



T A B

C

RADIATION PROTECTION

*Recommendations of
the International Commission on
Radiological Protection*

ICRP PUBLICATION 2

Report of Committee II
on
Permissible Dose for Internal Radiation
(1959)

PUBLISHED FOR
The International Commission on Radiological Protection

BY

PERGAMON PRESS

OXFORD · LONDON · EDINBURGH · NEW YORK
TORONTO · SYDNEY · PARIS · BRAUNSCHWEIG

DOE ARCHIVES

Table 1. Maximum permissible body burdens and maximum permissible concentrations of radionuclides in air and in water for occupational exposure

Radionuclide and type of decay	Organ of reference* (critical organ bold face)	Maximum permissible burden in total body g(μ c)	Maximum permissible concentrations			
			For 40 hr week		For 168 hr week	
			(MPC) _w (μ c/cm ³)	(MPC) _a (μ c/cm ³)	(MPC) _w (μ c/cm ³)	(MPC) _a (μ c/cm ³)
³ H ³ (HTO or H ₂ O): β^- [(sol.)]	Body tissue	10 ³	0.1	5 × 10 ⁻⁴	0.03	2 × 10 ⁻⁴
	Total body	2 × 10 ³	0.2	8 × 10 ⁻⁴	0.05	3 × 10 ⁻⁴
	Skin			2 × 10 ⁻³		4 × 10 ⁻⁴
⁷ Be ⁷ (sol.) α, γ	GI (LLI)		0.05	10 ⁻⁴	0.02	4 × 10 ⁻⁴
	Total body	600	6	6 × 10 ⁻⁴	2	2 × 10 ⁻⁴
	Kidney	800	9	8 × 10 ⁻⁴	3	3 × 10 ⁻⁴
	Liver	800	9	8 × 10 ⁻⁴	3	3 × 10 ⁻⁴
	Bone	2 × 10 ³	20	2 × 10 ⁻³	7	6 × 10 ⁻⁴
	Spleen	4 × 10 ³	50	4 × 10 ⁻³	20	2 × 10 ⁻³
	Lung			10 ⁻⁴		4 × 10 ⁻⁷
(insol.)	GI (LLI)		0.05	9 × 10 ⁻⁴	0.02	3 × 10 ⁻⁴
	Fat	300	0.02	4 × 10 ⁻⁴	8 × 10 ⁻³	10 ⁻⁴
¹⁴ C ¹⁴ (CO ₂) β^- (sol.)	Total body	400	0.03	5 × 10 ⁻⁴	0.01	2 × 10 ⁻⁴
	Bone	400	0.04	6 × 10 ⁻⁴	0.01	2 × 10 ⁻⁴
	Total body			5 × 10 ⁻³		10 ⁻³
¹⁸ F ¹⁸ β^+ (sol.)	GI (SI)		0.02	5 × 10 ⁻⁴	8 × 10 ⁻³	2 × 10 ⁻⁴
	Bone and teeth	20	0.2	3 × 10 ⁻³	0.06	9 × 10 ⁻⁴
	Total body	20	0.3	4 × 10 ⁻³	0.09	10 ⁻³
(insol.)	GI (ULI)		0.01	3 × 10 ⁻⁴	5 × 10 ⁻³	9 × 10 ⁻⁷
	Lung			2 × 10 ⁻⁴		6 × 10 ⁻⁴
²² Na ²² β^+, γ (sol.)	Total body	10	10 ⁻³	2 × 10 ⁻⁷	4 × 10 ⁻⁴	6 × 10 ⁻⁴
	GI (LLI)		0.01	2 × 10 ⁻⁴	3 × 10 ⁻³	7 × 10 ⁻⁷
	Lung			9 × 10 ⁻⁴		3 × 10 ⁻⁴
(insol.)			10 ⁻⁴	2 × 10 ⁻⁷	3 × 10 ⁻⁴	5 × 10 ⁻⁴
	GI (SI)		6 × 10 ⁻³	10 ⁻⁴	2 × 10 ⁻³	4 × 10 ⁻⁷
²⁴ Na ²⁴ β^-, γ (sol.)	Total body	7	0.01	2 × 10 ⁻⁴	4 × 10 ⁻³	6 × 10 ⁻⁷
	GI (LLI)		8 × 10 ⁻⁴	10 ⁻⁷	3 × 10 ⁻⁴	5 × 10 ⁻⁴
	Lung			8 × 10 ⁻⁷		3 × 10 ⁻⁷

* The abbreviations GI, S, SI, ULI and LLI refer to gastrointestinal tract, stomach, small intestine, upper large intestine, and lower large intestine, respectively.

