radiological health

HANDBOOK of

Selected Tissue Doses for Projections Common in Diagnostic Radiology

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Food and Drug Administration

HHS Publication (FDA) 89-8031

HANDBOOK of

Selected Tissue Doses for Projections Common in Diagnostic Radiology

Marvin Rosenstein, Ph.D.

WHO Collaborating Centers for:
- Standardization of Protection Against Nonionizing Radiations
- Training and General Tasks in Radiation Medicine
- Nuclear Medicine

December 1988
Supersedes
HEW Publication (FDA) 76-8031, May 1976

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Food and Drug Administration
Center for Devices and Radiological Health
Rockville, Maryland 20857

DESCRIPTION OF THE HANDBOOK

Purpose

This handbook contains data from which absorbed dose to selected tissues of a reference adult can be estimated for projections common in diagnostic radiology. It replaces the previous publication, FDA 76-8031, on the same topic (1). The Handbook permits the user to evaluate the effect on tissue dose of changes in technical parameters used in or among facilities. Variations due to anthropometric characteristics of the human body and its internal organs are not considered. Therefore, assignment of tissue doses to individual patients using the Handbook is not recommended.

Index of Tables 1 to 54

Note: Tables 55 through 58 and their use are discussed on page v.

[a] AP, anteroposterior - radiation incident on the anterior skin surface
PA, posteroanterior - radiation incident on the posterior skin surface
LAT, lateral - radiation incident on the right or left lateral skin surface

[b] Includes the projections: nasal bones, optic foramen, orbits, and sinuses.

[c] Includes the projections: retrograde pyelogram, KUB, barium enema, lumbosacral spine, IVP, and renal arteriogram.

Tissues

The tissues for which data are tabulated are: lungs, active bone marrow, thyroid, female breasts, testes, ovaries, uterus (embryo), and total trunk. The values tabulated are the average absorbed dose in the tissue (weighted over its entire mass) for 1-roentgen (0.258 mC/kg) entrance exposure (free-in-air). The user must take into consideration the actual entrance exposures at a given facility to estimate absorbed doses for that facility. The average absorbed dose in the uterus is used as the absorbed dose in the embryo, and is strictly applicable only in the first two months of pregnancy. The average absorbed dose in the total trunk tissue is used as an indicator for other tissues in the trunk of the body not specifically named. Total trunk tissue excludes the lungs and skeletal tissues in the trunk.

Beam Quality

The beam qualities (HVL, mm Al) listed in Tables 1 to 54 for conventional aluminum filtration can be produced in common practice with a variety of kVp, total filtration and waveform combinations. When the same beam quality is obtained using low kVp and high total filtration, versus high kVp and low total filtration, the tissue dose for the deeper tissues can differ (in the extreme) up to 30 percent. For the usual range of kVp and conventional aluminum filtration combinations used in diagnostic radiology, the extreme difference is not encountered, and use of the data in Tables 1 to 54 should have uncertainties of less than 10 percent when HVL alone is used to describe beam quality.

Therefore, in Tables 1 to 54, the data are presented as a function only of HVL (from 1.0 to 6.5 mm Al) without identification of a specific kVp. In preparing Tables 1 to 54, 27 diagnostic x-ray spectra for conventional aluminum filtration were used (2), as shown below:

Number of x-ray spectra	Range of kVp	Range of HVL (mm Al)
9	45 to 70	1.0 to 3.6
9	80 to 90	1.7 to 5.5
9	98 to 120	3.1 to 6.0

The author has additional tabulations for each of the three separate ranges of kilovoltages, should the reader require these more detailed data. The number of tables prohibits inclusion of all the data in the Handbook, but the author can make all or part of the expanded tabulations available, upon request.

In addition to conventional aluminum filtration, filters of higher atomic number, such as erbium composites and foils, are also used for some applications in diagnostic radiology. Therefore, some representative data are presented for such applications, using the 5 x-ray spectra for an erbium composite filter (3.2 mm erbium composite plus 2.0 mm Al) shown below:

kVp	HVL (mm Al)
70	6.0
80	6.5
90	7.0
100	7.5
120	8.5

These data are presented in Tables 1A, 24A, and 41A for the AP Skull, PA Chest and AP Abdominal projections. Similar data (not given) for an erbium foil filter (0.25 mm erbium foil plus 2.0 mm Al) are only from 1 to 3 percent higher. The author has data for other projections, and can make selected tabulations available, upon request.

The increase observed in all the tables for absorbed dose per 1-roentgen (0.258 mC kg) entrance exposure as a function of increasing HVL can be misleading, since the entrance exposure required to achieve a desired radiographic image is usually lower at the higher HVLs. Therefore, exposure conditions at the facility of interest must be applied.

Table Organization

Each tabulation presents separate values for males and females. The main difference is inclusion of tissues unique to the male or female. Differences also occur for the projections where the female breasts are in the x-ray field and therefore modify the transport of radiation to other tissues through shielding or backscattering. In some cases, the values for the female breasts were not obtained directly; in these instances the information given is more qualitative.

Cancer Detriment Index

The Handbook table for each projection includes an indicator of cancer detriment from the aggregate of the tissue doses, based on current risk coefficients (for a reference adult) for various cancers induced by radiation and the severity of those cancers (3,4,5).

A Cancer Detriment Index (CDI) has been formulated as follows:

$$CDI = \sum_{i=1}^{n} [r_i(f) + s_i\ r_i(c)]\ \bar{D}_i$$

where $r_i(f)$ is the lifetime risk coefficient for fatal cancer i (per unit absorbed dose)

$r_i(c)$ is the lifetime risk coefficient for "curable" cancer i (per unit absorbed dose)

s_i is the relative severity associated with successful treatment of cancer i, and

$\bar{D}_i$ is the average absorbed dose in the appropriate tissue for cancer i.

The risk coefficients and relative severities used in the Cancer Detriment Index are given below. These values can be readily modified when new expert conclusions are available.

Lifetime Risk Coefficients[a] for Induction of Fatal and "Curable" Cancers and the Relative Severities for Treatment of "Curable" Cancers

	$r_i(f)$[a]		$r_i(c)$[a]		
Cancer (i)	Male	Female	Male	Female	s_i
Lung	2.0	2.0	0.1	0.1	0.95
Leukemia	2.4	1.6	0.12	0.08	0.95
Thyroid	0.33	0.67	6.3	12.7	0.05
Breast	---	5.0	---	3.0	0.60
Other	5.0	5.0	1.5	1.5	0.75

[a] Multiply entries for $r_i(f)$ and $r_i(c)$ by 10^{-5} to obtain risk coefficients per rad, or by 10^{-6} to obtain risk coefficients per mGy.

The Cancer Detriment Index reflects both the detriment from fatal cancers and the detriment from cancers that can be treated successfully; the latter being given a weight equal to the ratio of fatal to fatal plus "curable" cancers (4). The values of CDI in Tables 1 to 54 are read as the "table entry" x 10^{-5}. For example, the value of CDI for AP Skull, male, HVL = 3.0 mm Al (Table 1) is 0.24 x 10^{-5}.

Complete discussions of the methodology used to obtain the data tabulated in the Handbook are given in the references (1,2,3,8).

INSTRUCTIONS FOR USE OF HANDBOOK

1. Select the radiographic view and projection (e.g., PA Chest). The field centers that were used in locating each of the radiographic projections are given in Appendix A.

2. Determine the actual beam quality (HVL, mm Al) and entrance exposure, free-in-air, at the facility. If not determined by direct measurement, beam quality and radiation output can be estimated from reference data (6,7) when the kVp, total filtration, and waveform of the x-ray machine are known.

3. Look up the tissue dose (or CDI) for 1-roentgen (0.258 mC/kg) entrance exposure in Tables 1 to 54 (including 1A, 24A and 41A). Linear interpolation between listed HVLs is recommended. Source-to-image receptor distances (SID) within 10 inches (25 cm) of the listed SID will not result in variations in these values larger than 10 percent.

   a. For active bone marrow only. If the field size is not equal to the reference film size listed, determine the field area/reference field area ratio. Select the relative dose factor from Table 55 for the appropriate field area ratio, view and anatomical segment of the body. Linear interpolation between listed field area/reference field area ratios is recommended. Multiply the active bone marrow value selected from Tables 1 to 54 for the reference film size by the relative dose factor.

   b. For the testes in AP view only. If the distance (cm) between the testes center and nearest edge of the entrance field is known, select the value from Table 56 rather than from Tables 1 to 54.

   c. For testicular shielding in AP view only. If the distance (cm) between the testes center and the nearest edge of the entrance field is known, select the testes value from Table 56 and multiply by the relative dose factor for testicular shielding from Table 57. The relative dose factors are applicable to both contact and shadow shields.

   d. For ovarian or uterine shielding in AP or PA view. If the vertical separation (cm) between the nearest point of the ovaries or uterus and the nearest edge of the entrance field can be estimated, select the ovaries/uterus value from Tables 1 to 54 and multiply by the relative dose factor for ovarian or uterine shielding from Table 58.

4. Multiply the tissue dose (or CDI) for 1-roentgen (0.258 mC/kg) entrance exposure obtained in instruction 3 by the actual entrance exposure, free-in-air, to obtain the tissue dose (or CDI) for the projection and view. These values are for the reference patient described in FDA 76-8030, "Organ Doses in Diagnostic Radiology" (8). The overall anthropometric characteristics of the reference patient are listed in Appendix B.

5. To obtain a tissue dose (or CDI) for an examination consisting of multiple projections and/or views, repeat instructions 1 through 4 for each set of conditions and sum the resultant values.

ACKNOWLEDGMENTS

The following individuals contributed to the preparation of this Handbook. Lynn McGuire of the John L. McClellan Memorial Veterans Hospital in Little Rock, Arkansas provided the x-ray spectra for the erbium composite filters used to produce the data for Tables 1A, 24A and 41A. He can be contacted for details of those x-ray spectra and related technical articles that are being prepared for publication. Linda W. Andersen of the Center for Devices and Radiological Health prepared the revised version of the computer program that generated the Handbook data, which is noted as reference (2). Joan N. Miller, also of the Center for Devices and Radiological Health, labored diligently to produce the tables in a format conducive to easy reference and use.

REFERENCES

1. Rosenstein, M. and L.W. Andersen. *Handbook of Selected Organ Doses for Projections Common in Diagnostic Radiology*. HHS Publication FDA 76-8031. Food and Drug Administration, Rockville, Maryland (1976).

2. Rosenstein, M. and L.W. Andersen. *Computer Program for Tissue Doses in Diagnostic Radiology*, 2nd Revision (supersedes FDA 78-8064). Food and Drug Administration, Rockville, Maryland (1988) (available from the authors).

3. Rosenstein, M. *Handbooks of Tissue Doses in Diagnostic Radiology*. In: Radiation Protection Practice, Proceedings of the 7th Congress of the International Radiation Protection Association. Pergamon Press, New York (1988).

4. Pochin, E.E. ICRP Publication 45, *Quantitative Bases for Developing a Unified Index of Harm*. International Commission on Radiological Protection. Pergamon Press, New York (1985).

5. *Ionizing Radiation: Levels and Effects, Volume II: Effects*. United Nations Scientific Committee on the Effects of Atomic Radiation, New York (1972).

6. NCRP Report No. 33, *Medical X-ray and Gamma-ray Protection for Energies up to 10 MeV, Equipment Design and Use*. National Council on Radiation Protection and Measurements, Bethesda, Maryland (1968).

