Offsite Dose Calculation Manual

For Arkansas Nuclear One

(Draft)

(Revision A)

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1.0 Introduction

The Off-site Dose Calculation Manual (ODCM) provides guidance for making release rate and dose calculations for radioactive liquid and gaseous effluents from Arkansas Nuclear One-Units 1 and 2. The methodology is drawn from NuReg 0133, Rev. 0. Many of the numbers contained within this manual were taken from NuReg 0133 and Reg. Guide 1.109. These numbers and the calculational method may be changed as provided for in the technical specification (for ex. use site-specific data or more accurate calculational metholodogy found in Reg. Guide 1.109). Site-specific numbers will be indicated as such.

A specification for a given item will have a different specification number for each unit; therefore, in the ODCM references to technical specifications will be made to the specification subjects. The specification subjects and numbers are presented below.

Subject	Specification Number ANO-1	ANO-2
Radioactive Gaseous Effluents - Instrumentation	3.5.7	3.3.3.9
Radioactive Liquid Effluents - Instrumentation	3.5.6	3.3.3.10
Radioactive Liquid Effluents - Concentration	3.22.1	3.11.1.1
Radioactive Liquid Effluents - Dose	3.22.2	3.11.1.2
Radioactive Liquid Effluents - Waste Treatment	3.22.3	3.11.1.3
Radioactive Gaseous Effluents - Dose Rate	3.23.1	3.11.2.1
Radioactive Gaseous Effluents - Dose, Noble Gases	3.23.2	3.11.2.2
Radioactive Gaseous Effluents - Dose, Particulates	3.23.3	3.11.2.3
Radioactive Gaseous Effluents - Radwaste Treatment	3.23.4	3.11.2.4
Radioactive Gaseous Effluents - Gas Storage Tanks	3.2.3.5	3.11.2.5

2.0 Liquid Effluents

2.1 Radioactive Liquid Effluent Monitor Setpoint.

The Radioactive Liquid Effluent Instrumentation specification requires that the radioactive liquid effluents be monitored with the alarm/trip setpoints adjusted to ensure that the limits of the radioactive liquid effluents concentration specification are not exceeded. These concentrations are for the site. The alarm/trip setpoint on the liquid effluent monitor is dependent upon the dilution water flowrate, liquid radwaste tank flowrate, the isotopic composition of the radioactive liquid to be discharged, a gross gamma count of the liquid to be discharged, the background countrate of the monitor, and the efficiency of the monitor. An adjustable setpoint will be used because of the variability of these parameters. The setpoint will be calculated and set on the monitor prior to the release of each batch of radioactive liquid effluents. The following methodology will be used for determining the setpoint.

1) A sample will be taken from the tank (batch) to be discharged. A gross gamma and a gamma isotopic analysis will be performed utilizing this sample.

2) The minimum dilution factor (DF) for the tank will be calculated based on results of the gamma isotopic analysis and the Maximum Permissible Concentration (MPC) of each detected radionuclide.

The DF is calculated by using the following equation:

$$DF = \sum_i (C_i/MPC_i)$$

where;
- DF = minimum dilution factor
- C_i = concentration of isotope i, (μCi /ml).
- MPC_i = maximum permissible concentration of isotope i, from 10 CFR 20, App. B, Table II, Column 2 (attached as Table 2-1), μCi/ml .

3) The dilution water flowrate is based upon the number of ANO-1 circulating water pumps in operation at the time of release. Each circulating water pump has an approximate flowrate of 191500 gpm.

4) The theoretical maximum release rate, F_m, of the tank (batch) can be expressed in terms of the dilution water flowrate, such that for each volume of dilution water released you may combine a given volume of liquid radwaste. This may be expressed in terms of the dilution factors:

$$F_m = PMPNUM \times 191500/DF$$

where;
- F_m = theoretical maximum release rate
- PMPNUM = number of ANO-1 circulating water pumps in operation.
- DF = dilution minimum factor calculated in Step 2
- 191500 = approximate flowrate of 1 ANO-1 circulating pump (gpm).

In the above equation, F_M approaches zero as DF increases. The actual Flowrate, F_A, will generally be equal to F_M for high activity releases. For low activity releases, F_M will become larger and may exceed the capacity of the pump. In this case flowrate, F_A may be set equal to the maximum flowrate of the pump.

5) The monitor setpoint is calculated by incorporating the monitor reading prior to starting the release (i.e., background countrate), and a term representing the maximum permissible release concentration for the observed isotope mixture. The monitor setpoint can be expressed as follows:

$$M_L = (K \times F_M/F_A) + B$$

where;

M_L = monitor setpoint (CPM).

K = monitor output countrate (CPM). for the gross activity of the release. This number is taken from a calibration curve of activity ($\mu Ci/ml$) vs. output countrate for the monitor (CPM).

F_M/F_A = number of times the activity would need to increase to equal the maximum permissible radioactive liquid effluent-concentration.

B = background countrate (CPM) prior to starting the release.

NOTE: The set points will be calculated assuming only one radioactive liquid effluent release at any given time.

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2.2 Liquid "Dose" Calculation

2.2.1 The "dose" or "dose commitment" to an individual in the unrestricted area from radioactive materials in liquid effluents released to unrestricted areas shall be less than or equal to the limits specified in Radioactive Liquid Effluents-Dose specification. The dose limits are on a per reactor basis.

The dose contribution for each radioactive liquid release shall be calculated for the total time period (length) of the release.

The dose commitment for the whole body or organs for each release is given by the following equation:

$$D_\tau = \sum_i [A_{i\tau} \times \Delta t \times C_i \times F]$$

where;

D_τ = dose commitment to the whole body or organ τ , from the release (mrem).

$A_{i\tau}$ = site related ingestion dose commitment factor to the total body or organ, τ , for each identified principal gamma and beta emitting isotope i , ($\frac{\text{mrem ml}}{\text{hr } \mu\text{Ci}}$).

Calculational method is in Section 2.2.2.

Δt = length in time of the release (hours).

C_i = the concentration of isotope i , in the undiluted radioactive liquid effluent (μCi/ml).

F = the near field average dilution factor for C_i during any liquid effluent release. This factor is calculated as:

$$F = \frac{\text{Radwaste flow rate (gallon/hr)}}{\text{dilution water flow rate (gallon/hr)} \times K}$$

where K , is used to account for any dilution in the near field of the plant (i.e. the discharge canal). For ANO-1, the factor is 1 since it has a once-through cooling system. A value of 1 will be used for ANO-2 since the unit 2 liquid radwaste effluents are discharged via the same point as for Unit 1.

Equation 1 can be reduced by combining Δt and F to give the volume of the release.

$$\Delta t \times F = \Delta t \times \frac{\text{radwaste flow rate}}{\text{dilution flow rate}}$$

$\Delta t \times$ radwaste flow rate is simply the volume of the waste that was released which can be designed as, V , (gallons).

Substituting the volume into equation 1 gives,

(2) $$D_\tau = \frac{V}{\text{Dilution Flowrate}} \times \sum_i (C_i \times A_{i\tau})$$

Where;

D_τ = dose commitment to be the whole body or organ τ from this release (mrem).

C_i = Concentration of radionuclide i , in the undiluted radioactive liquid effluent (μCi/ml).

$A_{i\tau}$ = ingestion dose commitment factor as calculated in Section 2.2.2 (see table 3-1 to locate tabulated values).

V = volume of the undiluted radioactive liquid released. (gallons)

dilution flow rate = flowrate of water in the discharge canal. This is conservatively assumed to be the ANO-1 circulating water flowrate (gallons/hours).

Equation 2 will be used to check the release against the radioactive liquid effluent dose technical specifications unless a more accurate method is used (i.e. from Reg. Guide 1.109).

2.2.2 Dose Commitment Factor $A_{i\tau}$

The equation for calculating dose contributions requires a dose commitment factor, $A_{i\tau}$, for each isotope, i . This factor embodies exposure from the consumption of fish, invertebrates and potable water where appropriate. The adult male is used as the maximum exposed individual. This factor can be expressed by:

(3) $$A_{i\tau} = K_o(U_w/D_w + U_F BF_i + U_i BI_i)DF_i$$

where;

$A_{i\tau}$ = composite dose parameter for the total body or critical organ of an adult for isotope i, for all appropriate pathways. (mrem/hr per μCi/ml)

K_0 = units conversion factor; $1.14 \times 10^5 = 10^6$ pci/μci x 10^3 ml/lit divided by 8,760 hr/yr.

U_W = average adult water consumption (assumed) 730 Kg/yr.

U_F = adult fish consumption (assumed) 21 Kg/yr.

U_I = adult invertebrate consumption (for salt-water sites only), 0 Kg/yr since ANO is not a saltwater site.

BF_I = bioaccumulation factor for isotope, i, in fish (pCi/kg per pCi/l). These values are taken from Reg. Guide 1.109 Table A-1.

BI_I = bioaccumulation factor for invertebrates (salt water sites only)

DF_I = dose conversion factor for nuclide, i , for adults in organ, τ , mrem/pCi ingested, from Table E-11 of Reg. Guide 1.109.

D_W = dilution factor from the near field area within one quarter mile of the release point to the potable water intake for adult water consumption.

The site is on Lake Dardanelle on the Arkansas River. There is no potable water intake in Lake Dardanelle or in the near vicinity downstream of the Dardanelle dam, therefore the term U_W/D_W will be deleted.

Substituting the appropriate factors into the above equation yields;

$$A_{i\tau} = 1.14 \times 10^5 \times 21\ BF_i \times DF_i$$

or

$$A_{i\tau} = 2.39 \times 10^6 \times BF_i \times DF_i \quad (4)$$

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Concentrations in Air and Water Above Natural Background

(See footnotes on page 20-15)

Element (atomic number)	Isotope [1]	†	Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Actinium (89)	Ac 227	S	2×10^{-12}	4×10^{-3}	8×10^{-14}	2×10^{-4}
		I	3×10^{-11}	5×10^{-3}	9×10^{-13}	3×10^{-4}
	Ac 228	S	8×10^{-8}	3×10^{-3}	3×10^{-9}	9×10^{-5}
		I	2×10^{-8}	3×10^{-3}	6×10^{-10}	9×10^{-5}
Americium (95)	Am 241	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		* I	1×10^{-10}	8×10^{-4}	4×10^{-12}	3×10^{-5}
	Am 242m	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	3×10^{-10}	3×10^{-3}	9×10^{-12}	9×10^{-5}
	Am 242	S	4×10^{-8}	4×10^{-3}	1×10^{-9}	1×10^{-4}
		I	5×10^{-8}	4×10^{-3}	2×10^{-9}	1×10^{-4}
	Am 243	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	1×10^{-10}	8×10^{-4}	4×10^{-12}	3×10^{-5}
	Am 244	S	4×10^{-6}	1×10^{-1}	1×10^{-7}	5×10^{-3}
		I	2×10^{-5}	1×10^{-1}	6×10^{-7}	3×10^{-3}
Antimony (51)	Sb 122	S	2×10^{-7}	8×10^{-4}	6×10^{-9}	3×10^{-5}
		I	1×10^{-7}	3×10^{-4}	5×10^{-9}	3×10^{-5}
	Sb 124	S	2×10^{-7}	7×10^{-4}	5×10^{-9}	2×10^{-5}
		I	2×10^{-8}	7×10^{-4}	7×10^{-10}	2×10^{-5}
	Sb 125	S	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	3×10^{-8}	3×10^{-3}	9×10^{-10}	1×10^{-4}
Argon (18)	A 37	Sub [2]	6×10^{-3}	.....	1×10^{-7}	.....
	A 41	Sub	2×10^{-6}	.....	4×10^{-8}	.....
Arsenic (33)	As 73	S	2×10^{-6}	1×10^{-2}	7×10^{-8}	5×10^{-4}
		I	4×10^{-7}	1×10^{-2}	1×10^{-8}	5×10^{-4}
	As 74	S	3×10^{-7}	2×10^{-3}	1×10^{-8}	5×10^{-5}
		I	1×10^{-7}	2×10^{-3}	4×10^{-9}	5×10^{-5}
	As 76	S	1×10^{-7}	6×10^{-4}	4×10^{-9}	2×10^{-5}
		I	1×10^{-7}	6×10^{-4}	3×10^{-9}	2×10^{-5}
	As 77	S	5×10^{-7}	2×10^{-3}	2×10^{-8}	8×10^{-5}
		I	4×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-5}
Astatine (85)	At 211	S	7×10^{-9}	3×10^{-3}	2×10^{-10}	1×10^{-4}
		I	3×10^{-8}	2×10^{-3}	1×10^{-9}	7×10^{-5}
Barium (56)	Ba 131	S	1×10^{-6}	5×10^{-3}	4×10^{-8}	2×10^{-4}
		I	4×10^{-7}	5×10^{-3}	1×10^{-8}	2×10^{-4}
	Ba 140	S	1×10^{-7}	8×10^{-4}	4×10^{-9}	3×10^{-5}
		I	4×10^{-8}	7×10^{-4}	1×10^{-9}	2×10^{-5}
Berkelium (97)	Bk 249	S	9×10^{-10}	2×10^{-2}	3×10^{-11}	6×10^{-4}
		I	1×10^{-7}	2×10^{-2}	4×10^{-9}	6×10^{-4}
	Bk 250	S	1×10^{-7}	6×10^{-3}	5×10^{-9}	2×10^{-4}
		I	1×10^{-6}	6×10^{-3}	4×10^{-8}	2×10^{-4}
Beryllium (4)	Be 7	S	6×10^{-6}	5×10^{-2}	2×10^{-7}	2×10^{-3}
		I	1×10^{-6}	5×10^{-2}	4×10^{-8}	2×10^{-3}
Bismuth (83)	Bi 206	S	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	5×10^{-9}	4×10^{-5}
	Bi 207	S	2×10^{-7}	2×10^{-3}	6×10^{-9}	6×10^{-5}
		I	1×10^{-6}	2×10^{-3}	5×10^{-10}	6×10^{-5}
	Bi 210	S	6×10^{-9}	1×10^{-3}	2×10^{-10}	4×10^{-5}
		I	6×10^{-9}	1×10^{-3}	2×10^{-10}	4×10^{-5}
	Bi 212	S	1×10^{-7}	1×10^{-3}	3×10^{-9}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	7×10^{-9}	4×10^{-5}

Concentrations in Air and Water Above Natural Background—Continued

(See footnotes on page 20-15)

Element (atomic number)	Isotope [1]	†	Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Bromine (35)	Br 82	S	1×10^{-6}	8×10^{-3}	4×10^{-8}	3×10^{-4}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-5}
Cadmium (48)	Cd 107	S	5×10^{-6}	5×10^{-3}	2×10^{-7}	2×10^{-4}
		I	[illegible]$^{-6}$	5×10^{-3}	3×10^{-9}	2×10^{-4}
	Cd 115m	S	4×10^{-8}	7×10^{-4}	1×10^{-9}	3×10^{-5}
		I	4×10^{-8}	7×10^{-4}	1×10^{-9}	3×10^{-5}
	Cd 115	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	3×10^{-5}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-5}
Calcium (20)	Ca 45	S	3×10^{-6}	3×10^{-4}	1×10^{-9}	9×10^{-6}
		I	1×10^{-7}	5×10^{-3}	4×10^{-9}	2×10^{-4}
	Ca 47	S	2×10^{-7}	1×10^{-3}	6×10^{-9}	5×10^{-5}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	3×10^{-5}
Californium (98)	Cf 249	S	2×10^{-12}	1×10^{-4}	5×10^{-14}	4×10^{-6}
		I	1×10^{-10}	7×10^{-4}	3×10^{-12}	2×10^{-5}
	Cf 250	S	5×10^{-12}	4×10^{-4}	2×10^{-13}	1×10^{-5}
		I	[illegible]$\times10^{-10}$	7×10^{-4}	3×10^{-12}	3×10^{-5}
	Cf 251	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	4×10^{-6}
		I	1×10^{-10}	8×10^{-4}	3×10^{-12}	3×10^{-5}
	Cf 252	* S	6×10^{-12}	2×10^{-4}	2×10^{-13}	7×10^{-6}
		* I	3×10^{-11}	2×10^{-4}	1×10^{-12}	7×10^{-6}
	Cf 253	S	8×10^{-10}	4×10^{-3}	3×10^{-11}	1×10^{-4}
		I	8×10^{-10}	4×10^{-3}	3×10^{-11}	1×10^{-4}
	Cf 254	S	5×10^{-12}	4×10^{-4}	2×10^{-13}	1×10^{-5}
		I	5×10^{-12}	4×10^{-4}	2×10^{-13}	1×10^{-5}
Carbon (6)	C 14	S	4×10^{-6}	2×10^{-2}	1×10^{-7}	8×10^{-4}
	(CO_2)	Sub	5×10^{-5}	.....	1×10^{-6}	.....
Cerium (58)	Ce 141	S	4×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
		I	2×10^{-7}	3×10^{-3}	5×10^{-9}	9×10^{-5}
	Ce 143	S	3×10^{-7}	1×10^{-3}	9×10^{-9}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	7×10^{-9}	4×10^{-5}
	Ce 144	S	1×10^{-8}	3×10^{-4}	3×10^{-10}	1×10^{-5}
		I	6×10^{-9}	3×10^{-4}	2×10^{-10}	1×10^{-5}
Cesium (55)	Cs 131	S	1×10^{-5}	7×10^{-2}	4×10^{-7}	2×10^{-3}
		I	3×10^{-6}	3×10^{-2}	1×10^{-7}	9×10^{-4}
	Cs 134m	S	4×10^{-5}	2×10^{-1}	1×10^{-6}	6×10^{-3}
		I	6×10^{-6}	3×10^{-2}	2×10^{-7}	1×10^{-3}
	Cs 134	S	4×10^{-8}	3×10^{-4}	1×10^{-9}	9×10^{-6}
		I	1×10^{-8}	1×10^{-3}	4×10^{-10}	4×10^{-5}
	Cs 135	S	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	9×10^{-8}	7×10^{-3}	3×10^{-9}	2×10^{-4}
	Cs 136	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	9×10^{-5}
		I	2×10^{-7}	2×10^{-3}	6×10^{-9}	6×10^{-5}
	Cs 137	S	6×10^{-8}	4×10^{-4}	2×10^{-9}	2×10^{-5}
		I	1×10^{-8}	1×10^{-3}	5×10^{-10}	4×10^{-5}
Chlorine (17)	Cl 36	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-5}
		I	2×10^{-8}	2×10^{-3}	8×10^{-10}	6×10^{-5}
	Cl 38	S	3×10^{-6}	1×10^{-3}	9×10^{-8}	4×10^{-4}
		I	2×10^{-6}	1×10^{-3}	7×10^{-8}	4×10^{-4}
Chromium (24)	Cr 51	S	1×10^{-3}	5×10^{-3}	4×10^{-7}	2×10^{-3}
		I	2×10^{-6}	5×10^{-3}	8×10^{-8}	2×10^{-3}

Concentrations in Air and Water Above Natural Background—Continued

(See footnotes on page 20-15)

Element (atomic number)	Isotope [1]	†	Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Cobalt (27)	Co 57	S	3×10^{-4}	2×10^{-3}	1×10^{-7}	5×10^{-4}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-4}
	Co 58m	S	2×10^{-6}	8×10^{-3}	6×10^{-7}	3×10^{-3}
		I	9×10^{-6}	6×10^{-3}	3×10^{-7}	2×10^{-3}
	Co 58	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	5×10^{-8}	3×10^{-3}	2×10^{-9}	9×10^{-5}
	Co 60	S	3×10^{-7}	1×10^{-3}	1×10^{-8}	5×10^{-5}
		I	9×10^{-9}	1×10^{-3}	3×10^{-10}	3×10^{-5}
Copper (29)	Cu 64	S	2×10^{-6}	1×10^{-3}	7×10^{-8}	3×10^{-4}
		I	1×10^{-6}	6×10^{-3}	4×10^{-8}	2×10^{-4}
Curium (96)	Cm 242	S	1×10^{-10}	7×10^{-4}	4×10^{-12}	2×10^{-5}
		¥ I	2×10^{-10}	7×10^{-4}	6×10^{-12}	2×10^{-5}
	Cm 243	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	5×10^{-6}
		I	1×10^{-10}	7×10^{-4}	3×10^{-12}	2×10^{-5}
	Cm 244	S	9×10^{-12}	2×10^{-4}	3×10^{-13}	7×10^{-6}
		I	1×10^{-10}	8×10^{-4}	3×10^{-12}	2×10^{-5}
	Cm 245	S	5×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	1×10^{-10}	8×10^{-4}	4×10^{-12}	3×10^{-5}
	Cm 246	S	5×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	1×10^{-10}	8×10^{-4}	4×10^{-12}	3×10^{-5}
	Cm 247	S	5×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	1×10^{-10}	6×10^{-4}	4×10^{-12}	2×10^{-5}
	Cm 248	S	6×10^{-13}	1×10^{-5}	2×10^{-14}	4×10^{-7}
		I	1×10^{-11}	4×10^{-5}	4×10^{-13}	1×10^{-6}
	Cm 249	S	1×10^{-5}	6×10^{-3}	4×10^{-7}	2×10^{-3}
		I	1×10^{-5}	6×10^{-3}	4×10^{-7}	2×10^{-3}
Dysprosium (66)	Dy 165	S	3×10^{-6}	1×10^{-3}	9×10^{-8}	4×10^{-4}
		I	2×10^{-6}	1×10^{-3}	7×10^{-8}	4×10^{-4}
	Dy 166	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	4×10^{-3}
		I	2×10^{-7}	1×10^{-3}	7×10^{-9}	4×10^{-3}
Einsteinium (99)	Es 253	S	8×10^{-10}	7×10^{-4}	3×10^{-11}	2×10^{-5}
		I	6×10^{-10}	7×10^{-4}	2×10^{-11}	2×10^{-5}
	Es 254m	S	5×10^{-9}	5×10^{-4}	2×10^{-10}	2×10^{-5}
		I	6×10^{-9}	5×10^{-4}	2×10^{-10}	2×10^{-5}
	Es 254	S	2×10^{-11}	4×10^{-4}	6×10^{-13}	1×10^{-5}
		I	1×10^{-10}	4×10^{-4}	4×10^{-12}	1×10^{-5}
	Es 255	S	5×10^{-10}	8×10^{-4}	2×10^{-11}	3×10^{-5}
		I	4×10^{-10}	8×10^{-4}	1×10^{-11}	3×10^{-5}
Erbium (68)	Er 169	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
		I	4×10^{-7}	3×10^{-3}	1×10^{-8}	9×10^{-5}
	Er 171	S	7×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Europium (63)	Eu 152	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
	(T/2 = 9.2 hrs)	I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
	Eu 152	S	1×10^{-8}	2×10^{-3}	4×10^{-10}	8×10^{-5}
	(T/2 = 13 yrs)	I	2×10^{-8}	2×10^{-3}	6×10^{-10}	8×10^{-5}
	Eu 154	S	4×10^{-9}	1×10^{-4}	1×10^{-10}	2×10^{-5}
		I	7×10^{-9}	6×10^{-4}	2×10^{-10}	2×10^{-5}
	Eu 155	S	9×10^{-8}	6×10^{-3}	3×10^{-9}	2×10^{-4}
		I	7×10^{-8}	6×10^{-3}	3×10^{-9}	2×10^{-4}

Concentrations in Air and Water Above Natural Background—Continued

(See footnotes on page 20-15)

Element (atomic number)	Isotope [1]	†	Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Fermium (100)	Fm 254	S	6×10^{-6}	4×10^{-3}	2×10^{-9}	1×10^{-4}
		I	7×10^{-6}	4×10^{-3}	2×10^{-9}	1×10^{-4}
	Fm 255	S	2×10^{-8}	1×10^{-3}	6×10^{-10}	3×10^{-5}
		I	1×10^{-8}	1×10^{-3}	4×10^{-10}	3×10^{-5}
	Fm 256	S	3×10^{-9}	3×10^{-3}	1×10^{-10}	9×10^{-5}
		I	2×10^{-9}	3×10^{-3}	6×10^{-11}	9×10^{-5}
Fluorine (9)	F 18	S	5×10^{-6}	2×10^{-3}	2×10^{-7}	8×10^{-4}
		I	3×10^{-6}	1×10^{-3}	9×10^{-8}	5×10^{-4}
Gadolinium (64)	Gd 153	S	2×10^{-7}	6×10^{-3}	8×10^{-9}	2×10^{-4}
		I	9×10^{-8}	6×10^{-3}	3×10^{-9}	2×10^{-4}
	Gd 159	S	5×10^{-7}	2×10^{-3}	2×10^{-8}	8×10^{-5}
		I	4×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-5}
Gallium (31)	Ga 72	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-5}
Germanium (32)	Ge 71	S	1×10^{-3}	5×10^{-3}	4×10^{-7}	2×10^{-3}
		I	6×10^{-4}	5×10^{-3}	2×10^{-7}	2×10^{-3}
Gold (79)	Au 196	S	1×10^{-6}	5×10^{-3}	4×10^{-8}	2×10^{-4}
		I	6×10^{-7}	4×10^{-3}	2×10^{-8}	1×10^{-4}
	Au 198	S	3×10^{-7}	2×10^{-3}	1×10^{-8}	5×10^{-5}
		I	2×10^{-7}	1×10^{-3}	8×10^{-9}	5×10^{-5}
	Au 199	S	1×10^{-6}	5×10^{-3}	4×10^{-8}	2×10^{-4}
		I	8×10^{-7}	4×10^{-3}	3×10^{-8}	2×10^{-4}
Hafnium (72)	Hf 181	S	4×10^{-8}	2×10^{-3}	1×10^{-9}	7×10^{-5}
		I	7×10^{-8}	2×10^{-3}	3×10^{-9}	7×10^{-5}
Holmium (67)	Ho 166	S	2×10^{-7}	9×10^{-4}	7×10^{-9}	3×10^{-5}
		I	2×10^{-7}	9×10^{-4}	6×10^{-9}	3×10^{-5}
Hydrogen (1)	H3	S	5×10^{-6}	1×10^{-1}	2×10^{-7}	3×10^{-3}
		I	5×10^{-6}	1×10^{-1}	2×10^{-7}	3×10^{-3}
		Sub	2×10^{-3}		4×10^{-5}	
Indium (49)	In 113m	S	8×10^{-6}	4×10^{-3}	3×10^{-7}	1×10^{-3}
		I	7×10^{-6}	4×10^{-3}	2×10^{-7}	1×10^{-3}
	In 114m	S	1×10^{-7}	5×10^{-4}	4×10^{-9}	2×10^{-5}
		I	2×10^{-8}	5×10^{-4}	7×10^{-10}	2×10^{-5}
	In 115m	S	2×10^{-6}	1×10^{-3}	8×10^{-8}	4×10^{-4}
		I	2×10^{-6}	1×10^{-3}	6×10^{-8}	4×10^{-4}
	In 115	S	2×10^{-7}	3×10^{-3}	9×10^{-9}	9×10^{-5}
		I	3×10^{-8}	3×10^{-3}	1×10^{-9}	9×10^{-5}
Iodine (53)	I 125	S	5×10^{-9}	4×10^{-3}	8×10^{-11}	2×10^{-6}
		I	2×10^{-7}	6×10^{-3}	6×10^{-9}	2×10^{-4}
	I 126	S	8×10^{-9}	5×10^{-3}	9×10^{-11}	3×10^{-6}
		I	3×10^{-7}	3×10^{-3}	1×10^{-8}	9×10^{-5}
	I 129	S	2×10^{-9}	1×10^{-3}	2×10^{-11}	6×10^{-6}
		I	7×10^{-8}	6×10^{-3}	2×10^{-9}	2×10^{-4}
	I 131	S	9×10^{-9}	6×10^{-3}	1×10^{-10}	3×10^{-6}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
	I 132	S	2×10^{-7}	2×10^{-3}	3×10^{-9}	8×10^{-6}
		I	9×10^{-7}	5×10^{-3}	3×10^{-8}	2×10^{-4}
	I 133	S	3×10^{-8}	2×10^{-4}	4×10^{-10}	1×10^{-6}
		I	2×10^{-7}	1×10^{-3}	7×10^{-9}	4×10^{-5}
	I 134	S	5×10^{-7}	4×10^{-3}	6×10^{-9}	2×10^{-5}