Radionuclide and type of decay	Organ of reference (critical organ bold face)	Maximum permissible burden in total body $q(\mu\text{c})$	Maximum permissible concentrations				
			For 40 hr week		For 168 hr week		
			(MPC) _w ($\mu\text{c}/\text{cm}^3$)	(MPC) _a ($\mu\text{c}/\text{cm}^3$)	(MPC) _w ($\mu\text{c}/\text{cm}^3$)	(MPC) _a ($\mu\text{c}/\text{cm}^3$)	
¹³⁷ Cs (sol.) β^- , γ	Total body	30	2×10^{-3}	4×10^{-7}	9×10^{-4}	10^{-7}	
	Liver	60	5×10^{-3}	7×10^{-7}	2×10^{-3}	2×10^{-7}	
	Spleen	80	7×10^{-3}	10^{-6}	2×10^{-3}	4×10^{-7}	
	Muscle	90	8×10^{-3}	10^{-6}	3×10^{-3}	4×10^{-7}	
	Kidney	100	8×10^{-3}	10^{-6}	3×10^{-3}	4×10^{-7}	
	GI (SI)		0.02	5×10^{-6}	8×10^{-3}	2×10^{-6}	
	Bone	400	0.03	4×10^{-6}	0.01	2×10^{-6}	
	Lung	800	0.06	9×10^{-6}	0.02	3×10^{-6}	
	(insol.)	Lung			2×10^{-7}		6×10^{-3}
	GI (LLI)		2×10^{-3}	3×10^{-7}	6×10^{-4}	10^{-7}	
¹³⁷ Cs (sol.) β^- , γ , e^-	Total body	30	4×10^{-4}	6×10^{-3}	2×10^{-4}	2×10^{-3}	
	Liver	40	5×10^{-4}	8×10^{-3}	2×10^{-4}	3×10^{-3}	
	Spleen	50	6×10^{-4}	9×10^{-3}	2×10^{-4}	3×10^{-3}	
	Muscle	50	7×10^{-4}	10^{-2}	2×10^{-4}	4×10^{-3}	
	Bone	100	10^{-3}	2×10^{-2}	5×10^{-4}	7×10^{-3}	
	Kidney	100	10^{-3}	2×10^{-2}	5×10^{-4}	8×10^{-3}	
	Lung	300	5×10^{-3}	6×10^{-2}	2×10^{-3}	2×10^{-2}	
	GI (SI)		0.02	5×10^{-2}	8×10^{-3}	2×10^{-2}	
	(insol.)	Lung			10^{-3}		5×10^{-3}
	GI (LLI)		10^{-3}	2×10^{-7}	4×10^{-4}	8×10^{-3}	
¹³¹ Ba (sol.) α , γ	GI (LLI)		5×10^{-3}	10^{-4}	2×10^{-3}	4×10^{-7}	
	Total body	50	0.1	2×10^{-4}	0.03	7×10^{-7}	
	Bone	80	0.1	3×10^{-4}	0.05	10^{-6}	
	Liver	10 ⁴	20	4×10^{-4}	7	10^{-4}	
	Muscle	2×10^4	40	7×10^{-4}	10	2×10^{-4}	
	Lung	2×10^4	40	7×10^{-4}	10	2×10^{-4}	
	Spleen	3×10^4	60	10^{-3}	20	4×10^{-4}	
	Kidney	4×10^4	70	10^{-3}	20	5×10^{-4}	
	(insol.)	Lung			4×10^{-7}		10^{-7}
	GI (LLI)		5×10^{-3}	9×10^{-7}	2×10^{-3}	3×10^{-7}	
¹⁴⁰ Ba (sol.) β^- , γ	GI (LLI)		8×10^{-4}	2×10^{-7}	3×10^{-4}	6×10^{-8}	
	Bone	4	6×10^{-3}	10^{-7}	2×10^{-3}	4×10^{-8}	
	Total body	9	0.01	3×10^{-7}	5×10^{-3}	10^{-7}	
	Liver	10^3	2	5×10^{-4}	0.9	2×10^{-8}	
	Lung	3×10^3	4	9×10^{-4}	2	3×10^{-8}	
	Spleen	3×10^3	5	10^{-4}	2	4×10^{-8}	
	Kidney	4×10^3	6	10^{-4}	2	4×10^{-8}	
	(insol.)	Lung			4×10^{-8}		10^{-8}
	GI (LLI)		7×10^{-4}	10^{-7}	2×10^{-4}	4×10^{-8}	