National Standards of People's Republic of China

GB 14882-94

Limited concentration of radioactive materials in foods

Issued on February 22, 1994 Implemented on September 1, 1994

Issued by
Ministry of Health of People's Republic of China

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1 Scope

This standard specifies the limited concentration of 12 radioactive materials in foods, and applies to all kinds of grain, potatoes (including sweet potato, potato, and cassava), vegetables, fruits, fish, shrimp, meat and dairy foods.

2 Reference

GB 4792 *Basic health standards for radiological protection*.
GB 14883.1 - 14883.10 *Examination of radioactive materials for foods*.

3 Limited concentration of radioactive materials in foods [Bq/kg(Or L milk)]

3.1 The artificial radionuclide limit concentration is shown in Table 1. Milk can be converted into an equivalent amount of fresh milk (1kg whole milk powder equals to 7L fresh milk).

Food	^{3}H	^{89}Sr	^{90}Sr	^{131}I	^{137}Cs	^{147}Pm	^{239}Pu
Grain	2.1×10^{5}	1.2×10^{3}	9.6×10^{1}	1.9×10^{2}	2.6×10^{2}	1.0×10^{4}	3.4
Pototoes	7.2×10^{4}	5.4×10^{2}	3.3×10^{1}	8.9×10^{1}	9.0×10^{1}	3.7×10^{3}	1.2
Vegetables	1.7×10^{5}	9.7×10^{2}	7.7×10^{1}	1.6×10^{2}	2.1×10^{2}	8.2×10^{3}	2.7
Fish, meat and shrimp	6.5×10^{5}	2.9×10^{3}	2.9×10^{2}	4.7×10^{2}	8.0×10^{2}	2.4×10^{4}	10.0
Milk	8.8×10^{4}	2.4×10^{2}	4.0×10^{1}	3.3×10^{1}	3.3×10^{2}	2.2×10^{3}	2.6

Table 1

3.2 The natural radionuclide limit concentration is shown in Table 2.

Food	^{210}Po Bq/kg	^{226}Ra Bq/kg	^{223}Ra Bq/kg	Natural Thorium mg/kg	Natural Uranium mg/kg
Grain	6.4	1.4×10	6.9	1.2	1.9
Pototoes	2.8	4.7	2.4	4.0×10^{-1}	6.4×10^{-1}
Vegetables	5.3	1.1×10	5.6	9.6×10^{-1}	1.5
Fish, meat and shrimp	1.5×10	3.8×10	2.1×10	3.6	5.4
Milk	1.3	3.7	2.8	7.5×10^{-1}	5.2×10^{-1}

Table 2

Note: The unit for all the radionuclide is Bq/kg (L milk) except the natural Thorium and Uranium (mg/kg).

4 Derivation of Limited Concentrations and Considerations in Radiological Hygiene Assessment

4.1 The Limited Concentrationsin (L_c) in the Table 1 and 2 comes from the hypothetical formula (1) for contamination of a single food with a single radionuclide. The L_c in Table 2 is the value thus derived plus the average concentration of the food type.

$$L_c = ALI/(365 \times I_d) \quad \cdots\cdots (1)$$

Where:
ALI - Annual limit intake
I_d - The average daily intake of the people who eat the most in China

4.2 When multiple foods (including drinking water) and/or are simultaneously contaminated with multiple radionuclides, the radiation hygiene evaluation shall meet the requirements of formula (2):

$$\sum_{i=1}^{m}\sum_{j=1}^{n}\frac{C_{ij}}{L_{c,ij}} \leqslant 1 \quad \cdots\cdots (2)$$

Where:
C_{ij} - The concentration of i-type nuclides contained in j-type food;
L_{cij} - The limited concentration of i-type nuclides for j-type food.

The ingestion concentration limit of radioactive substances in drinking water is derived from GB 4792. In the case of multi-source exposure that also includes other irradiation routes in practice, the ratio of the actual exposure dose (or pollution concentration) to dose limit (or corresponding derived limit) should be added to the left side of formula (2) during radiation health assessment to ensure the safety of relevant personnel.

Appendix A

Annual limit intake

A1 Annual limit intake of people of different ages is shown in the Table A1.

Radionuclide	Adults	Children	Infants
^{3}H	6.2×10^{7}	5.3×10^{2}	2.4×10^{2}
^{89}Sr	4.6×10^{6}	1.9×10^{5}	6.7×10^{4}
^{90}Sr	2.8×10^{4}	2.3×10^{4}	1.1×10^{4}
^{131}I	7.7×10^{4}	3.1×10^{4}	9.1×10^{4}
^{137}Cs	7.7×10^{4}	1.0×10^{5}	9.1×10^{4}
^{147}Pm	3.2×10^{6}	1.6×10^{6}	5.9×10^{5}
^{210}Po	2.2×10^{3}	1.0×10^{3}	3.3×10^{2}
^{226}Ra	4.0×10^{3}	2.5×10^{3}	1.0×10^{3}
^{223}Ra	2.0×10^{3}	2.1×10^{3}	7.7×10^{2}
Natural Thorium	347	297	206
Natural Uranium	551	358	142
^{239}Pu	1.0×10^{3}	1.0×10^{3}	7.1×10^{2}

Table A1

Note: the unit for the natural Thorium and Uranium is mg/kg.

Additional information:

This standard is proposed by the Department of Health Supervision of the Ministry of Health;

This standard was drafted by the Institute of Radiation Medicine, Chinese Academy of Medical Sciences;

The main drafter of this standard is Zhu Hongda;

TheFood Hygiene Supervision and Inspection Institute of the Ministry of Health, entrusted by the Ministry of Health, reserves the right of final explanations.