.042	1	156	211	229	304	200	271
0.083	2	180	214	264	311	230	272
0.167	4	203	223	299	326	261	281
0.333	8	225	238	332	350	294	301
0.5	12	240	249	355	367	318	317
1	24	265	268	394	397	359	343
2	48	284	284	422	422	387	364
4	96	308	308	458	458	420	395
8	192	355	355	527	527	483	455
10	240	377	377	560	560	513	483
20	480	478	477	709	709	650	611
30	720	568	568	844	843	773	727

Table D-14 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	146	205	213	294	240	311
0.083	2	172	211	251	304	268	307
0.167	4	198	221	290	321	302	319
0.333	8	223	238	328	348	350	351
0.5	12	241	251	355	368	387	378
1	24	271	273	401	402	453	422
2	48	291	290	431	427	494	452
4	96	309	307	457	453	525	480
8	192	331	329	490	485	563	514
10	240	339	337	501	497	576	526
20	480	368	366	545	540	626	572
30	720	397	395	588	582	675	617
Adult male							
0.042	1	172	231	248	326	271	344
0.083	2	206	254	298	361	312	368
0.167	4	243	275	353	395	360	396
0.333	8	280	295	408	427	419	430
0.5	12	306	308	447	449	464	454
1	24	350	330	515	485	544	494
2	48	377	347	555	510	590	521
4	96	396	364	584	535	620	547
8	192	418	384	616	565	655	577
10	240	425	391	627	575	666	588
20	480	456	419	672	616	714	629
30	720	486	446	716	656	761	671
Adult female							
0.042	1	177	217	254	307	271	304
0.083	2	199	236	289	338	308	335
0.167	4	225	257	328	371	352	369
0.333	8	255	279	374	406	409	409
0.5	12	278	294	409	430	454	438
1	24	317	319	468	471	532	486
2	48	340	337	503	498	577	517
4	96	357	353	528	522	607	543
8	192	377	373	558	551	641	573
10	240	384	380	567	561	652	583
20	480	411	407	608	601	699	624
30	720	438	433	648	641	745	665

Table D-15. Ingested Activity of ^{192}Ir vs. Count Rate (Bq/kcpm)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Infant							
0.042	1	34	40	41	48	42	49
0.083	2	34	39	42	47	43	48
0.167	4	35	39	43	47	43	48
0.333	8	35	40	44	49	44	49
0.5	12	38	42	46	51	47	52
1	24	50	53	61	65	62	66
2	48	110	113	135	138	138	140
4	96	607	603	744	737	762	751
8	192	2,873	2,729	3,536	3,355	3,644	3,420
10	240	3,191	3,020	3,927	3,715	4,050	3,787
20	480	3,907	3,694	4,809	4,544	4,960	4,632
30	720	4,573	4,323	5,630	5,318	5,807	5,421
1-y-old							
0.042	1	38	47	47	57	44	53
0.083	2	39	46	49	56	46	52
0.167	4	40	46	49	57	47	53
0.333	8	41	48	51	59	48	55
0.5	12	44	51	55	63	52	59
1	24	60	66	74	82	71	76
2	48	137	143	170	177	162	166
4	96	838	846	1,035	1,041	987	977
8	192	6,523	6,116	8,048	7,521	7,650	7,041
10	240	7,635	7,090	9,418	8,719	8,947	8,160
20	480	9,437	8,742	11,640	10,749	11,056	10,060
30	720	11,047	10,231	13,627	12,580	12,943	11,774
5-y-old							
0.042	1	38	56	47	71	45	61
0.083	2	40	55	50	69	48	60
0.167	4	41	56	51	70	50	61
0.333	8	43	60	54	75	52	65
0.5	12	46	64	58	80	57	70
1	24	65	85	81	106	80	92
2	48	150	186	188	232	189	203
4	96	928	1,102	1,162	1,376	1,170	1,205
8	192	7,353	7,995	9,163	9,923	8,778	8,812
10	240	8,626	9,273	10,741	11,500	10,218	10,230
20	480	10,669	11,436	13,284	14,180	12,618	12,620
30	720	12,492	13,385	15,554	16,597	14,773	14,771
10-y-old							
0.042	1	40	60	51	75	49	65
0.083	2	43	58	54	74	54	64
0.167	4	44	59	56	75	57	65
0.333	8	46	64	58	81	60	70
0.5	12	50	69	63	87	66	76
1	24	71	92	90	117	98	104
2	48	167	204	211	258	240	233
4	96	1,043	1,218	1,321	1,539	1,494	1,389
8	192	8,609	8,910	10,828	11,163	10,185	9,752
10	240	10,158	10,345	12,762	12,945	11,708	11,261
20	480	12,582	12,762	15,804	15,965	14,420	13,877
30	720	14,735	14,937	18,508	18,687	16,880	16,241

Table D-15 (continued)