7. HPA Report Series No. 8, *The Physics of Radiodiagnosis, Report B, Measurements Referring to Diagnostic X-ray Beams*. The Hospital Physicist's Association, London (1971) - Appendix V.

8. Rosenstein, M. *Organ Doses in Diagnostic Radiology*. HHS Publication FDA 76-8030. Food and Drug Administration, Rockville, Maryland (1976).

Tables And Appendices

TABLE 1. AP SKULL - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) ⟶	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	0.2	0.6	1.0	1.4	1.8	2.2	2.6	2.9	3.2	3.4	3.6	3.8
ACTIVE BONE MARROW	2.7	5.5	8.5	12	15	18	20	23	25	28	30	32
THYROID	131	192	240	279	311	336	357	374	388	400	409	417
TRUNK TISSUE	0.3	0.6	1.0	1.4	1.7	2.0	2.3	2.5	2.7	2.9	3.1	3.2
CDI (10^{-5})	0.09	0.14	0.18	0.22	0.25	0.28	0.30	0.32	0.34	0.35	0.37	0.38
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	0.2	0.6	1.0	1.4	1.8	2.2	2.6	2.9	3.2	3.4	3.6	3.8
ACTIVE BONE MARROW	2.7	5.5	8.5	12	15	18	20	23	25	28	30	32
THYROID	131	192	240	279	311	336	357	374	388	400	409	417
TRUNK TISSUE	0.3	0.6	1.0	1.4	1.7	2.0	2.3	2.5	2.7	2.9	3.1	3.2
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.18	0.26	0.34	0.39	0.44	0.49	0.52	0.55	0.57	0.59	0.61	0.62
OVARIES	+	+	+	+	+	+	+	+	+	+	+	+
UTERUS	+	+	+	+	+	+	+	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 1A. AP SKULL - FILTER MATERIAL: ERBIUM COMPOSITE (3.2 mm) + Al (2.0 mm)
SID: 40" (102 cm); FIELD SIZE at FILM: 10" x 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]				
kVp ⟶	70	80	90	100	120
HVL (mm Al) ⟶	6.0	6.5	7.0	7.5	8.5
LUNGS	2.7	3.0	3.4	3.8	4.5
ACTIVE BONE MARROW	20	23	27	30	37
THYROID	409	422	432	439	448
TRUNK TISSUE	2.5	2.7	3.0	3.3	3.7
CDI (10^{-5})	0.34	0.35	0.37	0.39	0.41
TESTES	+	+	+	+	+
FEMALE					
LUNGS	2.7	3.0	3.4	3.8	4.5
ACTIVE BONE MARROW	20	23	27	30	37
THYROID	409	422	432	439	448
TRUNK TISSUE	2.5	2.7	3.0	3.3	3.7
BREASTS	Not computed; negligible				
CDI (10^{-5})	0.59	0.61	0.63	0.65	0.68
OVARIES	+	+	+	+	+
UTERUS	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 2. PA SKULL - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	0.2	0.5	0.8	1.2	1.6	1.9	2.3	2.6	2.8	3.0	3.2	3.4
ACTIVE BONE MARROW	8.8	16	23	29	35	41	46	51	56	60	63	67
THYROID	3.3	8.2	14	20	26	32	37	42	46	49	52	54
TRUNK TISSUE	0.2	0.5	0.8	1.2	1.5	1.7	2.0	2.2	2.4	2.6	2.7	2.8
CDI (10^{-5})	0.03	0.05	0.07	0.10	0.12	0.14	0.16	0.17	0.19	0.20	0.22	0.23
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	0.2	0.5	0.8	1.2	1.6	1.9	2.3	2.6	2.8	3.0	3.2	3.4
ACTIVE BONE MARROW	8.8	16	23	29	35	41	46	51	56	60	63	67
THYROID	3.3	8.2	14	20	26	32	37	42	46	49	52	54
TRUNK TISSUE	0.2	0.5	0.8	1.2	1.5	1.7	2.0	2.2	2.4	2.6	2.7	2.8
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.02	0.04	0.06	0.09	0.11	0.13	0.14	0.16	0.17	0.19	0.20	0.21
OVARIES	+	+	+	+	+	+	+	+	+	+	+	+
UTERUS	+	+	+	+	+	+	+	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 3. LAT SKULL - SID: 40" (102 cm); FIELD SIZE at FILM: 12" X 10" (30.5 cm X 25.4 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	0.2	0.5	0.8	1.2	1.6	2.0	2.3	2.6	2.8	3.0	3.2	3.4
ACTIVE BONE MARROW	9.7	17	24	31	38	44	49	54	59	64	68	72
THYROID	42	72	98	120	139	155	168	179	187	195	200	205
TRUNK TISSUE	0.2	0.5	0.9	1.2	1.5	1.8	2.0	2.2	2.4	2.6	2.7	2.9
CDI (10^{-5})	0.05	0.09	0.13	0.17	0.20	0.22	0.25	0.27	0.29	0.31	0.32	0.34
TESTES	+	+	+	+	+	+	+	+	+	+	+	+

FEMALE												
LUNGS	0.2	0.5	0.8	1.2	1.6	2.0	2.3	2.6	2.8	3.0	3.2	3.4
ACTIVE BONE MARROW	9.7	17	24	31	38	44	49	54	59	64	68	72
THYROID	42	72	98	120	139	155	168	179	187	195	200	205
TRUNK TISSUE	0.2	0.5	0.9	1.2	1.5	1.8	2.0	2.2	2.4	2.6	2.7	2.9
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.07	0.13	0.18	0.22	0.26	0.29	0.32	0.34	0.37	0.38	0.40	0.41
OVARIES	+	+	+	+	+	+	+	+	+	+	+	+
UTERUS	+	+	+	+	+	+	+	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 4. PA FACIAL BONES - SID: 40" (102 cm); FIELD SIZE at FILM: 8" X 10" (20.5 cm X 25.4 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	0.1	0.3	0.5	0.7	1.0	1.2	1.4	1.6	1.7	1.9	2.0	2.1
ACTIVE BONE MARROW	9.9	17	25	32	38	44	50	55	60	64	68	72
THYROID	1.7	4.3	7.5	11	14	17	20	23	25	27	29	30
TRUNK TISSUE	0.1	0.2	0.4	0.5	0.7	0.8	1.0	1.1	1.2	1.3	1.4	1.5
CDI (10^{-5})	0.03	0.05	0.07	0.09	0.11	0.13	0.15	0.16	0.18	0.19	0.20	0.21
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	0.1	0.3	0.5	0.7	1.0	1.2	1.4	1.6	1.7	1.9	2.0	2.1
ACTIVE BONE MARROW	9.9	17	25	32	38	44	50	55	60	64	68	72
THYROID	1.7	4.3	7.5	11	14	17	20	23	25	27	29	30
TRUNK TISSUE	0.1	0.2	0.4	0.5	0.7	0.8	1.0	1.1	1.2	1.3	1.4	1.5
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.02	0.04	0.06	0.07	0.09	0.11	0.12	0.13	0.14	0.15	0.16	0.17
OVARIES	+	+	+	+	+	+	+	+	+	+	+	+
UTERUS	+	+	+	+	+	+	+	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 5. PA TMJ, ZYGOMES - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm AL) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	1.3	2.9	4.7	6.5	8.1	9.6	11	12	13	14	15	15
ACTIVE BONE MARROW	9.9	18	26	34	42	49	56	62	67	72	77	81
THYROID	5.4	14	24	34	44	54	62	69	75	81	85	89
TRUNK TISSUE	3.6	5.9	7.8	9.6	11	13	14	15	16	16	17	18
CDI (10^{-5})	0.05	0.10	0.14	0.18	0.22	0.25	0.29	0.31	0.34	0.36	0.38	0.40
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	1.3	2.9	4.7	6.5	8.1	9.6	11	12	13	14	15	15
ACTIVE BONE MARROW	9.9	18	26	34	42	49	56	62	67	72	77	81
THYROID	5.4	14	24	34	44	54	62	69	75	81	85	89
TRUNK TISSUE	3.6	5.9	7.8	9.6	11	13	14	15	16	16	17	18
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.05	0.09	0.13	0.18	0.21	0.25	0.28	0.31	0.33	0.36	0.38	0.39
OVARIES	+	+	+	+	+	+	+	+	+	+	+	+
UTERUS	+	+	+	+	+	+	+	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 6. PA MANDIBLE, MASTOID - SID: 40" (102 cm); FIELD SIZE at FILM: 8" X 10" (20.5 cm X 25.4 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	0.4	1.1	1.8	2.7	3.4	4.2	4.8	5.4	5.9	6.3	6.6	6.9
ACTIVE BONE MARROW	9.4	17	25	33	40	47	53	59	64	69	74	78
THYROID	4.5	12	21	30	39	47	55	62	67	72	76	80
TRUNK TISSUE	1.1	1.9	2.7	3.5	4.1	4.7	5.3	5.8	6.2	6.6	6.9	7.2
CDI (10^{-5})	0.03	0.07	0.10	0.13	0.16	0.19	0.21	0.24	0.26	0.27	0.29	0.31
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	0.4	1.1	1.8	2.7	3.4	4.2	4.8	5.4	5.9	6.3	6.6	6.9
ACTIVE BONE MARROW	9.4	17	25	33	40	47	53	59	64	69	74	78
THYROID	4.5	12	21	30	39	47	55	62	67	72	76	80
TRUNK TISSUE	1.1	1.9	2.7	3.5	4.1	4.7	5.3	5.8	6.2	6.6	6.9	7.2
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.03	0.06	0.09	0.12	0.15	0.18	0.20	0.23	0.25	0.26	0.28	0.29
OVARIES	+	+	+	+	+	+	+	+	+	+	+	+
UTERUS	+	+	+	+	+	+	+	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 7. LAT SELLA VOLUME, TMJ - SID: 40" (102 cm); FIELD SIZE at FILM: 8" X 10" (20.5 cm X 25.4 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	0.3	0.7	1.3	1.8	2.3	2.8	3.2	3.6	3.9	4.2	4.4	4.6
ACTIVE BONE MARROW	4.9	9.0	13	18	22	25	29	32	35	38	41	44
THYROID	25	46	65	82	96	109	119	128	135	141	146	150
TRUNK TISSUE	0.4	0.8	1.2	1.6	2.0	2.4	2.7	2.9	3.2	3.4	3.6	3.7
CDI (10^{-5})	0.03	0.06	0.09	0.11	0.13	0.15	0.17	0.19	0.20	0.22	0.23	0.24
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	0.3	0.7	1.3	1.8	2.3	2.8	3.2	3.6	3.9	4.2	4.4	4.6
ACTIVE BONE MARROW	4.9	9.0	13	18	22	25	29	32	35	38	41	44
THYROID	25	46	65	82	96	109	119	128	135	141	146	150
TRUNK TISSUE	0.4	0.8	1.2	1.6	2.0	2.4	2.7	2.9	3.2	3.4	3.6	3.7
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.04	0.08	0.12	0.15	0.18	0.21	0.23	0.25	0.26	0.28	0.29	0.30
OVARIES	+	+	+	+	+	+	+	+	+	+	+	+
UTERUS	+	+	+	+	+	+	+	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 8. AP CERVICAL SPINE - SID: 40" (102 cm); FIELD SIZE at FILM: 8" X 10" (20.5 cm X 25.4 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	1.7	3.8	6.0	8.1	10	12	14	15	16	17	18	19
ACTIVE BONE MARROW	2.8	5.4	8.2	11	14	17	20	22	25	27	30	32
THYROID	360	518	642	741	820	884	935	977	1011	1038	1060	1078
TRUNK TISSUE	4.3	7.0	9.4	11	13	15	16	18	19	20	21	21
CDI (10^{-5})	0.27	0.40	0.50	0.59	0.67	0.73	0.78	0.83	0.86	0.90	0.92	0.95
TESTES	+	+	+	+	+	+	+	+	+	+	+	+