Concentrations in Air and Water Above Natural Background—Continued

(See footnotes on page 20-15)

Element (atomic number)	Isotope[1]	†	Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Iodine (53)	I 129	I	3×10^{-8}	2×10^{-3}	1×10^{-7}	6×10^{-4}
	I 131	S	1×10^{-7}	7×10^{-4}	1×10^{-9}	4×10^{-6}
		I	4×10^{-7}	2×10^{-3}	1×10^{-8}	7×10^{-5}
Iridium (77)	Ir 190	S	1×10^{-6}	6×10^{-3}	4×10^{-8}	2×10^{-4}
		I	4×10^{-7}	5×10^{-3}	1×10^{-8}	2×10^{-4}
	Ir 192	S	1×10^{-7}	1×10^{-3}	4×10^{-9}	4×10^{-5}
		I	3×10^{-8}	1×10^{-3}	9×10^{-10}	4×10^{-5}
	Ir 194	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	3×10^{-5}
		I	2×10^{-7}	9×10^{-4}	5×10^{-9}	3×10^{-5}
Iron (26)	Fe 55	S	9×10^{-7}	2×10^{-3}	3×10^{-8}	8×10^{-4}
		I	1×10^{-6}	7×10^{-3}	3×10^{-8}	2×10^{-3}
	Fe 59	S	1×10^{-7}	2×10^{-3}	5×10^{-9}	6×10^{-5}
		I	5×10^{-8}	2×10^{-3}	2×10^{-9}	5×10^{-5}
Krypton (36)	Kr 85m	Sub	6×10^{-6}	.....	1×10^{-7}	.....
	Kr 85	Sub	1×10^{-5}	.....	3×10^{-7}	.....
	Kr 87	Sub	1×10^{-6}	.....	2×10^{-8}	.....
	Kr 88	Sub	1×10^{-6}	.....	2×10^{-8}	.....
Lanthanum (57)	La 140	S	2×10^{-7}	7×10^{-4}	5×10^{-9}	2×10^{-5}
		I	1×10^{-7}	7×10^{-4}	3×10^{-9}	2×10^{-5}
Lead (82)	Pb 203	S	3×10^{-6}	1×10^{-3}	9×10^{-8}	4×10^{-4}
		I	2×10^{-6}	1×10^{-3}	6×10^{-8}	4×10^{-4}
	Pb 210	S	1×10^{-10}	3×10^{-4}	4×10^{-12}	1×10^{-7}
		I	2×10^{-10}	5×10^{-3}	8×10^{-12}	2×10^{-4}
	Pb 212	S	2×10^{-8}	6×10^{-4}	6×10^{-10}	2×10^{-5}
		I	2×10^{-8}	5×10^{-4}	7×10^{-10}	2×10^{-5}
Lutetium (71)	Lu 177	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Manganese (25)	Mn 52	S	2×10^{-7}	1×10^{-3}	7×10^{-9}	3×10^{-5}
		I	1×10^{-7}	9×10^{-4}	5×10^{-9}	3×10^{-5}
	Mn 54	* S	4×10^{-7}	4×10^{-3}	1×10^{-8}	1×10^{-4}
		I	4×10^{-8}	3×10^{-3}	1×10^{-8}	1×10^{-4}
	Mn 56	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Mercury (80)	Hg 197m	S	7×10^{-7}	6×10^{-3}	3×10^{-8}	2×10^{-4}
		I	8×10^{-7}	5×10^{-3}	3×10^{-8}	2×10^{-4}
	Hg 197	S	1×10^{-6}	9×10^{-3}	4×10^{-8}	3×10^{-4}
		I	3×10^{-6}	1×10^{-2}	9×10^{-8}	5×10^{-4}
	Hg 203	S	7×10^{-8}	5×10^{-4}	2×10^{-9}	2×10^{-5}
		I	1×10^{-7}	3×10^{-3}	4×10^{-9}	1×10^{-4}
Molybdenum (42)	Mo 99	S	7×10^{-7}	5×10^{-3}	3×10^{-8}	2×10^{-4}
		I	2×10^{-7}	1×10^{-3}	7×10^{-9}	4×10^{-5}
Neodymium (60)	Nd 144	S	8×10^{-11}	2×10^{-3}	3×10^{-12}	7×10^{-5}
		I	3×10^{-10}	2×10^{-3}	1×10^{-11}	8×10^{-5}
	Nd 147	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
		I	2×10^{-7}	2×10^{-3}	8×10^{-9}	6×10^{-5}
	Nd 149	S	2×10^{-6}	8×10^{-3}	6×10^{-8}	3×10^{-4}
		I	1×10^{-6}	8×10^{-3}	5×10^{-8}	3×10^{-4}

Concentrations in Air and Water Above Natural Background—Continued

(See footnotes on page 20-15)

Element (atomic number)	Isotope[1]	†	Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Neptunium (93)	Np 237	S	4×10^{-12}	9×10^{-3}	1×10^{-13}	3×10^{-4}
		I	1×10^{-10}	9×10^{-4}	4×10^{-13}	3×10^{-5}
	Np 239	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	7×10^{-7}	4×10^{-3}	2×10^{-8}	1×10^{-4}
Nickel (28)	Ni 59	S	5×10^{-7}	6×10^{-3}	2×10^{-8}	2×10^{-4}
		I	8×10^{-7}	6×10^{-3}	3×10^{-8}	2×10^{-4}
	Ni 63	S	6×10^{-8}	8×10^{-4}	2×10^{-9}	3×10^{-5}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	7×10^{-5}
	Ni 65	S	9×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Niobium (Columbium) (41)	Nb 93m	S	1×10^{-7}	1×10^{-2}	4×10^{-9}	4×10^{-4}
		I	2×10^{-7}	1×10^{-2}	5×10^{-9}	4×10^{-4}
	Nb 95	S	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	1×10^{-7}	3×10^{-3}	3×10^{-9}	1×10^{-4}
	Nb 97	S	6×10^{-6}	3×10^{-2}	2×10^{-7}	9×10^{-4}
		I	5×10^{-6}	3×10^{-2}	2×10^{-7}	9×10^{-4}
Osmium (76)	Os 185	S	5×10^{-7}	2×10^{-3}	2×10^{-8}	7×10^{-5}
		I	5×10^{-8}	2×10^{-3}	2×10^{-9}	7×10^{-5}
	Os 191m	S	2×10^{-5}	7×10^{-2}	6×10^{-7}	3×10^{-3}
		I	9×10^{-6}	7×10^{-2}	3×10^{-7}	2×10^{-3}
	Os 191	S	1×10^{-6}	5×10^{-3}	4×10^{-8}	2×10^{-4}
		I	4×10^{-7}	5×10^{-3}	1×10^{-8}	2×10^{-4}
	Os 193	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
		I	3×10^{-7}	2×10^{-3}	9×10^{-9}	5×10^{-5}
Palladium (46)	Pd 103	S	1×10^{-6}	1×10^{-2}	5×10^{-8}	3×10^{-4}
		I	7×10^{-7}	8×10^{-3}	3×10^{-8}	3×10^{-4}
	Pd 109	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
		I	4×10^{-7}	2×10^{-3}	1×10^{-8}	7×10^{-5}
Phosphorus (15)	P 32	S	7×10^{-8}	5×10^{-4}	2×10^{-9}	2×10^{-5}
		I	8×10^{-8}	7×10^{-4}	3×10^{-9}	2×10^{-5}
Platinum (78)	Pt 191	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
	Pt 193m	S	7×10^{-6}	3×10^{-2}	2×10^{-7}	1×10^{-3}
		I	5×10^{-6}	3×10^{-2}	2×10^{-7}	1×10^{-3}
	* Pt 193	S	1×10^{-6}	3×10^{-2}	4×10^{-8}	9×10^{-4}
		I	3×10^{-7}	5×10^{-2}	1×10^{-8}	2×10^{-3}
	Pt 197m	S	6×10^{-6}	3×10^{-2}	2×10^{-7}	1×10^{-3}
		I	5×10^{-6}	3×10^{-2}	2×10^{-7}	9×10^{-4}
	Pt 197	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Plutonium (94)	Pu 238	S	2×10^{-12}	1×10^{-4}	7×10^{-14}	5×10^{-6}
		I	3×10^{-11}	8×10^{-4}	1×10^{-12}	3×10^{-5}
	Pu 239	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	5×10^{-6}
		I	4×10^{-11}	8×10^{-4}	1×10^{-12}	3×10^{-5}
	Pu 240	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	5×10^{-6}
		I	4×10^{-11}	8×10^{-4}	1×10^{-12}	3×10^{-5}
	Pu 241	S	9×10^{-11}	7×10^{-3}	3×10^{-12}	2×10^{-4}
		I	4×10^{-9}	4×10^{-3}	1×10^{-9}	1×10^{-3}

Concentrations in Air and Water Above Natural Background—Continued

(See footnotes on page 20-15)

Element (atomic number)	Isotope [1]	†	Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Plutonium (94)	Pu 242	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	3×10^{-6}
		I	4×10^{-11}	9×10^{-4}	1×10^{-12}	3×10^{-5}
	Pu 243	S	2×10^{-8}	1×10^{-3}	6×10^{-9}	3×10^{-4}
		I	2×10^{-8}	1×10^{-3}	8×10^{-9}	3×10^{-4}
	Pu 244	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	4×10^{-6}
		I	3×10^{-11}	3×10^{-4}	1×10^{-12}	1×10^{-5}
Polonium (84)	Po 210	S	5×10^{-10}	2×10^{-3}	2×10^{-11}	7×10^{-7}
		I	2×10^{-10}	8×10^{-4}	7×10^{-12}	3×10^{-5}
Potassium (19)	K 42	S	2×10^{-6}	9×10^{-3}	7×10^{-8}	3×10^{-4}
		I	1×10^{-7}	6×10^{-4}	4×10^{-9}	2×10^{-5}
Praseodymium (59)	Pr 142	S	2×10^{-7}	9×10^{-4}	7×10^{-9}	3×10^{-5}
		I	2×10^{-7}	9×10^{-4}	5×10^{-9}	3×10^{-5}
	Pr 143	S	3×10^{-7}	1×10^{-3}	1×10^{-8}	5×10^{-5}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	3×10^{-5}
Promethium (61)	Pm 147	S	6×10^{-8}	6×10^{-3}	2×10^{-9}	2×10^{-4}
		I	1×10^{-7}	6×10^{-3}	3×10^{-9}	2×10^{-4}
	Pm 149	S	3×10^{-7}	1×10^{-3}	1×10^{-8}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	8×10^{-9}	4×10^{-5}
Protactinium (91)	Pa 230	S	2×10^{-9}	7×10^{-3}	6×10^{-11}	2×10^{-4}
		I	8×10^{-10}	7×10^{-3}	3×10^{-11}	2×10^{-4}
	Pa 231	S	1×10^{-12}	3×10^{-3}	4×10^{-14}	9×10^{-7}
		I	1×10^{-10}	8×10^{-4}	4×10^{-12}	2×10^{-5}
	Pa 233	S	6×10^{-7}	4×10^{-3}	2×10^{-8}	1×10^{-4}
		I	2×10^{-7}	3×10^{-3}	6×10^{-9}	1×10^{-4}
Radium (88)	Ra 223	S	2×10^{-9}	2×10^{-3}	6×10^{-11}	7×10^{-7}
		I	2×10^{-10}	1×10^{-4}	8×10^{-12}	4×10^{-6}
	Ra 224	S	5×10^{-9}	7×10^{-3}	2×10^{-10}	2×10^{-4}
		I	7×10^{-10}	2×10^{-4}	2×10^{-11}	5×10^{-6}
	Ra 226	S	3×10^{-11}	4×10^{-7}	3×10^{-12}	3×10^{-8}
		I	5×10^{-11}	9×10^{-4}	2×10^{-12}	3×10^{-5}
	Ra 228	S	7×10^{-11}	8×10^{-7}	3×10^{-12}	3×10^{-8}
		I	4×10^{-11}	2×10^{-4}	1×10^{-12}	3×10^{-5}
Radon (86)	Rn 220	S	3×10^{-7}		1×10^{-8}	
	Rn 222 [3]	***	3×10^{-8}		3×10^{-9}	
Rhenium (75)	Re 183	S	3×10^{-6}	2×10^{-3}	9×10^{-8}	6×10^{-4}
		I	2×10^{-7}	8×10^{-3}	5×10^{-9}	3×10^{-4}
	Re 186	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
		I	2×10^{-7}	1×10^{-3}	8×10^{-9}	5×10^{-5}
	Re 187	S	9×10^{-6}	7×10^{-3}	3×10^{-7}	3×10^{-3}
		I	5×10^{-7}	4×10^{-3}	2×10^{-8}	2×10^{-4}
	Re 188	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
		I	2×10^{-7}	9×10^{-4}	6×10^{-9}	3×10^{-5}
Rhodium (45)	Rh 103m	S	8×10^{-5}	4×10^{-1}	3×10^{-6}	1×10^{-2}
		I	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
	Rh 105	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Rubidium (37)	Rb 86	S	3×10^{-7}	2×10^{-3}	1×10^{-8}	7×10^{-5}
		I	7×10^{-8}	7×10^{-4}	2×10^{-9}	2×10^{-5}
	Rb 87	S	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	7×10^{-8}	5×10^{-3}	2×10^{-9}	2×10^{-4}

Concentrations in Air and Water Above Natural Background—Continued

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Element (atomic number)	Isotope [1]	†	Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Ruthenium (44)	Ru 97	S	2×10^{-6}	1×10^{-3}	8×10^{-8}	4×10^{-6}
		I	2×10^{-6}	1×10^{-3}	6×10^{-8}	3×10^{-6}
	Ru 103	S	5×10^{-7}	2×10^{-3}	2×10^{-8}	8×10^{-5}
		I	8×10^{-8}	2×10^{-3}	3×10^{-9}	8×10^{-5}
	Ru 105	S	7×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
	Ru 106	S	8×10^{-8}	4×10^{-4}	3×10^{-9}	1×10^{-5}
		I	6×10^{-8}	3×10^{-4}	2×10^{-10}	1×10^{-5}
Samarium (62)	Sm 147	S	7×10^{-11}	2×10^{-3}	2×10^{-12}	6×10^{-5}
		I	3×10^{-10}	2×10^{-3}	9×10^{-12}	7×10^{-5}
	Sm 151	S	6×10^{-8}	1×10^{-2}	2×10^{-9}	4×10^{-4}
		I	1×10^{-7}	1×10^{-2}	5×10^{-9}	4×10^{-4}
	Sm 153	S	3×10^{-7}	2×10^{-3}	2×10^{-8}	8×10^{-5}
		I	4×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-5}
Scandium (21)	Sc 46	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	4×10^{-5}
		I	2×10^{-8}	1×10^{-3}	8×10^{-10}	4×10^{-5}
	Sc 47	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
	Sc 48	S	2×10^{-7}	8×10^{-4}	6×10^{-9}	3×10^{-5}
		I	1×10^{-7}	8×10^{-4}	5×10^{-9}	3×10^{-5}
Selenium (34)	Se 73	S	1×10^{-6}	9×10^{-3}	4×10^{-8}	3×10^{-4}
		I	1×10^{-7}	8×10^{-3}	4×10^{-9}	3×10^{-4}
Silicon (14)	Si 31	S	6×10^{-6}	3×10^{-2}	2×10^{-7}	9×10^{-4}
		I	1×10^{-6}	6×10^{-3}	3×10^{-8}	2×10^{-4}
Silver (47)	Ag 105	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	8×10^{-8}	3×10^{-3}	3×10^{-9}	1×10^{-4}
	Ag 110m	S	2×10^{-7}	9×10^{-4}	7×10^{-9}	3×10^{-5}
		I	1×10^{-8}	9×10^{-4}	3×10^{-10}	3×10^{-5}
	Ag 111	S	3×10^{-7}	1×10^{-3}	1×10^{-8}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	8×10^{-9}	4×10^{-5}
Sodium (11)	Na 22	S	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-5}
		I	9×10^{-8}	9×10^{-4}	3×10^{-10}	3×10^{-5}
	Na 24	S	1×10^{-6}	6×10^{-3}	4×10^{-8}	2×10^{-4}
		I	1×10^{-7}	6×10^{-3}	3×10^{-9}	2×10^{-4}
Strontium (38)	Sr 85m	S	4×10^{-6}	2×10^{-2}	1×10^{-7}	7×10^{-4}
		I	3×10^{-7}	2×10^{-2}	1×10^{-8}	7×10^{-4}
	Sr 85	S	2×10^{-7}	3×10^{-3}	8×10^{-9}	1×10^{-4}
		I	1×10^{-7}	5×10^{-3}	4×10^{-9}	2×10^{-4}
	Sr 89	S	3×10^{-8}	3×10^{-4}	3×10^{-10}	3×10^{-6}
		I	4×10^{-8}	8×10^{-4}	1×10^{-9}	3×10^{-5}
	Sr 90	S	1×10^{-9}	1×10^{-3}	3×10^{-11}	3×10^{-7}
		I	5×10^{-9}	1×10^{-3}	2×10^{-10}	4×10^{-5}
	Sr 91	S	4×10^{-7}	2×10^{-3}	2×10^{-8}	7×10^{-5}
		I	3×10^{-7}	1×10^{-3}	9×10^{-9}	5×10^{-5}
	Sr 92	S	4×10^{-7}	2×10^{-3}	2×10^{-8}	7×10^{-5}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
Sulfur (16)	S 35	S	3×10^{-7}	2×10^{-3}	9×10^{-9}	6×10^{-5}
		I	3×10^{-7}	8×10^{-3}	9×10^{-9}	3×10^{-4}
Tantalum (73)	Ta 182	S	4×10^{-8}	1×10^{-3}	1×10^{-9}	4×10^{-5}
		I	2×10^{-8}	1×10^{-3}	7×10^{-10}	4×10^{-5}

Concentrations in Air and Water Above Natural Background—Continued

(See footnotes on page 20-15)

Element (atomic number)	Isotope[1]	†	Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Technetium (13)	Tc 96m	S	8×10^{-7}	4×10^{-3}	3×10^{-6}	1×10^{-3}
		I	3×10^{-7}	3×10^{-3}	1×10^{-6}	1×10^{-3}
	Tc 96	S	6×10^{-7}	3×10^{-3}	2×10^{-6}	1×10^{-3}
		I	2×10^{-7}	1×10^{-3}	8×10^{-7}	5×10^{-4}
	Tc 97m	S	2×10^{-6}	1×10^{-3}	8×10^{-6}	4×10^{-3}
		I	2×10^{-7}	5×10^{-4}	5×10^{-7}	2×10^{-3}
	Tc 97	S	1×10^{-5}	5×10^{-3}	4×10^{-7}	2×10^{-3}
		I	3×10^{-7}	2×10^{-3}	1×10^{-6}	8×10^{-4}
	Tc 99m	S	4×10^{-5}	2×10^{-1}	1×10^{-6}	6×10^{-3}
		I	1×10^{-5}	8×10^{-3}	5×10^{-7}	3×10^{-3}
	Tc 99	S	2×10^{-6}	1×10^{-3}	7×10^{-9}	3×10^{-6}
		I	6×10^{-8}	5×10^{-3}	2×10^{-7}	2×10^{-6}
Tellurium (52)	Te 125m	S	4×10^{-7}	5×10^{-3}	1×10^{-8}	2×10^{-6}
		I	1×10^{-7}	3×10^{-3}	4×10^{-9}	1×10^{-6}
	Te 127m	S	1×10^{-7}	2×10^{-3}	5×10^{-9}	6×10^{-9}
		I	4×10^{-8}	2×10^{-3}	1×10^{-9}	5×10^{-3}
	Te 127	S	2×10^{-6}	8×10^{-3}	6×10^{-8}	3×10^{-6}
		I	9×10^{-7}	5×10^{-3}	3×10^{-8}	2×10^{-6}
	Te 129m	S	8×10^{-8}	1×10^{-3}	3×10^{-9}	3×10^{-9}
		I	3×10^{-8}	6×10^{-4}	1×10^{-8}	2×10^{-9}
	Te 129	S	5×10^{-6}	2×10^{-3}	2×10^{-7}	8×10^{-6}
		I	4×10^{-6}	2×10^{-3}	1×10^{-7}	8×10^{-6}
	Te 131m	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-9}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-9}
	Te 132	S	2×10^{-7}	9×10^{-4}	7×10^{-9}	3×10^{-9}
		I	1×10^{-7}	6×10^{-4}	4×10^{-9}	2×10^{-9}
Terbium (65)	Tb 160	S	1×10^{-7}	1×10^{-3}	3×10^{-9}	4×10^{-9}
		I	3×10^{-8}	1×10^{-3}	1×10^{-9}	4×10^{-9}
Thallium (81)	Tl 200	S	3×10^{-6}	1×10^{-3}	9×10^{-9}	4×10^{-6}
		I	1×10^{-6}	7×10^{-4}	4×10^{-9}	2×10^{-6}
	Tl 201	S	2×10^{-6}	9×10^{-3}	7×10^{-9}	3×10^{-6}
		I	9×10^{-7}	5×10^{-3}	3×10^{-9}	2×10^{-6}
	Tl 202	S	8×10^{-7}	4×10^{-3}	3×10^{-9}	1×10^{-6}
		I	2×10^{-7}	2×10^{-3}	8×10^{-9}	7×10^{-7}
	Tl 204	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-6}
		I	3×10^{-7}	2×10^{-3}	9×10^{-10}	6×10^{-7}
Thorium (90) *	Th 227	S	3×10^{-10}	5×10^{-4}	1×10^{-11}	2×10^{-9}
		I	2×10^{-10}	5×10^{-4}	6×10^{-11}	2×10^{-9}
	Th 228	S	9×10^{-13}	2×10^{-4}	3×10^{-11}	7×10^{-8}
		I	6×10^{-12}	4×10^{-4}	2×10^{-11}	1×10^{-9}
	Th 230	S	2×10^{-13}	5×10^{-7}	8×10^{-14}	2×10^{-6}
		I	1×10^{-12}	9×10^{-4}	3×10^{-13}	3×10^{-9}
	Th 231 *	S	1×10^{-6}	7×10^{-3}	5×10^{-8}	2×10^{-4}
		I	1×10^{-6}	7×10^{-3}	4×10^{-8}	2×10^{-4}
	Th 232	S	3×10^{-14}	5×10^{-7}	1×10^{-13}	2×10^{-6}
		I	3×10^{-14}	5×10^{-7}	1×10^{-13}	4×10^{-9}
	Th natural **	S	6×10^{-14}	6×10^{-7}	2×10^{-13}	2×10^{-6}
			6×10^{-14}	6×10^{-7}	2×10^{-13}	2×10^{-6}

Concentrations in Air and Water Above Natural Background—Continued

(See footnotes on page 20-15)

Element (atomic number)	Isotope[1]	†	Table I Column 1 Air (μCi/ml)	Table I Column 2 Water (μCi/ml)	Table II Column 1 Air (μCi/ml)	Table II Column 2 Water (μCi/ml)
Thorium (90)	Th 234	S	6×10^{-8}	5×10^{-4}	2×10^{-9}	2×10^{-6}
		I	3×10^{-8}	5×10^{-4}	1×10^{-9}	2×10^{-6}
Thulium (69)	Tm 170	S	4×10^{-8}	1×10^{-3}	1×10^{-9}	5×10^{-7}
		I	3×10^{-8}	1×10^{-3}	1×10^{-9}	5×10^{-7}
	Tm 171	S	1×10^{-7}	1×10^{-3}	4×10^{-9}	5×10^{-4}
		I	2×10^{-7}	1×10^{-3}	8×10^{-9}	5×10^{-4}
Tin (50)	Sn 113	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	9×10^{-7}
		I	5×10^{-8}	2×10^{-3}	2×10^{-9}	8×10^{-7}
	Sn 125	S	1×10^{-7}	5×10^{-4}	4×10^{-9}	2×10^{-6}
		I	8×10^{-8}	5×10^{-4}	3×10^{-9}	2×10^{-6}
Tungsten (Wolfram) (74)	W 181	S	2×10^{-6}	1×10^{-3}	8×10^{-9}	4×10^{-6}
		I	1×10^{-7}	1×10^{-3}	4×10^{-9}	3×10^{-6}
	W 185	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-6}
		I	1×10^{-7}	3×10^{-3}	4×10^{-9}	1×10^{-6}
	W 187	S	4×10^{-7}	2×10^{-3}	2×10^{-8}	7×10^{-7}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-7}
Uranium (92)	U 230	S	3×10^{-10}	1×10^{-4}	1×10^{-11}	5×10^{-4}
		I	1×10^{-10}	1×10^{-4}	4×10^{-12}	5×10^{-4}
	U 232	S	1×10^{-10}	8×10^{-4}	3×10^{-12}	3×10^{-3}
		I	3×10^{-11}	8×10^{-4}	9×10^{-13}	3×10^{-3}
	U 233	S	3×10^{-10}	9×10^{-4}	2×10^{-11}	3×10^{-3}
		I	1×10^{-10}	9×10^{-4}	4×10^{-12}	3×10^{-3}
	U 234 **	S[4]	6×10^{-10}	9×10^{-4}	2×10^{-11}	3×10^{-3}
		I	1×10^{-10}	9×10^{-4}	4×10^{-12}	3×10^{-3}
	U 235 **	S[4]	5×10^{-10}	8×10^{-4}	2×10^{-11}	3×10^{-3}
		I	1×10^{-10}	8×10^{-4}	4×10^{-12}	3×10^{-3}
	U 236	S	6×10^{-10}	1×10^{-3}	2×10^{-11}	4×10^{-3}
		I	1×10^{-10}	1×10^{-3}	4×10^{-12}	3×10^{-3}
	U 238 **	S[4]	7×10^{-11}	1×10^{-3}	3×10^{-12}	4×10^{-3}
		I	1×10^{-10}	1×10^{-3}	5×10^{-12}	4×10^{-3}
	U 240	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	3×10^{-3}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	3×10^{-3}
	U-natural **	S[4]	1×10^{-10}	1×10^{-3}	3×10^{-12}	3×10^{-3}
		I	1×10^{-10}	1×10^{-3}	3×10^{-12}	3×10^{-3}
Vanadium (23)	V 48	S	2×10^{-7}	9×10^{-4}	6×10^{-9}	3×10^{-3}
		I	6×10^{-8}	8×10^{-4}	2×10^{-9}	3×10^{-3}
Xenon (54)	Xe 131m	Sub	2×10^{-5}	.....	4×10^{-7}	.....
	Xe 133	Sub	1×10^{-5}	.....	3×10^{-7}	.....
	Xe 133m	Sub	1×10^{-5}	.....	3×10^{-7}	.....
	Xe 135	Sub	4×10^{-6}	.....	1×10^{-7}	.....
Ytterbium (70)	Yb 175	S	7×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Yttrium (39)	Y 90	S	1×10^{-7}	6×10^{-4}	4×10^{-9}	2×10^{-3}
		I	1×10^{-7}	6×10^{-4}	3×10^{-9}	2×10^{-3}
	Y 91m	S	2×10^{-6}	1×10^{-3}	8×10^{-8}	3×10^{-3}
		I	2×10^{-6}	1×10^{-3}	6×10^{-8}	3×10^{-3}
	Y 91	S	4×10^{-8}	8×10^{-4}	1×10^{-9}	3×10^{-3}
		I	3×10^{-8}	8×10^{-4}	1×10^{-9}	3×10^{-3}
	Y 92	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-3}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-3}
	Y 93	S	2×10^{-7}	8×10^{-4}	6×10^{-9}	3×10^{-3}
		I	1×10^{-7}	8×10^{-4}	5×10^{-9}	3×10^{-3}

Concentrations in Air and Water Above Natural Background--Continued

(See footnotes on page 20-15)

Element (atomic number)	Isotope [1]		Table I		Table II	
			Column 1	Column 2	Column 1	Column 2
			Air (μCi/ml)	Water (μCi/ml)	Air (μCi/ml)	Water (μCi/ml)
Zinc (30)	Zn 65	S	1×10^{-7}	3×10^{-3}	4×10^{-9}	1×10^{-4}
		I	6×10^{-8}	5×10^{-3}	2×10^{-9}	2×10^{-4}
	Zn 69m	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	7×10^{-5}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
	Zn 69	S	7×10^{-6}	5×10^{-2}	2×10^{-7}	2×10^{-3}
		I	9×10^{-6}	5×10^{-2}	3×10^{-7}	2×10^{-3}
Zirconium (40)	Zr 93	S	1×10^{-7}	2×10^{-3}	4×10^{-9}	8×10^{-5}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-5}
	Zr 95	S	1×10^{-7}	2×10^{-3}	4×10^{-9}	6×10^{-5}
		I	3×10^{-8}	2×10^{-3}	1×10^{-9}	6×10^{-5}
	Zr 97	S	1×10^{-7}	5×10^{-4}	4×10^{-9}	2×10^{-5}
		I	9×10^{-8}	5×10^{-4}	3×10^{-9}	2×10^{-5}
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life less than 2 hours.	.....	Sub	1×10^{-6}		3×10^{-8}	
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than 2 hours.			3×10^{-9}	9×10^{-3}	1×10^{-10}	3×10^{-6}
Any single radionuclide not listed above, which decays by alpha emission or spontaneous fission.			6×10^{-13}	4×10^{-7}	2×10^{-14}	3×10^{-8}

[1] Soluble (S), Insoluble (I).

