

TABLE I

Factors for Converting Air Concentrations of Radioiodine
to Thyroid Dose via Inhalation*
 (mrem/yr per pCi/m³)

<u>Age</u>	<u>I-129</u>	<u>I-130</u>	<u>I-131</u>	<u>I-132</u>	<u>I-133</u>	<u>I-134</u>	<u>I-135</u>
1 yr	20.8	2.22	20.4	0.250	5.05	0.0637	1.12
4 yr	10.7	1.21	10.6	0.135	2.59	0.0343	0.598
14 yr	17.5	0.880	8.53	0.0824	1.91	0.0237	0.413
Adult	36.3**	1.01	10.4	0.109	1.99	0.0273	0.471

* Breathing rates assumed: 1-year old, 5.6 m³/d; 4-year old, 7.0 m³/d; 14-year old, 13.5 m³/d; adult, 20 m³/d. Organic and inorganic forms of radioiodine give the same dose via inhalation.

** Dose in first year. Maximum dose rate after equilibrium is reached between thyroid burden and intake rate would be 1.09 times this value.

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To change f_w and f_a for short half-life radioiodines per ICRP Publ. 10.

TABLE II

Factors for Converting Air Concentrations of Radioiodine
to Thyroid Dose via the Milk Pathway*
(mrem/yr per pCi/m³)

<u>Age</u>	<u>I-129</u>	<u>I-130</u>	<u>I-131</u>	<u>I-132</u>	<u>I-133</u>	<u>I-134</u>	<u>I-135</u>
1 yr	5830	29.1	2665.	0.619	111	0.0624	8.30
4 yr	2400	12.8	1100.	0.267	41.3	0.0269	3.56
14 yr	2040	4.81	462.	0.0968	16.0	0.00968	1.27
Adult	2850**	3.75	379.	0.0747	12.3	0.00749	0.980

* Assuming:

- 1) Grazing 365 days/yr. Factors for other grazing seasons can be obtained by multiplying tabulated values by fraction of year during which cows graze.
- 2) No other radioiodine intake by cow or person.
- 3) No decay between milking and consumption.
- 4) Consumption of 1 liter/day of milk.
- 5) All radioiodine is inorganic. If only Z% of radioiodine is in an inorganic form, then multiply DF's by (Z/100).
- 6) Ignoring long-term accumulation in soil, which for I-129 would add 1.3% in one year or 50% in 40 years.

** Dose in first year. Maximum dose rate after equilibrium is reached between thyroid burden and intake rate would be 1.09 times this value.

TABLE III

Factors for Converting Air Concentrations of Radioiodine
to Thyroid Dose via Consumption of Green Leafy Vegetables*
(mrem/yr per pCi/m³)

<u>Age</u>	<u>I-129</u>	<u>I-130</u>	<u>I-131</u>	<u>I-132</u>	<u>I-133</u>	<u>I-134</u>	<u>I-135</u>
1 yr	0	0	0	0	0	0	0
4 yr	502	2.09	183	0.0443	7.43	0.00440	0.580
14 yr	720	1.33	129	0.0272	4.40	0.00267	0.351
Adult	1360**	1.40	143	0.0283	4.57	0.00280	0.366

* Assuming:

- 1) All 12 months of vegetable consumption is from local gardens.
- 2) One-year old eats no fresh vegetables; 4-year old eats 32 kg/yr (max); 14-year old eats 54 kg/yr (max); and adult eats 73 kg/yr (max).
- 3) Crops are exposed 3 months, above ground, to air deposition.
- 4) 25% of all fallout sticks to vegetables with an ecological half-life of 14 days.
- 5) No decay from garden to table.
- 6) All radioiodine is inorganic. If only Z% is inorganic, then multiply DF's by (Z/100).
- 7) Ignoring long-term accumulation in soil, which for I-129 would add 1.3% in one year or 50% in 40 years.

** Dose in first year. Maximum dose rate after equilibrium is reached between thyroid burden and intake rate would be 1.09 times this value.

TABLE A

Nuclide	Effective Half Life in Thyroid (Tooth/Baby)				
	Thyroid Uptake (a) $f_w(b)$	Infant $f_a(c)$	Child	Teen	Adult
F-129	0.30 ^(d)	0.23 ^(d)	20	50	100
I-130	0.20 ^(e)	0.15	0.504	0.512	0.5
F-131	0.30 ^(d)	0.23 ^(d)	5.14	6.93	7.44
F-132	0.08	0.06	0.974 ^g	0.0950	0.095
I-133	0.23	0.17	0.831	0.852	0.8
F-134	0.04	0.03	0.0365	0.0365	0.0365
I-135	0.15	0.11	0.270	0.272	0.27
Stable I	0.3 ^(d)	0.23 ^(d)	20	50	100

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- (a) Includes ~~corrections~~ for decay prior to reaching thyroid.
 - (b) From ICRP 10 unless otherwise noted.
 - (c) 0.75 times Sw
 - (d) From ICRP-2
 - (e) Estimated from values given in ICRP-10 for other short lived Iodine nuclides

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TABLE B

Ingestion Dose Commitment Factors for Radioiodine Nuclides
(mrem/50 years per pCi ingested during first year)^(a)