Time post intake		Camera					
		Siemens e.cam				Philips SKYLight	
		6 Windows		3 Windows			
d	h	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
15-y-old							
0.042	1	38	60	49	78	82	101
0.083	2	41	59	53	76	108	108
0.167	4	43	60	55	78	127	116
0.333	8	45	66	58	85	139	130
0.5	12	50	71	64	93	158	148
1	24	72	98	93	127	258	227
2	48	174	221	225	287	697	564
4	96	1,100	1,322	1,423	1,709	3,952	3,145
8	192	8,860	9,148	11,327	11,634	13,861	12,343
10	240	10,412	10,544	13,289	13,383	15,052	13,503
20	480	12,888	12,988	16,443	16,478	18,318	16,453
30	720	15,094	15,200	19,256	19,285	21,420	19,240
Adult male							
0.042	1	41	71	52	91	80	103
0.083	2	42	74	54	95	96	116
0.167	4	44	75	55	96	106	121
0.333	8	47	76	60	97	114	123
0.5	12	53	79	68	101	130	131
1	24	82	103	104	130	216	181
2	48	211	224	268	285	604	416
4	96	1,359	1,347	1,731	1,705	3,625	2,430
8	192	9,985	10,708	12,602	13,482	14,179	13,891
10	240	11,580	12,577	14,596	15,822	15,497	15,674
20	480	14,296	15,554	18,014	19,564	18,887	19,220
30	720	16,741	18,209	21,095	22,903	22,091	22,486
Adult female							
0.042	1	41	65	51	83	70	85
0.083	2	39	70	49	90	73	98
0.167	4	37	75	46	96	68	106
0.333	8	37	79	46	102	65	110
0.5	12	40	84	50	108	70	116
1	24	58	109	74	140	110	154
2	48	143	237	181	304	294	343
4	96	929	1,404	1,178	1,800	1,941	2,021
8	192	9,051	10,489	11,448	13,300	13,495	13,409
10	240	10,967	12,214	13,864	15,465	15,532	15,380
20	480	13,674	15,077	17,285	19,082	19,149	18,924
30	720	16,026	17,647	20,259	22,334	22,425	22,145

Table D-16. Ingested Activity of ^{241}Am vs. Count Rate (Bq/kcpm)

Time post intake		Camera			
		Siemens e.cam		Philips SKYLight	
d	h	Anterior	Posterior	Anterior	Posterior
Infant					
0.042	1	207	290	230	321
0.083	2	216	281	240	310
0.167	4	218	281	242	311
0.333	8	222	290	246	321
0.5	12	234	301	261	333
1	24	313	375	349	416
2	48	699	788	780	875
4	96	4,288	4,750	4,798	5,285
8	192	40,066	50,296	45,576	56,938
10	240	46,627	59,920	53,206	68,087
20	480	48,495	61,917	55,397	70,428
30	720	48,969	61,926	55,962	70,455
1-y-old					
0.042	1	264	433	278	451
0.083	2	284	418	300	436
0.167	4	292	423	308	441
0.333	8	299	443	317	465
0.5	12	320	465	340	490
1	24	442	590	472	624
2	48	1,024	1,258	1,100	1,336
4	96	6,864	8,082	7,387	8,600
8	192	256,642	283,625	277,124	301,996
10	240	642,551	655,176	696,902	697,957
20	480	848,823	829,245	922,862	883,596
30	720	854,288	831,746	928,929	886,269
5-y-old					
0.042	1	295	621	317	617
0.083	2	324	600	353	594
0.167	4	336	613	370	607
0.333	8	348	656	386	651
0.5	12	378	698	421	694
1	24	538	900	612	898
2	48	1,287	1,940	1,489	1,941
4	96	8,754	12,519	10,230	12,541
8	192	318,906	431,601	361,769	436,217
10	240	763,973	972,624	828,880	994,278
20	480	987,163	1,217,807	1,048,670	1,251,302
30	720	993,680	1,221,893	1,055,431	1,255,542
10-y-old					
0.042	1	340	762	375	758
0.083	2	379	735	438	734
0.167	4	397	754	473	758
0.333	8	414	817	502	830
0.5	12	452	878	558	900
1	24	656	1,149	855	1,201
2	48	1,598	2,501	2,206	2,653
4	96	10,986	16,200	15,642	17,290
8	192	409,347	550,221	518,390	574,385
10	240	1,010,709	1,214,861	1,085,992	1,232,133
20	480	1,326,686	1,507,093	1,322,786	1,509,801
30	720	1,336,571	1,511,716	1,331,755	1,514,264

Table D-16 (continued)

Time post intake		Camera			
		Siemens e.cam		Philips SKYLight	
d	h	Anterior	Posterior	Anterior	Posterior
15-y-old					
0.042	1	381	965	799	1,589
0.083	2	428	931	1,234	1,724
0.167	4	450	968	1,661	1,906
0.333	8	472	1,079	1,839	2,234
0.5	12	522	1,182	2,116	2,621
1	24	785	1,600	3,698	4,269
2	48	1,986	3,563	11,453	11,442
4	96	13,957	23,291	89,681	80,996
8	192	515,149	744,153	1,339,578	1,376,298
10	240	1,244,965	1,525,333	1,706,729	1,847,380
20	480	1,616,458	1,838,392	1,793,607	1,961,216
30	720	1,628,444	1,847,031	1,802,761	1,968,548
Adult male					
0.042	1	383	1,273	837	1,701
0.083	2	376	1,327	1,037	1,946
0.167	4	374	1,263	1,138	1,945
0.333	8	406	1,163	1,215	1,831
0.5	12	468	1,161	1,411	1,878
1	24	777	1,430	2,575	2,474
2	48	2,196	3,043	8,598	5,571
4	96	16,528	19,579	72,313	36,674
8	192	545,676	735,841	1,171,780	1,168,950
10	240	1,119,740	1,883,311	1,523,384	2,387,603
20	480	1,350,327	2,519,307	1,608,115	2,882,729
30	720	1,357,713	2,537,818	1,616,726	2,905,060
Adult female					
0.042	1	371	904	645	1,056
0.083	2	327	1,011	626	1,290
0.167	4	291	1,098	530	1,447
0.333	8	285	1,141	484	1,471
0.5	12	308	1,177	527	1,509
1	24	457	1,444	866	1,876
2	48	1,154	3,011	2,552	3,973
4	96	8,116	19,157	19,820	25,411
8	192	323,665	674,438	632,219	839,264
10	240	887,155	1,570,476	1,240,252	1,797,082
20	480	1,230,879	2,004,745	1,469,546	2,208,986
30	720	1,238,046	2,020,491	1,476,613	2,224,238

Appendix E

CUMULATIVE EFFECTIVE DOSE AT SELECTED TIMES AFTER INTAKE

As was discussed in chapter 5, two sets of dose coefficients have been calculated to help in assessing the biological effects of internal exposure. The first are coefficients for the cumulative effective dose, which is the integrated dose from the time of acute intake until the time of the assessment. The second set represents the lifetime effective dose commitment to the exposed individual, absent any medical intervention. The lifetime dose commitment to a child is defined as the integrated dose until age 70. The committed dose to an adult is the dose integrated over a period of 50 years following intake.