FEMALE												
LUNGS	1.7	3.8	6.0	8.1	10	12	14	15	16	17	18	19
ACTIVE BONE MARROW	2.8	5.4	8.2	11	14	17	20	22	25	27	30	32
THYROID	360	518	642	741	820	884	935	977	1011	1038	1060	1078
TRUNK TISSUE	4.3	7.0	9.4	11	13	15	16	18	19	20	21	21
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.50	0.74	0.92	1.07	1.20	1.30	1.38	1.45	1.51	1.56	1.60	1.63
OVARIES	+	+	+	+	+	+	+	+	+	+	+	+
UTERUS	+	+	+	+	+	+	+	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 9. AP CERVICAL SPINE - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	4.3	8.8	13	18	22	25	28	31	33	35	37	38
ACTIVE BONE MARROW	4.5	8.3	12	16	20	24	28	31	35	38	41	44
THYROID	365	528	658	761	844	911	966	1010	1046	1076	1100	1119
TRUNK TISSUE	7.4	12	16	20	23	25	28	30	32	33	35	36
CDI (10^{-5})	0.30	0.45	0.58	0.69	0.78	0.86	0.92	0.98	1.03	1.07	1.10	1.13
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	4.3	8.8	13	18	22	25	28	31	33	35	37	38
ACTIVE BONE MARROW	4.5	8.3	12	16	20	24	28	31	35	38	41	44
THYROID	365	528	658	761	844	911	966	1010	1046	1076	1100	1119
TRUNK TISSUE	7.4	12	16	20	23	25	28	30	32	33	35	36
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.54	0.79	1.01	1.18	1.32	1.44	1.54	1.62	1.69	1.74	1.79	1.83
OVARIES	+	+	+	+	+	+	+	+	+	+	+	+
UTERUS	+	+	+	+	+	+	+	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 10. LAT CERVICAL SPINE - SID: 40" (102 cm); FIELD SIZE at FILM: 8" X 10" (20.5 cm X 25.4 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	2.6	5.3	8.1	11	13	15	17	19	20	21	22	23
ACTIVE BONE MARROW	3.1	6.2	9.5	13	16	19	22	24	27	29	31	33
THYROID	3.9	8.7	14	19	24	29	32	36	39	41	43	45
TRUNK TISSUE	3.4	5.6	7.6	9.4	11	12	14	15	16	16	17	18
CDI (10^{-5})	0.04	0.07	0.10	0.13	0.15	0.17	0.20	0.21	0.23	0.24	0.26	0.27
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	2.6	5.3	8.1	11	13	15	17	19	20	21	22	23
ACTIVE BONE MARROW	3.1	6.2	9.5	13	16	19	22	24	27	29	31	33
THYROID	3.9	8.7	14	19	24	29	32	36	39	41	43	45
TRUNK TISSUE	3.4	5.6	7.6	9.4	11	12	14	15	16	16	17	18
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.04	0.07	0.10	0.13	0.15	0.18	0.20	0.22	0.23	0.25	0.26	0.27
OVARIES	+	+	+	+	+	+	+	+	+	+	+	+
UTERUS	+	+	+	+	+	+	+	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 11. LAT CERVICAL SPINE - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	4.3	8.7	13	18	21	25	28	30	32	34	36	37
ACTIVE BONE MARROW	4.6	8.8	13	18	22	26	30	34	37	40	43	45
THYROID	8.9	18	29	38	47	54	61	67	72	76	79	82
TRUNK TISSUE	4.8	8.0	11	13	16	18	19	21	22	23	24	25
CDI (10^{-5})	0.06	0.10	0.15	0.19	0.23	0.26	0.29	0.32	0.34	0.36	0.38	0.40
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	4.3	8.7	13	18	21	25	28	30	32	34	36	37
ACTIVE BONE MARROW	4.6	8.8	13	18	22	26	30	34	37	40	43	45
THYROID	8.9	18	29	38	47	54	61	67	72	76	79	82
TRUNK TISSUE	4.8	8.0	11	13	16	18	19	21	22	23	24	25
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.06	0.11	0.15	0.20	0.24	0.28	0.31	0.33	0.36	0.38	0.40	0.41
OVARIES	+	+	+	+	+	+	+	+	+	+	+	+
UTERUS	+	+	+	+	+	+	+	+	+	+	+	+

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 12. AP SHOULDER (ONE) - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	34	58	80	98	114	128	139	148	155	161	166	170
ACTIVE BONE MARROW	3.8	6.7	9.7	13	15	18	20	22	24	26	28	30
THYROID	5.9	11	16	21	26	30	33	36	39	41	43	45
TRUNK TISSUE	13	20	25	30	34	38	41	44	46	48	50	52
CDI (10^{-5})	0.16	0.27	0.36	0.44	0.51	0.56	0.61	0.66	0.70	0.73	0.75	0.78
TESTES	+	+	+	+	+	+	+	+	+	+	+	+

FEMALE												
LUNGS	25	44	60	74	86	96	104	111	116	121	125	128
ACTIVE BONE MARROW	3.2	5.7	8.2	11	13	15	17	19	21	22	24	25
THYROID	5.9	11	16	21	26	30	33	36	39	41	43	45
TRUNK TISSUE	10	16	20	24	28	31	33	35	37	39	40	42
BREASTS[c]	——————(150)——————				——————(200)——————				——————(250)——————			
CDI (10^{-5})	1.15	1.23	1.30	1.37	1.76	1.81	1.85	1.89	2.26	2.28	2.30	2.32
OVARIES	+	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1
UTERUS	+	+	+	+	+	+	+	+	+	+	+	0.1

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
[c] Not computed; one breast partially in field; estimated for HVL ranges indicated.
+ < 0.05 mrad

TABLE 13. LAT SHOULDER (ONE) - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	18	34	50	65	78	89	99	107	114	120	124	129
ACTIVE BONE MARROW	5.2	9.6	14	19	23	27	30	34	37	40	43	45
THYROID	79	129	172	208	237	261	281	297	309	319	327	333
TRUNK TISSUE	11	18	24	29	34	38	42	45	48	50	52	54
CDI (10^{-5})	0.17	0.29	0.40	0.50	0.58	0.66	0.72	0.77	0.82	0.86	0.90	0.93
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	21	39	58	75	89	102	113	123	131	138	143	148
ACTIVE BONE MARROW	4.2	7.7	11	15	18	21	24	27	30	32	34	36
THYROID	79	129	172	208	237	261	281	297	309	319	327	333
TRUNK TISSUE	9.2	15	20	25	29	32	35	38	40	42	44	46
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.21	0.36	0.49	0.60	0.70	0.79	0.86	0.92	0.97	1.02	1.05	1.08
OVARIES	+	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1
UTERUS	+	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 14. AP SHOULDERS (BOTH) - SID: 40" (102 cm); FIELD SIZE at FILM: 17" X 14" (43.2 cm X 35.6 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	92	160	221	274	319	357	389	416	438	456	471	483
ACTIVE BONE MARROW	9.6	18	26	34	42	49	56	62	69	74	79	84
THYROID	361	523	651	754	837	904	959	1004	1041	1071	1096	1116
TRUNK TISSUE	36	57	74	90	103	114	124	132	140	146	152	156
CDI (10^{-5})	0.67	1.06	1.40	1.69	1.94	2.15	2.33	2.49	2.62	2.73	2.82	2.90
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	69	120	166	205	239	268	292	312	328	342	353	362
ACTIVE BONE MARROW	8.1	15	22	29	35	42	48	53	58	63	68	72
THYROID	361	523	651	754	837	904	959	1004	1041	1071	1096	1116
TRUNK TISSUE	29	45	59	72	82	91	99	106	112	117	121	125
BREASTS	424	551	646	719	778	825	863	895	921	944	962	978
CDI (10^{-5})	3.69	4.99	5.99	6.79	7.45	7.98	8.42	8.78	9.09	9.36	9.57	9.75
OVARIES	+	+	+	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3
UTERUS	+	+	+	+	+	0.1	0.1	0.1	0.1	0.2	0.2	0.2

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 15. AP SCAPULA (ONE) - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	54	92	125	153	177	197	214	227	238	248	255	261
ACTIVE BONE MARROW	4.9	8.5	12	16	19	22	25	28	30	33	35	37
THYROID	6.3	12	18	23	28	33	37	40	43	45	48	49
TRUNK TISSUE	17	26	34	41	47	51	56	59	63	66	68	70
CDI (10^{-5})	0.24	0.38	0.51	0.63	0.72	0.81	0.88	0.94	0.99	1.03	1.07	1.10
TESTES	+	+	+	+	+	+	+	+	+	+	+	+

FEMALE												
LUNGS	41	69	94	115	133	148	160	170	179	186	191	196
ACTIVE BONE MARROW	4.2	7.2	10	13	16	19	21	24	26	28	30	32
THYROID	6.3	12	18	23	28	33	37	40	43	45	48	49
TRUNK TISSUE	14	21	27	33	37	41	45	48	50	52	54	56
BREASTS[c]	——————(150)——————				——————(200)——————				——————(250)——————			
CDI (10^{-5})	1.20	1.32	1.42	1.51	1.93	2.00	2.05	2.10	2.48	2.52	2.55	2.57
OVARIES	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
UTERUS	+	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
[c] Not computed; one breast partially in field; estimated for HVL ranges indicated.
+ < 0.05 mrad

TABLE 16. LAT SCAPULA (ONE) - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]

MALE (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	28	53	76	97	115	131	144	155	165	173	179	185
ACTIVE BONE MARROW	5.6	10	14	19	23	27	30	34	37	40	43	45
THYROID	19	32	44	54	63	70	76	81	85	89	92	94
TRUNK TISSUE	13	20	27	33	39	43	47	51	54	57	59	61
CDI (10^{-5})	0.16	0.28	0.39	0.49	0.58	0.65	0.72	0.77	0.82	0.87	0.90	0.94
TESTES	+	+	+	+	+	+	+	+	+	+	+	+