[2] "Sub" means that values given are for submersion in a semi-spherical infinite cloud of airborne material.

[3] These radon concentrations are appropriate for protection from radon-222 combined with its short-lived daughters. Alternatively, the value in Table I may be replaced by one-third (⅓) "working level." (A "working level" is defined as any combination of short-lived radon-222 daughters, polonium-218, lead-214, bismuth-214 and polonium-214, in one liter of air, without regard to the degree of equilibrium, that will result in the ultimate emission of 1.3×10^5 MeV of alpha particle energy.) The Table II value may be replaced by one-thirtieth (1/30) of a "working level." The limit on radon-222 concentrations in restricted areas may be based on an annual average.

[4] For soluble mixtures of U-238, U-234 and U-235 in air chemical toxicity may be the limiting factor. If the percent by weight (enrichment) of U-235 is less than 5, the concentration value for a 40-hour workweek, Table I, is 0.2 milligrams uranium per cubic meter of air average. For any enrichment, the product of the average concentration and time of exposure during a 40-hour workweek shall not exceed 8×10^{-4} SA μCi-hr/ml, where SA is the specific activity of the uranium inhaled. The concentration value for Table II is 0.007 milligrams uranium per cubic meter of air. The specific activity for natural uranium is 6.77×10^{-7} curies per gram U. The specific activity for other mixtures of U-235, U-238 and U-234, if not known, shall be:

$SA = 3.6 \times 10^{-7}$ curies/gram U (depleted $E \geq 0.7$)

$SA = (0.4 + 0.38\,E + 0.0034\,E^2)\,10^{-6}$

where E is the percentage by weight of U-235, expressed as percent.

* Amended 37 FR 23319.

** Amended 39 FR 23990; footnote redesignated 40 FR 50704.

*** Amended 40 FR 50704.

† Amended 38 FR 29314.

‡ Amended 39 FR 25-63; redesignated 40 FR 50704.

3.0 Gaseous Effluents

3.1 Gaseous Monitor Setpoints

3.1.0 This section applies to the following gaseous radiation monitors.

ANO-1	
RE 7400	Unit vents (reactor building purge, fuel handling area, and radwaste area ventilation systems)
RE 4830*	Waste gas holdup system monitor
ANO-2	
2RE 8233	Containment purge
2RE 8540	Fuel handling area ventilation system
2RE 8542	Radwaste area ventilation system
2RE 7828	Auxiliary building extension ventilation system
2RE 2429 *	Waste gas holdup system monitor

The determination of the setpoints for the above monitors will be based upon an arbitrarily set fraction of the maximum permissible concentration (MPC), at the site boundary, of noble gas activity released from the above release points. Other factors considered in the setpoint calculations include; background count rate for each monitor, radwaste flowrate, monitor calibration efficiency, atmospheric dilution factor and the number and type of ventilation systems in operation.

The fraction of an MPC allocated to each monitor will be dependent upon plant conditions, and the amount of activity that is expected to be released via each release point. The fraction assigned to each monitor may be varied. However, the sum of all of the fractions of an MPC assigned shall be less than or equal to 1 MPC. When the setpoint on one monitor is changed, the setpoint on at least one other monitor will be changed accordingly. Determining setpoints in this manner will allow the flexibility needed to maintain plant operation.

The fact that one monitor alarms would not necessarily mean the gaseous effluents are being released at such a rate that the one MPC limit is being violated. The alarm would indicate that more material is being released than the fraction of an MPC assigned to the alarmed monitor. An analysis of the material being released from each of these monitors and the release rate at those monitors would have to be done to ensure that the MPC limit is not being violated.

* These monitors provide an automatic isolation for the waste gas holdup systems and are not final effluent point monitors.

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The initial fractions of one MPC allocated to the release points is given below. The allocations may be changed as indicated above.

ANO-1	50%
ANO-2 Radwaste area	30%
ANO-2 Fuel handling area	19%
ANO-2 Auxiliary building extension	0%
ANO-2 Containment purge	0%

The containment purge and the auxiliary building extension ventilation systems are not operated continuously, therefore, they will not be routinely allocated a fraction of an MPC to be released.

The setpoints to be used during a batch type of release (i.e. reactor building purge, release from the waste gas hold up system or any other non-routine release) will be calculated for each release before it occurs.

3.1.1 The basic methodology for determining a monitor setpoint starts by determining the gross concentration in the stack as follows:

$$C_S = \frac{(C_{SB} * T_F) + (C_{SV} * V_F)}{T_F + V_F}$$

Where:

C_S = flow weighted gross activity in the stack (μCi/ml).

C_{SB} = gross activity of the sample (batch) (μCi/ml).

T_F = tank flow rate (ml/sec).

C_{SV} = gross activity of the sample (vent) (μCi/ml).

V_F = vent flow rate (ml/sec).

The next step is to calculate what fraction of an MPC the above radiogas mixture represents in the stack. This is done as follows:

$$\sigma_S = \frac{(\sigma_B * T_F) + (\sigma_V * V_F)}{T_F + V_F}$$

Where:

σ_S = flow weighted fraction of an MPC in the stack discharge (unitless).

σ_B = fraction of an MPC in the sample (batch) calculated by $\sum_i A_{iB}/MPC_i$.

Where:

A_{iB} = activities present in sample (batch).

MPC_i = MPC limits in 10CFR20. See Table 2-2, column 1 in this manual.

T_F = same as defined above.

σ_V = fraction of an MPC in the sample (vent) calculated by $\sum_i A_{iV}/MPC_i$.

Where: A_{iV} = activities present in sample (vent).

MPC_i = same as defined above.

V_F = same as defined above.

The boundary concentration may then be calculated as follows:

$$C_B = C_S/\sigma_S * f$$

where:

C_B = maximum concentration at the site boundry for each stack (μCi/ml).

C_S = same as defined above.

σ_S = same as defined above.

f = arbitrary fraction of 1 MPC assigned to the monitor.

NOTE: For calculations of continuous releases (vent stacks), the expression for the batch release becomes zero.

Using the value for C_B above, the next step is to calculate the monitor concentration as follows:

$$C_M = C_B/(F * \overline{(X/q)}_V * 1E\text{-}6)$$

C_M = concentration at the monitor (μCi/ml).

C_B = same as defined above.

F = the flowrate of radioactive gaseous effluents at the release point being considered (ml/sec).

$\overline{(X/q)}_V$ = atmospheric dispersion factor. We use 2.8E-6 sec/m^3 for this variable until it is replaced by more current data. (This value is found in the ANO-2 FSAR on Page 2.3-30.)

1E-6= conversion factor (m^3/ml).

The setpoint for the monitor is then calculated as follows:

$$S = C_M * K + B$$

Where:

S = Monitor setpoint (counts/sec).

C_M= same as defined above.

K = conversion factor determined from the calibration curve of the monitor (K is the slope of the line) (counts/sec vs. μCi/ml).

B = background count rate at the monitor (counts/sec).

3.2 Airborne Release Rates - Implementation of 10 CFR 20

The section provides the calculational methodology to implement the Radioactive Gaseous Effluents - Dose Rate specifications. It should be noted that these specifications are site related not unit related.

As stated in the technical specificatins, the instantaneous dose rate in unrestricted areas due to radioactive materials in gaseous effluents from the site shall be limited to:

a) The dose rate limit for a calendar year for noble gases shall be $\leq$ 500 mrem to the total body, and $\leq$ 3000 mrem to the skin, and

b) The dose rate limit for a calendar year for all radioiodines and for all radioactive materials in particulate form and radionuclides other than noble gases with half lives greater than 8 days shall be $\leq$ 1500 mrem to any organ.

3.2.1 Noble Gas Dose Rate

The dose rate for noble gases can be calculated from:

1) $DR = 10^6 \times \sum_i [K_i \times \overline{(X/q)}_v \times Q_i] \leq 500$ mrem/yr to the total body

2) $DR = 10^6 \times \sum_i [(L_i + 1.1M_i) \times \overline{(X/q)}_v \times Q_i] \leq 3000$ mrem/yr to the skin

Where:

DR = dose rate for time and organ in question (mrem/yr)

10^6 = Conversion factors, pCi/μCi.

$Q_i = \sum_j (A_{ij} F_j)$ Where:

A_{ij} = Activity of isotope i (μCi/ml) from release point j

F_j = Flow rate from vent j (ml/sec)

$\overline{(\chi/q)}_v$ = 2.8×10^{-6} sec/m^3 for all vent releases.

M_i = The air dose factor due to gamma emissions for each identified noble gas radionuclide, in mrad/yr per μCi/m^3 (unit conversion constant of 1.1 mrem/mrad converts air dose to skin dose). (see Table 3-1)

K_i = The total body dose factor due to gamma emissions for each identified noble gas radionuclide, in mrem/yr per pCi/m^3 (see Table 3-1)

L_i = The skin dose factor due to beta emissions for each identified noble gas radionuclide, in mrem/yr per μCi/m^3 . (see Table 3-1)

In equation 1), $(\chi/q)_v$ is constant and K_i is constant for a given radioisotope, and their product will be constant for a given isotope. The equation simplifies to:

3) $DR = \sum_i XK_i * Q_i \leq 500$ mrem/yr to the total body

where; $XK_i = \overline{(\chi/q)}_v \times k_i \times 10^6$, and all other variables are defined above.

In equation 2) $(\chi/q)_v$ is constant and $(L_i + 1.1M_i)$ is constant for any given radioisotope, and therefore, their product is constant. Equation 2 simplifies to:

4) $DR = \sum_i (LM_i * Q_i) \leq 3000$ mrem/yr to the skin.

where; $LM_i = 10^6 * \overline{(\chi/q)}_v * (L_i + 1.1M_i)$

See table 3-1 to locate tabulated values.

3.2.2 Radioiodine and Particulate Dose Rate.

The Dose rate for radioiodines, radioactive materials in particulate form and radionuclides other than noble gases with half lives > 8 days may be calculated from:

5) $L_{\tau} = \sum_{i} (P_i \star W \star Q_i) \leq$ 1500 mrem/yr to any organ

Where;

DR_{τ} = Dose rate to organ τ for the time period in question. (mrem/yr)

P_i = The dose parameter for radionuclides other than noble gases for the inhalation pathway, in mrem/yr per $\mu Ci/m^3$ and for food and ground plane pathways, in m^2 (mrem/yr per $\mu Ci/sec$). The dose factors are based on the critical individual organ and most restrictive age group (infant).

P_i is determined in equations 6, 7, and 8.

Q_i = The release rate of radionuclides, i, in gaseous effluent from all vent releases, in $\mu Ci/sec$

W = The dispersion parameter for estimating the dose to an individual due to all vent releases:

$W = 2.8 \times 10^{-6}$ sec/m^3 for the inhalation pathway.

$W = 1.4 \times 10^{-8}$ meters $^{-2}$, for the food and ground plane pathways.

Equation 5 considers the infant as the most restrictive age group. The organs that will be considered are the skin, bone, liver, total body, thyroid, kidney, lung and GI-LLI. There are three major pathways that may contribute to the doserate to the above items. The pathways considered will be inhalation, ground plane and food. The food pathway for the infant is considered to be from milk only. All three pathways will contribute to the whole body dose, while the skin will be affected by only the ground plane pathway, and the other organs will be affected by only the inhalation and food pathways.

The dispersion factor for the inhalation pathway will be $(\overline{\chi/q})_v$, while $(\overline{d/q})_v$ will be used for the ground plane and food pathways.

The equations for the pathways to an infant are:

6) $P_i = 1.4 \times 10^9 \times DFA$; for inhalation

7) $P_i = 8.76 \times 10^9 \times DFG \times (1-e^{-\lambda x 3.17 x 10^7})/\lambda_i$ for ground plane

8) $P_i = 2.4 \times 10^{10} \times r \times F_i \times DFL_i \times (e^{-\lambda_i x 1.73 x 10^5})/(\lambda_i + 5.73 \times 10^{-7})$ for food

where;

DFA_i = maximum organ inhalation dose factor for radionuclide, i. (mrem/pCi).

DFG_i = ground plane dose conversion factor for radionuclide, i , (mrem/hr per pCi/m^2) (see Table 3-1)

λ_i = decay constant for radionuclide, i (sec^{-1})

r = fraction of deposited activity retained on cows' feed grass (=1 for radioiodines, and .2 for particulates).

F_i = stable element transfer coefficient (day/liter) (from Reg. Guide 1.109 Table E-1).

DFL_i = organ ingestion dose factor for radionuclide, i .(mrem/pCi)

1.4×10^9 = Conversion factor, 10^6 pCi/μCi x 1400 m^3/yr (assume infant breathing rate)

8.76×10^9 = conversion factor, 10^6 pCi/μCi x 8760 hr/yr

2.4×10^{10} = conversion factor, (liter m^2 pCi per yr day μCi)

Since $(\overline{\chi/q})_v$ and $(\overline{d/q})_v$ (and therefore W) are assumed to be constant in equation 5, equation 5 may be reduced to

9) $DR = \sum_i PW_i \times Qi \leq 1500$ mrem/yr to any organ.

where $PW_i = (P_{i\ \text{inhalation}} \times (\overline{\chi/q})_v) + (P_{i\ \text{ground plain}} \times (\overline{d/q})_v) + (P_{i\ \text{Food}} \times (\overline{d/q})_v)$

and is determined for each organ.

See Table 3-1 to locate tabulated values of PW_i.

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3.3 Dose Due to Noble Gases

The air dose in unrestricted areas due to noble gases released in gaseous effluents shall be less than or equal to 5 mrad for gamma radiation and 10 mrad for beta radiation for any calendar quarter for each unit. The general objective of less than or equal to 10 mrad of gamma radiation and 20 mrad of beta radiation for a calendar year per unit (2.5 mrad and 5 mrad respectively per quarter) should be used for planning releases.

The air dose in unrestricted area due to noble gases released in gaseous effluents should be determined by the following expressions:

During any calendar quarter, for gamma radiation:

1) $3.17 \times 10^{-8} \sum_i \left[M_i \left[(\overline{x/Q})\, \tilde{Q}_i + (\overline{x/q})\, \tilde{q}_i \right] \right] = D \text{ mrad}$

During any calendar quarter, for beta radiation:

2) $3.17 \times 10^{-8} \sum_i \left[N_i \left[(\overline{x/Q})\, \tilde{Q}_i + (\overline{x/q})\, \tilde{q}_i \right] \right] = D \text{ mrad}$

where:

M_i = The air dose factor due to gamma emissions for each identified noble gas radionuclide, in mrad/yr per $\mu Ci/m^3$

N_i = The air dose factor due to beta emissions for each identified noble gas radionuclide, in mrad/yr per $\mu Ci/m^3$

$(\overline{x/Q})$ = 0 sec/m^3 For vent releases. The highest calculated annual average relative concentration for area at or beyond the unrestricted area boundary for long term releases (greater than 500 hrs/year).

$(\overline{x/q})$ = 2.8×10^{-6} sec/m^3 For vent releases. The relative concentration for areas at or beyond the unrestricted area boundary for short term releases (equal to or less than 500 hrs/year).

$\tilde{Q}_i$ = The average release of noble gas radionuclides in gaseous effluents, i, for long term releases (greater than 500 hrs/yr) from all vents, in μCi . Releases shall be cumulative over the calendar quarter or year as appropriate.

$\tilde{q}_i$ = The average release of noble gas radionuclides in gaseous effluents, i, for short term releases (equal to or less than 500 hrs/year) from all vents, in μCi . Releases shall be cumulative over the calendar quarter or year as appropriate.

D = The "dose" for the type of radiation and time f in question.

3.17×10^{-8} = The inverse of the nu er of seconds per year.

The above equations have been simplified from the equations found in NuReg 0133 Rev. 0, because we have no free-standing stacks. We will simplify the equation further by saying that there are no long term releases. We will take weekly samples from the unit vents (continuous release points) and use a release period of 168 hours per sample (i.e. consider items as short term releases). Individual samples will be taken for each batch release.

Equation "1") has been reduced to;

$$D = 3.17 \times 10^{-8} \Sigma MX_i \, q_i$$

and equation "2") has been reduced to;

$$D = 3.17 \times 10^{-8} \Sigma NX_i \, q_i$$

Where:

$MX_i = M_i \times \overline{(\chi/q)} \times 10^6$ pCi/μCi

$NX_i = N_i \times \overline{(\chi/q)} \times 10^6$ pCi/μCi (see table 3-1)

q_i = has been previously defined.

3.4 Dose Due to Radioiodines, and Particulates in Gaseous Effluents

3.4.1 Dose Equation-Particulates, etc.

The dose to an individual from radioiodines, radioactive materials in particulate form and radionuclides other than noble gases, with half lives greater than 8 days in gaseous effluents released to unrestricted areas shall be as specified in the technical specifications. (Radioactive Gaseous Effluents-Dose Particulates) This section will provide the calculational methodology for verification that the limits are not exceeded.

$$D_\tau = 3.17 \times 10^{-8} \sum_i R_i \left[W_s \tilde{Q}_{is} + W_s \tilde{q}_{is} + W \tilde{Q}_i + w \tilde{q}_i \right]$$

where:

D_τ = Dose to the whole body or any organ.

$\tilde{Q}_i$ = The releases of radionuclides, radioactive materials in particulate form and radionuclides other than noble gases in gaseous effluents, i, for long term releases greater than 500 hrs/yr., in μCi. Releases shall be cumulative over the calendar quarter or year as appropriate.

W = The dispersion parameter for estimating the dose to an individual at the controlling location for long term releases (greater than 500 hrs/yr.):

$W = (\overline{\chi/Q})$ for the inhalation pathway, in sec/m^3

$W = (\overline{D/Q})$ for the food and ground plane pathways in $meters^{-2}$.

w = The dispersion parameter for estimating the dose to an individual at the controlling location for short term releases (equal to or less than 500 hrs/yr.):

$w = 2.8 \times 10^{-6}$ for the inhalation pathway in sec/m^3

$w = 1.4 \times 10^{-8}$ for the food and ground plane pathway in $meters^{-2}$.

3.17×10^{-8} = The inverse of the number of seconds in a year.

R_i = The dose factor for organ τ, for each identified radionuclide, i, in m^2(mrem/yr) per μCi/sec or mrem/yr per μCi/m^3 calculation method in section 3.4.2.

A dispersion parameter of 2.8×10^{-6} sec/m^3 (as per ANO Unit II, F.S.A.R., Section 2.3.4.4., Page 2.3-30) will be used for "w" for the inhalation pathway. The reasons for using this value are as follows:

a) The majority of our releases are going to be in the 8-24 hour range (these being waste gas decay tanks and reactor building purges.)

b) The majority of the gaseous activity released from the site will be released from the waste gas decay tanks and reactor building purges, within the time frame of 8 to 24 hours.

A dispersion parameter of 1.4×10^{-8} $meters^{-2}$ will be used for the food on ground plane pathways. This assumes a deposition velocity of 5×10^{-3} meters/sec; as obtained from the ANO-2 F.S.A.R., Page 11.3-15.

The quantity W.Q. (that is the values for long term releases) is dropped because we will not consider long term releases. (see Section 3.3)

There are no free standing stacks at ANO, therefore, we will delete the terms pertaining to stacks.

The previous equation reduces to:

$$D_\tau = 3.17 \times 10^{-8} \sum_i Rw_i \, q_i$$

where $Rw_i = R_i \times w_i$ for nuclide i, for organ τ, (see Table 3-1 to locate the tabulated values).

3.4.2 Calculation of R_i (or Rw_i)

3.4.2.0 Introduction:

This part of the ODCM deals with the computation of pathway dose factors (R_i). These factors are for isotopes found in gaseous releases (the isotopes being in particulate form, radioiodine and tritium). Each potential pathway for the isotope to enter man is expressed in the form of an equation. These equations are then summed together so the total dose contribution for each isotope can be obtained.

There are four age groups for which these factors are to be considered: adult, teenager, child and infant. The infant and child are the least tolerant to radiation. Thus, they also possess the most restrictive limits as to how much radioactive gas can be released per unit time. Therefore, only these two age groups will be calculated, since it becomes apparent that if the limits for these two age groups are met, then the limits for the less restrictive teenager and adult groups must have been satisfied also.

In developing the R_i values, separate expressions are written for each of the potential pathways. These expressions are denoted by $R_i^G[D/Q]$, $R_i^I[\chi/Q]$, $R_i^C[D/Q]$, $R_i^M[D/Q]$ and $R_i^V[D/Q]$, where the superscripts G, I, C, M and V refer to ground plane, inhalation, cow's milk, goat and vegetation, respectively. The 'argument' notation, [ ], indicates the appropriate dispersion parameter, w, to be applied with the R_i factor. In the case of tritium, the dispersion parameter, w, is always taken as $(\overline{\chi/Q})$. The R_i values are listed in tabular form at the end of the ODCM.

Each of the five pathways mentioned in the above paragraph will, at this time, be considered and reduced to as simple an expression as possible.

3.4.2.1. Inhalation Pathway Factor, $R_i^I[\chi/Q]$

$$R_i^I[\chi/Q] = [K'(BR)_a\ (DFA_i)_a * \chi/Q](\text{mrem/yr per } \mu Ci/m^3)$$

where:

χ/Q = 2.8 E-6 sec/m^3

K' = a constant of unit conversion, 10^6 pCi/μCi.

Combining terms: $\chi/Q \times K' = (2.8E\text{-}6)(10^6) = 2.8$

$$R_i^I[\chi/Q] = 2.8(BR)_a(DFA_i)_a$$

$(BR)_a$ = the breathing rate of the receptor of age group (a) in m^3/yr

$(DFA_i)_a$ = the maximum organ inhalation dose factor for the receptor of age group (a) for the ith radionuclide, in mrem/pCi. The total body is considered as an organ in the selection of $(DFA_i)_a$.

The breathing rates $(BR)_a$ for the various age groups are tabulated below, as given in Table E-5 of the Regulatory Guide 1.109.

Age Group (a)	Breathing Rate (m^3/yr)
Infant	1400
Child	3700
Teen	8000
Adult	8000

Inhalation dose factors ($DFA_i)_a$ for the various age groups are given in Tables E-7 through E-10 of Regulatory Guide 1.109. (See Table 3-1)

3.4.2.2. Ground Plane Pathway Factor, R_i^G [D/Q]

$R_i^G[D/Q] = [K'K''(SF)DFG_i[(1-e^{-\lambda_i t})/\lambda_i]\ 5E\text{-}3\chi/Q]$ (m^2mrem/yr per μCi/sec)

Where:

K' = a constant of unit conversion, 10^6 pCi/μCi.

K'' = a constant of unit conversion, 8760 hr/yr.

λ_i = the decay constant for the ith radionuclide, sec^{-1}.

t = the exposure time, 4.73×10^8 sec (15 years).

DFG_i = the ground plane dose conversion factor for the ith radionuclide (mrem/hr per pCi/m^2).

5E-3 = m/sec disposition factor.

SF = the shielding factor (dimensionless).

χ/Q = 2.8E-6(sec/m^3)

A shielding factor of 0.7 is suggested in Table E-15 of Regulatory Guide 1.109. A tabulation of DFG_i values is presented in Table E-6 of Regulatory Guide 1.109.

Combining terms, the above equation can be expressed in the following manner:

$R_i^G[D/Q] = ([6.13E9\ DFG_i[(1-e^{-\lambda_i 4.73E8})/\lambda_i] \times 5E\text{-}3 \times 2.8E\text{-}6$

where: 6.13 E9 = K' x K'' x 0.7

NOTE: This equation is the same for all age groups.

Combining terms: $6.13 \times 10^9 \times 5 \times 10^{-3} \times 2.8 \times 10^{-6}$

$R_i^G[D/Q] = 85.8\ DFG_i[(1-e^{-\lambda_i 4.73E8})/\lambda_i]$

3.4.2.3. Grass-Cow-Milk Pathway Factor, $R_i^C[D/Q]$

$$R_i^C[D/Q] = \left[K' \frac{Q_F\,(U_{ap})}{\lambda_i + \lambda_w} F_m(r)(DFL_i)_a \left[\frac{f_p f_s}{Y_p} + \frac{(1-f_p f_s)e^{-\lambda_i t_h}}{Y_s}\right] e^{-\lambda_i t_f}\right]$$

$$\times\ 5E\text{-}3 \times \chi/Q\ (m^2 \times mrem/yr\ \text{per}\ \mu Ci/sec)$$

The quantity $f_p f_s = 1$ by definition (unless site specific data is available via land census), and so everything within the inner brackets reduces to $[1/Y_p]$, or [1/0.7] or [1.43], (see below)

$\therefore$ K' x Q_F x (U_{ap}) [1.43] = 2.36E10

$\therefore$ The equation can be written:

$$R_i^C[D/Q] = \left[\frac{(2.36E10)(Fm)(r)(DFL_i)_a(e^{-\lambda_i 1.73E5})}{(\lambda_i + 5.73E\text{-}7)}\right] \chi/Q * 5E\text{-}3$$

Where:

χ/q = 2.8E-6 sec/m^3

K' = a constant of unit conversion, 10^6 pCi/μCi.

Q_F = the cow's consumption rate, in kg/day wet weight.

U_{ap} = the receptor's milk consumption rate for age (a), in liters/yr.

Y_p = the agricultural productivity by unit area of pasture feed grass, in kg/m^2.

Y_s = the agricultural productivity by unit area of stored feed, in kg/m^2.

F_m = the stable element transfer coefficients, in days/liter.

r = fraction of deposited activity retained on cow's feed grass.

$(DFL_i)_a$ = the maximum organ ingestion dose factor for the ith radionuclide for the receptor in age group (a), in mrem/pCi.

λ_i = the decay constant for the ith radionuclide, in sec^{-1}.

λ_w = the decay constant for removal of activity on leaf and plant surfaces by weathering, 5.73×10^{-7} sec^{-1} (corresponding to a 14 day half-life).

t_f = the transport time from pasture to cow, to milk, to receptor, in sec.

t_h = the transport time from pasture, to harvest, to cow, to milk, to receptor, in sec.

f_p = fraction of the year that the cow is on pasture (dimensionless).

f_s = fraction of the cow feed that is pasture grass while the cow is on pasture (dimensionless).