The coefficients in tables E-1 to E-6 are tabulated at 12 time steps, a subset of the 50 time steps used by the Assess computer code (Anigstein et al. 2009). They are specific to the f_1 values listed in table 2-2 and, for the inhalation pathway, to a particle size distribution with a 1 μm AMAD. These coefficients can be used to determine doses resulting from intakes that are calculated using the calibration factors in appendix D, an alternative to using Assess. Such dose calculations can be useful in assessing the efficacy of any potential intervention.

Table E-1. Cumulative Effective Dose Following Intake of ^{60}Co (Sv/Bq)

Time post intake		Age					
d	h	3 mo	1 y	5 y	10 y	15 y	20 y
Inhalation: Type *M*							
0.042	1	9.97e-11	6.88e-11	3.62e-11	2.54e-11	1.93e-11	1.54e-11
0.083	2	1.91e-10	1.34e-10	7.07e-11	4.97e-11	3.70e-11	2.96e-11
0.167	4	3.60e-10	2.60e-10	1.37e-10	9.67e-11	7.03e-11	5.66e-11
0.333	8	7.00e-10	5.17e-10	2.71e-10	1.91e-10	1.34e-10	1.09e-10
0.5	12	1.05e-09	7.83e-10	4.08e-10	2.85e-10	1.98e-10	1.61e-10
1	24	2.01e-09	1.53e-09	7.88e-10	5.50e-10	3.76e-10	3.05e-10
2	48	3.41e-09	2.61e-09	1.36e-09	9.47e-10	6.59e-10	5.32e-10
4	96	4.95e-09	3.79e-09	2.04e-09	1.43e-09	1.05e-09	8.43e-10
8	192	6.90e-09	5.27e-09	2.96e-09	2.10e-09	1.65e-09	1.32e-09
10	240	7.75e-09	5.92e-09	3.37e-09	2.40e-09	1.92e-09	1.53e-09
20	480	1.14e-08	8.74e-09	5.14e-09	3.68e-09	3.08e-09	2.45e-09
30	720	1.42e-08	1.10e-08	6.55e-09	4.68e-09	3.98e-09	3.17e-09
Lifetime committed dose		4.16e-08	3.39e-08	2.13e-08	1.46e-08	1.21e-08	1.02e-08
Inhalation: Type *S*							
0.042	1	1.04e-10	7.18e-11	3.79e-11	2.67e-11	2.04e-11	1.62e-11
0.083	2	2.01e-10	1.41e-10	7.45e-11	5.25e-11	3.94e-11	3.15e-11
0.167	4	3.84e-10	2.74e-10	1.46e-10	1.03e-10	7.52e-11	6.05e-11
0.333	8	7.63e-10	5.53e-10	2.90e-10	2.04e-10	1.45e-10	1.17e-10
0.5	12	1.16e-09	8.44e-10	4.40e-10	3.08e-10	2.14e-10	1.74e-10
1	24	2.29e-09	1.67e-09	8.60e-10	6.00e-10	4.11e-10	3.33e-10
2	48	3.93e-09	2.87e-09	1.49e-09	1.04e-09	7.25e-10	5.84e-10
4	96	5.64e-09	4.16e-09	2.23e-09	1.57e-09	1.16e-09	9.25e-10
8	192	7.69e-09	5.76e-09	3.24e-09	2.30e-09	1.82e-09	1.45e-09
10	240	8.60e-09	6.48e-09	3.69e-09	2.63e-09	2.13e-09	1.69e-09
20	480	1.26e-08	9.66e-09	5.72e-09	4.10e-09	3.47e-09	2.75e-09
30	720	1.59e-08	1.23e-08	7.40e-09	5.31e-09	4.57e-09	3.62e-09
Lifetime committed dose		9.15e-08	8.57e-08	5.88e-08	4.03e-08	3.42e-08	3.07e-08
Ingestion							
0.042	1	2.79e-10	1.80e-10	1.01e-10	6.56e-11	4.65e-11	3.74e-11
0.083	2	4.65e-10	3.16e-10	1.79e-10	1.17e-10	8.11e-11	6.60e-11
0.167	4	7.69e-10	5.76e-10	3.28e-10	2.17e-10	1.46e-10	1.22e-10
0.333	8	1.33e-09	1.12e-09	6.37e-10	4.24e-10	2.79e-10	2.44e-10
0.5	12	1.88e-09	1.69e-09	9.56e-10	6.36e-10	4.16e-10	3.73e-10
1	24	3.36e-09	3.22e-09	1.82e-09	1.21e-09	7.87e-10	7.31e-10
2	48	5.35e-09	5.21e-09	2.95e-09	1.95e-09	1.27e-09	1.19e-09
4	96	7.08e-09	6.61e-09	3.74e-09	2.47e-09	1.61e-09	1.48e-09
8	192	8.47e-09	7.24e-09	4.11e-09	2.71e-09	1.77e-09	1.56e-09
10	240	8.99e-09	7.43e-09	4.22e-09	2.78e-09	1.82e-09	1.58e-09
20	480	1.10e-08	8.15e-09	4.64e-09	3.05e-09	2.00e-09	1.63e-09
30	720	1.24e-08	8.70e-09	4.96e-09	3.26e-09	2.15e-09	1.67e-09
Lifetime committed dose		5.42e-08	2.68e-08	1.69e-08	1.12e-08	7.94e-09	3.42e-09