FEMALE												
LUNGS	33	60	87	111	132	150	166	179	189	198	206	212
ACTIVE BONE MARROW	4.5	8.0	12	15	18	21	24	27	30	32	34	36
THYROID	19	32	44	54	63	70	76	81	85	89	92	94
TRUNK TISSUE	11	17	23	28	33	37	40	43	46	48	50	52
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.17	0.29	0.40	0.50	0.59	0.67	0.73	0.79	0.84	0.88	0.92	0.95
OVARIES	+	+	+	+	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
UTERUS	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 17. AP SCAPULAE (BOTH) - SID: 40" (102 cm); FIELD SIZE at FILM: 17" X 14" (43.2 cm X 35.6 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	124	211	289	357	414	462	502	535	562	585	603	618
ACTIVE BONE MARROW	11	20	29	38	47	55	62	69	76	82	88	93
THYROID	188	276	347	406	453	492	525	552	574	593	608	621
TRUNK TISSUE	43	66	87	104	119	132	144	154	162	170	176	182
CDI (10^{-5})	0.67	1.08	1.44	1.74	2.01	2.23	2.43	2.59	2.73	2.85	2.95	3.04
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	93	158	217	268	311	346	376	401	422	439	452	463
ACTIVE BONE MARROW	9.5	17	25	32	40	46	53	59	64	70	74	79
THYROID	188	276	347	406	453	492	525	552	574	593	608	621
TRUNK TISSUE	34	53	69	83	96	106	115	123	130	136	141	146
BREASTS	424	551	646	719	778	825	863	895	921	944	962	978
CDI (10^{-5})	3.55	4.79	5.76	6.55	7.18	7.71	8.13	8.50	8.80	9.06	9.27	9.45
OVARIES	+	+	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.5
UTERUS	+	+	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 18. AP HUMERUS (ONE) - SID: 40" (102 cm); FIELD SIZE at FILM: 7" X 17" (17.8 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	30	51	70	86	100	111	121	129	135	141	145	148
ACTIVE BONE MARROW	3.2	5.9	8.5	11	14	16	18	20	22	24	25	27
THYROID	0.6	1.5	2.7	4.0	5.2	6.4	7.4	8.4	9.2	9.9	11	11
TRUNK TISSUE	13	19	24	28	32	35	38	40	42	44	46	47
CDI (10^{-5})	0.15	0.24	0.32	0.38	0.44	0.49	0.54	0.57	0.60	0.63	0.65	0.68
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	22	38	52	65	75	83	91	97	101	105	109	111
ACTIVE BONE MARROW	2.7	5.0	7.3	9.5	12	14	15	17	19	20	21	23
THYROID	0.6	1.5	2.7	4.0	5.2	6.4	7.4	8.4	9.2	9.9	11	11
TRUNK TISSUE	10	15	19	23	26	28	30	32	34	35	37	38
BREASTS[c]	——(150)——				——(200)——				——(250)——			
CDI (10^{-5})	1.14	1.20	1.26	1.31	1.70	1.74	1.77	1.80	2.16	2.18	2.20	2.22
OVARIES	+	+	+	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3
UTERUS	+	+	+	+	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
[c] Not computed; one breast partially in field; estimated for HVL ranges indicated.
+ < 0.05 mrad

TABLE 19. LAT STERNUM - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	31	57	82	104	124	140	155	166	177	185	192	197
ACTIVE BONE MARROW	5.6	10	15	19	23	27	31	34	37	40	43	45
THYROID	6.4	12	17	22	26	29	33	36	38	40	42	44
TRUNK TISSUE	13	21	28	34	39	44	48	52	55	58	60	62
CDI (10^{-5})	0.16	0.28	0.39	0.49	0.57	0.65	0.72	0.77	0.82	0.87	0.90	0.94
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	36	65	94	120	142	161	178	191	203	213	221	227
ACTIVE BONE MARROW	4.5	8.0	12	15	18	22	24	27	30	32	34	36
THYROID	6.4	12	17	22	26	29	33	36	38	40	42	44
TRUNK TISSUE	11	18	24	29	33	37	41	44	47	49	51	53
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.16	0.27	0.38	0.48	0.57	0.64	0.71	0.76	0.81	0.85	0.89	0.92
OVARIES	+	+	+	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3
UTERUS	+	+	+	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 20. AP RIBS, BARIUM SWALLOW - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]

MALE												
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	127	216	296	366	425	474	515	550	578	601	620	635
ACTIVE BONE MARROW	12	21	30	39	48	56	64	71	78	84	90	96
THYROID	117	175	223	262	295	322	345	364	380	393	404	413
TRUNK TISSUE	42	67	88	107	123	137	149	160	169	177	184	190
CDI (10^{-5})	0.63	1.03	1.38	1.69	1.96	2.18	2.38	2.54	2.68	2.81	2.91	3.00
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	95	162	222	274	319	356	387	412	433	451	465	477
ACTIVE BONE MARROW	10	18	26	33	41	48	54	60	66	72	77	82
THYROID	117	175	223	262	295	322	345	364	380	393	404	413
TRUNK TISSUE	34	53	71	86	99	110	119	128	135	141	147	152
BREASTS	424	551	646	719	778	825	863	895	922	944	963	978
CDI (10^{-5})	3.46	4.67	5.63	6.39	7.01	7.53	7.95	8.31	8.61	8.86	9.07	9.25
OVARIES	+	0.2	0.4	0.7	1.1	1.4	1.7	1.9	2.1	2.3	2.5	2.6
UTERUS	+	0.1	0.3	0.6	0.9	1.2	1.4	1.7	1.9	2.0	2.2	2.3

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 21. PA RIBS, BARIUM SWALLOW - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	109	188	261	324	379	425	463	496	523	546	564	580
ACTIVE BONE MARROW	21	38	55	71	86	101	114	127	138	149	158	168
THYROID	3.8	11	19	28	37	45	52	59	64	69	72	75
TRUNK TISSUE	39	62	83	101	116	130	141	152	161	169	176	182
CDI (10^{-5})	0.52	0.88	1.20	1.49	1.75	1.97	2.16	2.32	2.47	2.59	2.70	2.80
TESTES	+	+	+	+	+	+	+	+	+	0.1	0.1	0.1
FEMALE												
LUNGS	114	198	274	341	398	446	487	521	549	573	593	609
ACTIVE BONE MARROW	18	32	46	60	73	86	97	108	117	126	135	142
THYROID	3.8	11	19	28	37	45	52	59	64	69	72	75
TRUNK TISSUE	33	53	70	85	99	110	120	129	137	143	149	154
BREASTS	5.0	13	24	35	46	56	65	73	79	85	90	94
CDI (10^{-5})	0.51	0.89	1.27	1.61	1.92	2.19	2.43	2.63	2.81	2.96	3.09	3.20
OVARIES	+	0.1	0.2	0.5	0.7	1.0	1.2	1.5	1.8	2.0	2.3	2.5
UTERUS	+	0.2	0.4	0.6	0.9	1.2	1.5	1.8	2.0	2.2	2.3	2.4

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 22. LAT RIBS, BARIUM SWALLOW - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	37	69	100	128	152	173	191	206	219	230	239	246
ACTIVE BONE MARROW	7.3	13	19	25	31	36	41	46	50	54	58	61
THYROID	23	38	51	62	72	80	87	93	98	102	105	107
TRUNK TISSUE	18	29	39	47	54	61	66	71	75	79	83	86
CDI (10^{-5})	0.22	0.38	0.53	0.66	0.78	0.88	0.97	1.04	1.11	1.17	1.22	1.26
TESTES	+	+	+	+	+	+	+	+	0.1	0.1	0.1	0.1
FEMALE												
LUNGS	43	80	115	147	175	199	220	237	252	264	274	283
ACTIVE BONE MARROW	5.8	11	15	20	25	29	33	37	40	43	46	49
THYROID	23	38	51	62	72	80	87	93	98	102	105	107
TRUNK TISSUE	16	25	33	40	46	52	56	60	64	67	70	73
BREASTS[c]	——(150)——				——(200)——				——(250)——			
CDI (10^{-5})	1.24	1.41	1.55	1.69	2.14	2.25	2.33	2.41	2.82	2.87	2.92	2.96
OVARIES	+	0.1	0.1	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1.0	1.0
UTERUS	+	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.7

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
[c] Not computed; breasts partially in field; estimated for HVL ranges indicated.
+ < 0.05 mrad

TABLE 23. AP CHEST - SID: 72" (183 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	145	248	342	423	491	549	597	638	671	698	721	739
ACTIVE BONE MARROW	15	26	38	49	60	71	81	90	99	107	115	122
THYROID	126	189	240	283	318	347	372	393	410	424	436	447
TRUNK TISSUE	56	89	117	141	162	180	196	209	221	231	241	248
CDI (10^{-5})	0.77	1.25	1.68	2.06	2.38	2.66	2.89	3.10	3.27	3.42	3.55	3.67
TESTES	+	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1
FEMALE												
LUNGS	109	186	256	317	368	412	448	478	503	524	541	554
ACTIVE BONE MARROW	12	22	32	42	51	60	69	77	84	91	98	104
THYROID	126	189	240	283	318	348	372	393	410	424	436	447
TRUNK TISSUE	45	71	93	113	130	144	157	168	177	185	192	199
BREASTS	446	580	680	757	819	868	909	942	970	993	1013	1029
CDI (10^{-5})	3.72	5.05	6.10	6.94	7.63	8.20	8.68	9.07	9.41	9.69	9.93	10.13
OVARIES	0.1	0.5	1.2	1.9	2.8	3.6	4.3	4.9	5.5	5.9	6.2	6.5
UTERUS	0.1	0.4	0.9	1.5	2.1	2.7	3.2	3.7	4.1	4.5	4.8	5.0

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 24. PA CHEST - SID: 72" (183 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]

MALE												
HVL (mm Al) ⟶	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	124	216	301	375	439	493	539	578	610	637	660	678
ACTIVE BONE MARROW	27	49	71	92	113	131	149	165	180	194	207	219
THYROID	4.0	11	21	30	40	49	57	64	70	75	79	82
TRUNK TISSUE	52	82	109	132	152	170	185	199	210	221	230	238
CDI (10^{-5})	0.65	1.09	1.49	1.85	2.16	2.44	2.68	2.88	3.06	3.22	3.36	3.48
TESTES	+	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.2
FEMALE												
LUNGS	130	227	316	394	461	518	566	607	641	669	693	712
ACTIVE BONE MARROW	23	42	60	79	96	112	127	140	153	165	176	186
THYROID	4.0	11	21	30	40	49	57	64	70	75	79	82
TRUNK TISSUE	44	70	92	112	129	144	157	169	179	187	195	202
BREASTS	6.4	17	31	45	59	72	84	94	103	111	117	122
CDI (10^{-5})	0.63	1.10	1.56	1.99	2.37	2.71	3.01	3.26	3.49	3.68	3.84	3.98
OVARIES	0.1	0.3	0.7	1.2	1.7	2.3	2.9	3.4	4.0	4.5	5.0	5.4
UTERUS	0.1	0.4	0.8	1.4	2.0	2.6	3.2	3.7	4.2	4.6	4.9	5.2

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 24A. PA CHEST - FILTER MATERIAL: ERBIUM COMPOSITE (3.2 mm) + Al (2.0 mm)
SID: 72" (183 cm); FIELD SIZE at FILM: 14" x 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]				
kVp ⟶	70	80	90	100	120
HVL (mm Al) ⟶	6.0	6.5	7.0	7.5	8.5
LUNGS	611	645	678	707	753
ACTIVE BONE MARROW	154	170	190	211	250
THYROID	60	68	76	85	98
TRUNK TISSUE	206	218	230	242	261
CDI (10^{-5})	2.96	3.16	3.36	3.54	3.87
TESTES	+	0.1	0.1	0.1	0.2
FEMALE					
LUNGS	641	677	712	742	791
ACTIVE BONE MARROW	131	145	161	179	212
THYROID	60	68	76	85	98
TRUNK TISSUE	175	185	196	205	222
BREASTS	87	98	111	124	147
CDI (10^{-5})	3.30	3.55	3.82	4.06	4.50
OVARIES	2.1	2.7	3.6	4.7	6.8
UTERUS	2.7	3.3	4.2	5.0	6.7