5E-3 = m/sec disposition factor.

Combining terms: (2.36E10)(2.8E-6)(5E-3) = 330

$$R_i^C[D/Q] = \frac{(330)(Fm)(r)(DFL_i)_a\,(e^{-\lambda_i 1.73E5})}{(\lambda_i + 5.73E\text{-}7)}$$

SPECIAL NOTE: The above equation is applicable in the case that the milk animal is a goat.

Milk cattle are considered to be fed from two potential sources, pasture grass and stored feeds. Following the development in Regulatory Guide 1.109, the values of f_p and f_s will be considered unity, in lieu of site specific information provided in the annual land census report by the licensee.

Tabulated below are the appropriate parameter values and their reference to Regulatory Guide 1.109. In the case that the milk animal is a goat, rather than a cow, refer to Regulatory Guide 1.109 for the appropriate parameter values.

Parameter	Value	RG. 1.109
r (dimensionless)	1.0 for radioiodine	E-15
	0.2 for particulates	E-15
F_m (days/liter)	Each stable element	E-1
U_{ap} (liters/yr)-Infant	330	E-5
-Child	330	E-5
-Teen	400	E-5
-Adult	310	E-5
$(DFL_i)_a$(mrem/pCi)	Each radionuclide	E-11 to E-14
Y_p (kg/m^2)	0.7	E-15
Y_s (kg/m^2)	2.0	E-15
t_f (seconds)	1.73 x 10^5 (2 days)	E-15
t_h (seconds)	7.78 x 10^6 (90 days)	E-15
Q_F (kg/day)	50 (cow), 6 (goat)	E-3

The concentration of tritium in milk is based on the airborne concentration rather than the deposition. Therefore, the R_i^C is based on [χ/Q] :

$$R_i^C[\chi/Q] = [K'K''' F_m Q_F U_{ap} (DFL_i)_a [0.75(0.5/H)] \chi/q] \text{(mrem/yr per } \mu\text{Ci/m}^3)$$

where: χ/q = 2.8E-6 sec/m^3

K''' = a constant on unit conversion, 10^3 gm/kg.

H = absolute humidity of the atmosphere, in gm/m^3.

0.75 = the fraction of total feed that is water.

0.5 = the ratio of the specific activity of the feed grass water to the atmospheric water.

Other parameters and values are given above. The value of H may be considered as 8 grams/meter^3, in lieu of site specific information (as per NuReg 0133, 5.3.1.3., Page 34, Paragraph 1).

Combining terms χ/Q (K' x K''' x U_{ap} x (0.75(0.5/8)) = 4.5E4)

$$\therefore R_i^C[\chi/Q] = (4.5E4)(F_m)(DFL_i)_a$$

3.4.2.4. Grass-Cow-Meat Pathway Factor, $R_i^M[D/Q]$

The integrated concentration in meat follows in a similar manner to the development for the milk pathway, therefore:

$$R_i^M[D/Q] = \left[K' \frac{Q_F(U_{ap})}{\lambda_i + \lambda_w} F_f(r)(DFL_i)_a \left[\frac{f_p f_s}{Y_p} + \frac{(1-f_p f_s)e^{-\lambda_i t_h}}{Y_s}\right] e^{-\lambda_i t_f}\right]$$

x 5E-3 * χ/Q (m^2.mrem/yr per µCi/sec)

where:

5E-3 = m/sec deposition factor.

F_f = the stable element transfer coefficients, in days/kg.

U_{ap} = the receptor's meat consumption rate for age (a), in kg/yr.

t_f = the transport time from pasture to receptor, in sec.

t_h = the transport time from crop field to receptor, in sec.

χ/q = 2.8E-6 sec/m^3.

Tabulated below are the appropriate parameter values and their reference to Regulatory Guide 1.109:

Parameter		Value	RG 1.109
r (dimensionless)		1.0 for radioiodine	E-15
		0.2 for particulates	E-15
F_f (days/kg)		Each stable element	E-1
U_{ap} (kg/yr)	- Infant	0	E-5
	- Child	41	E-5
	- Teen	65	E-5
	- Adult	110	E-5
$(DFL_i)_a$ (mrem/pCi)		Each radionuclide	E-11 to E-14
Y_p (kg/m^2)		0.7	E-15
Y_s (kg/m^2)		2.0	E-15
t_f (seconds)		1.73×10^6 (20 days)	E-15
t_h (seconds)		7.78×10^6 (90 days)	E-15
Q_F (kg/day)		50 (cow), 6 (goat)	E-3

The above equation can be reduced and rearranged to the following after inverting the appropriate values:

$$R_i^M[D/Q] = \left[\frac{(2.36E10)(F_f)(r)(DFL_i)_a\ (e^{-\lambda_i 1.73E6})}{(\lambda_i + 5.7E\text{-}7)}\right] * \chi/Q * 5E\text{-}3$$

Equation 3.4.2.4. was reduced in the same manner as was equation 3.4.2.3., and for the same reasons.

Combining terms: $(\chi/Q)(5E\text{-}3)(2.36E10) = 330$

$$R_i^M[D/Q] = \frac{(330)(F_f)(r)(DFL_i)_a(e^{-\lambda_i 1.73E6})}{(\lambda_i + 5.7E\text{-}7)}$$

The concentration of tritium in meat is based on its airborne concentration rather than the deposition. Therefore, the R_i^M is based on $[\chi/Q]$:

$$R_i^M[\chi/Q] = \left[K'K'''F_f Q_F U_{ap} (DFL_i)_a\ [0.75(0.5/H)]\ \chi/Q\right] \text{(mrem/yr per } \mu\text{Ci/m}^3\text{)}$$

where all terms are defined above and in Section 3.4.2.3. of this manual.

The equation for tritium contribution via the meat pathway is reduced to the following expression.

$$R_i^M[\chi/Q] = 4.5E4 \times F_f \times (DFL_i)_a \quad \text{where:}$$

$$4.5E4 = \left[K' \times K''' \times U_{ap} \times (0.75(0.5/8)\right] * \chi/Q$$

3.4.2.5. Vegetation Pathway Factor, $R_i^V[D/Q]$

The integrated concentration in vegetation consumed by man follows the expression developed in the derivation of the milk factor. Man is considered to consume two types of vegetation (fresh and stored) that differ only in the time period between harvest and consumption, therefore:

$$R_i^V[D/Q] = \left[K' \left[\frac{(r)}{Y_v(\lambda_i + \lambda_w)}\right] (DFL_i)_a \left[U_a^L f_L e^{-\lambda_i t_L} + U_a^S f_g e^{-\lambda_i t_h}\right]\right] * 5E\text{-}3 * \chi/Q \quad (m^2 \cdot mrem/yr \text{ per } \mu Ci/sec)$$

where:

χ/Q = 2.8E-6 sec/m^3.

K' = a constant of unit conversion, 10^6 pCi/μCi.

U_a^L = the consumption rate of fresh leafy vegetation by the receptor in age group (a), in kg/yr.

U_a^S = the consumption rate of stored vegetation by the receptor in age group (a), in kg/yr.

f_L = the fraction of the annual intake of fresh leafy vegetation grown locally.

f_g = the fraction of the annual intake of stored vegetation grown locally.

t_L = the average time between harvest of leafy vegetation and its consumption, in seconds.

t_h = the average time between harvest of stored vegetation and its consumption, in seconds.

Y_v = the vegetation areal density, in kg/m^2.

5E-3 = deposition factor (m/sec).

and all other factors are defined in Section 3.4.2.3. of this manual.

Tabulated below are the appropriate parameter values and their reference to Regulatory Guide 1.109.

Parameter			Value	RG1.109
r (dimensionless)			1.0 for radioiodines	E-1
			0.2 for particulates	E-1
$(DFL_i)_a$ (mrem/pCi		)	Each radionuclide	E-11 to E-14
U_a^L(kg/yr)	-	Infant	0	E-5
	-	Child	26	E-5
	-	Teen	42	E-5
	-	Adult	64	E-5
U_a^S (kg/yr)	-	Infant	0	E-5
	-	Child	520	E-5
	-	Teen	630	E-5
	-	Adult	520	E-5
f_L (dimensionless)			site specific (default = 1.0)	
f_g (dimensionless)			site specific (default = 0.76)	(see Ref. 6, Page 28)
t_L (seconds)			8.6×10^4 (1 day)	E-15
t_h (seconds)			5.18×10^6 (60 days)	E-15
Y_v (kg/m^2)			2.0	E-15

Rearranging the above equation and maintaining appropriate values:

$$R_i^V[D/Q] = \left[\frac{5E5(r)(DFL_i)_a[26e^{-\lambda i 8.64E4} \quad 395e^{-\lambda i 5.18E6}]}{(\lambda_i + 5.73E\text{-}7)}\right] * \chi/Q * 5E\text{-}3$$

Combining terms: $(5E5)(5E\text{-}3)(\chi/Q) = 7E\text{-}3$

$$R_i^V[D/Q] = \frac{(7E\text{-}3)(r)(DFL_i)_a\ [(26e^{-\lambda i 8.6E4} + 395e^{-\lambda_i 5.18E6})]}{(\lambda_i + 5.73E\text{-}7)}$$

The concentration of tritium in vegetation is based on the airborne concentration rather than the deposition. Therefore, the R_i^V is based on [χ/Q]:

$$R_i^V[\chi/Q] = \left(K'K'''[U_a^L f_L + U_a^S f_g]\ (DFL_i)_a\ [0.75(0.5/H)] * \chi/Q\right) \text{(mrem/yr per } \mu Ci/m^3)$$

where all terms have been defined above and in Section 3.4.2.3. of this manual.

This equation reduces to the following after inserting the appropriate value:

$$Ri[\chi/Q] = 7.42E4 \times (DFL_i)_a$$

where: 7.42E4 = $\left(K' \times K''' \times [U_a^L f_L + V_a^S f_g] \times [0.75(0.518)]\right) * \chi/Q$

Calculation for the Infant

A value of zero is assigned to the U_{ap} parameter in the grass-cow-meat pathway for the infant. A zero value is also assig to the U_a^L and U_a^S parameters in the grass-cow-vegetation pathway. The reason for this is that it is assumed that there is zero consumption via the meat and vegetation pathways for an infant. Therefore:

$$R_i = R_i^I[\chi/Q] + R_i^G[D/Q] + R_i^C[D/Q]$$

after substituting the expanded expressions for the various pathways considered here, the expression becomes:

$$R_i = [(3920)(DFA_i)_a] + (85.8)(DFG_i)([1-e^{-\lambda_i 4.73E8}]/\lambda_i) + \frac{(330)(F_m)(r)(DFL_i)_a\ (e^{-\lambda_i 1.73E5})}{(\lambda_i + 5.73E\text{-}7)}$$

Where: 3920 = 2.8 $(BR)_a$ for an infant.

1.0E-2 = F_m as per table E-1 in NuReg 1.109 (for tritium).
3.08 E-7 = $(\ DFL_i\ )_a$ for tritium as per Table E-14 in NuReg 1.109.
All other terms as defined previously. The tritium factor is calculated as follows:

$$R_i^I[\chi/Q] + R_i^C[\chi/Q] = (2.8(BR)_a\ (DFA_i)_a) + (4.5E4)(F_m)(DFL_i)_a$$

Substituting values the equation becomes:

$$R_i = [2.8(1400)(4.62E\text{-}7)] + [4.5E4(1.0E\text{-}2)(3.08E\text{-}7)] = 1.95E\text{-}3$$

Calculations for the Child

All five pathways are applicable for the child, therefore, the summation for each isotope is:

$$R_i = R_i^I[\chi/Q] + R_i^G[D/Q] + R_i^C[D/Q] + R_i^M[D/Q] + R_i^V[D/Q], \text{ or}$$

$$R_i = \left((10360)(DFA_i)_a) + (85.8DFG_i[(1-e^{-\lambda_i 4.73E8})/\lambda_i]\right) + \left(\frac{(330)(F_m)(r)(DFL_i)_a(e^{-\lambda_i 1.73E5})}{(\lambda_i + 5.7E\text{-}7)}\right) + \left(\frac{(330)(F_f)(r)(DFL_i)_a(e^{-\lambda_i 1.73E6})}{(\lambda_i + 5.7E\text{-}7)}\right) + \left((7E\text{-}3)(r)(DFL_i)_a\ [(26e^{-\lambda_i 8.6E4} + 395e^{-\lambda_i 5.18E6})]\right)$$

1319 074

where:

$10360 = (2.8)(BR)_a = (2.8)(3700)$

The tritium factor for the child is calculated as follows:

$$R_i = R_i^I\,[\chi/Q] + R_i^C\,[\chi/Q] + R_i^M[\chi/Q] + R_i^V[\chi/Q] \text{ or}$$
$$R_i = [2.8(BR)_a(DFA_i)_a] + [4.5E4(F_m)(DFL_i)_a] + [4.5E4(F_f)(DFL_i)_a\,] + [7.42E4(DFL_i)_a\,]$$

Substituting values:

$$R_i = [2.8(3700)(3.04E\text{-}7)] + [4.5E4(1.0E\text{-}2)(3.04E\text{-}7)] + [4.5E4(1.2E\text{-}2)(3.04E\text{-}7)] + [7.42E4(3.04E\text{-}7)]$$

$R_i = 2.6E\text{-}2$

Table 3-1

Contents of ODCM Record File

Variable	Record #	Elements	Description
$A_{i\tau}$	62	16-100	Adult bone dose factor, liquid release
$A_{i\tau}$	63	16-100	Adult liver dose factor, liquid release
$A_{i\tau}$	64	16-100	Adult total body dose factor, liquid release
$A_{i\tau}$	65	16-100	Adult thyroid dose factor, liquid release
$A_{i\tau}$	66	16-100	Adult kidney dose factor, liquid release
$A_{i\tau}$	67	16-100	Adult lung dose factor, liquid release
$A_{i\tau}$	68	16-100	Adult GI-LLI dose factor, liquid release
BF_I	61	16-100	Bio-accummulation factors for freshwater fish (Reg Guide 1.109 Table A-1)
DFA_i	31	16-100	Infant inhalation dose factor for bones
DFA_i	32	16-100	Infant inhalation dose factor for liver
DFA_i	33	16-100	Infant inhalation dose factor for total body
DFA_i	34	16-100	Infant inhalation dose factor for thyroid
DFA_i	35	16-100	Infant inhalation dose factor for kidneys
DFA_i	36	16-100	Infant inhalation dose factor for lungs
DFA_i	37	16-100	Infant inhalation dose factor for GI-LLI
DFA_i	46	16-100	Child inhalation dose factor for bone
DFA_i	47	16-100	Child inhalation dose factor for liver
DFA_i	48	16-100	Child inhalation dose factor for total body
DFA_i	49	16-100	Child inhalation dose factor for thyroid
DFA_i	50	16-100	Child inhalation dose factor for kidney
DFA_i	51	16-100	Child inhalation dose factor for lung
DFA_i	52	16-100	Child inhalation dose factor for GI-LLI
DFG_I	21	16-100	Skin external dose factor for standing on contaminated ground. (R.G. 1.109 Table E-9)

Variable	Record #	Elements	Description
DFG_i	22	16-100	Total body external dose factor for standing on contaminated ground (R.G. 1.109 Table E-9)
DFL_i	24	16-100	Infant ingestion dose factor for bone
DFL_i	25	16-100	Infant ingestion dose factor for liver
DFL_i	26	16-100	Infant ingestion dose factor for total body
DFL_i	27	16-100	Infant ingestion dose factor for thyroid
DFL_i	28	16-100	Infant ingestion dose factor for kidney
DFL_i	29	16-100	Infant ingestion dose factor for lung
DFL_i	30	16-100	Infant ingestion dose factor for GI-LLI
DFL_i	39	16-100	Child ingestion dose factor for bone
DFL_i	40	16-100	Child ingestion dose factor for liver
DFL_i	41	16-100	Child ingestion dose factor for total body
DFL_i	42	16-100	Child ingestion dose factor for thyroid
DFL_i	43	16-100	Child ingestion dose factor for kidney
DFL_i	44	16-100	Child ingestion dose factor for lung
DFL_i	45	16-100	Child ingestion dose factor for GI-LLI
F_f	53	16-100	Stable element transfer data-meat (R.G. 1.109, Table E-1)
F_m	23	16-100	Stable element transfer data-cow (R.G. 1.109, Table E-1)
HL_i	38	1-100	Radioisotope halflife in seconds
K_i	21	1-15	Gamma body dose factor (R.G. 1.109, Table B-1)
LM_i	5	1-15	Skin dose factors-gas release, $(L_i + 1.1\, M_i) \times (\overline{\chi/q}) \times 10^6$ L_i values from Reg. Guide 1.109
M_i	23	1-15	Gamma air dose factors-gas release (R.G. 1.109, Table B-1)
MX_i	6	1-15	$M_i \times (\overline{\chi/q})$ for gas release
N_i	24	1-15	Beta air dose factor-gas release (R.G. 1.109, Table B-1)

Variable	Record #	Elements	Description
NX_i	7	1-15	$N_i \times (\overline{\chi/q})$
PW_i	4	16-100	Infant unshielded skin dose factor-gas release, $\Sigma P_i \times W$ for the ground plane, inhalation, and food pathways
PW_i	5	16-100	Infant unshielded total body doses factor-gas release
PW_i		16-100	Infant bone dose factors-gas release
PW_i	7	16-100	Infant liver dose factor-gas release
PW_i	8	16-100	Infant thyroid dose factor-gas release
PW_i	9	16-100	Infant kidney dose factor-gas release
PW_i	10	16-100	Infant lung dose factor-gas release
PW_i	11	16-100	Infant GI-LLI dose factor-gas release
RW_i	12	16-100	Infant shielded skin dose factors-gas release (ground plane)
RW_i	13	16-100	Infant shielded total body dose factor-gas release
RW_i	14	16-100	Child bone dose factor-gas release
RW_i	15	16-100	Child liver dose factor-gas released
RW_i	16	16-100	Child thyroid dose factor-gas release
RW_i	17	16-100	Child kidney dose factor-gas release
RW_i	18	16-100	Child lung dose factor-gas release
RW_i	19	16-100	Child GI-LLI dose factor-gas release
RW_i	20	16-100	Child shielded total body dose factor-gas release
XK_i	4	1-15	$K_i \times (\overline{\chi/q}) \times 10^6$ total body dose rate factor-gas release

Variable	Record #	Elements	Description
NX_i	7	1-15	$N_i \times (\overline{\chi/q})$
PW_i	4	16-100	Infant unshielded skin dose factor-gas release, $\Sigma P_i \times W$ for the ground plane, inhalation, and food pathways
PW_i	5	16-100	Infant unshielded total body doses factor-gas release
PW_i	6	16-100	Infant bone dose factors-gas release
PW_i	7	16-100	Infant liver dose factor-gas release
PW_i	8	16-100	Infant thyroid dose factor-gas release
PW_i	9	16-100	Infant kidney dose factor-gas release
PW_i	10	16-100	Infant lung dose factor-gas release
PW_i	11	16-100	Infant GI-LLI dose factor-gas release
RW_i	12	16-100	Infant shielded skin dose factors-gas release (ground plane)
RW_i	13	16-100	Infant shielded total body dose factor-gas release
RW_i	14	16-100	Child bone dose factor-gas release
RW_i	15	16-100	Child liver dose factor-gas released
RW_i	16	16-100	Child thyroid dose factor-gas release
RW_i	17	16-100	Child kidney dose factor-gas release
RW_i	18	16-100	Child lung dose factor-gas release
RW_i	19	16-100	Child GI-LLI dose factor-gas release
RW_i	20	16-100	Child shielded total body dose factor-gas release
XK_i	4	1-15	$K_i \times (\overline{\chi/q}) \times 10^6$ total body dose rate factor-gas release

AR-41	2.475E-02	ZR-97	6.930E-02
KR-83M	2.117E-07	NB-94	0.000E-01
KR-85M	3.276E-03	NB-95	5.885E 00
KR-85	4.508E-05	MO-90	0.000E-01
KR-87	1.658E-02	MO-99	9.342E-02
KR-88	4.116E-02	TC-99M	4.223E-03
KR-89	4.648E-02	RU-103	2.537E 00
KR-90	4.368E-02	RU-106	5.048E 00
XE-131M	2.562E-04	AG-110M	5.154E 01
XE-133M	7.028E-04	CD-109	0.000E-01
XE-133	8.232E-04	CD-113M	0.000E-01
XE-135M	8.736E-03	SN-113	0.000E-01
XE-135	5.068E-03	SB-122	0.000E-01
XE-137	3.976E-03	SB-124	0.000E-01
XE-138	2.472E-02	SB-125	0.000E-01
H-3	0.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	9.944E-02
C-14	0.000E-01	I-131	4.181E-01
NA-24	2.776E-01	I-132	2.902E-02
P-32	0.000E-01	I-133	6.019E-02
K-40	0.000E-01	I-134	1.072E-02
CR-51	1.104E-01	I-135	5.970E-02
MN-54	1.809E 01	CS-134	4.618E 01
MN-56	2.144E-02	CS-136	3.369E 00
FE-55	0.000E-01	CS-137	1.883E 01
FE-59	6.382E 00	CS-138	8.510E-03
CO-56	0.000E-01	BA-139	2.369E-03
CO-57	0.000E-01	BA-140	4.671E-01
CO-58	8.685E 00	LA-140	4.361E-01
CO-60	7.283E 01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	9.512E-01
NI-65	7.015E-03	EU-152	0.000E-01
CU-64	1.375E-02	W-187	5.478E-02
ZN-65	1.111E 01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	4.706E-03	BI-214	0.000E-01
RB-88	7.573E-04	RA-226	0.000E-01
RB-89	2.981E-03	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	5.191E-04	NP-239	3.951E-02
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	5.155E-02	BBBBBBB	0.000E-01
SR-92	1.725E-02	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	1.058E-04	EEEEEEE	0.000E-01
Y-91M	2.321E-03	FFFFFFF	0.000E-01
Y-91	2.395E-02	GGGGGGG	0.000E-01
Y-92	4.269E-03	HHHHHHH	0.000E-01
Y-93	5.117E-03	IIIIIII	0.000E-01
ZR-95	5.689E 00	JJJJJJJ	0.000E-01

XK_i - elements 1→15, total body dose factor - gas release
$= K_i * (\chi/q) * 10^6$ (sec/yr per μCi/mrem)

Pw_i - elements 16→100, infant unshielded skin dose factor - gas release,
$= \Sigma P_i * W$ (mrem sec/yr μCi)

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AR-41	3.618E-02	ZR-97	5.959E-02
KR-83M	5.944E-05	NB-94	0.000E-01
KR-85M	7.876E-03	NB-95	5.015E 00
KR-85	3.805E-03	MO-90	0.000E-01
KR-87	4.625E-02	MO-99	6.666E-01
KR-88	5.345E-02	TC-99M	3.696E-03
KR-89	8.156E-02	RU-103	2.177E 00
KR-90	7.062E-02	RU-106	4.237E 00
XE-131M	1.813E-03	AG-110M	4.685E 01
XE-133M	3.790E-03	CD-109	0.000E-01
XE-133	1.944E-03	CD-113M	0.000E-01
XE-135M	1.234E-02	SN-113	0.000E-01
XE-135	1.112E-02	SB-122	0.000E-01
XE-137	3.881E-02	SB-124	0.000E-01
XE-138	3.993E-02	SB-125	0.000E-01
H-3	8.400E-03	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	2.237E-01
C-14	7.136E 00	I-131	2.049E 01
NA-24	4.899E-01	I-132	2.819E-02
P-32	8.858E 01	I-133	2.910E-01
K-40	0.000E-01	I-134	1.089E-02
CR-51	9.596E-02	I-135	6.018E-02
MN-54	1.557E 01	CS-134	1.377E 02
MN-56	1.814E-02	CS-136	3.376E 01
FE-55	3.417E-01	CS-137	7.712E 01
FE-59	7.659E 00	CS-138	8.951E-03
CO-56	0.000E-01	BA-139	2.106E-03
CO-57	0.000E-01	BA-140	5.933E-01
CO-58	8.282E 00	LA-140	3.850E-01
CO-60	6.490E 01	CE-139	0.000E-01
NI-63	1.731E 01	CE-144	1.318E 00
NI-65	6.036E-03	EU-152	0.000E-01
CU-64	1.335E-02	W-187	4.739E-02
ZN-65	1.349E 02	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	5.155E-03	BI-214	0.000E-01
RB-88	1.466E-03	RA-226	0.000E-01
RB-89	3.060E-03	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	5.230E 00	NP-239	3.417E-02
SR-90	4.485E 02	AAAAAAA	0.000E-01
SR-91	4.426E-02	BBBBBBB	0.000E-01
SR-92	1.553E-02	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	3.367E-04	EEEEEEE	0.000E-01
Y-91M	2.005E-03	FFFFFFF	0.000E-01
Y-91	6.522E-02	GGGGGGG	0.000E-01
Y-92	3.597E-03	HHHHHHH	0.000E-01
Y-93	3.751E-03	IIIIIII	0.000E-01
ZR-95	4.961E 00	JJJJJJJ	0.000E-01

LM_i - elements 1→15, skin dose factors - gas release
$= (L_i + 1.1\ M_i) * (\chi/q) * 10^6$ (mrem/μCi per yr/sec)

PW_i - elements 16→100, infant unshielded total body dose factor - gas release
$= \Sigma P_i * W$ (mrem sec/yr/ μCi)

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AR-41	2.604E-02	ZR-97	4.195E-04
KR-83M	5.404E-05	NB-94	0.000E-01
KR-85M	3.444E-03	NB-95	5.384E-02
KR-85	4.816E-05	MO-90	0.000E-01
KR-87	1.728E-02	MO-99	0.000E-01
KR-88	4.256E-02	TC-99M	3.989E-07
KR-89	4.844E-02	RU-103	5.769E-03
KR-90	4.564E-02	RU-106	2.458E-01
XE-131M	4.368E-04	AG-110M	5.532E 00
XE-133M	9.156E-04	CD-109	0.000E-01
XE-133	9.884E-04	CD-113M	0.000E-01
XE-135M	9.408E-03	SN-113	0.000E-01
XE-135	5.376E-03	SB-122	0.000E-01
XE-137	4.228E-03	SB-124	0.000E-01
XE-138	2.579E-02	SB-125	0.000E-01
H-3	0.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	3.011E-01
C-14	3.343E 01	I-131	3.889E 01
NA-24	2.506E-01	I-132	4.743E-03
P-32	2.285E 03	I-133	5.666E-01
K-40	0.000E-01	I-134	2.579E-03
CR-51	0.000E-01	I-135	1.255E-02
MN-54	0.000E-01	CS-134	5.210E 02
MN-56	0.000E-01	CS-136	2.804E 01
FE-55	1.980E 00	CS-137	7.351E 02
FE-59	3.235E 00	CS-138	1.415E-03
CO-56	0.000E-01	BA-139	4.155E-06
CO-57	0.000E-01	BA-140	3.583E 00
CO-58	0.000E-01	LA-140	1.416E-03
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	4.989E 02	CE-144	8.971E 00
NI-65	F.766E-06	EU-152	0.000E-01
CU-64	0.000E-01	W-187	9.079E-04
ZN-65	7.920E 01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	1.823E 02	NP-239	1.039E-03
SR-90	1.848E 03	AAAAAAA	0.000E-01
SR-91	4.611E-03	BBBBBBB	0.000E-01
SR-92	2.947E-05	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	9.222E-03	EEEEEEE	0.000E-01
Y-91M	1.141E-06	FFFFFFF	0.000E-01
Y-91	1.647E 00	GGGGGGG	0.000E-01
Y-92	4.586E-05	HHHHHHH	0.000E-01
Y-93	4.195E-04	IIIIIII	0.000E-01
ZR-95	3.231E-01	JJJJJJJ	0.000E-01