Nuclide	Infant		Child		Teenager		Adult	
	Total Body	Thyroid	Total Body	Thyroid	Total Body	Thyroid	Total Body	Thyroid
I-129	1.55E-5	1.36E-2	7.62E-6	5.58E-3	6.54E-6 ^(b)	4.77E-3 ^(b)	9.21E-6 ^(c)	7.23E-3 ^(c)
I-130	5.21E-6	1.48E-3	2.99E-6	6.50E-4	1.19E-6	2.43E-4	8.80E-7	1.89E-4
I-131+D	1.86E-5	1.39E-2	9.82E-6	5.72E-3	4.40E-6	2.39E-3	3.41E-6	1.95E-3
I-132	1.19E-6	1.58E-4	6.74E-7	6.82E-5	2.62E-7	2.46E-5	1.93E-7	1.90E-5
I-133+D	5.33E-6	3.31E-3	2.77E-6	1.36E-3	1.04E-6	4.76E-4	7.53E-7	3.63E-4
I-134	6.34E-7	4.15E-5	3.58E-7	1.79E-5	1.39E-7	6.45E-6	1.03E-7	4.99E-6
I-135	2.61E-6	6.49E-4	1.48E-6	2.79E-4	5.79E-7	1.01E-4	4.28E-7	7.65E-5

(a) 1 yr chronic intake, calculated from parameters in Table A

(b) 69% of this dose is received in the first year.

(c) 64% of this dose is received in the first year.

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TABLE C

Inhalation Dose Commitment Factors for Radioiodine Nuclides
(mrem/50 years per pCi inhaled during first year)^(a)

Nuclide	Infant		Child		Teenager		Adult	
	Total Body	Thyroid	Total Body	Thyroid	Total Body	Thyroid	Total Body	Thyroid
I-129	1.16E-5	1.04E-2	5.71E-6	4.28E-3	4.90E-6 ^(b)	3.66E-3 ^(b)	6.91E-6 ^(c)	5.54E-3 ^(c)
I-130	3.91E-6	1.14E-3	2.24E-6	4.99E-4	8.93E-7	1.86E-4	6.60E-7	1.42E-4
I-131+D	1.40E-5	1.06E-2	7.37E-6	4.39E-3	3.30E-6	1.83E-3	2.56E-6	1.49E-3
I-132	8.96E-7	1.21E-4	5.06E-7	5.23E-5	1.97E-7	1.89E-5	1.45E-7	1.43E-5
I-133+D	4.00E-6	2.54E-3	2.08E-6	1.04E-3	7.78E-7	3.65E-4	5.65E-7	2.69E-4
I-134	4.75E-7	3.18E-5	2.69E-7	1.37E-5	1.05E-7	4.94E-6	7.69E-8	3.73E-6
I-135	1.95E-6	4.97E-4	1.11E-6	2.14E-4	4.34E-7	7.76E-5	3.21E-7	5.60E-5

(a) 1 yr chronic intake, calculated from parameters in Table A

(b) 69% of this dose is received in the first year.

(c) 64% of this dose is received in the first year.

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Inhalation Dose Factors for Nuclides with Age Dependent Biological Half Lives
(mrem/50 y per pCi inhaled during first year)

Nuclide	Infant		Child		Teenager	
	Total Body	Thyroid	Total Body	Thyroid	Total Body	Thyroid
H-3	3.08E-7	3.08E-7	2.03E-7	2.03E-7	1.06E-7	1.06E-7
I-129	1.16E-5	1.04E-2	5.71E-6	4.28E-3	4.90E-6	3.66E-3
I-131+D	1.40E-5	1.06E-2	7.37E-6	4.39E-3	3.30E-6	1.83E-3
I-133+D	4.00E-6	2.54E-3	2.08E-6	1.04E-3	7.78E-7	3.65E-4
Cs-134	5.32E-5	---	6.07E-5	---	6.86E-5	---
Cs-135	4.73E-6	---	4.45E-6	---	4.47E-6	---
Cs-136	3.78E-5	---	3.14E-5	---	1.71E-5	---
Cs-137+D	3.25E-5	---	3.47E-5	---	3.89E-5	---

*Used in MRC Dose Factors
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GAS, BRH W D*

Ingestion Dose Factors for Nuclides with Age Dependent Biological Half Lives
(mrem/50 y per pCi ingested during first year)

<u>Nuclide</u>	<u>Infant</u>		<u>Child</u>		<u>Teenager</u>	
	<u>Total Body</u>	<u>Thyroid</u>	<u>Total Body</u>	<u>Thyroid</u>	<u>Total Body</u>	<u>Thyroid</u>
H-3	3.08E-7	3.08E-7	2.03E-7	2.03E-7	1.06E-7	1.06E-7
I-129	1.55E-5	1.36E-2	7.62E-6	5.58E-3	6.54E-6	4.77E-3
I-131+D	1.86E-5	1.39E-2	9.82E-6	5.72E-3	4.40E-6	2.39E-3
I-133+D	5.33E-6	3.31E-3	2.77E-6	1.36E-3	1.04E-6	4.76E-4
Cs-134	7.10E-5	---	8.10E-5	---	9.14E-5	---
Cs-135	6.30E-6	---	5.93E-6	---	5.96E-6	---
Cs-136	5.04E-5	---	4.18E-5	---	2.27E-5	---
Cs-137+D	4.33E-5	---	4.62E-5	---	5.19E-5	---

*Hand calculated dose factors
1-1-61*