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 25. LAT CHEST - SID: 72" (183 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	50	92	133	171	203	232	256	276	293	308	320	330
ACTIVE BONE MARROW	10	19	27	36	44	52	59	66	72	78	84	89
THYROID	37	61	82	100	115	128	138	147	154	160	165	169
TRUNK TISSUE	27	43	57	69	80	90	98	105	111	117	122	126
CDI (10^{-5})	0.32	0.54	0.75	0.94	1.10	1.25	1.37	1.48	1.58	1.66	1.73	1.80
TESTES	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
FEMALE												
LUNGS	57	106	153	196	234	266	294	318	337	354	388	379
ACTIVE BONE MARROW	8.2	15	22	29	35	41	47	53	58	62	67	71
THYROID	37	61	82	100	115	128	138	147	154	160	165	169
TRUNK TISSUE	23	37	49	59	68	76	83	89	95	100	104	108
BREASTS[c]	——(180)——				——(280)——				——(380)——			
CDI (10^{-5})	1.54	1.77	1.98	2.17	3.02	3.16	3.28	3.39	4.16	4.24	4.31	4.37
OVARIES	0.1	0.2	0.4	0.6	0.9	1.1	1.4	1.7	1.9	2.1	2.3	2.5
UTERUS	0.1	0.2	0.4	0.6	0.9	1.1	1.3	1.5	1.7	1.9	2.0	2.1

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
[c] Not computed; breasts partially in field; estimated for HVL ranges indicated.
+ < 0.05 mrad

TABLE 26. AP THORACIC SPINE - SID: 40" (102 cm); FIELD SIZE at FILM: 7" X 17" (17.8 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	44	78	111	139	164	186	204	219	232	243	252	259
ACTIVE BONE MARROW	6.8	11	16	20	25	29	33	38	42	45	49	53
THYROID	38	59	78	94	108	120	130	138	146	152	157	162
TRUNK TISSUE	22	36	48	59	68	76	83	89	95	99	103	107
CDI (10^{-5})	0.27	0.45	0.62	0.76	0.89	1.01	1.10	1.19	1.26	1.33	1.39	1.44
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	33	59	83	105	123	139	153	164	174	182	189	194
ACTIVE BONE MARROW	5.7	9.6	14	17	21	25	28	32	35	39	42	45
THYROID	38	59	78	94	108	120	130	138	146	152	157	162
TRUNK TISSUE	18	29	38	47	54	61	66	71	76	79	83	86
BREASTS	212	276	323	360	389	412	432	447	461	472	481	489
CDI (10^{-5})	1.68	2.27	2.73	3.11	3.42	3.66	3.88	4.06	4.21	4.34	4.45	4.55
OVARIES	0.1	0.2	0.4	0.6	0.9	1.1	1.4	1.6	1.8	2.0	2.1	2.3
UTERUS	+	0.2	0.3	0.6	0.8	1.1	1.3	1.5	1.7	1.9	2.0	2.1

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 27. AP THORACIC SPINE - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	126	216	296	365	424	474	515	549	575	600	619	635
ACTIVE BONE MARROW	12	21	30	39	47	56	63	70	77	84	90	96
THYROID	39	63	84	103	119	133	146	156	165	173	181	187
TRUNK TISSUE	43	68	90	109	126	140	152	163	172	180	187	193
CDI (10^{-5})	0.58	0.96	1.30	1.60	1.85	2.07	2.26	2.43	2.56	2.68	2.79	2.88
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	95	162	222	274	318	355	386	412	433	450	465	476
ACTIVE BONE MARROW	10	18	25	33	40	47	54	60	66	71	76	81
THYROID	39	63	84	103	119	133	146	156	165	173	181	187
TRUNK TISSUE	35	54	72	87	101	112	122	130	138	144	150	155
BREASTS	424	551	646	719	778	825	863	895	921	944	962	978
CDI (10^{-5})	3.36	4.53	5.45	6.19	6.79	7.29	7.70	8.05	8.34	8.59	8.80	8.97
OVARIES	0.1	0.3	0.7	1.2	1.8	2.3	2.7	3.2	3.5	3.8	4.0	4.1
UTERUS	0.1	0.3	0.6	1.0	1.4	1.8	2.2	2.5	2.8	3.1	3.3	3.4

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 28. LAT THORACIC SPINE - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	36	67	96	123	146	166	183	197	209	219	228	235
ACTIVE BONE MARROW	6.9	12	18	23	29	34	38	43	47	51	54	58
THYROID	0.8	2.3	4.3	6.5	8.7	11	13	14	16	17	18	18
TRUNK TISSUE	17	27	36	44	51	57	62	66	70	74	77	80
CDI (10^{-5})	0.20	0.34	0.47	0.59	0.69	0.79	0.87	0.94	0.10	1.05	1.10	1.14
TESTES	+	+	+	+	+	+	+	+	+	0.1	0.1	0.1
FEMALE												
LUNGS	42	77	111	141	168	191	210	227	241	252	262	270
ACTIVE BONE MARROW	5.5	9.9	14	19	23	27	31	34	37	41	43	46
THYROID	0.8	2.3	4.3	6.5	8.7	11	13	14	16	17	18	18
TRUNK TISSUE	15	23	31	37	43	48	53	56	60	63	66	68
BREASTS[c]	——(5)——				——(20)——				——(35)——			
CDI (10^{-5})	0.22	0.35	0.48	0.59	0.81	0.89	0.97	1.04	1.19	1.24	1.29	1.32
OVARIES	+	0.1	0.2	0.3	0.4	0.5	0.7	0.8	0.9	1.0	1.1	1.2
UTERUS	+	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.8	0.9	0.9

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
[c] Not computed; minimal scattered radiation to breasts; estimated for HVL ranges indicated.
+ < 0.05 mrad

TABLE 29. AP FULL SPINE - SID: 72" (183 cm); FIELD SIZE at FILM: 14" X 36" (35.6 cm X 91.4 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	145	250	344	426	496	555	605	646	680	709	732	751
ACTIVE BONE MARROW	21	44	70	97	123	149	173	196	217	237	256	273
THYROID	388	565	708	823	917	993	1055	1107	1149	1184	1212	1236
TRUNK TISSUE	115	184	244	296	340	378	411	438	462	482	500	514
CDI (10^{-5})	1.31	2.12	2.85	3.48	4.03	4.49	4.90	5.24	5.54	5.80	6.02	6.21
TESTES	3.9	9.3	16	22	28	33	37	41	45	48	50	52
FEMALE												
LUNGS	109	187	258	320	372	416	454	484	510	531	549	563
ACTIVE BONE MARROW	18	37	59	83	105	126	147	167	185	202	217	232
THYROID	388	565	708	823	917	993	1055	1107	1149	1184	1212	1236
TRUNK TISSUE	92	147	195	237	272	303	328	351	370	386	400	412
BREASTS	446	580	680	757	819	868	909	942	970	994	1013	1030
CDI (10^{-5})	4.36	6.04	7.38	8.48	9.39	10.14	10.76	11.29	11.74	12.12	12.43	12.70
OVARIES	59	120	183	243	298	346	388	425	457	483	506	525
UTERUS	82	162	243	319	386	445	496	539	575	605	630	650

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
\+ < 0.05 mrad

TABLE 30. LAT FULL SPINE - SID: 72" (183 cm); FIELD SIZE at FILM: 14" X 36" (35.6 cm X 91.4 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	50	94	136	174	208	238	263	284	302	317	330	341
ACTIVE BONE MARROW	19	39	61	83	104	124	144	162	178	194	208	222
THYROID	149	246	330	401	459	506	545	576	601	621	637	649
TRUNK TISSUE	61	94	124	150	172	192	209	224	237	248	259	268
CDI (10^{-5})	0.62	1.03	1.41	1.75	2.05	2.31	2.54	2.74	2.92	3.08	3.21	3.33
TESTES	0.7	2.0	3.6	5.4	7.2	8.9	11	12	13	14	15	16
FEMALE												
LUNGS	58	108	156	200	239	273	302	327	347	365	380	392
ACTIVE BONE MARROW	16	31	49	66	83	100	115	129	143	155	167	177
THYROID	149	246	330	401	459	506	545	576	601	621	637	649
TRUNK TISSUE	51	80	106	128	147	163	178	190	201	211	220	227
BREASTS[c]	——————(180)——————				——————(280)——————				——————(380)——————			
CDI (10^{-5})	1.88	2.31	2.71	3.05	4.04	4.30	4.52	4.72	5.57	5.71	5.83	5.94
OVARIES	11	28	48	69	89	109	127	143	157	170	181	191
UTERUS	7.5	19	34	50	66	82	96	109	120	131	140	148

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
[c] Not computed; breasts partially in field; estimated for HVL ranges indicated.
\+ < 0.05 mrad

TABLE 31. PA CHOLECYSTOGRAPHY - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	31	52	71	88	103	115	126	135	142	148	154	158
ACTIVE BONE MARROW	9.4	18	28	37	46	55	63	70	77	83	88	94
THYROID	+	0.2	0.4	0.6	0.8	1.1	1.3	1.5	1.7	1.8	1.9	2.0
TRUNK TISSUE	23	34	44	52	59	66	71	76	81	85	88	92
CDI (10^{-5})	0.23	0.37	0.49	0.60	0.70	0.78	0.86	0.93	0.99	1.04	1.09	1.13
TESTES	+	+	+	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3
FEMALE												
LUNGS	32	55	75	93	108	121	132	141	149	156	161	166
ACTIVE BONE MARROW	8.0	16	24	32	39	47	53	59	65	70	75	80
THYROID	+	0.2	0.4	0.6	0.8	1.1	1.3	1.5	1.7	1.8	1.9	2.0
TRUNK TISSUE	20	29	37	44	50	56	60	65	69	72	75	78
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.20	0.32	0.43	0.52	0.60	0.67	0.74	0.79	0.84	0.89	0.93	0.96
OVARIES	0.3	1.0	2.1	3.3	4.7	5.9	7.1	8.2	9.1	9.9	11	11
UTERUS	0.3	0.9	1.9	2.9	4.1	5.1	6.2	7.1	7.9	8.6	9.2	9.7

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 32. AP LITHOTRIPSY - SID: 48" (122 cm); FIELD SIZE at FILM: 3.5" X 3.5" (8.9 cm X 8.9 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	1.6	3.2	4.8	6.2	7.5	8.6	9.5	10	11	12	12	12
ACTIVE BONE MARROW	0.6	0.9	1.3	1.6	2.0	2.3	2.6	2.9	3.2	3.5	3.8	4.0
THYROID	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	2.1	3.0	3.8	4.5	5.2	5.7	6.2	6.7	7.1	7.5	7.8	8.2
CDI (10^{-5})	0.02	0.03	0.04	0.04	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	1.2	2.4	3.6	4.6	5.6	6.4	7.1	7.7	8.2	8.7	9.0	9.3
ACTIVE BONE MARROW	0.5	0.8	1.1	1.4	1.7	2.0	2.2	2.5	2.7	3.0	3.2	3.4
THYROID	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	1.6	2.4	3.1	3.6	4.1	4.6	5.0	5.4	5.7	6.0	6.3	6.5
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.01	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.07
OVARIES	+	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.7
UTERUS	+	+	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.5	0.6

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 33. AP LITHOTRIPSY - SID: 48" (122 cm); FIELD SIZE at FILM: 4" X 6" (10.2 cm X 15.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	5.6	10	14	18	21	24	26	28	29	31	32	33
ACTIVE BONE MARROW	1.1	1.7	2.4	3.1	3.7	4.4	5.0	5.6	6.2	6.7	7.3	7.8
THYROID	+	+	+	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3
TRUNK TISSUE	4.2	6.3	8.0	9.6	11	12	13	14	15	16	16	17
CDI (10^{-5})	0.04	0.06	0.08	0.10	0.12	0.13	0.15	0.16	0.17	0.18	0.19	0.19
TESTES	+	+	+	+	+	+	+	+	+	+	+	+
FEMALE												
LUNGS	4.2	7.5	11	13	16	18	19	21	22	23	24	24
ACTIVE BONE MARROW	0.9	1.5	2.0	2.6	3.2	3.7	4.2	4.7	5.2	5.7	6.2	6.6
THYROID	+	+	+	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3
TRUNK TISSUE	3.4	5.0	6.4	7.7	8.7	9.7	11	11	12	13	13	14
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.03	0.05	0.06	0.08	0.09	0.10	0.11	0.12	0.13	0.13	0.14	0.15
OVARIES	+	0.1	0.3	0.6	0.8	1.1	1.3	1.4	1.5	1.6	1.7	1.7
UTERUS	+	0.1	0.2	0.4	0.5	0.7	0.8	0.9	1.0	1.1	1.1	1.2