Table E-2. Cumulative Effective Dose Following Intake of ^{90}Sr (Sv/Bq)

Time post intake		Age					
d	h	3 mo	1 y	5 y	10 y	15 y	25 y
Inhalation: Type *F*							
0.042	1	4.20e-11	2.56e-11	1.20e-11	7.81e-12	5.79e-12	4.61e-12
0.083	2	6.61e-11	4.04e-11	1.83e-11	1.16e-11	7.87e-12	6.49e-12
0.167	4	1.09e-10	6.96e-11	3.15e-11	1.96e-11	1.20e-11	1.03e-11
0.333	8	2.09e-10	1.47e-10	6.58e-11	4.03e-11	2.23e-11	2.00e-11
0.5	12	3.26e-10	2.42e-10	1.08e-10	6.54e-11	3.46e-11	3.19e-11
1	24	7.20e-10	5.71e-10	2.52e-10	1.51e-10	7.64e-11	7.35e-11
2	48	1.52e-09	1.21e-09	5.35e-10	3.19e-10	1.60e-10	1.58e-10
4	96	2.86e-09	2.13e-09	9.54e-10	5.71e-10	2.98e-10	2.83e-10
8	192	5.23e-09	3.40e-09	1.53e-09	9.47e-10	5.33e-10	4.51e-10
10	240	6.36e-09	3.94e-09	1.78e-09	1.11e-09	6.44e-10	5.20e-10
20	480	1.13e-08	6.09e-09	2.73e-09	1.80e-09	1.14e-09	8.04e-10
30	720	1.54e-08	7.68e-09	3.43e-09	2.34e-09	1.56e-09	1.02e-09
Lifetime committed dose		1.23e-07	5.17e-08	3.08e-08	4.09e-08	5.25e-08	2.39e-08
Inhalation: Type *S*							
0.042	1	8.66e-11	5.54e-11	2.87e-11	2.01e-11	1.72e-11	1.33e-11
0.083	2	1.57e-10	1.02e-10	5.32e-11	3.73e-11	3.20e-11	2.49e-11
0.167	4	2.85e-10	1.90e-10	1.00e-10	7.05e-11	5.93e-11	4.65e-11
0.333	8	6.12e-10	4.15e-10	2.13e-10	1.47e-10	1.15e-10	9.18e-11
0.5	12	1.03e-09	7.03e-10	3.51e-10	2.39e-10	1.78e-10	1.42e-10
1	24	2.54e-09	1.73e-09	8.33e-10	5.55e-10	3.85e-10	3.11e-10
2	48	5.45e-09	3.71e-09	1.79e-09	1.18e-09	8.11e-10	6.58e-10
4	96	9.28e-09	6.44e-09	3.23e-09	2.18e-09	1.58e-09	1.29e-09
8	192	1.46e-08	1.05e-08	5.64e-09	3.89e-09	3.07e-09	2.52e-09
10	240	1.72e-08	1.25e-08	6.84e-09	4.74e-09	3.83e-09	3.14e-09
20	480	2.94e-08	2.21e-08	1.26e-08	8.79e-09	7.34e-09	6.08e-09
30	720	4.01e-08	3.05e-08	1.76e-08	1.23e-08	1.03e-08	8.61e-09
Lifetime committed dose		4.14e-07	3.94e-07	2.69e-07	1.83e-07	1.59e-07	1.57e-07
Ingestion							
0.042	1	2.31e-10	1.26e-10	6.10e-11	3.45e-11	2.33e-11	1.82e-11
0.083	2	3.50e-10	1.95e-10	9.46e-11	5.38e-11	3.57e-11	2.79e-11
0.167	4	5.49e-10	3.32e-10	1.63e-10	9.38e-11	5.88e-11	4.70e-11
0.333	8	1.04e-09	7.28e-10	3.61e-10	2.12e-10	1.25e-10	1.05e-10
0.5	12	1.62e-09	1.23e-09	6.16e-10	3.63e-10	2.10e-10	1.81e-10
1	24	3.54e-09	2.95e-09	1.48e-09	8.73e-10	4.98e-10	4.47e-10
2	48	6.98e-09	5.95e-09	2.99e-09	1.77e-09	1.01e-09	9.19e-10
4	96	1.10e-08	8.92e-09	4.50e-09	2.67e-09	1.52e-09	1.37e-09
8	192	1.57e-08	1.09e-08	5.52e-09	3.32e-09	1.94e-09	1.63e-09
10	240	1.77e-08	1.16e-08	5.87e-09	3.55e-09	2.11e-09	1.71e-09
20	480	2.66e-08	1.44e-08	7.23e-09	4.53e-09	2.84e-09	2.02e-09
30	720	3.40e-08	1.64e-08	8.22e-09	5.29e-09	3.47e-09	2.27e-09
Lifetime committed dose		2.27e-07	7.24e-08	4.68e-08	5.97e-08	7.89e-08	2.77e-08

Table E-3. Cumulative Effective Dose Following Intake of ^{131}I (Sv/Bq)