MX_i - elements 1→15, M * (χ/q) for gas release (mrad/μ Ci per yr/sec)

PW_i - elements 16→100, infant bone dose factor, gas release = ΣP_i * W (mrem sec/yr μCi)

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AR-41	2.604E-02	ZR-97	4.195E-04
KR-83M	5.404E-05	NB-94	0.000E-01
KR-85M	3.444E-03	NB-95	5.384E-02
KR-85	4.816E-05	MO-90	0.000E-01
KR-87	1.728E-02	MO-99	0.000E-01
KR-88	4.256E-02	TC-99M	3.989E-07
KR-89	4.844E-02	RU-103	5.769E-03
KR-90	4.564E-02	RU-106	2.458E-01
XE-131M	4.368E-04	AG-110M	5.532E 00
XE-133M	9.156E-04	CD-109	0.000E-01
XE-133	9.884E-04	CD-113M	0.000E-01
XE-135M	9.408E-03	SN-113	0.000E-01
XE-135	5.376E-03	SB-122	0.000E-01
XE-137	4.228E-03	SB-124	0.000E-01
XE-138	2.579E-02	SB-125	0.000E-01
H-3	0.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	3.011E-01
C-14	3.343E 01	I-131	3.889E 01
NA-24	2.506E-01	I-132	4.743E-03
P-32	2.285E 03	I-133	5.666E-01
K-40	0.000E-01	I-134	2.579E-03
CR-51	0.000E-01	I-135	1.255E-02
MN-54	0.000E-01	CS-134	5.210E 02
MN-56	0.000E-01	CS-136	2.804E 01
FE-55	1.980E 00	CS-137	7.351E 02
FE-59	3.235E 00	CS-138	1.415E-03
CO-56	0.000E-01	BA-139	4.155E-06
CO-57	0.000E-01	BA-140	3.583E 00
CO-58	0.000E-01	LA-140	1.416E-03
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	4.989E 02	CE-144	8.971E 00
NI-65	6.766E-06	EU-152	0.000E-01
CU-64	0.000E-01	W-187	9.079E-04
ZN-65	7.920E 01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	1.823E 02	NP-239	1.039E-03
SR-90	1.848E 03	AAAAAAA	0.000E-01
SR-91	4.611E-03	BBBBBBB	0.000E-01
SR-92	2.947E-05	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	9.222E-03	EEEEEEE	0.000E-01
Y-91M	1.141E-06	FFFFFFF	0.000E-01
Y-91	1.647E 00	GGGGGGG	0.000E-01
Y-92	4.586E-05	HHHHHHH	0.000E-01
Y-93	4.195E-04	IIIIIII	0.000E-01
ZR-95	3.231E-01	JJJJJJJ	0.000E-01

MX_i - elements 1→15, M * (χ/q) for gas release (mrad/μ Ci per yr/sec)

PW_i - elements 16→100, infant bone dose factor, gas release = ΣP_i * W (mrem sec/yr μCi)

Revision A

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	0.000E-01
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	8.400E-03	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	2.201E-01
C-14	7.136E 00	I-131	1.506E 04
NA-24	2.506E-01	I-132	4.743E-01
P-32	0.000E-01	I-133	1.502E 02
K-40	0.000E-01	I-134	1.247E-01
CR-51	1.662E-03	I-135	2.256E 00
MN-54	0.000E-01	CS-134	0.000E-01
MN-56	0.000E-01	CS-136	0.000E-01
FE-55	0.000E-01	CS-137	0.000E-01
FE-59	0.000E-01	CS-138	0.000E-01
CO-56	0.000E-01	BA-139	0.000E-01
CO-57	0.000E-01	BA-140	0.000E-01
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

PW_i - elements 16→100, infant thyroid dose factor - gas release
$= \Sigma P_i * W$ (mrem sec/μCi yr)

Revision A

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	0.000E-01
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-0	AG-110M	0.000E-01
XE-133M	0.000E-0	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	8.400E-03	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	2.201E-01
C-14	7.136E 00	I-131	1.506E 04
NA-24	2.506E-01	I-132	4.743E-01
P-32	0.000E-01	I-133	1.502E 02
K-40	0.000E-01	I-134	1.247E-01
CR-51	1.602E-03	I-135	2.256E 00
MN-54	0.000E-01	CS-134	0.000E-01
MN-56	0.000E-01	CS-136	0.000E-01
FE-55	0.000E-01	CS-137	0.000E-01
FE-59	0.000E-01	CS-138	0.000E-01
CO-56	0.000E-01	BA-139	0.000E-01
CO-57	0.000E-01	BA-140	0.000E-01
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

PW_i - elements 16→100, infant thyroid dose factor - gas release
$= \Sigma P_i * W$ (mrem sec/μCi yr)

Revision A

AR-41	0.000E-01	ZR-97	3.089E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.341E 00
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	3.775E-01
KR-88	0.000E-01	TC-99M	2.270E-03
KR-89	0.000E-01	RU-103	1.544E 00
KR-90	0.000E-01	RU-106	3.238E 01
XE-131M	0.000E-01	AG-110M	1.027E 01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	8.400E-03	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	9.526E-01
C-14	7.136E 00	I-131	0.000E-01
NA-24	2.506E-01	I-132	0.000E-01
P-32	0.000E-01	I-133	0.000E-01
K-40	0.000E-01	I-134	0.000E-01
CR-51	3.887E-02	I-135	0.000E-01
MN-54	2.799E 00	CS-134	1.026E 02
MN-56	3.508E-02	CS-136	6.720E 00
FE-55	8.514E-01	CS-137	9.352E 01
FE-59	4.492E 00	CS-138	1.831E-04
CO-56	0.000E-01	BA-139	1.666E-02
CO-57	0.000E-01	BA-140	4.471E 00
CO-58	2.176E 00	LA-140	4.704E-01
CO-60	1.262E 01	CE-139	0.000E-01
NI-63	5.841E-01	CE-144	2.756E 01
NI-65	2.274E-02	EU-152	0.000E-01
CU-64	2.603E-02	W-187	1.109E-01
ZN-65	1.811E 00	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	5.684E 00	NP-239	1.666E-01
SR-90	3.148E 01	AAAAAAA	0.000E-01
SR-91	1.474E-01	BBBBBBB	0.000E-01
SR-92	6.664E-02	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	7.526E-01	EEEEEEE	0.000E-01
Y-91M	7.801E-03	FFFFFFF	0.000E-01
Y-91	6.860E 00	GGGGGGG	0.000E-01
Y-92	6.860E-02	HHHHHHH	0.000E-01
Y-93	2.140E-01	IIIIIII	0.000E-01
ZR-95	4.900E 00	JJJJJJJ	0.000E-01

PW_i - elements 16→100, infant lung dose factors - gas release
$= \Sigma P_i * W$ (mrem sec/μCi yr)

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AR-41	0.000E-01	ZR-97	3.089E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.341E 00
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	3.775E-01
KR-88	0.000E-01	TC-99M	2.270E-03
KR-89	0.000E-01	RU-103	1.544E 00
KR-90	0.000E-01	RU-106	3.238E 01
XE-131M	0.000E-01	AG-110M	1.027E 01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	8.400E-03	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	9.526E-01
C-14	7.136E 00	I-131	0.000E-01
NA-24	2.506E-01	I-132	0.000E-01
P-32	0.000E-01	I-133	0.000E-01
K-40	0.000E-01	I-134	0.000E-01
CR-51	3.887E-02	I-135	0.000E-01
MN-54	2.799E 00	CS-134	1.026E 02
MN-56	3.508E-02	CS-136	6.720E 00
FE-55	8.514E-01	CS-137	9.352E 01
FE-59	4.492E 00	CS-138	1.831E-04
CO-56	0.000E-01	BA-139	1.666E-02
CO-57	0.000E-01	BA-140	4.471E 00
CO-58	2.176E 00	LA-140	4.704E-01
CO-60	1.262E 01	CE-139	0.000E-01
NI-63	5.841E-01	CE-144	2.756E 01
NI-65	2.274E-02	EU-152	0.000E-01
CU-64	2.603E-02	W-187	1.109E-01
ZN-65	1.811E 00	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	5.684E 00	NP-239	1.666E-01
SR-90	3.148E 01	AAAAAAA	0.000E-01
SR-91	1.474E-01	BBBBBBB	0.000E-01
SR-92	6.664E-02	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	7.526E-01	EEEEEEE	0.000E-01
Y-91M	7.801E-03	FFFFFFF	0.000E-01
Y-91	6.860E 00	GGGGGGG	0.000E-01
Y-92	6.860E-02	HHHHHHH	0.000E-01
Y-93	2.140E-01	IIIIIII	0.000E-01
ZR-95	4.900E 00	JJJJJJJ	0.000E-01

PW_i - elements 16→100, infant lung dose factors - gas release
$= \Sigma P_i$ * W (mrem sec/μCi yr)

AR-41	0.000E-01	ZR-97	4.851E-02
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	4.206E 00
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	6.539E-02
KR-88	0.000E-01	TC-99M	2.956E-03
KR-89	0.000E-01	RU-103	1.779E 00
KR-90	0.000E-01	RU-106	7.067E 00
XE-131M	0.000E-01	AG-110M	5.696E 01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.900E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	0.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	6.961E-02
C-14	0.000E-01	I-131	2.927E-01
NA-24	1.943E-01	I-132	2.031E-02
P-32	0.000E-01	I-133	4.213E-02
K-40	0.000E-01	I-134	7.507E-03
CR-51	7.728E-02	I-135	4.179E-02
MN-54	2.274E 01	CS-134	1.120E 02
MN-56	1.501E-02	CS-136	2.358E 00
FE-55	0.000E-01	CS-137	1.683E 02
FE-59	4.482E 00	CS-138	5.957E-03
CO-56	0.000E-01	BA-139	1.659E-03
CO-57	0.000E-01	BA-140	3.270E-01
CO-58	6.256E 00	LA-140	3.053E-01
CO-60	3.541E 02	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	1.127E 00
NI-65	4.910E-03	EU-152	0.000E-01
CU-64	9.622E-03	W-187	3.834E-02
ZN-65	1.202E 01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	3.294E-03	BI-214	0.000E-01
RB-88	5.301E-04	RA-226	0.000E-01
RB-89	2.087E-03	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	3.663E-04	NP-239	2.766E-02
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	3.608E-02	BBBBBBB	0.000E-01
SR-92	1.208E-02	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	7.406E-05	EEEEEEE	0.000E-01
Y-91M	1.625E-03	FFFFFFF	0.000E-01
Y-91	1.699E-02	GGGGGGG	0.000E-01
Y-92	2.989E-03	HHHHHHH	0.000E-01
Y-93	3.582E-03	IIIIIII	0.000E-01
ZR-95	4.066E 00	JJJJJJJ	0.000E-01

RW_i - elements 16→100, infant shielded skin dose factor
$= \Sigma R_i * W$ (mrem sec/μCi yr)

Revision A

AR-41	0.000E-01	ZR-97	4.851E-02
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	4.206E 00
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	6.539E-02
KR-88	0.000E-01	TC-99M	2.956E-03
KR-89	0.000E-01	RU-103	1.779E 00
KR-90	0.000E-01	RU-106	7.067E 00
XE-131M	0.000E-01	AG-110M	5.696E 01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	0.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	6.961E-02
C-14	0.000E-01	I-131	2.927E-01
NA-24	1.943E-01	I-132	2.031E-02
P-32	0.000E-01	I-133	4.213E-02
K-40	0.000E-01	I-134	7.507E-03
CR-51	7.728E-02	I-135	4.179E-02
MN-54	2.274E 01	CS-134	1.120E 02
MN-56	1.501E-02	CS-136	2.358E 00
FE-55	0.000E-01	CS-137	1.683E 02
FE-59	4.482E 00	CS-138	5.957E-03
CO-56	0.000E-01	BA-139	1.659E-03
CO-57	0.000E-01	BA-140	3.270E-01
CO-58	6.256E 00	LA-140	3.053E-01
CO-60	3.541E 02	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	1.127E 00
NI-65	4.910E-03	EU-152	0.000E-01
CU-64	9.622E-03	W-187	3.834E-02
ZN-65	1.202E 01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	3.294E-03	BI-214	0.000E-01
RB-88	5.301E-04	RA-226	0.000E-01
RB-89	2.087E-03	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	3.663E-04	NP-239	2.766E-02
SR-90	0.000E-01	AAAAAAAA	0.000E-01
SR-91	3.608E-02	BBBBBBBB	0.000E-01
SR-92	1.208E-02	CCCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	7.406E-05	EEEEEEE	0.000E-01
Y-91M	1.625E-03	FFFFFFF	0.000E-01
Y-91	1.699E-02	GGGGGGG	0.000E-01
Y-92	2.989E-03	HHHHHHH	0.000E-01
Y-93	3.582E-03	IIIIIII	0.000E-01
ZR-95	4.066E 00	JJJJJJJ	0.000E-01

RW_i - elements 16→100, infant shielded skin dose factor
$= \Sigma R_i$ * W (mrem sec/μCi yr)

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AR-41	0.000E-01	ZR-97	5.334E-04
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.238E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	2.611E-07
KR-89	0.000E-01	RU-103	1.748E 00
KR-90	0.000E-01	RU-106	5.337E 01
XE-131M	0.000E-01	AG-110M	3.559E 00
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	8.400E-03	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	2.655E-01
C-14	3.334E 01	I-131	2.088E 01
NA-24	1.772E-01	I-132	5.927E-03
P-32	1.233E 03	I-133	3.475E-01
K-40	0.000E-01	I-134	3.284E-03
CR-51	0.000E-01	I-135	1.552E-02
MN-54	0.000E-01	CS-134	5.580E 02
MN-56	0.000E-01	CS-136	1.575E 01
FE-55	1.739E 01	CS-137	8.101E 02
FE-59	1.101E 01	CS-138	1.772E-03
CO-56	0.000E-01	BA-139	5.160E-06
CO-57	0.000E-01	BA-140	6.141E 00
CO-58	0.000E-01	LA-140	1.848E-03
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	1.263E 03	CE-144	2.078E 01
NI-65	1.006E-05	EU-152	0.000E-01
CU-64	0.000E-01	W-187	1.364E-03
ZN-65	7.410E 01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	6.245E 02	NP-239	1.341E-03
SR-90	1.938E 04	AAAAAAA	0.000E-01
SR-91	1.029E-02	BBBBBBB	0.000E-01
SR-92	4.685E-05	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	1.183E-02	EEEEEEE	0.000E-01
Y-91M	1.419E-06	FFFFFFF	0.000E-01
Y-91	2.839E 00	GGGGGGG	0.000E-01
Y-92	5.700E-05	HHHHHHH	0.000E-01
Y-93	5.265E-04	IIIIIII	0.000E-01
ZR-95	6.128E-01	JJJJJJJ	0.000E-01

RW_i - elements 16→100, child bone dose factors - gas release
$= \Sigma R_i * W$ (mrem sec/μCi yr)

Revision A

AR-41	0.000E-01	ZR-97	5.334E-04
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.238E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	2.611E-07
KR-89	0.000E-01	RU-103	1.748E 00
KR-90	0.000E-01	RU-106	5.337E 01
XE-131M	0.000E-01	AG-110M	3.559E 00
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	8.400E-03	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	2.655E-01
C-14	3.334E 01	I-131	2.088E 01
NA-24	1.772E-01	I-132	5.927E-03
P-32	1.233E 03	I-133	3.475E-01
K-40	0.000E-01	I-134	3.284E-03
CR-51	0.000E-01	I-135	1.552E-02
MN-54	0.000E-01	CS-134	5.580E 02
MN-56	0.000E-01	CS-136	1.575E 01
FE-55	1.739E 01	CS-137	8.101E 02
FE-59	1.101E 01	CS-138	1.772E-03
CO-56	0.000E-01	BA-139	5.160E-06
CO-57	0.000E-01	BA-140	6.141E 00
CO-58	0.000E-01	LA-140	1.848E-03
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	1.263E 03	CE-144	2.078E 01
NI-65	1.006E-05	EU-152	0.000E-01
CU-64	0.000E-01	W-187	1.364E-03
ZN-65	7.410E 01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	6.245E 02	NP-239	1.341E-03
SR-90	1.938E 04	AAAAAAA	0.000E-01
SR-91	1.029E-02	BBBBBBB	0.000E-01
SR-92	4.685E-05	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	1.183E-02	EEEEEEE	0.000E-01
Y-91M	1.419E-06	FFFFFFF	0.000E-01
Y-91	2.839E 00	GGGGGGG	0.000E-01
Y-92	5.700E-05	HHHHHHH	0.000E-01
Y-93	5.265E-04	IIIIIII	0.000E-01
ZR-95	6.128E-01	JJJJJJJ	0.000E-01

RW_i - elements 16→100, child bone dose factors - gas release
$= \Sigma R_i * W$ (mrem sec/μCi yr)

Revision A

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	0.000E-01
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.408E-02	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.711E-01
C-14	6.666E 00	I-131	6.945E 03
NA-24	1.772E-01	I-132	5.419E-01
P-32	0.000E-01	I-133	7.?34E 01
K-40	0.000E-01	I-134	1.419E-01
CR-51	2.007E-03	I-135	2.495E 00
MN-54	0.000E-01	CS-134	0.000E-01
MN-56	0.000E-01	CS-136	0.000E-01
FE-55	0.000E-01	CS-137	0.000E-01
FE-59	0.000E-01	CS-138	0.000E-01
CO-56	0.000E-01	BA-139	0.000E-01
CO-57	0.000E-01	BA-140	0.000E-01
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

RW_i - elements 16→100, child thyroid dose factor - gas release
$= \Sigma R_i * W$ (mrem sec/μCi yr)

Revision A

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	0.000E-01
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.408E-02	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.71[illegible]-01
C-14	6.666E 00	I-131	6.946E 03
NA-24	1.772E-01	I-132	5.419E-01
P-32	0.000E-01	I-133	7.994E 01
K-40	0.000E-01	I-134	1.419E-01
CR-51	2.007E-03	I-135	2.495E 00
MN-54	0.000E-01	CS-134	0.000E-01
MN-56	0.000E-01	CS-136	0.000E-01
FE-55	0.000E-01	CS-137	0.000E-01
FE-59	0.000E-01	CS-138	0.000E-01
CO-56	0.000E-01	BA-139	0.000E-01
CO-57	0.000E-01	BA-140	0.000E-01
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

RW_i - elements 16→100, child thyroid dose factor - gas release
$= \Sigma R_i * W$ (mrem sec/μCi yr)

Revision A

AR-41	0.000E-01	ZR-97	3.170E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.720E 00
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	3.792E-01
KR-88	0.000E-01	TC-99M	2.663E-03
KR-89	0.000E-01	RU-103	1.854E 00
KR-90	0.000E-01	RU-106	4.009E 01
XE-131M	0.000E-01	AG-110M	1.533E 01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.408E-02	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.057E 00
C-14	6.666E 00	I-131	0.000E-01
NA-24	1.772E-01	I-132	0.000E-01
P-32	0.000E-01	I-133	0.000E-01
K-40	0.000E-01	I-134	0.000E-01
CR-51	5.078E-02	I-135	0.000E-01
MN-54	4.413E 00	CS-134	1.018E 02
MN-56	3.678E-02	CS-136	3.438E 00
FE-55	5.489E 00	CS-137	9.092E 01
FE-59	8.692E 00	CS-138	1.906E-04
CO-56	0.000E-01	BA-139	1.616E-02
CO-57	0.000E-01	BA-140	4.883E 00
CO-58	3.098E 00	LA-140	5.118E-01
CO-60	1.979E 01	CE-139	0.000E-01
NI-63	7.697E-01	CE-144	3.232E-01
NI-65	2.290E-02	EU-152	0.000E-01
CU-64	2.683E-02	W-187	1.150E-01
ZN-65	2.787E 00	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	6.040E 00	NP-239	1.627E-01
SR-90	4.134E 01	AAAAAAA	0.000E-01
SR-91	1.492E-01	BBBBBBB	0.000E-01
SR-92	6.724E-02	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	7.325E-01	EEEEEEE	0.000E-01
Y-91M	7.874E-03	FFFFFFF	0.000E-01
Y-91	7.356E 00	GGGGGGG	0.000E-01
Y-92	6.693E-02	HHHHHHH	0.000E-01
Y-93	2.082E-01	IIIIIII	0.000E-01
ZR-95	6.247E 00	JJJJJJJ	0.000E-01

RW_i - elements 16→100, child lung dose factors - gas release
$= \Sigma R_i * W$ (mrem sec/μCi yr)

Revision A

AR-41	0.000E-01	ZR-97	3.170E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.720E 00
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	3.792E-01
KR-88	0.000E-01	TC-99M	2.663E-03
KR-89	0.000E-01	RU-103	1.854E 00
KR-90	0.000E-01	RU-106	4.009E 01
XE-131M	0.000E-01	AG-110M	1.533E 01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.300E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.408E-02	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.057E 00
C-14	6.666E 00	I-131	0.000E-01
NA-24	1.772E-01	I-132	0.000E-01
P-32	0.000E-01	I-133	0.000E-01
K-40	0.000E-01	I-134	0.000E-01
CR-51	5.078E-02	I-135	0.000E-01
MN-54	4.413E 00	CS-134	1.018E 02
MN-56	3.678E-02	CS-136	3.438E 00
FE-55	5.489E 00	CS-137	9.092E 01
FE-59	8.692E 00	CS-138	1.906E-04
CO-56	0.000E-01	BA-139	1.616E-02
CO-57	0.000E-01	BA-140	4.883E 00
CO-58	3.098E 00	LA-140	5.118E-01
CO-60	1.979E 01	CE-139	0.000E-01
NI-63	7.697E-01	CE-144	3.232E-01
NI-65	2.290E-02	EU-152	0.000E-01
CU-64	2.683E-01	W-187	1.150E-01
ZN-65	2.787E 00	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	6.040E 00	NP-239	1.627E-01
SR-90	4.134E 01	AAAAAAA	0.000E-01
SR-91	1.492E-01	BBBBBBB	0.000E-01
SR-92	6.724E-02	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	7.325E-01	EEEEEEE	0.000E-01
Y-91M	7.874E-03	FFFFFFF	0.000E-01
Y-91	7.356E 00	GGGGGGG	0.000E-01
Y-92	6.693E-02	HHHHHHH	0.000E-01
Y-93	2.082E-01	IIIIIII	0.000E-01
ZR-95	6.247E 00	JJJJJJJ	0.000E-01

RW_i - elements 16→100, child lung dose factors - gas release
$= \Sigma R_i * W$ (mrem sec/μCi yr)

Revision A

AR-41	0.000E-01	ZR-97	4.173E-02
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	3.610E 00
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	3.746E-01
KR-88	0.000E-01	TC-99M	2.589E-03
KR-89	0.000E-01	RU-103	2.197E 00
KR-90	0.000E-01	RU-106	1.266E 01
XE-131M	0.000E-01	AG-110M	5.074E 01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.408E-02	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	2.011E-01
C-14	6.666E 00	I-131	1.217E 01
NA-24	3.448E-01	I-132	2.252E-02
P-32	4.751E 01	I-133	1.971E-01
K-40	0.000E-01	I-134	9.108E-03
CR-51	6.901E-02	I-135	4.891E-02
MN-54	2.200E 01	CS-134	2.891E 02
MN-56	1.270E-02	CS-136	3.009E 01
FE-55	2.859E 00	CS-137	2.587E 02
FE-59	1.269E 01	CS-138	6.766E-03
CO-55	0.000E-01	BA-139	1.474E-03
CO-57	0.000E-01	BA-140	6.445E-01
CO-58	9.145E 00	LA-140	2.696E-01
CO-60	3.205E 02	CE-139	0.000E-01
NI-63	4.296E 01	CE-144	2.085E 00
NI-65	4.226E-03	EU-152	0.000E-01
CU-64	9.227E-03	W-187	3.338E-02
ZN-65	1.332E 02	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	4.357E-03	BI-214	0.000E-01
RB-88	1.489E-03	RA-226	0.000E-01
RB-89	2.550E-03	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	1.784E 01	NP-239	2.395E-02
SR-90	4.800E 03	AAAAAAA	0.000E-01
SR-91	3.125E-02	BBBBBBB	0.000E-01
SR-92	1.087E-02	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	3.812E-04	EEEEEEE	0.000E-01
Y-91M	1.403E-03	FFFFFFF	0.000E-01
Y-91	9.087E-02	GGGGGGG	0.000E-01
Y-92	2.518E-03	HHHHHHH	0.000E-01
Y-93	2.632E-03	IIIIIII	0.000E-01
ZR-95	3.625E 00	JJJJJJJ	0.000E-01

RW_i - elements 16→100, child shielded total body dose fact - gas release
$= \Sigma R_i * W$ (mrem sec/μCi yr)

Revision A

AR-41	0.000E-01	ZR-97	4.173E-02
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	3.610E 00
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	3.746E-01
KR-88	0.000E-01	TC-99M	2.589E-03
KR-89	0.000E-01	RU-103	2.197E 00
KR-90	0.000E-01	RU-106	1.266E 01
XE-131M	0.000E-01	AG-110M	5.074E 01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.408E-02	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	2.011E-01
C-14	6.666E 00	I-131	1.217E 01
NA-24	3.448E-01	I-132	2.252E-02
P-32	4.751E 01	I-133	1.971E-01
K-40	0.000E-01	I-134	9.108E-03
CR-51	6.901E-02	I-135	4.891E-02
MN-54	2.200E 01	CS-134	2.[illegible]1E 02
MN-56	1.270E-02	CS-136	3.009E 01
FE-55	2.859E 00	CS-137	2.587E 02
FE-59	1.269E 01	CS-138	6.766E-03
CO-56	0.000E-01	BA-139	1.474E-03
CO-57	0.000E-01	BA-140	6.445E-01
CO-58	9.145E 00	LA-140	2.696E-01
CO-60	3.205E 02	CE-139	0.000E-01
NI-63	4.296E 01	CE-144	2.085E 00
NI-65	4.226E-03	EU-152	0.000E-01
CU-64	9.227E-03	W-187	3.338E-02
ZN-65	1.332E 02	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	4.357E-03	BI-214	0.000E-01
RB-88	1.489E-03	RA-226	0.000E-01
RB-89	2.550E-03	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	1.784E 01	NP-239	2.395E-02
SR-90	4.860E 03	AAAAAAA	0.000E-01
SR-91	3.125E-02	BBBBBBB	0.000E-01
SR-92	1.087E-02	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	3.812E-04	EEEEEEE	0.000E-01
Y-91M	1.403E-03	FFFFFFF	0.000E-01
Y-91	9.087E-02	GGGGGGG	0.000E-01
Y-92	2.518E-03	HHHHHHH	0.000E-01
Y-93	2.632E-03	IIIIIII	0.000E-01
ZR-95	3.625E 00	JJJJJJJ	0.000E-01

RW_i - elements 16→100, child shielded total body dose factor - gas release
$= \Sigma R_i * W$ (mrem sec/μCi yr)