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 34. AP UPPER GI - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	82	138	188	231	267	298	323	344	362	377	388	398
ACTIVE BONE MARROW	7.7	15	23	32	40	48	56	64	71	78	85	91
THYROID	0.1	0.5	1.0	1.6	2.2	2.8	3.4	3.8	4.2	4.5	4.7	4.9
TRUNK TISSUE	46	71	93	112	128	142	154	164	173	181	189	195
CDI (10^{-5})	0.47	0.76	1.02	1.25	1.44	1.61	1.76	1.89	2.00	2.10	2.19	2.26
TESTES	+	0.1	0.2	0.4	0.5	0.7	0.8	0.9	1.0	1.1	1.2	1.2
FEMALE												
LUNGS	62	104	141	173	200	223	242	258	272	282	291	299
ACTIVE BONE MARROW	6.5	13	20	27	34	41	48	54	61	66	72	77
THYROID	0.1	0.5	1.0	1.6	2.2	2.8	3.4	3.8	4.2	4.5	4.7	4.9
TRUNK TISSUE	37	57	74	89	102	113	123	131	139	145	151	156
BREASTS[c]	——————(15)——————				——————(35)——————				——————(55)——————			
CDI (10^{-5})	0.47	0.69	0.89	1.06	1.35	1.47	1.59	1.68	1.90	1.97	2.03	2.09
OVARIES	6.5	15	25	35	44	53	61	68	74	79	83	87
UTERUS	4.1	10	18	26	34	41	48	53	58	62	65	68

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
[c] Not computed; minimal scattered radiation to breasts; estimated for HVL ranges indicated
+ < 0.05 mrad

TABLE 35. PA UPPER GI - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	70	119	163	202	235	263	287	306	323	337	349	358
ACTIVE BONE MARROW	21	41	62	83	103	121	139	154	169	182	194	204
THYROID	0.2	0.5	1.0	1.7	2.3	3.0	3.6	4.2	4.7	5.1	5.5	5.8
TRUNK TISSUE	45	70	91	109	125	139	151	162	171	179	187	193
CDI (10^{-5})	0.48	0.78	1.06	1.30	1.52	1.71	1.88	2.02	2.15	2.26	2.36	2.45
TESTES	+	0.1	0.2	0.4	0.6	0.8	1.0	1.2	1.3	1.4	1.5	1.6
FEMALE												
LUNGS	74	125	172	212	247	276	301	322	339	354	366	376
ACTIVE BONE MARROW	18	35	53	71	87	103	118	131	143	154	165	174
THYROID	0.2	0.5	1.0	1.7	2.3	3.0	3.6	4.2	4.7	5.1	5.5	5.8
TRUNK TISSUE	39	59	77	93	107	118	129	138	145	152	159	164
BREAST[c]	——(5)——				——(20)——				——(35)——			
CDI (10^{-5})	0.45	0.71	0.95	1.16	1.46	1.62	1.76	1.88	2.09	2.18	2.26	2.33
OVARIES	2.9	8.4	16	24	32	40	47	53	58	63	67	70
UTERUS	2.1	6.4	12	19	26	32	37	42	47	50	53	55

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
[c] Not computed; minimal scattered radiation to breasts; estimated for HVL ranges indicated.
+ < 0.05 mrad

TABLE 36. LAT UPPER GI - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	24	43	62	79	94	106	117	126	134	140	145	149
ACTIVE BONE MARROW	4.1	8.3	13	18	23	27	32	36	40	44	47	51
THYROID	0.1	0.3	0.5	0.8	1.1	1.3	1.6	1.7	1.9	2.0	2.1	2.2
TRUNK TISSUE	21	32	42	50	58	64	70	75	79	83	86	89
CDI (10^{-5})	0.19	0.31	0.42	0.52	0.61	0.68	0.75	0.81	0.86	0.91	0.95	0.99
TESTES	+	+	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4
FEMALE												
LUNGS	27	50	72	91	108	122	134	145	154	161	167	172
ACTIVE BONE MARROW	3.3	6.6	10	14	18	22	25	29	32	35	38	41
THYROID	0.1	0.3	0.5	0.8	1.1	1.3	1.6	1.7	1.9	2.0	2.1	2.2
TRUNK TISSUE	18	27	36	43	49	54	59	63	67	70	73	76
BREASTS[c]	——(5)——				——(20)——				——(35)——			
CDI (10^{-5})	0.20	0.31	0.42	0.51	0.70	0.77	0.83	0.88	1.03	1.07	1.10	1.13
OVARIES	0.9	2.4	4.3	6.4	8.5	11	13	14	16	18	19	20
UTERUS	0.6	1.8	3.5	5.3	7.2	8.9	11	12	13	14	15	16

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
[c] Not computed; minimal scattered radiation to breasts; estimated for HVL ranges indicated.
+ < 0.05 mrad

TABLE 37. AP UPRIGHT ABDOMEN - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	74	123	166	202	233	259	281	299	314	326	336	344
ACTIVE BONE MARROW	7.7	16	25	35	44	54	63	72	80	88	95	103
THYROID	0.1	0.2	0.5	0.9	1.2	1.6	1.9	2.2	2.4	2.6	2.7	2.8
TRUNK TISSUE	50	76	100	119	137	151	164	176	185	194	201	208
CDI (10^{-5})	0.48	0.77	1.02	1.24	1.44	1.61	1.75	1.88	1.99	2.09	2.18	2.26
TESTES	0.1	0.2	0.4	0.7	1.0	1.3	1.5	1.8	2.0	2.2	2.3	2.4
FEMALE												
LUNGS	74	123	166	202	233	259	281	299	314	326	336	344
ACTIVE BONE MARROW	7.7	16	25	35	44	54	63	72	80	88	95	103
THYROID	0.1	0.2	0.5	0.9	1.2	1.6	1.9	2.2	2.4	2.6	2.7	2.8
TRUNK TISSUE	50	76	100	119	137	151	164	176	185	194	201	208
BREASTS[c]	——(15)——				——(35)——				——(55)——			
CDI (10^{-5})	0.57	0.85	1.10	1.32	1.64	1.80	1.94	2.06	2.30	2.39	2.47	2.54
OVARIES	19	40	63	85	105	123	139	153	165	175	184	191
UTERUS	12	27	45	62	78	92	105	115	125	132	139	144

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
[c] Not computed; minimal scattered radiation to breasts; estimated for HVL ranges indicated.
+ < 0.05 mrad

TABLE 38. AP LUMBAR SPINE - SID: 40" (102 cm); FIELD SIZE at FILM: 7" X 17" (17.8 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	8.1	15	22	28	34	39	43	47	50	52	55	56
ACTIVE BONE MARROW	3.2	7.3	12	18	23	29	34	39	44	49	54	58
THYROID	+	+	0.1	0.2	0.3	0.4	0.5	0.5	0.5	0.5	0.5	0.5
TRUNK TISSUE	29	45	58	70	80	89	97	104	110	115	120	124
CDI (10^{-5})	0.20	0.32	0.43	0.53	0.62	0.70	0.77	0.83	0.89	0.94	0.99	1.03
TESTES	0.3	1.0	1.8	2.7	3.6	4.4	5.1	5.8	6.3	6.7	7.1	7.3
FEMALE												
LUNGS	8.1	15	22	28	34	39	43	47	50	52	55	56
ACTIVE BONE MARROW	3.2	7.3	12	18	23	29	34	39	44	49	54	58
THYROID	+	+	0.1	0.2	0.3	0.4	0.5	0.5	0.5	0.5	0.5	0.5
TRUNK TISSUE	29	45	58	70	80	89	97	104	110	115	120	124
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.20	0.32	0.42	0.52	0.60	0.68	0.74	0.80	0.85	0.90	0.94	0.98
OVARIES	33	65	98	129	157	181	202	221	236	249	260	270
UTERUS	64	123	180	233	279	318	352	380	404	423	439	451

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 39. AP LUMBAR SPINE - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	23	40	57	71	84	94	104	111	118	124	129	133
ACTIVE BONE MARROW	6.9	16	26	37	49	60	70	80	90	99	107	114
THYROID	+	0.1	0.2	0.3	0.5	0.6	0.8	0.8	0.9	1.0	1.0	1.0
TRUNK TISSUE	55	85	110	132	151	167	181	194	204	214	222	229
CDI (10^{-5})	0.40	0.64	0.86	1.05	1.22	1.37	1.51	1.62	1.73	1.82	1.90	1.97
TESTES	0.5	1.4	2.6	4.0	5.3	6.6	7.7	8.7	9.6	10	11	11
FEMALE												
LUNGS	23	40	57	71	84	94	104	111	118	124	129	133
ACTIVE BONE MARROW	6.9	16	26	37	49	60	70	80	90	99	107	114
THYROID	+	0.1	0.2	0.3	0.5	0.6	0.8	0.8	0.9	1.0	1.0	1.0
TRUNK TISSUE	55	85	110	132	151	167	181	194	204	214	222	229
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.40	0.63	0.84	1.02	1.18	1.32	1.45	1.56	1.65	1.74	1.81	1.88
OVARIES	49	98	149	196	239	277	310	338	363	383	401	416
UTERUS	68	132	197	257	310	355	395	428	456	479	498	514

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 40. LAT LUMBAR SPINE - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	2.8	5.9	9.2	12	15	18	20	22	24	26	27	28
ACTIVE BONE MARROW	4.2	9.3	15	22	28	34	40	45	50	55	59	63
THYROID	+	+	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3
TRUNK TISSUE	22	34	43	52	59	66	71	76	81	85	88	91
CDI (10^{-5})	0.15	0.24	0.32	0.40	0.47	0.53	0.58	0.63	0.67	0.71	0.74	0.77
TESTES	0.1	0.3	0.5	0.8	1.1	1.5	1.8	2.0	2.3	2.5	2.7	2.8
FEMALE												
LUNGS	2.8	5.9	9.2	12	15	18	20	22	24	26	27	28
ACTIVE BONE MARROW	4.2	9.3	15	22	28	34	40	45	50	55	59	63
THYROID	+	+	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3
TRUNK TISSUE	22	34	43	52	59	66	71	76	81	85	88	91
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.15	0.23	0.31	0.38	0.44	0.50	0.55	0.59	0.63	0.66	0.69	0.72
OVARIES	7.1	17	30	42	55	67	77	87	96	103	110	116
UTERUS	4.2	11	19	28	36	45	53	60	66	72	77	81