Time post intake		Age					
d	h	3 mo	1 y	5 y	10 y	15 y	20 y
Inhalation: Type *F*							
0.042	1	5.90e-11	4.04e-11	1.90e-11	1.14e-11	8.07e-12	6.21e-12
0.083	2	1.31e-10	9.85e-11	4.58e-11	2.46e-11	1.61e-11	1.19e-11
0.167	4	3.66e-10	3.05e-10	1.43e-10	6.99e-11	4.38e-11	3.06e-11
0.333	8	1.15e-09	1.01e-09	4.72e-10	2.20e-10	1.34e-10	9.05e-11
0.5	12	2.23e-09	1.99e-09	9.25e-10	4.24e-10	2.57e-10	1.71e-10
1	24	6.18e-09	5.58e-09	2.59e-09	1.17e-09	7.03e-10	4.62e-10
2	48	1.43e-08	1.30e-08	6.08e-09	2.75e-09	1.64e-09	1.07e-09
4	96	2.78e-08	2.57e-08	1.21e-08	5.52e-09	3.30e-09	2.15e-09
8	192	4.60e-08	4.33e-08	2.08e-08	9.70e-09	5.80e-09	3.79e-09
10	240	5.20e-08	4.93e-08	2.39e-08	1.13e-08	6.73e-09	4.40e-09
20	480	6.67e-08	6.49e-08	3.23e-08	1.58e-08	9.47e-09	6.21e-09
30	720	7.06e-08	6.96e-08	3.52e-08	1.75e-08	1.05e-08	6.92e-09
Lifetime committed dose		7.21e-08	7.16e-08	3.66e-08	1.86e-08	1.12e-08	7.39e-09
Ingestion							
0.042	1	2.60e-10	1.51e-10	7.51e-11	4.29e-11	2.95e-11	2.30e-11
0.083	2	4.47e-10	2.84e-10	1.44e-10	7.83e-11	5.33e-11	4.00e-11
0.167	4	9.78e-10	7.30e-10	3.78e-10	1.89e-10	1.26e-10	8.84e-11
0.333	8	2.85e-09	2.37e-09	1.24e-09	5.82e-10	3.83e-10	2.53e-10
0.5	12	5.52e-09	4.74e-09	2.49e-09	1.14e-09	7.45e-10	4.82e-10
1	24	1.55e-08	1.37e-08	7.16e-09	3.23e-09	2.10e-09	1.33e-09
2	48	3.63e-08	3.23e-08	1.70e-08	7.66e-09	4.96e-09	3.13e-09
4	96	7.08e-08	6.39e-08	3.41e-08	1.55e-08	1.00e-08	6.31e-09
8	192	1.17e-07	1.08e-07	5.87e-08	2.73e-08	1.77e-08	1.11e-08
10	240	1.33e-07	1.23e-07	6.74e-08	3.16e-08	2.05e-08	1.29e-08
20	480	1.70e-07	1.62e-07	9.14e-08	4.44e-08	2.89e-08	1.83e-08
30	720	1.81e-07	1.74e-07	9.94e-08	4.93e-08	3.22e-08	2.04e-08
Lifetime committed dose		1.84e-07	1.79e-07	1.04e-07	5.24e-08	3.42e-08	2.17e-08

Table E-4. Cumulative Effective Dose Following Intake of ^{137}Cs (Sv/Bq)

Time post intake		Age					
d	h	3 mo	1 y	5 y	10 y	15 y	20 y
Inhalation: Type *F*							
0.042	1	1.24e-10	8.50e-11	3.88e-11	2.49e-11	1.55e-11	1.31e-11
0.083	2	1.78e-10	1.23e-10	5.68e-11	3.57e-11	2.17e-11	1.83e-11
0.167	4	2.60e-10	1.85e-10	8.68e-11	5.38e-11	3.21e-11	2.69e-11
0.333	8	3.97e-10	2.91e-10	1.38e-10	8.50e-11	5.00e-11	4.18e-11
0.5	12	5.21e-10	3.86e-10	1.85e-10	1.13e-10	6.62e-11	5.53e-11
1	24	8.37e-10	6.24e-10	3.00e-10	1.84e-10	1.07e-10	8.91e-11
2	48	1.32e-09	9.74e-10	4.68e-10	2.86e-10	1.66e-10	1.39e-10
4	96	2.04e-09	1.47e-09	7.03e-10	4.32e-10	2.49e-10	2.11e-10
8	192	3.19e-09	2.24e-09	1.07e-09	6.63e-10	3.84e-10	3.29e-10
10	240	3.68e-09	2.57e-09	1.23e-09	7.64e-10	4.46e-10	3.85e-10
20	480	5.58e-09	3.75e-09	1.85e-09	1.19e-09	7.38e-10	6.50e-10
30	720	6.77e-09	4.44e-09	2.28e-09	1.53e-09	1.01e-09	8.97e-10
Lifetime committed dose		8.76e-09	5.42e-09	3.66e-09	3.75e-09	4.46e-09	4.67e-09
Ingestion							
0.042	1	3.12e-10	1.76e-10	8.72e-11	5.09e-11	3.51e-11	2.77e-11
0.083	2	4.51e-10	2.56e-10	1.28e-10	7.48e-11	5.12e-11	4.06e-11
0.167	4	5.79e-10	3.35e-10	1.68e-10	9.92e-11	6.71e-11	5.35e-11
0.333	8	7.37e-10	4.38e-10	2.22e-10	1.33e-10	8.81e-11	7.09e-11
0.5	12	8.87e-10	5.37e-10	2.74e-10	1.65e-10	1.09e-10	8.79e-11
1	24	1.34e-09	8.34e-10	4.31e-10	2.63e-10	1.70e-10	1.39e-10
2	48	2.22e-09	1.42e-09	7.40e-10	4.54e-10	2.89e-10	2.38e-10
4	96	3.88e-09	2.53e-09	1.32e-09	8.17e-10	5.14e-10	4.25e-10
8	192	6.79e-09	4.43e-09	2.35e-09	1.46e-09	9.21e-10	7.70e-10
10	240	8.06e-09	5.24e-09	2.80e-09	1.74e-09	1.11e-09	9.35e-10
20	480	1.29e-08	8.20e-09	4.56e-09	2.94e-09	2.00e-09	1.72e-09
30	720	1.60e-08	9.93e-09	5.77e-09	3.91e-09	2.82e-09	2.45e-09
Lifetime committed dose		2.10e-08	1.24e-08	9.68e-09	1.01e-08	1.34e-08	1.36e-08