Revision A

AR-41	2.690E-03	ZR-97	5.500E-09
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	1.460E-03	NB-95	5.100E-09
KR-85	1.340E-03	MO-90	0.000E-01
KR-87	9.730E-03	MO-99	1.900E-09
KR-88	2.370E-03	TC-99M	9.600E-10
KR-89	1.010E-02	RU-103	3.600E-09
KR-90	7.290E-03	RU-106	1.500E-09
XE-131M	4.760E-04	AG-110M	1.800E-08
XE-133M	9.940E-04	CD-109	0.000E-01
XE-133	3.060E-04	CD-113M	0.000E-01
XE-135M	7.110E-04	SN-113	0.000E-01
XE-135	1.860E-03	SB-122	0.000E-01
XE-137	1.220E-02	SB-124	0.000E-01
XE-138	4.130E-03	SB-125	0.000E-01
H-3	0.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.700E-09
C-14	0.000E-01	I-131	2.800E-09
NA-24	2.500E-08	I-132	1.700E-08
P-32	0.000E-01	I-133	3.700E-09
K-40	0.000E-01	I-134	1.600E-08
CR-51	2.200E-10	I-135	1.200E-08
MN-54	5.800E-09	CS-134	1.200E-08
MN-56	1.100E-08	CS-136	1.500E-08
FE-55	0.000E-01	CS-137	4.200E-09
FE-59	8.000E-09	CS-138	2.100E-08
CO-56	0.000E-01	BA-139	2.400E-09
CO-57	0.000E-01	BA-140	2.100E-09
CO-58	7.000E-09	LA-140	1.500E-08
CO-60	1.700E-08	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	3.200E-10
NI-65	3.700E-09	EU-152	0.000E-01
CU-64	1.500E-09	W-187	3.100E-09
ZN-65	4.000E-09	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	1.200E-08	BI-214	0.000E-01
RB-88	3.500E-09	RA-226	0.000E-01
RB-89	1.500E-08	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	5.600E-13	NP-239	9.500E-10
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	7.100E-09	BBBBBBB	0.000E-01
SR-92	9.000E-09	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	2.200E-12	EEEEEEE	0.000E-01
Y-91M	3.800E-09	FFFFFFF	0.000E-01
Y-91	2.400E-11	GGGGGGG	0.000E-01
Y-92	1.600E-09	HHHHHHH	0.000E-01
Y-93	5.700E-10	IIIIIII	0.000E-01
ZR-95	5.000E-09	JJJJJJJ	0.000E-01

DFG_i - elements 16→100, total body external dose factor for standing on contaminated ground (mrem/hr per pCi/m^2)

AR-41	3.280E-03	ZR-97	1.480E-08
KR-83M	2.880E-04	NB-94	0.000E-01
KR-85M	1.970E-03	NB-95	4.200E-08
KR-85	1.950E-03	MO-90	0.000E-01
KR-87	1.030E-02	MO-99	0.000E-01
KR-88	2.930E-03	TC-99M	1.920E-09
KR-89	1.060E-02	RU-103	1.430E-06
KR-90	7.830E-03	RU-106	2.410E-05
XE-131M	1.110E-03	AG-110M	9.960E-07
XE-133M	1.480E-03	CD-109	0.000E-01
XE-133	1.050E-03	CD-113M	0.000E-01
XE-135M	7.390E-04	SN-113	0.000E-01
XE-135	2.460E-03	SB-122	0.000E-01
XE-137	1.270E-02	SB-124	0.000E-01
XE-138	4.750E-03	SB-125	0.000E-01
H-3	0.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	2.080E-05
C-14	2.370E-05	I-131	3.590E-05
NA-24	1.010E-05	I-132	1.660E-06
P-32	1.700E-03	I-133	1.250E-05
K-40	0.000E-01	I-134	8.690E-07
CR-51	0.000E-01	I-135	3.640E-06
MN-54	0.000E-01	CS-134	3.770E-04
MN-56	0.000E-01	CS-136	4.590E-05
FE-55	1.390E-05	CS-137	5.220E-04
FE-59	3.080E-05	CS-138	4.810E-07
CO-56	0.000E-01	BA-139	8.810E-07
CO-57	0.000E-01	BA-140	1.710E-04
CO-58	0.000E-01	LA-140	2.110E-08
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	6.340E-04	CE-144	2.980E-06
NI-65	4.700E-06	EU-152	0.000E-01
CU-64	0.000E-01	W-187	9.030E-07
ZN-65	1.840E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	2.510E-03	NP-239	1.110E-08
SR-90	1.850E-02	AAAAAAA	0.000E-01
SR-91	5.000E-05	BBBBBBB	0.000E-01
SR-92	1.920E-05	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	8.690E-08	EEEEEEE	0.000E-01
Y-91M	8.100E-10	FFFFFFF	0.000E-01
Y-91	1.130E-06	GGGGGGG	0.000E-01
Y-92	7.650E-09	HHHHHHH	0.000E-01
Y-93	2.430E-08	IIIIIII	0.000E-01
ZR-95	2.060E-07	JJJJJJJ	0.000E-01

N_i - elements 1→15, Beta air dose factor, gas release (mrad/pCi per yr/m^3)
DFL_i - elements 16→100, infant ingestion dose factor for bone (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	1.160E-09
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.000E-08
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	6.630E-06
KR-88	0.000E-01	TC-99M	5.100E-08
KR-89	0.000E-01	RU-103	4.950E-07
KR-90	0.000E-01	RU-106	3.010E-06
XE-131M	0.000E-01	AG-110M	4.810E-07
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.080E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	9.610E-06
C-14	5.060E-06	I-131	1.860E-05
NA-24	1.010E-05	I-132	1.200E-06
P-32	6.590E-05	I-133	5.330E-06
K-40	0.000E-01	I-134	6.330E-07
CR-51	1.410E-08	I-135	2.640E-06
MN-54	4.510E-06	CS-134	7.100E-05
MN-56	1.410E-07	CS-136	5.040E-05
FE-55	2.400E-06	CS-137	4.330E-05
FE-59	2.120E-05	CS-138	3.790E-07
CO-56	0.000E-01	BA-139	2.550E-08
CO-57	0.000E-01	BA-140	8.810E-06
CO-58	8.980E-06	LA-140	2.140E-09
CO-60	2.550E-05	CE-139	0.000E-01
NI-63	2.200E-05	CE-144	1.670E-07
NI-65	2.420E-07	EU-152	0.000E-01
CU-64	2.820E-07	W-187	2.170E-07
ZN-65	2.910E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	3.820E-07	BI-214	0.000E-01
RB-88	2.730E-07	RA-226	0.000E-01
RB-89	1.970E-07	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	7.200E-05	NP-239	5.610E-10
SR-90	4.710E-03	AAAAAAA	0.000E-01
SR-91	1.810E-06	BBBBBBB	0.000E-01
SR-92	7.130E-07	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	2.330E-09	EEEEEEE	0.000E-01
Y-91M	2.760E-11	FFFFFFF	0.000E-01
Y-91	3.010E-08	GGGGGGG	0.000E-01
Y-92	2.150E-10	HHHHHHH	0.000E-01
Y-93	6.620E-10	IIIIIII	0.000E-01
ZR-95	3.560E-08	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, infant ingestion dose factor for total body (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	1.160E-09
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.000E-08
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	6.630E-06
KR-88	0.000E-01	TC-99M	5.100E-08
KR-89	0.000E-01	RU-103	4.950E-07
KR-90	0.000E-01	RU-106	3.010E-06
XE-131M	0.000E-01	AG-110M	4.810E-07
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.080E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	9.610E-06
C-14	5.060E-06	I-131	1.860E-05
NA-24	1.010E-05	I-132	1.200E-06
P-32	6.590E-05	I-133	5.330E-06
K-40	0.000E-01	I-134	6.330E-07
CR-51	1.410E-08	I-135	2.640E-06
MN-54	4.510E-06	CS-134	7.100E-05
MN-56	1.410E-07	CS-136	5.040E-05
FE-55	2.400E-06	CS-137	4.330E-05
FE-59	2.120E-05	CS-138	3.790E-07
CO-56	0.000E-01	BA-139	2.550E-08
CO-57	0.000E-01	BA-140	8.810E-06
CO-58	8.980E-06	LA-140	2.140E-09
CO-60	2.550E-05	CE-139	0.000E-01
NI-63	2.200E-05	CE-144	1.670E-07
NI-65	2.420E-07	EU-152	0.000E-01
CU-64	2.820E-07	W-187	2.170E-07
ZN-65	2.910E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	3.820E-07	BI-214	0.000E-01
RB-88	2.730E-07	RA-226	0.000E-01
RB-89	1.970E-07	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	7.200E-05	NP-239	5.610E-10
SR-90	4.710E-03	AAAAAAA	0.000E-01
SR-91	1.810E-06	BBBBBBB	0.000E-01
SR-92	7.130E-07	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	2.330E-09	EEEEEEE	0.000E-01
Y-91M	2.760E-11	FFFFFFF	0.000E-01
Y-91	3.010E-08	GGGGGGG	0.000E-01
Y-92	2.150E-10	HHHHHHH	0.000E-01
Y-93	6.620E-10	IIIIIII	0.000E-01
ZR-95	3.560E-08	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, infant ingestion dose factor for total body (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	2.560E-09
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.240E-08
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	5.080E-05
KR-88	0.000E-01	TC-99M	4.260E-08
KR-89	0.000E-01	RU-103	3.080E-06
KR-90	0.000E-01	RU-106	2.850E-05
XE-131M	0.000E-01	AG-110M	1.040E-06
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.080E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	6.440E-05
C-14	5.060E-06	I-131	4.940E-05
NA-24	1.010E-05	I-132	3.760E-06
P-32	0.000E-01	I-133	2.140E-05
K-40	0.000E-01	I-134	1.990E-06
CR-51	2.010E-09	I-135	8.070E-06
MN-54	4.410E-06	CS-134	1.810E-04
MN-56	7.030E-07	CS-136	5.380E-05
FE-55	0.000E-01	CS-137	1.640E-04
FE-59	0.000E-01	CS-138	3.900E-07
CO-56	0.000E-01	BA-139	3.510E-10
CO-57	0.000E-01	BA-140	4.060E-08
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	4.930E-07
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	1.080E-06	W-187	0.000E-01
ZN-65	3.060E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	1.980E-09
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	5.410E-08	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, infant ingestion dose factor for kidneys (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	2.560E-09
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.240E-08
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	5.080E-05
KR-88	0.000E-01	TC-99M	4.260E-08
KR-89	0.000E-01	RU-103	3.080E-06
KR-90	0.000E-01	RU-106	2.850E-05
XE-131M	0.000E-01	AG-110M	1.040E-06
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.080E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	6.440E-05
C-14	5.060E-06	I-131	4.940E-05
NA-24	1.010E-05	I-132	3.760E-06
P-32	0.000E-01	I-133	2.140E-05
K-40	0.000E-01	I-134	1.990E-06
CR-51	2.010E-09	I-135	8.070E-06
MN-54	4.410E-06	CS-134	1.810E-04
MN-56	7.030E-07	CS-136	5.380E-05
FE-55	0.000E-01	CS-137	1.640E-04
FE-59	0.000E-01	CS-138	3.900E-07
CO-56	0.000E-01	BA-139	3.510E-10
CO-57	0.000E-01	BA-140	4.060E-08
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	4.930E-07
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	1.080E-06	W-187	0.000E-01
ZN-65	3.060E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	1.980E-09
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	5.410E-08	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, infant ingestion dose factor for kidneys (mrem/pCi ingested)

PR-41	0.000E-01	ZR-97	1.620E-04
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.460E-05
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	1.120E-05
KR-88	0.000E-01	TC-99M	1.150E-06
KR-89	0.000E-01	RU-103	1.800E-05
KR-90	0.000E-01	RU-106	1.830E-04
XE-131M	0.000E-01	AG-110M	3.770E-05
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.080E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	3.810E-05
C-14	5.060E-06	I-131	1.510E-06
NA-24	1.010E-05	I-132	2.730E-06
P-32	2.300E-05	I-133	3.080E-06
K-40	0.000E-01	I-134	1.840E-06
CR-51	4.110E-07	I-135	2.620E-06
MN-54	7.310E-06	CS-134	1.910E-06
MN-56	7.430E-05	CS-136	2.050E-06
FE-55	1.140E-06	CS-137	1.910E-06
FE-59	2.570E-07	CS-138	1.250E-06
CO-56	0.000E-01	BA-139	5.580E-05
CO-57	0.000E-01	BA-140	4.200E-05
CO-58	8.970E-06	LA-140	9.770E-05
CO-60	2.570E-05	CE-139	0.000E-01
NI-63	1.950E-06	CE-144	1.710E-04
NI-65	4.050E-05	EU-152	0.000E-01
CU-64	1.250E-05	W-187	3.690E-05
ZN-65	5.330E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	1.000E-24	BI-214	0.000E-01
RB-88	4.850E-07	RA-226	0.000E-01
RB-89	9.740E-08	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	5.160E-04	NP-239	2.870E-05
SR-90	2.310E-04	AAAAAAA	0.000E-01
SR-91	5.920E-05	BBBBBBB	0.000E-01
SR-92	2.070E-04	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	1.200E-04	EEEEEEE	0.000E-01
Y-91M	2.700E-06	FFFFFFF	0.000E-01
Y-91	8.100E-05	GGGGGGG	0.000E-01
Y-92	1.460E-04	HHHHHHH	0 000E-01
Y-93	1.920E-04	IIIIIII	0 000E-01
ZR-95	2.500E-05	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, infant ingestion dose factors for GI-LLI (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	1.620E-04
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.460E-05
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	1.120E-05
KR-88	0.000E-01	TC-99M	1.150E-06
KR-89	0.000E-01	RU-103	1.800E-05
KR-90	0.000E-01	RU-106	1.830E-04
XE-131M	0.000E-01	AG-110M	3.770E-05
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.080E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	3.810E-05
C-14	5.060E-06	I-131	1.510E-06
NA-24	1.010E-05	I-132	2.730E-06
P-32	2.300E-05	I-133	3.080E-06
K-40	0.000E-01	I-134	1.840E-06
CR-51	4.110E-07	I-135	2.620E-06
MN-54	7.310E-06	CS-134	1.910E-06
MN-56	7.430E-05	CS-136	2.050E-06
FE-55	1.140E-06	CS-137	1.910E-06
FE-59	2.570E-07	CS-138	1.250E-06
CO-56	0.000E-01	BA-139	5.580E-05
CO-57	0.000E-01	BA-140	4.200E-05
CO-58	8.970E-06	LA-140	9.770E-05
CO-60	2.570E-05	CE-139	0.000E-01
NI-63	1.950E-06	CE-144	1.710E-04
NI-65	4.050E-05	EU-152	0.000E-01
CU-64	1.250E-05	W-187	3.690E-05
ZN-65	5.330E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	1.000E-24	BI-214	0.000E-01
RB-88	4.850E-07	RA-226	0.000E-01
RB-89	9.740E-08	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	5.160E-04	NP-239	2.870E-05
SR-90	2.310E-04	AAAAAAA	0.000E-01
SR-91	5.920E-05	BBBBBBB	0.000E-01
SR-92	2.070E-04	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	1.200E-04	EEEEEEE	0.000E-01
Y-91M	2.700E-06	FFFFFFF	0.000E-01
Y-91	8.100E-05	GGGGGGG	0.000E-01
Y-92	1.460E-04	HHHHHHH	0.000E-01
Y-93	1.920E-04	IIIIIII	0.000E-01
ZR-95	2.500E-05	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, infant ingestion dose factors for GI-LLI (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	1.830E-08
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	4.590E-06
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	1.180E-07
KR-88	0.000E-01	TC-99M	2.060E-12
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	5.160E-06
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	4.620E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.690E-07
C-14	3.790E-06	I-131	3.170E-05
NA-24	7.540E-06	I-132	2.530E-06
P-32	8.030E-05	I-133	1.370E-05
K-40	0.000E-01	I-134	1.340E-06
CR-51	0.000E-01	I-135	5.430E-06
MN-54	1.810E-05	CS-134	5.020E-04
MN-56	1.100E-09	CS-136	9.610E-05
FE-55	8.390E-06	CS-137	4.370E-04
FE-59	1.680E-05	CS-138	5.580E-07
CO-56	0.000E-01	BA-139	7.030E-13
CO-57	0.000E-01	BA-140	4.000E-08
CO-58	8.710E-07	LA-140	1.430E-07
CO-60	5.730E-06	CE-139	0.000E-01
NI-63	1.460E-05	CE-144	8.650E-04
NI-65	2.030E-10	EU-152	0.000E-01
CU-64	1.340E-09	W-187	6.440E-09
ZN-65	4.470E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	3.980E-07	RA-226	0.000E-01
RB-89	2.290E-07	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	2.370E-08
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	1.990E-05	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, infant inhalation dose factor for liver (mrem/pCi inhaled)

AR-41	0.000E-01	ZR-97	1.830E-08
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	4.590E-06
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	1.180E-07
KR-88	0.000E-01	TC-99M	2.060E-12
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	5.160E-06
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	4.620E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.690E-07
C-14	3.790E-06	I-131	3.170E-05
NA-24	7.540E-06	I-132	2.530E-06
P-32	8.030E-05	I-133	1.370E-05
K-40	0.000E-01	I-134	1.340E-06
CR-51	0.000E-01	I-135	5.430E-06
MN-54	1.810E-05	CS-134	5.020E-04
MN-56	1.100E-09	CS-136	9.610E-05
FE-55	8.390E-06	CS-137	4.370E-04
FE-59	1.680E-05	CS-138	5.580E-07
CO-56	0.000E-01	BA-139	7.030E-13
CO-57	0.000E-01	BA-140	4.000E-08
CO-58	8.710E-07	LA-140	1.430E-07
CO-60	5.730E-06	CE-139	0.000E-01
NI-63	1.460E-05	CE-144	8.650E-04
NI-65	2.030E-10	EU-152	0.000E-01
CU-64	1.340E-09	W-187	6.440E-09
ZN-65	4.470E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	3.980E-07	RA-226	0.000E-01
RB-89	2.290E-07	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	2.370E-08
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	1.990E-05	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, infant inhalation dose factor for liver (mrem/pCi inhaled)

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AR-41	0.000E-01	ZR-97	8.360E-09
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	2.700E-06
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	2.310E-08
KR-88	0.000E-01	TC-99M	2.660E-11
KR-89	0.000E-01	RU-103	4.850E-07
KR-90	0.000E-01	RU-106	7.770E-06
XE-131M	0.000E-01	AG-110M	3.570E-06
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	4.620E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.260E-07
C-14	3.790E-06	I-131	1.400E-05
NA-24	7.540E-06	I-132	8.997E-07
P-32	5.530E-05	I-133	4.000E-06
K-40	0.000E-01	I-134	4.750E-07
CR-51	6.390E-08	I-135	1.980E-06
MN-54	3.560E-06	CS-134	5.320E-05
MN-56	1.580E-10	CS-136	3.780E-05
FE-55	2.380E-06	CS-137	3.250E-05
FE-59	6.770E-06	CS-138	3.840E-07
CO-56	0.000E-01	BA-139	3.070E-11
CO-57	0.000E-01	BA-140	2.070E-06
CO-58	1.300E-06	LA-140	3.680E-08
CO-60	8.410E-06	CE-139	0.000E-01
NI-63	8.290E-06	CE-144	1.260E-04
NI-65	8.790E-11	EU-152	0.000E-01
CU-64	5.530E-10	W-187	2.230E-09
ZN-65	2.220E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	2.860E-07	BI-214	0.000E-01
RB-88	2.050E-07	RA-226	0.000E-01
RB-89	1.470E-07	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	8.150E-06	NP-239	1.340E-08
SR-90	1.850E-03	AAAAAAA	0.000E-01
SR-91	2.470E-09	BBBBBBB	0.000E-01
SR-92	2.790E-10	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	6.300E-08	EEEEEEE	0.000E-01
Y-91M	9.900E-12	FFFFFFF	0.000E-01
Y-91	1.120E-05	GGGGGGG	0.000E-01
Y-92	3.290E-10	HHHHHHH	0.000E-01
Y-93	2.910E-09	IIIIIII	0.000E-01
ZR-95	1.450E-05	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, infant inhalation dose factor for total body (mrem/pCi inhaled)

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.0[illegible]E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	0.000E-01
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	4.620E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.990E-07
C-14	3.790E-06	I-131	1.060E-02
NA-24	7.540E-06	I-132	1.210E-04
P-32	0.000E-01	I-133	2.540E-03
K-40	0.000E-01	I-134	3.180E-05
CR-51	4.110E-08	I-135	4.970E-04
MN-54	0.000E-01	CS-134	0.000E-01
MN-56	0.000E-01	CS-136	0.000E-01
FE-55	0.000E-01	CS-137	0.000E-01
FE-59	0.000E-01	CS-138	0.000E-01
CO-56	0.000E-01	BA-139	0.000E-01
CO-57	0.000E-01	BA-140	0.000E-01
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEFE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

DFA_i - elements 16→100 infant inhalation dose factors for thyroid (mrem/pCi inhal d)

AR-41	0.000E-01	ZR-97	1.850E-08
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	3.370E-06
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	1.890E-07
KR-88	0.000E-01	TC-99M	2.220E-11
KR-89	0.000E-01	RU-103	3.030E-06
KR-90	0.000E-01	RU-106	7.610E-05
XE-131M	0.000E-01	AG-110M	7.800E-06
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	4.620E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	7.390E-07
C-14	3.790E-06	I 131	3.700E-05
NA-24	7.540E-06	I-132	2.820E-06
P-32	0.000E-01	I-133	1.600E-05
K-40	0.000E-01	I-134	1.490E-06
CR-51	9.450E-09	I-135	6.050E-06
MN-54	3.560E-06	CS-134	1.360E-04
MN-56	7.860E-10	CS-136	4.030E-05
FE-55	0.000E-01	CS-137	1.230E-04
FE-59	0.000E-01	CS-138	2.930E-07
CO-56	0.000E-01	BA-139	4.230E-13
CO-57	0.000E-01	BA-140	9.590E-09
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	3.840E-04
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	2.840E-09	W-187	0.000E-01
ZN-65	2.320E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	4.730E-08
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	2.220E-05	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, infant inhalation dose factors for kidneys (mrem/pCi inhaled)

AR-41	0.000E-01	ZR-97	7.880E-05
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	3.420E-04
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	9.630E-05
KR-88	0.000E-01	TC-99M	5.790E-07
KR-89	0.000E-01	RU-103	3.940E-04
KR-90	0.000E-01	RU-106	8.260E-03
XE-131M	0.000E-01	AG-110M	2.620E-03
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	4.620E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	2.430E-04
C-14	3.790E-06	I-131	0.000E-01
NA-24	7.540E-06	I-132	0.000E-01
P-32	0.000E-01	I-133	0.000E-01
K-40	0.000E-01	I-134	0.000E-01
CR-51	9.170E-06	I-135	0.000E-01
MN-54	7.140E-04	CS-134	5.690E-05
MN-56	8.950E-06	CS-136	8.400E-06
FE-55	6.210E-05	CS-137	5.090E-05
FE-59	7.250E-04	CS-138	4.670E-08
CO-56	0.000E-01	BA-139	4.250E-06
CO-57	0.000E-01	BA-140	1.140E-03
CO-58	5.550E-04	LA-140	1.200E-04
CO-60	3.220E-03	CE-139	0.000E-01
NI-63	1.490E-04	CE-144	7.030E-03
NI-65	5.800E-06	EU-152	0.000E-01
CU-64	6.640E-06	W-187	2.830E-05
ZN-65	4.620E-04	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	1.450E-03	NP-239	4.250E-05
SR-90	8.030E-03	AAAAAAA	0.000E-01
SR-91	3.760E-05	BBBBBBB	0.000E-01
SR-92	1.700E-05	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	1.920E-04	EEEEEEE	0.000E-01
Y-91M	1.990E-06	FFFFFFF	0.000E-01
Y-91	1.750E-03	GGGGGGG	0.000E-01
Y-92	1.750E-05	HHHHHHH	0.000E-01
Y-93	5.460E-05	IIIIIII	0.000E-01
ZR-95	1.250E-03	JJJJJJJ	0.000E-01

DPA_i - elements 16→100, infant inhalation dose factor for lungs (mrem/pCi inhaled)

AR-41	0.000E-01	ZR-97	1.000E-04
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	9.050E-06
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	3.480E-05
KR-88	0.000E-01	TC-99M	1.450E-06
KR-89	0.000E-01	RU-103	1.150E-05
KR-90	0.000E-01	RU-106	1.170E-04
XE-131M	0.000E-01	AG-110M	2.360E-05
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	4.620E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	3.150E-05
C-14	3.790E-06	I-131	7.560E-07
NA-24	7.540E-06	I-132	1.360E-06
P-32	1.150E-05	I-133	1.540E-06
K-40	0.000E-01	I-134	9.210E-07
CR-51	2.550E-05	I-135	1.310E-06
MN-54	5.040E-06	CS-134	9.530E-07
MN-56	5.120E-05	CS-136	1.020E-06
FE-55	7.820E-07	CS-137	9.530E-07
FE-59	1.770E-05	CS-138	6.260E-07
CO-56	0.000E-01	BA-139	3.640E-05
CO-57	0.000E-01	BA-140	2.740E-05
CO-58	7.950E-06	LA-140	6.060E-05
CO-60	2.200E-05	CE-139	0.000E-01
NI-63	1.730E-06	CE-144	1.060E-04
NI-65	3.580E-05	EU-152	0.000E-01
CU-64	1.070E-05	W-187	2.540E-05
ZN-65	3.670E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	1.000E-24	BI-214	0.000E-01
RB-88	2.420E-07	RA-226	0.000E-01
RB-89	4.870E-08	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	4.570E-05	NP-239	1.780E-05
SR-90	9.360E-05	AAAAAAA	0.000E-01
SR-91	5.240E-05	BBBBBBB	0.000E-01
SR-92	1.000E-04	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	7.430E-05	EEEEEEE	0.000E-01
Y-91M	1.680E-06	FFFFFFF	0.000E-01
Y-91	5.020E-05	GGGGGGG	0.000E-01
Y-92	9.040E-05	HHHHHHH	0.000E-01
Y-93	1.190E-04	IIIIIII	0.000E-01
ZR-95	1.550E-05	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, infant inhalation dose factors for GI-LLI (mrem/pCi inhaled)

AR-41	6.588E 03	ZR-97	6.120E 04
KR-83M	6.700E 03	NB-94	6.300E 11
KR-85M	1.610E 04	NB-95	5.660E 06
KR-85	3.400E 08	MO-90	2.050E 04
KR-87	4.579E 03	MO-99	2.400E 05
KR-88	1.008E 04	TC-99M	2.170E 04
KR-89	1.900E 02	RU-103	3.420E 06
KR-90	3.230E 01	RU-106	3.170E 07
XE-131M	1.028E 06	AG-110M	2.190E 07
XE-133M	1.950E 05	CD-109	3.910E 07
XE-133	4.570E 05	CD-113M	4.600E 08
XE-135M	9.360E 02	SN-113	9.960E 06
XE-135	3.300E 04	SB-122	2.350E 05
XE-137	2.300E 02	SB-124	5.200E 06
XE-138	1.020E 03	SB-125	8.600E 07
H-3	4.000E 08	SB-127	3.350E 05
BE-7	4.600E 06	TE-132	2.810E 05
C-14	1.810E 11	I-131	6.950E 05
NA-24	5.410E 04	I-132	8.200E 03
P-32	1.230E 06	I-133	7.560E 04
K-40	3.980E 16	I-134	3.190E 03
CR-51	2.400E 06	I-135	2.410E 04
MN-54	2.700E 07	CS-134	6.500E 07
MN-56	9.320E 03	CS-136	1.120E 06
FE-55	8.200E 07	CS-137	9.520E 08
FE-59	3.850E 06	CS-138	2.004E 03
CO-56	6.680E 06	BA-139	4.960E 03
CO-57	2.330E 07	BA-140	1.100E 06
CO-58	6.160E 06	LA-140	1.450E 05
CO-60	1.660E 08	CE-139	1.190E 07
NI-63	2.900E 09	CE-144	2.460E 07
NI-65	9.220E 03	EU-152	4.170E 08
CU-64	4.570E 04	W-187	8.600E 04
ZN-65	2.110E 07	HG-203	4.040E 06
SE-75	1.040E 07	PB-214	1.300E 03
BR-84	1.900E 03	BI-214	7.090E 03
RB-88	1.070E 03	RA-226	5.060E 10
RB-89	9.360E 02	TH-228	6.030E 07
SR-85	5.630E 06	U-235	2.440E 16
SR-89	4.550E 06	NP-239	2.030E 05
SR-90	8.880E 08	AAAAAAA	0.000E-01
SR-91	3.510E 04	BBBBBBB	0.000E-01
SR-92	9.750E 03	CCCCCCC	0.000E-01
Y-88	9.210E 06	DDDDDDD	0.000E-01
Y-90	2.300E 05	EEEEEEE	0.000E-01
Y-91M	2.982E 03	FFFFFFF	0.000E-01
Y-91	5.080E 06	GGGGGGG	0.000E-01
Y-92	1.270E 04	HHHHHHH	0.000E-01
Y-93	3.708E 04	IIIIIII	0.000E-01
ZR-95	5.660E 06	JJJJJJJ	0.000E-01