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 41. AP ABDOMINAL - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) ⟶	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	2.1	5.0	8.4	12	15	18	21	23	25	27	29	30
ACTIVE BONE MARROW	6.5	16	27	39	52	64	75	86	96	105	114	121
THYROID	+	+	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4
TRUNK TISSUE	60	92	120	143	164	181	196	209	221	231	240	247
CDI (10^{-5})	0.39	0.61	0.82	1.00	1.16	1.31	1.44	1.55	1.65	1.74	1.81	1.88
TESTES	2.9	7.0	12	17	21	25	29	32	35	37	39	40
FEMALE												
LUNGS	2.1	5.0	8.4	12	15	18	21	23	25	27	29	30
ACTIVE BONE MARROW	6.5	16	27	39	52	64	75	86	96	105	114	121
THYROID	+	+	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4
TRUNK TISSUE	60	92	120	143	164	181	196	209	221	231	240	247
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.38	0.60	0.80	0.97	1.12	1.25	1.37	1.48	1.57	1.65	1.72	1.78
OVARIES	52	105	160	212	259	301	337	369	396	419	438	454
UTERUS	73	145	218	285	345	398	442	480	512	539	561	579

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 41A. AP ABDOMINAL - FILTER MATERIAL: ERBIUM COMPOSITE (3.2 mm) + Al (2.0 mm)
SID: 40" (102.0 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]				
kVp ⟶	70	80	90	100	120
HVL (mm Al) ⟶	6.0	6.5	7.0	7.5	8.5
LUNGS	23	25	28	31	35
ACTIVE BONE MARROW	71	83	98	114	145
THYROID	0.3	0.3	0.4	0.4	0.5
TRUNK TISSUE	218	230	242	252	270
CDI (10^{-5})	1.56	1.67	1.79	1.90	2.10
TESTES	32	36	39	42	48
FEMALE					
LUNGS	23	25	28	31	35
ACTIVE BONE MARROW	71	83	98	114	145
THYROID	0.3	0.3	0.4	0.4	0.5
TRUNK TISSUE	218	230	242	252	270
BREASTS	Not computed; negligible				
CDI (10^{-5})	1.50	1.60	1.70	1.80	1.97
OVARIES	374	405	438	468	518
UTERUS	500	537	573	605	658

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 42. PA ABDOMINAL - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]

MALE												
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	1.8	4.3	7.3	10	13	16	19	21	23	24	26	27
ACTIVE BONE MARROW	27	55	85	114	142	168	192	214	233	251	267	281
THYROID	+	+	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.5
TRUNK TISSUE	58	88	115	138	158	175	190	203	214	225	234	241
CDI (10^{-5})	0.43	0.69	0.93	1.15	1.35	1.53	1.68	1.82	1.95	2.06	2.16	2.24
TESTES	0.9	2.8	5.4	8.5	12	15	17	20	22	23	25	26

FEMALE												
LUNGS	1.8	4.3	7.3	10	13	16	19	21	23	24	26	27
ACTIVE BONE MARROW	27	55	85	114	142	168	192	214	233	251	267	282
THYROID	+	+	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.5
TRUNK TISSUE	58	88	115	138	158	175	190	203	214	225	234	241
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.40	0.64	0.86	1.06	1.23	1.39	1.52	1.65	1.75	1.85	1.93	2.01
OVARIES	27	64	107	151	193	232	266	295	321	343	361	376
UTERUS	25	59	97	136	173	206	235	261	283	302	318	332

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 43. LAT ABDOMINAL - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	0.5	1.3	2.2	3.2	4.1	5.0	5.9	6.6	7.2	7.7	8.2	8.5
ACTIVE BONE MARROW	4.5	10	17	24	31	38	45	51	57	62	67	71
THYROID	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	26	40	52	62	70	78	85	90	95	100	104	107
CDI (10^{-5})	0.17	0.27	0.36	0.45	0.52	0.58	0.64	0.70	0.74	0.78	0.82	0.85
TESTES	0.4	1.2	2.2	3.3	4.4	5.4	6.4	7.2	8.0	8.6	9.2	9.6
FEMALE												
LUNGS	0.5	1.3	2.2	3.2	4.1	5.0	5.9	6.6	7.2	7.7	8.2	8.5
ACTIVE BONE MARROW	4.5	10	17	24	31	38	45	51	57	62	67	71
THYROID	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	26	40	52	62	70	78	85	90	95	100	104	107
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.17	0.26	0.35	0.43	0.49	0.55	0.61	0.65	0.69	0.73	0.76	0.79
OVARIES	8.4	21	35	51	66	81	94	106	116	126	134	141
UTERUS	5.6	14	25	37	49	60	70	80	88	96	102	108

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 44. AP SACRUM, COCCYX, SACROILIAC JOINT - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	+	0.1	0.2	0.4	0.6	0.7	0.9	1.0	1.1	1.2	1.3	1.4
ACTIVE BONE MARROW	2.6	7.1	13	20	27	34	40	46	51	56	61	65
THYROID	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	35	53	68	82	93	103	111	119	125	131	136	141
CDI (10^{-5})	0.22	0.34	0.45	0.55	0.64	0.71	0.78	0.84	0.90	0.95	0.99	1.03
TESTES	13	24	35	45	54	62	69	75	79	83	87	89
FEMALE												
LUNGS	+	0.1	0.2	0.4	0.6	0.7	0.9	1.0	1.1	1.2	1.3	1.4
ACTIVE BONE MARROW	2.6	7.1	13	20	27	34	40	46	51	56	61	65
THYROID	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	35	53	68	82	93	103	111	119	125	131	136	141
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.22	0.34	0.44	0.53	0.62	0.69	0.75	0.81	0.86	0.90	0.94	0.97
OVARIES	48	97	146	192	233	270	301	328	351	371	387	401
UTERUS	72	142	212	276	333	382	424	459	489	513	533	560

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 45. LAT SACRUM, COCCYX - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	+	+	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6
ACTIVE BONE MARROW	4.1	9.3	15	22	28	34	39	44	49	53	57	61
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	20	30	39	47	53	59	64	68	72	75	78	80
CDI (10^{-5})	0.13	0.21	0.28	0.34	0.40	0.45	0.49	0.53	0.56	0.59	0.62	0.64
TESTES	1.1	2.8	4.7	6.8	8.8	11	12	14	15	16	17	18
FEMALE												
LUNGS	+	+	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6
ACTIVE BONE MARROW	4.1	9.3	15	22	28	34	39	44	49	53	57	61
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	20	30	39	47	53	59	64	68	72	75	78	80
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.13	0.20	0.27	0.32	0.37	0.42	0.46	0.49	0.52	0.55	0.57	0.59
OVARIES	8.1	20	34	49	64	78	91	102	112	121	129	136
UTERUS	5.5	14	25	36	47	58	68	77	85	92	99	104

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
\+ < 0.05 mrad

TABLE 46. AP PELVIS, LUMBOPELVIC - SID: 40" (102 cm); FIELD SIZE at FILM: 17" X 14" (43.2 cm X 35.6 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	0.1	0.3	0.6	1.0	1.4	1.7	2.1	2.4	2.7	2.9	3.1	3.2
ACTIVE BONE MARROW	5.8	15	26	38	51	63	74	84	94	103	111	118
THYROID	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	66	98	126	150	170	188	203	216	227	237	246	253
CDI (10^{-5})	0.42	0.64	0.84	1.02	1.17	1.31	1.43	1.54	1.63	1.72	1.79	1.86
TESTES	23	43	61	78	93	106	117	126	134	141	146	151
FEMALE												
LUNGS	0.1	0.3	0.6	1.0	1.4	1.7	2.1	2.4	2.7	2.9	3.1	3.2
ACTIVE BONE MARROW	5.8	15	26	38	51	63	74	84	94	103	111	118
THYROID	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	66	98	126	150	170	188	203	216	227	237	246	253
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.41	0.63	0.82	0.99	1.13	1.26	1.37	1.47	1.55	1.63	1.70	1.76
OVARIES	53	107	163	217	266	309	347	380	408	431	451	468
UTERUS	74	148	222	292	353	407	453	493	526	553	576	595

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
\+ < 0.05 mrad

TABLE 47. LAT PELVIS, LUMBOPELVIC - SID: 40" (102 cm); FIELD SIZE at FILM: 14" X 17" (35.6 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5[c]	5.0	5.5	6.0	6.5
LUNGS	0.1	0.2	0.3	0.5	0.7	0.9	1.1	1.2	1.4	1.5	1.6	1.7
ACTIVE BONE MARROW	4.9	11	18	26	34	41	48	54	60	65	70	75
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	27	41	53	63	72	80	86	92	97	101	105	109
CDI (10^{-5})	0.18	0.28	0.37	0.45	0.53	0.59	0.65	0.70	0.75	0.79	0.82	0.86
TESTES	4.8	11	17	24	30	36	41	45	49	52	55	57
FEMALE												
LUNGS	0.1	0.2	0.3	0.5	0.7	0.9	1.1	1.2	1.4	1.5	1.6	1.7
ACTIVE BONE MARROW	4.9	11	18	26	34	41	48	54	60	65	70	75
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	27	41	53	63	72	80	86	92	97	101	105	109
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.17	0.27	0.35	0.43	0.50	0.56	0.61	0.66	0.70	0.73	0.77	0.79
OVARIES	8.6	21	37	53	69	84	98	110	121	131	140	147
UTERUS	5.9	15	27	39	52	64	75	85	94	102	109	116

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 48. AP URETHROGRAM - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	+	+	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6
ACTIVE BONE MARROW	2.5	6.9	13	19	25	32	38	43	49	53	57	61
THYROID	+	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	32	48	63	75	85	94	102	109	116	121	126	130
CDI (10^{-5})	0.20	0.31	0.42	0.51	0.59	0.66	0.72	0.78	0.83	0.88	0.92	0.95
TESTES	228	301	357	400	435	463	486	506	522	535	547	557

FEMALE												
LUNGS	+	+	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6
ACTIVE BONE MARROW	2.5	6.9	13	19	25	32	38	43	49	53	57	61
THYROID	+	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	32	48	63	75	85	94	102	109	116	121	126	130
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.20	0.31	0.40	0.49	0.57	0.63	0.69	0.74	0.79	0.83	0.87	0.90
OVARIES	48	94	142	187	227	262	292	318	340	359	375	388
UTERUS	72	140	209	272	328	376	417	451	480	504	523	539

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 49. AP CYSTOGRAPHY - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	+	+	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6
ACTIVE BONE MARROW	2.5	6.9	13	19	25	32	38	43	49	53	57	61
THYROID	+	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	32	48	63	75	85	94	102	109	116	121	126	130
CDI (10^{-5})	0.20	0.31	0.42	0.51	0.59	0.66	0.72	0.78	0.83	0.88	0.92	0.95
TESTES	228	301	357	400	435	463	486	506	522	535	547	557
FEMALE												
LUNGS	+	+	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6
ACTIVE BONE MARROW	2.5	6.9	13	19	25	32	38	43	49	53	57	61
THYROID	+	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TRUNK TISSUE	32	48	63	75	85	94	102	109	116	121	126	130
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.20	0.31	0.40	0.49	0.57	0.63	0.69	0.74	0.79	0.83	0.87	0.90
OVARIES	48	94	142	187	227	262	292	318	340	359	375	388
UTERUS	72	140	209	272	328	376	417	451	480	504	523	539

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 50. AP HIP (ONE) - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	+	+	+	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3
ACTIVE BONE MARROW	2.4	6.2	11	16	21	27	31	36	40	44	47	50
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	25	38	50	59	67	75	81	86	91	95	99	102
CDI (10^{-5})	0.16	0.25	0.33	0.40	0.47	0.52	0.57	0.62	0.66	0.69	0.72	0.75
TESTES	376	483	560	620	667	704	734	758	779	795	809	821
FEMALE												
LUNGS	+	+	+	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3
ACTIVE BONE MARROW	2.4	6.2	11	16	21	27	31	36	40	44	47	50
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	25	38	50	59	67	75	81	86	91	95	99	102
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.16	0.25	0.32	0.39	0.45	0.50	0.55	0.59	0.62	0.66	0.68	0.71
OVARIES	25	51	77	103	125	145	163	178	191	202	211	219
UTERUS	57	108	159	206	247	282	312	337	359	376	390	402