Table E-5. Cumulative Effective Dose Following Intake of ^{192}Ir (Sv/Bq)

Time post intake		Age					
d	h	3 mo	1 y	5 y	10 y	15 y	20 y
Inhalation: Type *F*							
0.042	1	5.93e-11	3.77e-11	1.79e-11	1.18e-11	8.35e-12	6.71e-12
0.083	2	9.73e-11	6.23e-11	2.90e-11	1.88e-11	1.23e-11	1.00e-11
0.167	4	1.70e-10	1.12e-10	5.17e-11	3.33e-11	2.01e-11	1.67e-11
0.333	8	3.46e-10	2.33e-10	1.07e-10	6.79e-11	3.84e-11	3.20e-11
0.5	12	5.50e-10	3.73e-10	1.70e-10	1.07e-10	5.89e-11	4.92e-11
1	24	1.16e-09	7.89e-10	3.56e-10	2.24e-10	1.19e-10	9.97e-11
2	48	2.04e-09	1.40e-09	6.31e-10	3.93e-10	2.09e-10	1.75e-10
4	96	2.89e-09	1.99e-09	9.07e-10	5.59e-10	3.04e-10	2.55e-10
8	192	3.78e-09	2.61e-09	1.22e-09	7.39e-10	4.15e-10	3.49e-10
10	240	4.16e-09	2.88e-09	1.35e-09	8.16e-10	4.63e-10	3.90e-10
20	480	5.78e-09	4.05e-09	1.93e-09	1.15e-09	6.74e-10	5.70e-10
30	720	7.09e-09	5.01e-09	2.41e-09	1.43e-09	8.48e-10	7.19e-10
Lifetime committed dose		1.52e-08	1.14e-08	5.70e-09	3.32e-09	2.06e-09	1.76e-09
Inhalation: Type *M*							
0.042	1	1.08e-10	7.05e-11	3.63e-11	2.52e-11	2.05e-11	1.60e-11
0.083	2	1.96e-10	1.30e-10	6.77e-11	4.72e-11	3.80e-11	2.99e-11
0.167	4	3.55e-10	2.43e-10	1.27e-10	8.87e-11	7.00e-11	5.55e-11
0.333	8	7.10e-10	4.93e-10	2.55e-10	1.76e-10	1.32e-10	1.06e-10
0.5	12	1.11e-09	7.69e-10	3.92e-10	2.69e-10	1.95e-10	1.57e-10
1	24	2.25e-09	1.57e-09	7.85e-10	5.35e-10	3.74e-10	3.01e-10
2	48	3.93e-09	2.75e-09	1.38e-09	9.43e-10	6.66e-10	5.34e-10
4	96	5.66e-09	4.03e-09	2.09e-09	1.45e-09	1.08e-09	8.63e-10
8	192	7.67e-09	5.57e-09	3.03e-09	2.15e-09	1.73e-09	1.37e-09
10	240	8.53e-09	6.23e-09	3.44e-09	2.45e-09	2.01e-09	1.59e-09
20	480	1.20e-08	8.94e-09	5.12e-09	3.68e-09	3.14e-09	2.49e-09
30	720	1.45e-08	1.09e-08	6.32e-09	4.55e-09	3.93e-09	3.11e-09
Lifetime committed dose		2.34e-08	1.83e-08	1.08e-08	7.60e-09	6.45e-09	5.22e-09
Inhalation: Type *S*							
0.042	1	1.13e-10	7.41e-11	3.83e-11	2.67e-11	2.18e-11	1.71e-11
0.083	2	2.07e-10	1.38e-10	7.20e-11	5.03e-11	4.08e-11	3.21e-11
0.167	4	3.76e-10	2.57e-10	1.36e-10	9.49e-11	7.55e-11	5.97e-11
0.333	8	7.50e-10	5.22e-10	2.71e-10	1.88e-10	1.43e-10	1.14e-10
0.5	12	1.17e-09	8.13e-10	4.16e-10	2.87e-10	2.10e-10	1.68e-10
1	24	2.38e-09	1.66e-09	8.34e-10	5.69e-10	4.03e-10	3.23e-10
2	48	4.14e-09	2.91e-09	1.47e-09	1.01e-09	7.18e-10	5.74e-10
4	96	5.99e-09	4.27e-09	2.23e-09	1.55e-09	1.18e-09	9.35e-10
8	192	8.19e-09	5.96e-09	3.27e-09	2.33e-09	1.90e-09	1.50e-09
10	240	9.13e-09	6.69e-09	3.73e-09	2.67e-09	2.22e-09	1.75e-09
20	480	1.30e-08	9.76e-09	5.64e-09	4.08e-09	3.53e-09	2.79e-09
30	720	1.59e-08	1.21e-08	7.07e-09	5.13e-09	4.48e-09	3.55e-09
Lifetime committed dose		2.82e-08	2.25e-08	1.35e-08	9.51e-09	8.16e-09	6.62e-09
Ingestion							
0.042	1	3.13e-10	1.82e-10	9.30e-11	5.57e-11	3.85e-11	3.06e-11
0.083	2	4.93e-10	2.94e-10	1.52e-10	9.22e-11	6.26e-11	4.98e-11
0.167	4	8.29e-10	5.19e-10	2.73e-10	1.68e-10	1.09e-10	8.71e-11
0.333	8	1.70e-09	1.11e-09	5.86e-10	3.62e-10	2.26e-10	1.80e-10
0.5	12	2.75e-09	1.82e-09	9.55e-10	5.91e-10	3.62e-10	2.89e-10
1	24	5.79e-09	3.87e-09	2.03e-09	1.26e-09	7.58e-10	6.05e-10
2	48	9.74e-09	6.53e-09	3.42e-09	2.12e-09	1.27e-09	1.02e-09
4	96	1.21e-08	8.15e-09	4.27e-09	2.65e-09	1.59e-09	1.27e-09
8	192	1.26e-08	8.43e-09	4.42e-09	2.74e-09	1.64e-09	1.31e-09
10	240	1.26e-08	8.44e-09	4.43e-09	2.74e-09	1.65e-09	1.31e-09
20	480	1.27e-08	8.48e-09	4.45e-09	2.76e-09	1.65e-09	1.32e-09
30	720	1.28e-08	8.52e-09	4.47e-09	2.77e-09	1.66e-09	1.33e-09
Lifetime committed dose		1.34e-08	8.74e-09	4.59e-09	2.85e-09	1.71e-09	1.37e-09