HL_i - elements 1→100, Radionuclide half life (sec)

Revision A

AR-41	0.000E-01	ZR-97	6.990E-09
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	2.250E-08
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	9.230E-10
KR-89	0.000E-01	RU-103	7.310E-07
KR-90	0.000E-01	RU-106	1.170E-05
XE-131M	0.000E-01	AG-110M	5.390E-07
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	0.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.010E-05
C-14	1.210E-05	I-131	1.720E-05
NA-24	5.800E-06	I-132	8.000E-07
P-32	8.250E-04	I-133	5.920E-06
K-40	0.000E-01	I-134	4.190E-07
CR-51	0.000E-01	I-135	1.750E-06
MN-54	0.000E-01	CS-134	2.340E-04
MN-56	0.000E-01	CS-136	2.350E-05
FE-55	1.150E-05	CS-137	3.270E-04
FE-59	1.650E-05	CS-138	2.280E-07
CO-56	0.000E-01	BA-139	4.140E-07
CO-57	0.000E-01	BA-140	8.310E-05
CO-58	0.000E-01	LA-140	1.010E-08
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	5.380E-04	CE-144	2.080E-06
NI-65	2.220E-06	EU-152	0.000E-01
CU-64	0.000E-01	W-187	4.290E-07
ZN-65	1.370E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	1.320E-03	NP-239	5.250E-09
SR-90	1.700E-02	AAAAAAA	0.000E-01
SR-91	2.400E-05	BBBBBBB	0.000E-01
SR-92	9.030E-06	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	4.110E-08	EEEEEEE	0.000E-01
Y-91M	3.820E-10	FFFFFFF	0.000E-01
Y-91	6.020E-07	GGGGGGG	0.000E-01
Y-92	3.600E-09	HHHHHHH	0.000E-01
Y-93	1.140E-08	IIIIIII	0.000E-01
ZR-95	1.160E-07	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, child ingestion dose factor for bone (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	1.010E-00
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	8.760E-09
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	1.330E-05
KR-88	0.000E-01	TC-99M	1.810E-09
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	3.640E-07
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.030E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	4.470E-06
C-14	2.420E-06	I-131	1.730E-05
NA-24	5.800E-06	I-132	1.470E-06
P-32	3.860E-05	I-133	7.320E-06
K-40	0.000E-01	I-134	7.780E-07
CR-51	0.000E-01	I-135	3.150E-06
MN-54	1.070E-05	CS-134	3.840E-04
MN-56	3.340E-07	CS-136	6.460E-05
FE-55	6.100E-06	CS-137	3.130E-04
FE-59	2.670E-05	CS-138	3.170E-07
CO-56	0.000E-01	BA-139	2.210E-10
CO-57	0.000E-01	BA-140	7.280E-08
CO-58	1.800E-06	LA-140	3.530E-09
CO-60	5.290E-06	CE-139	0.000E-01
NI-63	2.880E-05	CE-144	6.520E-07
NI-65	2.090E-07	EU-152	0.000E-01
CU-64	2.450E-07	W-187	2.540E-07
ZN-65	3.650E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	1.900E-07	RA-226	0.000E-01
RB-89	1.170E-07	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	3.770E-10
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	2.550E-08	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, child ingestion dose factors for liver (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	5.960E-10
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	6.260E-09
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	3.290E-06
KR-88	0.000E-01	TC-99M	3.000E-08
KR-89	0.000E-01	RU-103	2.810E-07
KR-90	0.000E-01	RU-106	1.460E-06
XE-131M	0.000E-01	AG-110M	2.910E-07
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.030E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	5.400E-06
C-14	2.420E-06	I-131	9.830E-06
NA-24	5.800E-06	I-132	6.760E-07
P-32	3.180E-05	I-133	2.770E-06
K-40	0.000E-01	I-134	3.580E-07
CR-51	8.900E-09	I-135	1.490E-06
MN-54	2.850E-06	CS-134	8.100E-05
MN-56	7.540E-08	CS-136	4.180E-05
FE-55	1.890E-06	CS-137	4.620E-05
FE-59	1.330E-05	CS-138	2.010E-07
CO-56	0.000E-01	BA-139	1.200E-08
CO-57	0.000E-01	BA-140	4.850E-06
CO-58	5.510E-06	LA-140	1.190E-09
CO-60	1.560E-05	CE-139	0.000E-01
NI-63	1.830E-05	CE-144	1.110E-07
NI-65	1.220E-07	EU-152	0.000E-01
CU-64	1.480E-07	W-187	1.140E-07
ZN-65	2.270E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	1.980E-07	BI-214	0.000E-01
RB-88	1.320E-07	RA-226	0.000E-01
RB-89	1.040E-07	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	3.770E-05	NP-239	2.650E-10
SR-90	4.310E-03	AAAAAAA	0.000E-01
SR-91	9.060E-07	BBBBBBB	0.000E-01
SR-92	3.620E-07	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	1.100E-09	EEEEEEE	0.000E-01
Y-91M	1.390E-11	FFFFFFF	0.000E-01
Y-91	1.610E-08	GGGGGGG	0.000E-01
Y-92	1.030E-08	HHHHHHH	0.000E-01
Y-93	3.130E-10	IIIIIII	0.000E-01
ZR-95	2.270E-08	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, child ingestion dose factors for total body (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	0.000E-01
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.030E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	6.510E-06
C-14	2.420E-06	I-131	5.720E-03
NA-24	5.800E-06	I-132	6.820E-05
P-32	0.000E-01	I-133	1.360E-03
K-40	0.000E-01	I-134	1.790E-05
CR-51	4.940E-09	I-135	2.790E-04
MN-54	0.000E-01	CS-134	0.000E-01
MN-56	0.000E-01	CS-136	0.000E-01
FE-55	0.000E-01	CS-137	0.000E-01
FE-59	0.000E-01	CS-138	0.000E-01
CO-56	0.000E-01	BA-139	0.000E-01
CO-57	0.000E-01	BA-140	0.000E-01
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, child ingestion dose factors for thyroid (mrem/pCi ingested)

AR-41	3.157E 03	ZR-97	1.450E-09
KR-83M	4.178E-20	NB-94	0.000E-01
KR-85M	8.169E 02	NB-95	8.230E-09
KR-85	2.223E-15	MO-90	0.000E-01
KR-87	1.620E-10	MO-99	2.840E-05
KR-88	7.579E-13	TC-99M	2.630E-08
KR-89	4.926E 01	RU-103	1.840E-06
KR-90	3.684E 10	RU-106	1.580E-05
XE-131M	2.722E-15	AG-110M	6.780E-07
XE-133M	9.842E-15	CD-109	0.000E-01
XE-133	5.067E 07	CD-113M	0.000E-01
XE-135M	6.013E-13	SN-113	0.000E-01
XE-135	6.295E-13	SB-122	0.000E-01
XE-137	1.304E-31	SB-124	0.000E-01
XE-138	3.081E 00	SB-125	0.000E-01
H-3	2.300E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	4.150E-05
C-14	2.420E-06	I-131	2.840E-05
NA-24	5.800E-06	I-132	2.250E-06
P-32	0.000E-01	I-133	1.220E-05
K-40	0.000E-01	I-134	1.190E-06
CR-51	1.350E-09	I-135	4.830E-06
MN-54	3.000E-06	CS-134	1.190E-04
MN-56	4.040E-07	CS-136	3.440E-05
FE-55	0.000E-01	CS-137	1.020E-04
FE-59	0.000E-01	CS-138	2.230E-07
CO-56	0.000E-01	BA-139	1.930E-10
CO-57	0.000E-01	BA-140	2.370E-08
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	3.610E-07
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	5.920E-07	W-187	0.000E-01
ZN-65	2.300E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	1.090E-09
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	1.650E-09	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, child ingestion dose factors for kidneys (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	9.190E-10
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.030E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	0.000E-01
C-14	2.420E-06	I-131	0.000E-01
NA-24	5.800E-06	I-132	0.000E-01
P-32	0.000E-01	I-133	0.000E-01
K-40	0.000E-01	I-134	0.000E-01
CR-51	9.020E-09	I-135	0.000E-01
MN-54	0.000E-01	CS-134	4.270E-05
MN-56	0.000E-01	CS-136	5.130E-06
FE-55	3.450E-06	CS-137	3.670E-05
FE-59	7.740E-06	CS-138	2.400E-08
CO-56	0.000E-01	BA-139	1.300E-10
CO-57	0.000E-01	BA-140	4.340E-08
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, child ingestion dose factors for lung (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	1.530E-04
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.620E-05
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	1.100E-05
KR-88	0.000E-01	TC-99M	1.030E-06
KR-89	0.000E-01	RU-103	1.890E-05
KR-90	0.000E-01	RU-106	1.820E-04
XE-131M	0.000E-01	AG-110M	4.330E-05
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.030E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	4.500E-05
C-14	2.420E-06	I-131	1.540E-06
NA-24	5.800E-06	I-132	1.730E-06
P-32	2.280E-05	I-133	2.950E-06
K-40	0.000E-01	I-134	5.160E-07
CR-51	4.720E-07	I-135	2.400E-06
MN-54	8.980E-06	CS-134	2.070E-06
MN-56	4.840E-05	CS-136	2.270E-06
FE-55	1.130E-06	CS-137	1.960E-06
FE-59	2.780E-05	CS-138	1.460E-07
CO-56	0.000E-01	BA-139	2.390E-05
CO-57	0.000E-01	BA-140	4.210E-05
CO-58	1.050E-05	LA-140	9.840E-05
CO-60	2.930E-05	CE-139	0.000E-01
NI-63	1.940E-06	CE-144	1.700E-04
NI-65	2.560E-05	EU-152	0.000E-01
CU-64	1.150E-05	W-187	3.570E-05
ZN-65	6.410E-06	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	1.000E-24	BI-214	0.000E-01
RB-88	9.320E-09	RA-226	0.000E-01
RB-89	1.020E-09	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	5.110E-05	NP-239	2.790E-05
SR-90	2.290E-04	AAAAAAA	0.000E-01
SR-91	5.300E-05	BBBBBBB	0.000E-01
SR-92	1.710E-04	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	1.170E-04	EEEEEEE	0.000E-01
Y-91M	7.480E-07	FFFFFFF	0.000E-01
Y-91	8.020E-05	GGGGGGG	0.000E-01
Y-92	1.040E-04	HHHHHHH	0.000E-01
Y-93	1.700E-04	IIIIIII	0.000E-01
ZR-95	2.660E-05	JJJJJJJ	0.000E-01

DFL_i - elements 16→100, child ingestion dose factors for GI-LLI (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	5.070E-08
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	6.350E-06
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	4.810E-13
KR-89	0.000E-01	RU-103	7.550E-07
KR-90	0.000E-01	RU-106	3.680E-05
XE-131M	0.000E-01	AG-110M	4.560E-06
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	0.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.300E-07
C-14	9.700E-06	I-131	1.300E-05
NA-24	4.350E-06	I-132	5.720E-07
P-32	7.040E-04	I-133	4.480E-06
K-40	0.000E-01	I-134	3.170E-07
CR-51	0.000E-01	I-135	1.330E-06
MN-54	0.000E-01	CS-134	1.760E-04
MN-56	0.000E-01	CS-136	1.760E-05
FE-55	1.280E-05	CS-137	2.450E-04
FE-59	5.590E-06	CS-138	1.710E-07
CO-56	0.000E-01	BA-139	4.980E-10
CO-57	0.000E-01	BA-140	2.000E-05
CO-58	0.000E-01	LA-140	1.740E-07
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	2.220E-04	CE-144	1.830E-03
NI-65	8.080E-10	EU-152	0.000E-01
CU-64	0.000E-01	W-187	4.410E-09
ZN-65	1.150E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	1.620E-04	NP-239	1.260E-07
SR-90	2.730E-02	AAAAAAA	0.000E-01
SR-91	3.280E-08	BBBBBBB	0.000E-01
SR-92	3.540E-09	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	1.110E-06	EEEEEEE	0.000E-01
Y-91M	1.370E-10	FFFFFFF	0.000E-01
Y-91	2.470E-04	GGGGGGG	0.000E-01
Y-92	5.500E-09	HHHHHHH	0.000E-01
Y-93	5.040E-08	IIIIIII	0.000E-01
ZR-95	5.130E-05	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, child inhalation dose factors for bone (mrem/pCi inhaled)

AR-41	0.000E-01	ZR-97	7.340E-09
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	2.480E-06
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	4.660E-08
KR-88	0.000E-01	TC-99M	9.410E-13
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	3.080E-06
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.040E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	7.360E-08
C-14	1.820E-06	I-131	1.300E-05
NA-24	4.350E-06	I-132	1.100E-06
P-32	3.090E-05	I-133	5.490E-06
K-40	0.000E-01	I-134	5.840E-07
CR-51	0.000E-01	I-135	2.360E-06
MN-54	1.160E-05	CS-134	2.740E-04
MN-56	4.480E-10	CS-136	4.620E-05
FE-55	6.800E-06	CS-137	2.230E-04
FE-59	9.040E-06	CS-138	2.270E-07
CO-56	0.000E-01	BA-139	2.660E-13
CO-57	0.000E-01	BA-140	1.750E-08
CO-58	4.790E-07	LA-140	6.080E-08
CO-60	3.550E-06	CE-139	0.000E-01
NI-63	1.250E-05	CE-144	5.720E-04
NI-65	7.990E-11	EU-152	0.000E-01
CU-64	5.390E-10	W-187	2.610E-09
ZN-65	3.060E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	1.520E-07	RA-226	0.000E-01
RB-89	9.330E-08	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	9.040E-09
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	1.130E-05	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, child inhalation dose factors for liver (mrem/pCi inhaled)

AR-41	0.000E-01	ZR-97	4.320E-09
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.770E-06
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	1.150E-08
KR-88	0.000E-01	TC-99M	1.560E-11
KR-89	0.000E-01	RU-103	2.900E-07
KR-90	0.000E-01	RU-106	4.570E-06
XE-131M	0.000E-01	AG-110M	2.470E-06
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.040E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	7.120E-08
C-14	1.820E-06	I-131	7.370E-06
NA-24	4.350E-06	I-132	5.070E-07
P-32	2.670E-05	I-133	2.080E-06
K-40	0.000E-01	I-134	2.690E-07
CR-51	4.170E-08	I-135	1.120E-06
MN-54	2.570E-06	CS-134	6.070E-05
MN-56	8.430E-11	CS-136	3.140E-05
FE-55	2.100E-06	CS-137	3.470E-05
FE-59	4.510E-06	CS-138	1.500E-07
CO-56	0.000E-01	BA-139	1.450E-11
CO-57	0.000E-01	BA-140	1.170E-06
CO-58	8.550E-07	LA-140	2.040E-08
CO-60	6.120E-06	CE-139	0.000E-01
NI-63	7.560E-06	CE-144	9.770E-05
NI-65	4.440E-11	EU-152	0.000E-01
CU-64	2.900E-10	W-187	1.170E-09
ZN-65	1.900E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	1.480E-07	BI-214	0.000E-01
RB-88	9.900E-08	RA-226	0.000E-01
RB-89	7.830E-08	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	4.660E-06	NP-239	6.350E-09
SR-90	1.740E-03	AAAAAAA	0.000E-01
SR-91	1.240E-09	BBBBBBB	0.000E-01
SR-92	1.420E-10	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	2.990E-08	EEEEEEE	0.000E-01
Y-91M	4.980E-12	FFFFFFF	0.000E-01
Y-91	6.590E-06	GGGGGGG	0.000E-01
Y-92	1.570E-10	HHHHHHH	0.000E-01
Y-93	1.380E-09	IIIIIII	0.000E-01
ZR-95	1.000E-05	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, child inhalation dose factor for total body (mrem/pCi inhaled)

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	0.000E-01
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.040E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	8.580E-08
C-14	1.820E-06	I-131	4.390E-03
NA-24	4.350E-06	I-132	5.230E-05
P-32	0.000E-01	I-133	1.040E-03
K-40	0.000E-01	I-134	1.370E-05
CR-51	2.310E-08	I-135	2.140E-04
MN-54	0.000E-01	CS-134	0.000E-01
MN-56	0.000E-01	CS-136	0.000E-01
FE-55	0.000E-01	CS-137	0.000E-01
FE-59	0.000E-01	CS-138	0.000E-01
CO-56	0.000E-01	BA-139	0.000E-01
CO-57	0.000E-01	BA-140	0.000E-01
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-90	0.000E-01	DDDDDDD	0.000E-01
Y-91	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, child inhalation dose factor for thyroid (mrem/pCi inhaled)

1319 081

AR-41	0.000E-01	ZR-97	1.050E-08
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	2.330E-06
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	1.060E-07
KR-88	0.000E-01	TC-99M	1.370E-11
KR-89	0.000E-01	RU-103	1.900E-06
KR-90	0.000E-01	RU-106	4.970E-05
XE-131M	0.000E-01	AG-110M	5.740E-06
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.040E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	4.790E-07
C-14	1.820E-06	I-131	2.130E-05
NA-24	4.350E-06	I-132	1.690E-06
P-32	0.000E-01	I-133	9.130E-06
K-40	0.000E-01	I-134	8.920E-07
CR-51	6.570E-09	I-135	3.620E-06
MN-54	2.710E-06	CS-134	8.930E-05
MN-56	4.520E-10	CS-136	2.580E-05
FE-55	0.000E-01	CS-137	7.630E-05
FE-59	0.000E-01	CS-138	1.680E-07
CO-56	0.000E-01	BA-139	2.330E-13
CO-57	0.000E-01	BA-140	5.710E-09
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	3.170E-04
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	1.630E-09	W-187	0.000E-01
ZN-65	1.930E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	2.630E-08
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	1.610E-05	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, child inhalation dose factors for kidneys (mrem/pCi inhaled)

AR-41	0.000E-01	ZR-97	3.060E-05
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.660E-04
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	3.660E-05
KR-88	0.000E-01	TC-99M	2.570E-07
KR-89	0.000E-01	RU-103	1.790E-04
KR-90	0.000E-01	RU-106	3.870E-03
XE-131M	0.000E-01	AG-110M	1.480E-03
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.070E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.020E-04
C-14	1.820E-06	I-131	0.000E-01
NA-24	4.350E-06	I-132	0.000E-01
P-32	0.000E-01	I-133	0.000E-01
K-40	0.000E-01	I-134	0.000E-01
CR-51	4.590E-06	I-135	0.000E-01
MN-54	4.260E-04	CS-134	3.270E-05
MN-56	3.550E-06	CS-136	3.930E-06
FE-55	3.000E-05	CS-137	2.810E-05
FE-59	3.430E-04	CS-138	1.840E-08
CO-56	0.000E-01	BA-139	1.560E-06
CO-57	0.000E-01	BA-140	4.710E-04
CO-58	2.990E-04	LA-140	4.940E-05
CO-60	1.910E-03	CE-139	0.000E-01
NI-63	7.430E-05	CE-144	3.120E-05
NI-65	2.210E-06	EU-152	0.000E-01
CU-64	2.590E-06	W-187	1.110E-05
ZN-65	2.690E-04	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	5.830E-04	NP-239	1.570E-05
SR-90	3.990E-03	AAAAAAA	0.000E-01
SR-91	1.440E-05	BBBBBBB	0.000E-01
SR-92	6.490E-06	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	7.070E-05	EEEEEEE	0.000E-01
Y-91M	7.600E-07	FFFFFFF	0.000E-01
Y-91	7.100E-04	GGGGGGG	0.000E-01
Y-92	6.460E-06	HHHHHHH	0.000E-01
Y-93	2.010E-05	IIIIIII	0.000E-01
ZR-95	6.030E-04	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, child inhalation dose factor for lungs (mrem/pCi inhaled)

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AR-41	0.000E-01	ZR-97	9.490E-05
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.000E-05
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	3.420E-05
KR-88	0.000E-01	TC-99M	1.300E-06
KR-89	0.000E-01	RU-103	1.210E-05
KR-90	0.000E-01	RU-106	1.160E-04
XE-131M	0.000E-01	AG-110M	2.710E-05
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	3.040E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	3.720E-05
C-14	1.820E-06	I-131	7.680E-07
NA-24	4.350E-06	I-132	8.650E-07
P-32	1.140E-05	I-133	1.480E-06
K-40	0.000E-01	I-134	2.580E-07
CR-51	2.930E-07	I-135	1.200E-06
MN-54	6.160E-06	CS-134	1.040E-06
MN-56	3.330E-05	CS-136	1.130E-06
FE-55	7.750E-07	CS-137	9.780E-07
FE-59	1.910E-05	CS-138	7.290E-08
CO-56	0.000E-01	BA-139	1.560E-05
CO-57	0.000E-01	BA-140	2.750E-05
CO-58	9.290E-06	LA-140	6.100E-05
CO-60	2.600E-05	CE-139	0.000E-01
NI-63	1.710E-06	CE-144	1.050E-04
NI-65	2.270E-05	EU-152	0.000E-01
CU-64	9.920E-06	W-187	2.460E-05
ZN-65	4.410E-06	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	1.000E-24	BI-214	0.000E-01
RB-88	4.660E-09	RA-226	0.000E-01
RB-89	5.110E-10	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	4.520E-05	NP-239	1.730E-05
SR-90	9.280E-05	AAAAAAA	0.000E-01
SR-91	4.700E-05	BBBBBBB	0.000E-01
SR-92	6.550E-05	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	7.240E-05	EEEEEEE	0.000E-01
Y-91M	4.640E-07	FFFFFFF	0.000E-01
Y-91	4.970E-05	GGGGGGG	0.000E-01
Y-92	6.460E-05	HHHHHHH	0.000E-01
Y-93	1.050E-04	IIIIIII	0.000E-01
ZR-95	1.650E-05	JJJJJJJ	0.000E-01

DFA_i - elements 16→100, child inhalation dose factors for GI-LLI (mrem/pCi inhaled)

AR-41	0.000E-01	ZR-97	3.400E-02
KR-83M	0.000E-01	NB-94	2.800E-01
KR-85M	0.000E-01	NB-95	2.800E-01
KR-85	0.000E-01	MO-90	8.000E-03
KR-87	0.000E-01	MO-99	8.000E-03
KR-88	0.000E-01	TC-99M	4.000E-01
KR-89	0.000E-01	RU-103	4.000E-01
KR-90	0.000E-01	RU-106	4.000E-01
XE-131M	0.000E-01	AG-110M	1.700E-02
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	1.200E-02	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	7.700E-02
C-14	3.100E-02	I-131	2.900E-03
NA-24	3.000E-02	I-132	2.900E-03
P-32	4.600E-02	I-133	2.900E-03
K-40	0.000E-01	I-134	2.900E-03
CR-51	2.400E-03	I-135	2.900E-03
MN-54	8.000E-04	CS-134	4.000E-03
MN-56	8.000E-04	CS-136	4.000E-03
FE-55	4.000E-02	CS-137	4.000E-03
FE-59	4.000E-02	CS-138	4.000E-03
CO-56	1.300E-02	BA-139	3.200E-03
CO-57	1.300E-02	BA-140	3.200E-03
CO-58	1.300E-02	LA-140	2.000E-04
CO-60	1.300E-02	CE-139	1.200E-03
NI-63	5.300E-02	CE-144	1.200E-03
NI-65	5.300E-02	EU-152	0.000E-01
CU-64	8.000E-03	W-187	1.300E-03
ZN-65	3.000E-02	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	3.100E-02	RA-226	0.000E-01
RB-89	3.100E-02	TH-228	0.000E-01
SR-85	6.000E-04	U-235	0.000E-01
SR-89	6.000E-04	NP-239	2.000E-04
SR-90	6.000E-06	AAAAAAA	0.000E-01
SR-91	6.000E-04	BBBBBBB	0.000E-01
SR-92	6.000E-04	CCCCCCC	0.000E-01
Y-88	4.600E-03	DDDDDDD	0.000E-01
Y-90	4.600E-03	EEEEEEE	0.000E-01
Y-91M	4.600E-03	FFFFFFF	0.000E-01
Y-91	4.600E-03	GGGGGGG	0.000E-01
Y-92	4.600E-03	HHHHHHH	0.000E-01
Y-93	4.600E-03	IIIIIII	0.000E-01
ZR-95	3.400E-02	JJJJJJJ	0.000E-01

Ff - elements 16→100, stable element transfer data-meat (day/kg)

AR-41	0.000E-01	ZR-97	1.680E-09
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	6.220E-09
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	2.470E-10
KR-89	0.000E-01	RU-103	1.850E-07
KR-90	0.000E-01	RU-106	2.750E-06
XE-131M	0.000E-01	AG-110M	1.600E-07
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	0.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	2.520E-06
C-14	2.840E-06	I-131	4.160E-06
NA-24	1.700E-06	I-132	2.030E-07
P-32	1.930E-04	I-133	1.420E-06
K-40	0.000E-01	I-134	1.060E-07
CR-51	0.000E-01	I-135	4.430E-07
MN-54	0.000E-01	CS-134	6.220E-05
MN-56	0.000E-01	CS-136	6.510E-06
FE-55	2.750E-06	CS-137	7.370E-05
FE-59	4.340E-06	CS-138	5.520E-08
CO-56	0.000E-01	BA-139	9.700E-08
CO-57	0.000E-01	BA-140	2.030E-05
CO-58	0.000E-01	LA-140	2.500E-09
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	1.300E-04	CE-144	4.880E-07
NI-65	5.280E-07	EU-152	0.000E-01
CU-64	0.000E-01	W-187	1.030E-07
ZN-65	4.840E-06	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	3.080E-04	NP-239	1.190E-09
SR-90	7.580E-03	AAAAAAA	0.000E-01
SR-91	5.670E-06	BBBBBBB	0.000E-01
SR-92	2.150E-06	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	9.620E-09	EEEEEEE	0.000E-01
Y-91M	9.090E-11	FFFFFFF	0.000E-01
Y-91	1.410E-07	GGGGGGG	0.000E-01
Y-92	8.450E-10	HHHHHHH	0.000E-01
Y-93	2.680E-09	IIIIIII	0.000E-01
ZR-95	3.040E-08	JJJJJJJ	0.000E-01

DF_i - elements 16→100, adult ingestion dose factors for bone - liquid releases (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	3.390E-10
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	3.460E-09
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	4.310E-06
KR-88	0.000E-01	TC-99M	6.980E-10
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	1.480E-07
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	1.050E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.630E-06
C-14	5.680E-07	I-131	5.950E-06
NA-24	1.700E-06	I-132	5.430E-07
P-32	1.200E-05	I-133	2.470E-06
K-40	0.000E-01	I-134	2.880E-07
CR-51	0.000E-01	I-135	1.160E-06
MN-54	4.570E-06	CS-134	1.480E-04
MN-56	1.150E-07	CS-136	2.570E-05
FE-55	1.900E-06	CS-137	1.090E-04
FE-59	1.020E-05	CS-138	1.090E-07
CO-56	0.000E-01	BA-139	6.910E-11
CO-57	0.000E-01	BA-140	2.550E-08
CO-58	7.450E-07	LA-140	1.260E-09
CO-60	2.140E-06	CE-139	0.000E-01
NI-63	9.010E-06	CE-144	2.040E-07
NI-65	6.860E-08	EU-152	0.000E-01
CU-64	8.330E-08	W-187	8.610E-08
ZN-65	1.540E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	6.050E-08	RA-226	0.000E-01
RB-89	4.010E-08	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	1.170E-10
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	9.750E-09	JJJJJJJ	0.000E-01