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
\+ < 0.05 mrad

TABLE 51. AP HIPS (BOTH) - SID: 40" (102 cm); FIELD SIZE at FILM: 17" X 14" (43.2 cm X 35.6 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	+	+	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.6	0.6	0.7
ACTIVE BONE MARROW	5.3	13	23	34	45	56	66	75	83	91	98	104
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	49	75	97	115	131	145	157	167	176	184	191	197
CDI (10^{-5})	0.32	0.49	0.65	0.79	0.92	1.03	1.13	1.21	1.29	1.36	1.42	1.47
TESTES	514	669	786	876	947	1005	1052	1091	1124	1151	1174	1193
FEMALE												
LUNGS	+	+	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.6	0.6	0.7
ACTIVE BONE MARROW	5.3	13	23	34	45	56	66	75	83	91	98	104
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	49	75	97	115	131	145	157	167	176	184	191	197
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.31	0.48	0.63	0.76	0.88	0.98	1.07	1.15	1.22	1.28	1.34	1.38
OVARIES	50	100	152	201	245	284	318	348	373	394	412	427
UTERUS	72	142	212	278	336	386	429	466	497	523	544	561

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 52. LAT HIP (ONE) - SID: 40" (102 cm); FIELD SIZE at FILM: 10" X 12" (25.4 cm X 30.5 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
ACTIVE BONE MARROW	3.4	7.6	12	17	22	27	31	35	39	43	46	48
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	15	24	31	37	42	47	51	54	57	60	62	64
CDI (10^{-5})	0.10	0.16	0.22	0.27	0.32	0.36	0.39	0.42	0.45	0.48	0.50	0.52
TESTES	6.3	14	22	31	39	46	52	58	63	67	71	74
FEMALE												
LUNGS	+	+	+	+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
ACTIVE BONE MARROW	3.4	7.6	12	17	22	27	31	35	39	43	46	48
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	15	24	31	37	42	47	51	54	57	60	62	64
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.10	0.16	0.21	0.26	0.30	0.33	0.36	0.39	0.42	0.44	0.46	0.48
OVARIES	6.3	16	27	39	50	61	70	79	87	94	100	105
UTERUS	4.6	12	20	30	39	48	56	64	71	77	82	86

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 53. AP FEMUR (ONE) - SID: 40" (102 cm); FIELD SIZE at FILM: 7" X 17" (17.8 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	+	+	+	+	+	+	+	+	+	+	+	+
ACTIVE BONE MARROW	0.8	2.1	3.7	5.5	7.3	9.0	11	12	14	15	16	17
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	5.5	8.6	11	14	16	18	19	21	22	23	24	25
CDI (10^{-5})	0.04	0.06	0.08	0.10	0.12	0.13	0.14	0.16	0.17	0.18	0.19	0.19
TESTES	98	136	166	190	209	225	239	250	260	268	275	281

FEMALE												
LUNGS	+	+	+	+	+	+	+	+	+	+	+	+
ACTIVE BONE MARROW	0.8	2.1	3.7	5.5	7.3	9.0	11	12	14	15	16	17
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	5.5	8.6	11	14	16	18	19	21	22	23	24	25
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.04	0.06	0.08	0.09	0.11	0.12	0.14	0.15	0.16	0.16	0.17	0.18
OVARIES	0.5	1.4	2.7	4.0	5.4	6.7	7.8	8.8	9.7	10	11	12
UTERUS	0.7	1.9	3.5	5.3	7.0	8.6	10	11	13	13	14	15

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 54. LAT FEMUR (ONE) - SID: 40" (102 cm); FIELD SIZE at FILM: 7" X 17" (17.8 cm X 43.2 cm)

MALE	TISSUE DOSES (mrad) and CANCER DETRIMENT INDEX for 1 R EXPOSURE at SKIN ENTRANCE (FREE-IN-AIR)[a,b]											
HVL (mm Al) →	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
LUNGS	+	+	+	+	+	+	+	+	+	+	+	+
ACTIVE BONE MARROW	0.8	1.9	3.1	4.4	5.7	7.0	8.1	9.3	10	11	12	13
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	2.2	3.5	4.7	5.8	6.7	7.5	8.2	8.9	9.4	10	10	11
CDI (10^{-5})	0.02	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.09	0.10
TESTES	2.2	5.2	8.8	12	16	19	22	25	27	29	31	32

FEMALE												
LUNGS	+	+	+	+	+	+	+	+	+	+	+	+
ACTIVE BONE MARROW	0.8	1.9	3.1	4.4	5.7	7.0	8.1	9.3	10	11	12	13
THYROID	+	+	+	+	+	+	+	+	+	+	+	+
TRUNK TISSUE	2.2	3.5	4.7	5.8	6.7	7.5	8.2	8.9	9.4	10	10	11
BREASTS	Not computed; negligible											
CDI (10^{-5})	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.08	0.09
OVARIES	0.1	0.4	0.8	1.2	1.7	2.1	2.5	2.9	3.2	3.4	3.6	3.8
UTERUS	0.1	0.5	0.9	1.4	2.0	2.6	3.1	3.5	3.9	4.3	4.6	4.8

[a] Divide table entries for tissues (mrad per R) by 25.8 to obtain SI units (mGy per mC/kg).
[b] Divide table entries for CDI (per R) by 0.258 to obtain SI units (per mC/kg).
+ < 0.05 mrad

TABLE 57. EFFECT OF TESTICULAR SHIELDING ON ABSORBED DOSE TO THE TESTES

AP View
14" x 17" (35.6 cm x 43.2 cm) field size at film
SID = 40" (102 cm)

Testes center and x-ray field edge separation[a] (cm)	Relative absorbed dose to the testes after shielding
-15	0.17
-10	0.15
-5	0.13
-4	0.12
-3	0.11
-2	0.10
-1	0.10
0	0.13
1	0.14
2	0.21
3	0.26
4	0.33
5	0.36
10	0.80
15	0.90

[a] This separation is measured between the testes center and the nearest edge of the entrance x-ray field on the patient surface.

For -15 cm: testes are centered in field.
For -3 to -15 cm: testes are completely in field.
For -2 to 2 cm: testes are partially in field.
For 3 to 15 cm: testes are out of field.

TABLE 58. EFFECT OF OVARIAN OR UTERINE SHIELDING ON ABSORBED DOSE TO THE OVARIES OR UTERUS[a]

AP or PA View
14" x 17" (35.6 cm x 43.2 cm) field size at film
SID = 40" (102 cm)

Separation (cm) between the ovaries or uterus and the x-ray field[b]	Relative absorbed dose to the ovaries or uterus after shielding
Completely or partially in the field, or separated by less than 3 cm from field edge	0.65
Separated by 3 cm to 6 cm from field edge	0.80
Separated by more than 6 cm from field edge	1.00

[a] The relative absorbed doses were computed directly for shielding of the ovaries in the AP view. It is assumed that the same values would apply nominally for shielding of the ovaries in the PA view and the uterus in the AP and PA views.

[b] This separation is taken as the estimated vertical separation between the nearest point of the ovaries or uterus and the nearest edge of the entrance x-ray field on the patient surface.

APPENDIX A. FIELD CENTERS FOR X-RAY PROJECTIONS
(REFERENCE ADULT PATIENT)

Projection	Distance from Vertex (cm)	Distance from Nearest Anatomical Landmark		Distance from Midline* (cm)
		Landmark	(cm)	
AP,PA,LAT Skull; PA Facial Bones, Nasal Bones, Optic Foramen, Orbits, Sinuses	8.5	nasion	0	0
PA TMJ, Zygomes, Mandible, Mastoid; LAT Sella Volume, TMJ	14.0	nasion	5.5 below	0
AP Cervical Spine	17.4	exterior auditory canal	3.4 below	0
LAT Cervical Spine	22.5	exterior auditory canal	8.5 below	5.0
AP Shoulder (one)	31.0	sternal notch	0	±15.3
LAT Shoulder (one); AP Shoulders (both)	31.0	sternal notch	0	0
AP Scapula (one)	35.8	sternal notch	4.8 below	±13.6
LAT Scapula (one); AP Scapulae (both)	35.8	sternal notch	4.8 below	0
AP Humerus (one)	35.8	sternal notch	4.8 below	±16.8
LAT Sternum	37.0	sternal notch	6.0 below	0
AP,PA,LAT Ribs, Barium Swallow	40.5	sternal notch	9.5 below	0
AP,PA,LAT Chest; AP Thoracic Spine	42.4	xiphoid process	7.6 above	0
LAT Thoracic Spine	42.4	xiphoid process	7.6 above	5.0
AP,LAT Full Spine	50.0	xiphoid process	0	0
PA Cholecystography	55.5	xiphoid process	5.5 below	-8.5
AP Lithotripsy	56.0	xiphoid process	6.0 below	±10.0
AP,PA Upper GI	56.6	xiphoid process	6.6 below	4.3
LAT Upper GI	56.6	xiphoid process	6.6 below	-3.0
AP Upright Abdomen	60.0	xiphoid process	10.0 below	0
AP Lumbar Spine	66.5	bi-iliac crest	5.5 above	0
LAT Lumbar Spine	66.5	bi-iliac crest	5.5 above	5.0
AP,PA,LAT Retrograde Pyelogram, KUB, Barium Enema, Lumbosacral Spine, IVP, Renal Arteriogram	72.0	bi-iliac crest	0	0
AP,LAT Sacrum, Coccyx, Sacroiliac Joint; AP,LAT Pelvis, Lumbopelvic	80.0	bi-iliac crest	8.0 below	0
AP Urethrogram, Cystography	84.0	pubic symphysis	4.0 above	0
AP Hip (one)	88.0	pubic symphysis	0	±8.5
AP Hips (both); LAT Hip (one)	88.0	pubic symphysis	0	0
AP Femur (one)	107.0	pubic symphysis	19.0 below	±8.5
LAT Femur (one)	107.0	pubic symphysis	19.0 below	0

* Midline of AP,PA or right lateral surface.

APPENDIX B. ANTHROPOMORPHIC CHARACTERISTICS OF REFERENCE ADULT PATIENT

Height	-	174 cm
Weight	-	70 kg

Distance from vertex to:

Nasion	-	8.5 cm
Exterior auditory canal	-	14 cm
Thyroid (center)	-	21.5 cm
Sternal notch	-	31 cm
Breasts (region)	-	from 30.8 cm to 50.5 cm
Xiphoid process	-	50 cm
Bi-iliac crest	-	72 cm
Ovaries (center)	-	79 cm
Uterus (center)	-	80 cm
Pubic symphysis	-	88 cm
Testes (center)	-	96.3 cm

Phantom dimensions:

Head,	Thickness	-	20 cm
	Width	-	14 cm
Thorax,	Thickness	-	20 cm
	Width	-	34.4 cm
Abdomen,	Thickness	-	20 cm
	Width	-	34.4 cm

U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES

Public Health Service
Food and Drug Administration
Center for Devices and Radiological Health
Rockville, Maryland 20857

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

ADDRESS CORRECTION REQUESTED
Return this sheet to above address, if you:
☐ do NOT wish to receive this material, or
☐ have a change of address
(indicate change, including ZIP code).

BULK RATE
POSTAGE AND FEES PAID
PHS/FDA
PERMIT NO. G-285

Handbook of Selected Tissue Doses for Projections Common in Diagnostic Radiology . FDA 89-8031