Table E-6. Cumulative Effective Dose Following Intake of ^{241}Am (Sv/Bq)

Time post intake		Age					
d	h	3 mo	1 y	5 y	10 y	15 y	20 y
Inhalation: Type *M*							
0.042	1	3.39e-08	2.47e-08	1.63e-08	1.17e-08	1.10e-08	8.98e-09
0.083	2	6.46e-08	4.70e-08	3.11e-08	2.23e-08	2.08e-08	1.70e-08
0.167	4	1.24e-07	8.99e-08	5.93e-08	4.23e-08	3.91e-08	3.22e-08
0.333	8	2.31e-07	1.67e-07	1.10e-07	7.81e-08	7.17e-08	5.94e-08
0.5	12	3.29e-07	2.38e-07	1.56e-07	1.11e-07	1.01e-07	8.41e-08
1	24	5.91e-07	4.29e-07	2.80e-07	1.99e-07	1.81e-07	1.50e-07
2	48	1.05e-06	7.66e-07	4.97e-07	3.53e-07	3.22e-07	2.66e-07
4	96	1.90e-06	1.39e-06	8.95e-07	6.38e-07	5.82e-07	4.78e-07
8	192	3.43e-06	2.52e-06	1.62e-06	1.15e-06	1.05e-06	8.63e-07
10	240	4.13e-06	3.03e-06	1.95e-06	1.39e-06	1.27e-06	1.04e-06
20	480	7.06e-06	5.20e-06	3.33e-06	2.37e-06	2.15e-06	1.76e-06
30	720	9.25e-06	6.84e-06	4.36e-06	3.09e-06	2.80e-06	2.29e-06
Lifetime committed dose		7.38e-05	6.97e-05	5.11e-05	4.06e-05	4.03e-05	4.17e-05
Ingestion							
0.042	1	1.33e-09	7.30e-10	3.52e-10	1.99e-10	1.35e-10	1.05e-10
0.083	2	2.01e-09	1.11e-09	5.39e-10	3.07e-10	2.03e-10	1.59e-10
0.167	4	3.29e-09	1.88e-09	9.18e-10	5.30e-10	3.32e-10	2.61e-10
0.333	8	7.02e-09	4.15e-09	2.05e-09	1.20e-09	7.05e-10	5.60e-10
0.5	12	1.17e-08	7.00e-09	3.47e-09	2.04e-09	1.18e-09	9.38e-10
1	24	2.60e-08	1.55e-08	7.71e-09	4.56e-09	2.59e-09	2.08e-09
2	48	4.56e-08	2.67e-08	1.33e-08	7.88e-09	4.46e-09	3.58e-09
4	96	6.15e-08	3.38e-08	1.69e-08	9.98e-09	5.65e-09	4.54e-09
8	192	7.43e-08	3.57e-08	1.78e-08	1.05e-08	5.97e-09	4.78e-09
10	240	7.98e-08	3.60e-08	1.79e-08	1.06e-08	6.03e-09	4.83e-09
20	480	1.07e-07	3.78e-08	1.88e-08	1.11e-08	6.35e-09	5.06e-09
30	720	1.33e-07	3.96e-08	1.97e-08	1.16e-08	6.66e-09	5.28e-09
Lifetime committed dose		3.73e-06	3.75e-07	2.74e-07	2.22e-07	2.04e-07	2.04e-07

REFERENCES

Anigstein, R., et al. 2007a. "Use of Radiation Detection, Measuring, and Imaging Instruments to Assess Internal Contamination from Intakes of Radionuclides. Part I: Feasibility Studies." http://www.bt.cdc.gov/radiation/clinicians/evaluation/pdf/Part_I.pdf

Anigstein, R., R. H. Olsher, and J. C. Engdahl. 2007b. "Use of Radiation Detection, Measuring, and Imaging Instruments to Assess Internal Contamination from Intakes of Radionuclides. Part II: Field Tests and Monte Carlo Simulations Using Anthropomorphic Phantoms." http://www.bt.cdc.gov/radiation/clinicians/evaluation/pdf/Part_II.pdf

Anigstein, R., et al. 2007c. "Use of Radiation Detection, Measuring, and Imaging Instruments to Assess Internal Contamination from Intakes of Radionuclides. Part III: Field Tests and Monte Carlo Simulations of Philips SKYLight Gamma Camera." http://www.bt.cdc.gov/radiation/clinicians/evaluation/pdf/Part_III.pdf

Anigstein, R., D. A. Loomis, and R. H. Olsher. 2009. Assess: A Program to Help Hospital Staff Use Gamma Cameras to Assess Accidental Intakes of Radioisotopes. [Computer software].