DF_i - elements 16→100, adult ingestion dose factors for liver - liquid release (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	1.550E-10
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.860E-09
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	8.200E-07
KR-88	0.000E-01	TC-99M	8.890E-09
KR-89	0.000E-01	RU-103	7.970E-08
KR-90	0.000E-01	RU-106	3.480E-07
XE-131M	0.000E-01	AG-110M	8.790E-08
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	1.050E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.530E-06
C-14	5.680E-07	I-131	3.410E-06
NA-24	1.700E-06	I-132	1.900E-07
P-32	7.460E-06	I-133	7.530E-07
K-40	0.000E-01	I-134	1.030E-07
CR-51	2.660E-09	I-135	4.280E-07
MN-54	8.720E-07	CS-134	1.210E-04
MN-56	2.040E-08	CS-136	1.850E-05
FE-55	4.430E-07	CS-137	7.140E-05
FE-59	3.910E-06	CS-138	5.400E-08
CO-56	0.000E-01	BA-139	2.840E-09
CO-57	0.000E-01	BA-140	1.330E-06
CO-58	1.670E-06	LA-140	3.330E-10
CO-60	4.720E-06	CE-139	0.000E-01
NI-63	4.360E-06	CE-144	2.620E-08
NI-65	3.130E-08	EU-152	0.000E-01
CU-64	3.910E-08	W-187	3.010E-08
ZN-65	6.960E-06	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	5.210E-08	BI-214	0.000E-01
RB-88	3.210E-08	RA-226	0.000E-01
RB-89	2.820E-08	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	8.840E-06	NP-239	6.450E-11
SR-90	1.860E-03	AAAAAAA	0.000E-01
SR-91	2.290E-07	BBBBBBB	0.000E-01
SR-92	9.300E-08	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	2.580E-10	EEEEEEE	0.000E-01
Y-91M	3.520E-12	FFFFFFF	0.000E-01
Y-91	3.770E-09	GGGGGGG	0.000E-01
Y-92	2.470E-11	HHHHHHH	0.000E-01
Y-93	7.400E-11	IIIIIII	0.000E-01
ZR-95	6.600E-09	JJJJJJJ	0.000E-01

DF_i - elements 16→100, adult ingestion dose factors for total body -liquid release (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	0.000E-01
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	IN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	1.050E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.800E-06
C-14	5.680E-07	I-131	1.950E-03
NA-24	1.700E-06	I-132	1.900E-05
P-32	0.000E-01	I-133	3.630E-04
K-40	0.000E-01	I-134	4.990E-06
CR-51	1.590E-09	I-135	7.650E-05
MN-54	0.000E-01	CS-134	0.000E-01
MN-56	0.000E-01	CS-136	0.000E-01
FE-55	0.000E-01	CS-137	0.000E-01
FE-59	0.000E-01	CS-138	0.000E-01
CO-56	0.000E-01	BA-139	0.000E-01
CO-57	0.000E-01	BA-140	0.000E-01
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

DF_i - elements 16→100, adult ingestion dose factors for thyroid - liquid releases (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	5.120E-10
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	3.420E-09
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	9.760E-06
KR-88	0.000E-01	TC-99M	1.060E-08
KR-89	0.000E-01	RU-103	7.060E-07
KR-90	0.000E-01	RU-106	5.310E-06
XE-131M	0.000E-01	AG-110M	2.910E-07
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	1.050E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.570E-05
C-14	5.680E-07	I-131	1.020E-05
NA-24	1.700E-06	I-132	8.650E-07
P-32	0.000E-01	I-133	4.310E-06
K-40	0.000E-01	I-134	4.580E-07
CR-51	5.860E-10	I-135	1.860E-06
MN-54	1.360E-06	CS-134	4.790E-05
MN-56	1.460E-07	CS-136	1.430E-05
FE-55	0.000E-01	CS-137	3.700E-05
FE-59	0.000E-01	CS-138	8.010E-08
CO-56	0.000E-01	BA-139	6.460E-11
CO-57	0.000E-01	BA-140	8.670E-09
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	1.210E-07
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	2.100E-07	W-187	0.000E-01
ZN-65	1.030E-05	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	3.650E-10
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	1.530E-08	JJJJJJJ	0.000E-01

DF_i - elements 16→100, adult ingestion dose factor for kidney - liquid release (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	3.420E-10
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	1.050E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	0.000E-01
C-14	5.680E-07	I-131	0.000E-01
NA-24	1.700E-06	I-132	0.000E-01
P-32	0.000E-01	I-133	0.000E-01
K-40	0.000E-01	I-134	0.000E-01
CR-51	3.530E-09	I-135	0.000E-01
MN-54	0.000E-01	CS-134	1.590E-05
MN-56	0.000E-01	CS-136	1.960E-06
FE-55	1.060E-06	CS-137	1.230E-05
FE-59	2.850E-06	CS-138	7.910E-09
CO-56	0.000E-01	BA-139	3.920E-11
CO-57	0.000E-01	BA-140	1.460E-08
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

DF_i - elements 16→100, adult ingestion dose factor for lung-liquid release (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	1.050E-04
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	2.100E-05
KR-85	0.000E-01	MO-99	0.000E-01
KR-87	0.000E-01	MO-99	9.990E-06
KR-88	0.000E-01	TC-99M	4.130E-07
KR-89	0.000E-01	RU-103	2.160E-05
KR-90	0.000E-01	RU-106	1.780E-04
XE-131M	0.000E-01	AG-110M	6.040E-05
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	1.050E-07	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	7.710E-05
C-14	5.680E-07	I-131	1.570E-06
NA-24	1.700E-06	I-132	1.020E-07
P-32	2.170E-05	I-133	2.220E-06
K-40	0.000E-01	I-134	2.510E-10
CR-51	6.690E-07	I-135	1.310E-06
MN-54	1.400E-05	CS-134	2.590E-06
MN-56	3.670E-06	CS-136	2.920E-06
FE-55	1.090E-06	CS-137	2.110E-06
FE-59	3.400E-05	CS-138	4.650E-13
CO-56	0.000E-01	BA-139	1.720E-07
CO-57	0.000E-01	BA-140	4.180E-05
CO-58	1.510E-05	LA-140	9.250E-05
CO-60	4.020E-05	CE-139	0.000E-01
NI-63	1.880E-06	CE-144	1.650E-04
NI-65	1.740E-06	EU-152	0.000E-01
CU-64	7.100E-06	W-187	2.820E-05
ZN-65	9.700E-06	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	4.090E-13	BI-214	0.000E-01
RB-88	8.360E-19	RA-226	0.000E-01
RB-89	2.330E-21	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	4.940E-05	NP-239	2.400E-05
SR-90	2.190E-04	AAAAAAA	0.000E-01
SR-91	2.700E-05	BBBBBBB	0.000E-01
SR-92	4.260E-05	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	1.020E-04	EEEEEEE	0.000E-01
Y-91M	2.670E-10	FFFFFFF	0.000E-01
Y-91	7.760E-05	GGGGGGG	0.000E-01
Y-92	1.480E-05	HHHHHHH	0.000E-01
Y-93	8.500E-05	IIIIIII	0.000E-01
ZR-95	3.090E-05	JJJJJJJ	0.000E-01

DF_i - elements 16→100, adult ingestion dose factors for GI-LLI - liquid releases (mrem/pCi ingested)

AR-41	0.000E-01	ZR-97	3.300E 00
KR-83M	0.000E-01	NB-94	3.000E 04
KR-85M	0.000E-01	NB-95	3.000E 04
KR-85	0.000E-01	MO-90	1.000E 01
KR-87	0.000E-01	MO-99	1.000E 01
KR-88	0.000E-01	TC-99M	1.500E 01
KR-89	0.000E-01	RU-103	1.000E 01
KR-90	0.000E-01	RU-106	1.000E 01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	9.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	4.000E 02
C-14	4.600E 03	I-131	1.500E 01
NA-24	1.000E 02	I-132	1.500E 01
P-32	1.000E 05	I-133	1.500E 01
K-40	0.000E-01	I-134	1.500E 01
CR-51	2.000E 02	I-135	1.500E 01
MN-54	4.000E 02	CS-134	2.000E 03
MN-56	4.000E 02	CS-136	2.000E 03
FE-55	1.000E 02	CS-137	2.000E 03
FE-59	1.000E 02	CS-138	2.000E 03
CO-56	5.000E 01	BA-139	4.000E 00
CO-57	5.000E 01	BA-140	4.000E 00
CO-58	5.000E 01	LA-140	2.500E 01
CO-60	5.000E 01	CE-139	1.000E 00
NI-63	1.000E 02	CE-144	1.000E 00
NI-65	1.000E 02	EU-152	0.000E-01
CU-64	5.000E 01	W-187	1.200E 03
ZN-65	2.000E 03	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	4.200E 02	BI-214	0.000E-01
RB-88	2.000E 03	RA-226	0.000E-01
RB-89	2.000E 03	TH-228	0.000E-01
SR-85	3.000E 01	U-235	0.000E-01
SR-89	3.000E 01	NP-239	1.000E 01
SR-90	3.000E 01	AAAAAAA	0.000E-01
SR-91	3.000E 01	BBBBBBB	0.000E-01
SR-92	3.000E 01	CCCCCCC	0.000E-01
Y-88	2.500E 01	DDDDDDD	0.000E-01
Y-90	2.500E 01	EEEEEEE	0.000E-01
Y-91M	2.500E 01	FFFFFFF	0.000E-01
Y-91	2.500E 01	GGGGGGG	0.000E-01
Y-92	2.500E 01	HHHHHHH	0.000E-01
Y-93	2.500E 01	IIIIIII	0.000E-01
ZR-95	3.300E 00	JJJJJJJ	0.000E-01

BF_i - elements 16→100, bio-accumulation factors for fresh water fish, (pCi/kg per pci/l, from Reg. Guide 1.109)

AR-41	0.000E-01	ZR-97	1.327E-02
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	4.467E 02
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	8.870E-03
KR-89	0.000E-01	RU-103	4.429E 00
KR-90	0.000E-01	RU-106	6.583E 01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD 109	0.000E-01
XE-133	0.000E-01	CD-[illegible] M	0.000E-01
XE-135M	0.000E-01	SN-1[illegible]	0.000E-01
XE-135	0.000E-01	SB-12[illegible]	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	0.000E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	2.413E 03
C-14	3.128E 04	I-131	1.494E 02
NA-24	4.070E 02	I-132	7.290E 00
P-32	4.620E 07	I-133	5.099E 01
K-40	0.000E-01	I-134	3.806E 00
CR-51	0.000E-01	I-135	1.591E 01
MN-54	0.000E-01	CS-134	2.978E 05
MN-56	0.000E-01	CS-136	3.117E 04
FE-55	6.583E 02	CS-137	3.816E 05
FE-59	1.039E 03	CS-138	2.643E 02
CO-56	0.000E-01	BA-139	9.289E-01
CO-57	0.000E-01	BA-140	1.944E 02
CO-58	0.000E-01	LA-140	[illegible].496E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	3.112E 04	CE-[illegible]44	1.158E 00
NI-65	1.264E 02	EU-152	0.000E-01
CU-64	0.000E-01	W-[illegible]87	2.959E 02
ZN-65	2.317E 04	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	2.212E 04	NP-239	2.849E-02
SR-90	5.444E 05	AAAAAAA	0.000E-01
SR-91	4.072E 02	BBBBBBB	0.000E-01
SR-92	1.544E 02	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	5.758E-01	EEEEEEE	0.000E-01
Y-91M	5.440E-03	FFFFFFF	0.000E-01
Y-91	8.439E 00	GGGGGGG	0.000E-01
Y-92	5.057E-02	HHHHHHH	0.000E-01
Y-93	1.604E-01	IIIIIII	0.000E-01
ZR-95	2.402E-01	JJJJJJJ	0.000E-01

A_{it} - elements 16→100, Adult bone dose factor for liquid release (mrem/hr per μCi/ml)

AR-41	0.000E-01	ZR-97	2.678E-03
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	2.485E 02
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	1.032E 02
KR-88	0.000E-01	TC-99M	2.507E-02
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.262E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.561E 03
C-14	6.255E 03	I-131	2.137E 02
NA-24	4.070E 02	I-132	1.950E 01
P-32	2.873E 06	I-133	8.870E 01
K-40	0.000E-01	I-134	1.034E 01
CR-51	0.000E-01	I-135	4.166E 01
MN-54	4.376E 03	CS-134	7.086E 05
MN-56	1.101E 02	CS-136	1.231E 05
FE-55	4.549E 02	CS-137	5.219E 05
FE-59	2.442E 03	CS-138	5.219E 02
CO-56	0.000E-01	BA-139	6.617E-04
CO-57	0.000E-01	BA-140	2.442E-01
CO-58	8.918E 01	LA-140	7.541E-02
CO-60	2.562E 02	CE-139	0.000E-01
NI-63	2.157E 03	CE-144	4.884E-01
NI-65	1.642E 01	EU-152	0.000E-01
CU-64	9.971E 00	W-187	2.473E 02
ZN-65	7.374E 04	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	2.897E 02	RA-226	0.000E-01
RB-89	1.920E 02	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	2.801E-03
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	7.703E-02	JJJJJJJ	0.000E-01

A_{iT} - elements 16→100, adult liver dose factor for liquid releases (mrem/hr per μCi/ml)

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AR-41	0.000E-01	ZR-97	1.225E-03
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.336E 02
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	1.963E 01
KR-88	0.000E-01	TC-99M	3.192E-01
KR-89	0.000E-01	RU-103	1.908E 00
KR-90	0.000E-01	RU-106	8.331E 00
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.262E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.465E 03
C-14	6.255E 03	I-131	1.225E 02
NA-24	4.070E 02	I-132	6.823E 00
P-32	1.786E 06	I-133	2.704E 01
K-40	0.000E-01	I-134	3.699E 00
CR-51	1.274E 00	I-135	1.537E 01
MN-54	8.350E 02	CS-134	5.793E 05
MN-56	1.954E 01	CS-136	8.858E 04
FE-55	1.061E 02	CS-137	3.419E 05
FE-59	9.361E 02	CS-138	2.586E 02
CO-56	0.000E-01	BA-139	2. 20E-02
CO-57	0.000E-01	BA-140	1.274E 01
CO-58	1.999E 02	LA-140	1.993E-02
CO-60	5.650E 02	CE-139	0.000E-01
NI-63	1.044E 03	CE-144	6.272E-02
NI-65	7.493E 00	EU-152	0.000E-01
CU-64	4.680E 00	W-187	8.647E 01
ZN-65	3.332E 04	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	5.239E 01	BI-214	0.000E-01
RB-88	1.537E 02	RA-226	0.000E-01
RB-89	1.350E 02	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	6.349E 02	NP-239	1.544E-03
SR-90	1.336E 05	AAAAAAA	0.000E-01
SR-91	1.645E 01	BBBBBBB	0.000E-01
SR-92	6.679E 00	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	1.544E-02	EEEEEEE	0.000E-01
Y-91M	2.107E-04	FFFFFFF	0.000E-01
Y-91	2.256E-01	GGGGGGG	0.000E-01
Y-92	1.478E-03	HHHHHHH	0.000E-01
Y-93	4.429E-03	IIIIIII	0.000E-01
ZR-95	5.214E-02	JJJJJJJ	0.000E-01

$A_{i\tau}$ - elements 16→100, adult total body dose factors for liquid releases, (mrem/hr per μCi/ml)

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	0.000E-01
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.262E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.724E 03
C-14	6.255E 03	I-131	7.002E 04
NA-24	4.070E 02	I-132	6.823E 02
P-32	0.000E-01	I-133	1.304E 04
K-40	0.000E-01	I-134	1.792E 02
CR-51	7.613E-01	I-135	2.747E 03
MN-54	0.000E-01	CS-134	0.000E-01
MN-56	0.000E-01	CS-136	0.000E-01
FE-55	0.000E-01	CS-137	0.000E-01
FE-59	0.000E-01	CS-138	0.000E-01
CO-56	0.000E-01	BA-139	0.000E-01
CO-57	0.000E-01	BA-140	0.000E-01
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

A_{iT} - elements 16→100, adult thyroid dose factors for liquid releases (mrem/hr per μCi/ml)

AR-41	0.000E-01	ZR-97	4.045E-03
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	2.456E 02
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	2.337E 02
KR-88	0.000E-01	TC-99M	3.806E-01
KR-89	0.000E-01	RU-103	1.690E 01
KR-90	0.000E-01	RU-106	1.271E 02
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.262E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	1.503E 04
C-14	6.255E 03	I-131	3.663E 02
NA-24	4.070E 02	I-132	3.106E 01
P-32	0.000E-01	I-133	1.548E 02
K-40	0.000E-01	I-134	1.645E 01
CR-51	2.806E-01	I-135	6.679E 01
MN-54	1.302E 03	CS-134	2.293E 05
MN-56	1.398E 02	CS-136	6.847E 04
FE-55	0.000E-01	CS-137	1.772E 05
FE-59	0.000E-01	CS-138	3.835E 02
CO-56	0.000E-01	BA-139	6.186E-04
CO-57	0.000E-01	BA-140	8.302E-02
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	2.897E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	2.514E 01	W-187	0.000E-01
ZN-65	4.932E 04	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	8.738E-03
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	1.209E-01	JJJJJJJ	0.000E-01

A_{iT} - elements 16→100, adult kidney dose factors, for liquid releases (mrem/hr μCi/ml)

AR-41	0.000E-01	ZR-97	0.000E-01
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	0.000E-01
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	0.000E-01
KR-88	0.000E-01	TC-99M	1.228E-02
KR-89	0.000E-01	RU-103	0.000E-01
KR-90	0.000E-01	RU-106	0.000E-01
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.262E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	0.000E-01
C-14	6.255E 03	I-131	0.000E-01
NA-24	4.070E 02	I-132	0.000E-01
P-32	0.000E-01	I-133	0.000E-01
K-40	0.000E-01	I-134	0.000E-01
CR-51	1.690E 00	I-135	0.000E-01
MN-54	0.000E-01	CS-134	7.613E 04
MN-56	0.000E-01	CS-136	9.384E 03
FE-55	2.538E 02	CS-137	5.889E 04
FE-59	6.823E 02	CS-138	3.787E 01
CO-56	0.000E-01	BA-139	3.754E-04
CO-57	0.000E-01	BA-140	1.398E-01
CO-58	0.000E-01	LA-140	0.000E-01
CO-60	0.000E-01	CE-139	0.000E-01
NI-63	0.000E-01	CE-144	0.000E-01
NI-65	0.000E-01	EU-152	0.000E-01
CU-64	0.000E-01	W-187	0.000E-01
ZN-65	0.000E-01	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	0.000E-01	BI-214	0.000E-01
RB-88	0.000E-01	RA-226	0.000E-01
RB-89	0.000E-01	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	0.000E-01	NP-239	0.000E-01
SR-90	0.000E-01	AAAAAAA	0.000E-01
SR-91	0.000E-01	BBBBBBB	0.000E-01
SR-92	0.000E-01	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	0.000E-01	EEEEEEE	0.000E-01
Y-91M	0.000E-01	FFFFFFF	0.000E-01
Y-91	0.000E-01	GGGGGGG	0.000E-01
Y-92	0.000E-01	HHHHHHH	0.000E-01
Y-93	0.000E-01	IIIIIII	0.000E-01
ZR-95	0.000E-01	JJJJJJJ	0.000E-01

$A_{i\tau}$ - elements 16→18, adult lung dose factors for liquid releases (mrem/hr per μCi/ml)

AR-41	0.000E-01	ZR-97	8.295E 02
KR-83M	0.000E-01	NB-94	0.000E-01
KR-85M	0.000E-01	NB-95	1.508E 06
KR-85	0.000E-01	MO-90	0.000E-01
KR-87	0.000E-01	MO-99	2.392E 02
KR-88	0.000E-01	TC-99M	1.483E 01
KR-89	0.000E-01	RU-103	5.171E 02
KR-90	0.000E-01	RU-106	4.261E 03
XE-131M	0.000E-01	AG-110M	0.000E-01
XE-133M	0.000E-01	CD-109	0.000E-01
XE-133	0.000E-01	CD-113M	0.000E-01
XE-135M	0.000E-01	SN-113	0.000E-01
XE-135	0.000E-01	SB-122	0.000E-01
XE-137	0.000E-01	SB-124	0.000E-01
XE-138	0.000E-01	SB-125	0.000E-01
H-3	2.262E-01	SB-127	0.000E-01
BE-7	0.000E-01	TE-132	7.383E 04
C-14	6.255E 03	I-131	5.638E 01
NA-24	4.070E 02	I-132	3.663E 00
P-32	5.195E 06	I-133	7.972E 01
K-40	0.000E-01	I-134	9.013E-03
CR-51	3.203E 02	I-135	4.704E 01
MN-54	1.341E 04	CS-134	1.240E 04
MN-56	3.514E 03	CS-136	1.398E 04
FE-55	2.609E 02	CS-137	1.010E 04
FE-59	8.140E 03	CS-138	2.226E-03
CO-56	0.000E-01	BA-139	1.647E 00
CO-57	0.000E-01	BA-140	4.003E 02
CO-58	1.807E 03	LA-140	5.536E 03
CO-60	4.812E 03	CE-139	0.000E-01
NI-63	4.501E 02	CE-144	3.950E 02
NI-65	4.166E 02	EU-152	0.000E-01
CU-64	8.499E 02	W-187	8.101E 04
ZN-65	4.644E 04	HG-203	0.000E-01
SE-75	0.000E-01	PB-214	0.000E-01
BR-84	4.112E-04	BI-214	0.000E-01
RB-88	4.003E-09	RA-226	0.000E-01
RB-89	1.116E-11	TH-228	0.000E-01
SR-85	0.000E-01	U-235	0.000E-01
SR-89	3.548E 03	NP-239	5.746E 02
SR-90	1.573E 04	AAAAAAA	0.000E-01
SR-91	1.939E 03	BBBBBBB	0.000E-01
SR-92	3.060E 03	CCCCCCC	0.000E-01
Y-88	0.000E-01	DDDDDDD	0.000E-01
Y-90	6.105E 03	EEEEEEE	0.000E-01
Y-91M	1.598E-02	FFFFFFF	0.000E-01
Y-91	4.644E 03	GGGGGGG	0.000E-01
Y-92	8.858E 02	HHHHHHH	0.000E-01
Y-93	5.087E 03	IIIIIII	0.000E-01
ZR-95	2.441E 02	JJJJJJJ	0.000E-01

A_{iT} - elements 16→100, adult GI-LLI dose factors for liquid releases, (mrem/hr per μCi/ml)

4.0 Environmental Sampling Stations - Radiological

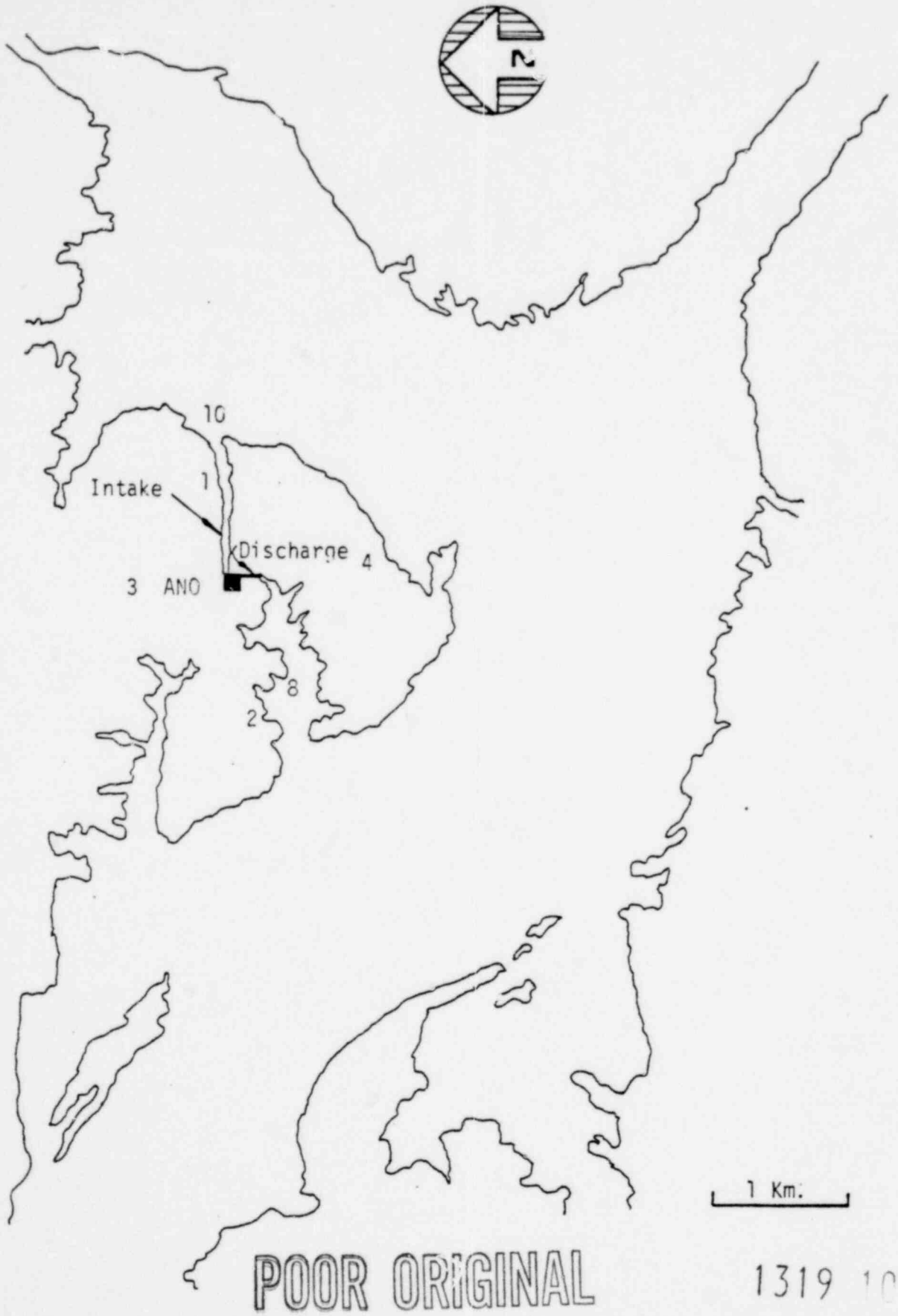
Environmental samples will be collected as specified in the technical specifications. The approximate locations of the sample sites are shown on figures 4-1a, and 4-1b.

Table 4-1 lists its approximate distances and directions of the sample stations from the plant.

Table 4-1

Location of Permanent Sample Stations

Permanent Sample Station	Approximate Direction and Distance From Plant
1	92 degrees-0.5 miles
2	235 degrees-0.5 miles
3	4 degrees-0.4 miles
4	171 degrees-0.4 miles
5	298 degrees-8.5 miles
6	109 degrees-6.8 miles
7	209 degrees-19.3 miles
8	180 degrees-0.1 miles
10	90 degrees-1.0 miles
11	240 degrees-0.5 miles
13	95 degrees-2.0 miles
14	65 degrees-5.8 miles
19	99 degrees-5.0 miles



ARKANSAS POWER & LIGHT CO. ARKANSAS NUCLEAR ONE	RADIOLOGICAL SAMPLE STATIONS	FIG. 4 -1a

Station 7 at Danville.

Figure 4-1b
Radiological Sample Stations