Anigstein, R., R. H. Olsher, and M. C. Erdman. 2010a. "Use of Radiation Detection, Measuring, and Imaging Instruments to Assess Internal Contamination from Intakes of Radionuclides. Part IV: Response of Philips SKYLight Gamma Camera to ^{90}Sr." http://www.bt.cdc.gov/radiation/clinicians/evaluation/pdf/Part_IV.pdf

Anigstein, R., R. H. Olsher, and D. A. Loomis. 2010b. "Using Gamma Cameras to Assess Internal Contamination from Intakes of Radioisotopes." http://www.bt.cdc.gov/radiation/clinicians/evaluation/pdf/Instructions.pdf

Bolch, W. E. (Director, Advanced Laboratory for Radiation Dosimetry Studies [ALRADS], Department of Nuclear and Radiological Engineering, University of Florida). 2005. <wbolch@ufl.edu> "Revised ORNL Phantom Series" October 6, 2005, personal e-mail to Richard H. Olsher, SC&A, Inc.

Dimbylow, P. J. 1998. "Induced Current Densities from Low-Frequency Magnetic Fields in a 2 mm Resolution, Anatomically Realistic Model of the Body." *Physics in Medicine and Biology 43*, 221–230.

Dimbylow, P. J. 2005. "Development of the Female Voxel Phantom, NAOMI, and its Application to Calculations of Induced Current Densities and Electric Fields from Applied Low Frequency Magnetic and Electric Fields." *Physics in Medicine and Biology, 50*, 1047–1070.

Eckerman, K. F., et al. 1999. "Cancer Risk Coefficients for Environmental Exposure to Radionuclides," Federal Guidance Report 13, EPA-402/R-99-001, Oak Ridge, TN: Oak Ridge National Laboratory.

Eckerman, K. F., et al. 2006. "User's Guide to the DCAL System," ORNL/TM-2001/190. http://ordose.ornl.gov/documents/dcalman.pdf

Eckerman, K. F., M. Cristy, and J. C. Ryman. 1996. "The ORNL Mathematical Phantom Series." http://homer.hsr.ornl.gov/VLab/mird2.pdf

Eckerman, K. F., and J. C. Ryman. 1993. "External Exposure to Radionuclides in Air, Water, and Soil," Federal Guidance Report No. 12, EPA 402-R-93-081. Washington, DC: U.S. Environmental Protection Agency, Office of Radiation and Indoor Air.

Han, E., W. E. Bolch, and K. F. Eckerman. 2006. "Revisions to the ORNL Series of Adult and Pediatric Computational Phantoms for Use with the MIRD Schema." *Health Physics, 90*(4), 337-356.

International Commission on Radiation Units and Measurements (ICRU). 1992. "Photon, Electron, Proton and Neutron Interaction Data for Body Tissue," ICRU Report 46. Bethesda, MD: Author.

International Commission on Radiological Protection (ICRP). 1994a. "Human Respiratory Tract Model for Radiological Protection," ICRP Publication 66. *Annals of the ICRP, 24*(1-3). Tarrytown, NY: Elsevier Science, Inc.

International Commission on Radiological Protection (ICRP). 1994b. "Dose Coefficients for Intakes of Radionuclides by Workers," ICRP Publication 68. *Annals of the ICRP*, *24*(4). Tarrytown, NY: Elsevier Science, Inc.

International Commission on Radiological Protection (ICRP). 1995. "Basic Anatomical and Physiological Data for Use in Radiation Protection: The Skeleton," ICRP Publication 70. *Annals of the ICRP, 25*(2). Oxford: Pergamon Press.

International Commission on Radiological Protection (ICRP). 1996. "Age-Dependent Doses to the Members of the Public from Intake of Radionuclides. Part 5: Compilation of Ingestion and Inhalation Coefficients," ICRP Publication 72. *Annals of the ICRP*, *26*(1). Tarrytown, NY: Elsevier Science, Inc.

International Commission on Radiological Protection (ICRP). 1998. The ICRP Database of Dose Coefficients: Workers and Members of the Public, Ver. 2.01. [Data file]. Pergamon—Distributed by Elsevier Science Ltd.

International Commission on Radiological Protection (ICRP). 2002. "Basic Anatomical and Physiological Data for Use in Radiation Protection: Reference Values," ICRP Publication 89. *Annals of the ICRP*, *32*(3–4). Oxford: Pergamon Press.

Jones, D. G. 1997. "A Realistic Anthropomorphic Phantom for Calculating Organ Doses Arising from External Photon Irradiation." *Radiation Protection Dosimetry, 72*(1), 21–29.

Oak Ridge National Laboratory (ORNL), Life Science Division, Dosimetry Research Group. 2006. DCAL: Dose and Risk Calculation System, Version 8.4. [Computer software and manual]. http://ordose.ornl.gov/resources/DCAL01_setup.exe

Wang, B., X. G. Xu, and C. H. Kim. 2004. "A Monte Carlo CT Model of the Rando Phantom." *American Nuclear Society Transactions*, *90*, 473-474.