

RADIATION SAFETY DIRECTORATE

Pursuant to Article 26-e, paragraph 1, item 11 of the Law on Ionising Radiation Protection and Radiation Safety (Official Gazette of the Republic of Macedonia No. 48/02 and 135/07), the Director of the Radiation Safety Directorate hereby adopts a

RULEBOOK ON THE MAXIMUM PERMITTED LEVELS OF RADIONUCLIDES IN FOOD, WATER, AIR, SOIL, ANIMAL AND PLANT PRODUCTS AND RAW MATERIALS, AS WELL AS IN GENERAL USE PRODUCTS

I. General provision

Article 1

This Rulebook shall prescribe the maximum permitted levels of radionuclides in food, water, air, soil, animal and plant products and raw materials, as well as in general use products.

II. Maximum permitted levels of radionuclides in food and air

Article 2

The maximum permitted levels of radionuclides in food and air shall be determined by the limits for annual intake of radionuclide in the human body by way of inhalation and ingestion, in accordance with the regulations on ionising radiation protection and radiation safety.

Article 3

The maximum permitted levels of radionuclides in food and feed intended for the market following a nuclear accident or radiation emergency shall be given in Appendix 1, which is a constituent part of this Rulebook.

Evidence of compliance with the provisions of paragraph 1 of this Article shall be submitted for imports of food and feed proceeding from a country where a nuclear accident or radiation emergency has occurred.

Article 4

Imports of the products and berries originating from countries affected by the Chernobyl disaster, listed in Appendix 2, which is a constituent part of this Rulebook, shall not be made if the total specific activity of Cs-134 and Cs-137 therein exceeds:

1. 370 Bq/kg for the milk and milk products listed in Table 2 of Appendix 2 of this Rulebook, as well as for foods intended for infants in the first four to six months of age, if specifically indicated on the product package;
2. 600 Bq/kg for the remaining products and berries listed in Table 1 of Appendix 2 of this Rulebook.

The maximum permitted levels of radionuclides shall refer to the finished product intended for human consumption. The appropriate specific activity for dried and concentrated products shall be calculated on the basis of the instructions provided for the preparation thereof.

III. Maximum permitted levels of radionuclides in water

Article 5

The reference exposure level for all radionuclides present in potable water consumed for a

period of one year shall be 0,1 mSv.

In cases where the indicative values for a total beta activity and for a total alpha activity of 1 Bq/l and 0,5 Bq/l respectively are not exceeded, additional radiological analyses shall not be performed and the water shall be considered potable.

In cases where the indicative values for a total beta activity and a total alpha activity referred to in paragraph 2 of this Article are exceeded, additional radiological analyses shall be performed for the purpose of determining whether the reference level referred to in paragraph 1 of this Article has been exceeded.

The reference levels of the maximum permitted levels of radionuclides in potable water shall be calculated by means of the following formula:

$$GL_j = \frac{IDC}{h(g)_{j,HHI} \cdot q},$$

where GL_j is the reference level of radionuclide j in potable water (Bq/l); IDC is the reference level equivalent to 0,1 mSv/per year; $h(g)_{j,HHI}$ is the dose conversion factor for radionuclide j introduced into the body of an individual aged above 18(mSv/Bq); q is the annual volume of consumed water, amounting to 730 l/ per year.

The reference levels referred to in paragraph 4 of this Article shall refer to natural radionuclides and radionuclides emitted into the environment in accordance with the regulations on ionising radiation protection and radiation safety.

Article 6

The non-dimensional activity index I , calculated on the basis of the results obtained by measuring the activity of a given radionuclide per unit volume of potable water, shall be used to determine whether the reference level referred to in paragraph 1 of Article 6 of this Rulebook has been exceeded.

The activity index referred to in paragraph 1 of this Article shall be calculated with the following formula:

$$I = \sum_j \frac{C_j}{GL_j},$$

where C_j is the measured activity of radionuclide j per unit volume of potable water and GL_j is the reference level of radionuclide j referred to in Article 6 paragraph 4 of this Rulebook.

If the activity index is smaller than or equals 1, the potable water may be consumed without any restrictions regarding exposure to ionising radiation.

If the activity index exceeds 1, the water shall be considered unfit to drink and additional water analysis shall be performed in addition, appropriate activities to overcome this condition shall be taken, if such activities are deemed necessary and justifiable.

If the additional analyses demonstrate that the water is unfit to drink and it is not possible to take the appropriate activities to overcome this condition, the water shall not be used for drinking and a sign bearing the wording "Water unfit to drink" shall be put.

Article 7

The provisions of this chapter shall apply to water used for the manufacture of drinks, industrial preparation or production of food, animal water-supply and irrigation of crops.

Article 8

The provisions of this chapter shall not apply in cases of nuclear accidents or radiation emergencies.

IV. Maximum permitted levels of radionuclides in soil

Article 9

The maximum permitted levels of radionuclides in soil shall not cause exposure of the general public above the established dose limits, taking into account the external exposure to ionising radiation and the exposure resulting from eventual radioactive contamination of air, water and food, in accordance with the regulations on ionising radiation protection and radiation safety.

In cases where the established dose limits for individuals are exceeded as a result of the exposure referred to in paragraph 1 of this Article, the soil shall be decontaminated in accordance with the regulations on ionising radiation protection and radiation safety.

V. Maximum permitted levels of radionuclides in animal and plant products and raw materials

Article 10

Exemption levels shall apply to the maximum permitted levels of radionuclides in animal and plant products and raw materials, in accordance with the regulations on ionising radiation protection and radiation safety.

In the case of natural uranium, natural thorium and potassium-40, exemption levels shall apply, in accordance with the regulations on ionising radiation protection and radiation safety.

Article 11

The maximum permitted levels of radionuclides in tobacco and tobacco preparations shall be equivalent to those for alpha emitters.

Article 12

The maximum permitted levels of radionuclides in products for personal hygiene, face and body care and embellishment shall be equivalent to the maximum permitted levels of radionuclides in potable water.

VI. Maximum permitted levels of radionuclides in general use products

Article 13

Exemption levels shall apply to the maximum permitted levels of radionuclides in general use products, in accordance with the regulations on ionising radiation protection and radiation safety.

VII. Transitional and final provision

Article 14

On the day of entry into force of this Rulebook, the provisions on the maximum permitted levels of radioactive contamination of air, potable water and food, soil, products for personal hygiene, face and body care and embellishment, children's toys and other general use products of the Rulebook on the maximum permitted levels of radioactive contamination of the environment and on performing decontamination (Official Gazette of SFRY No. 8/87) shall cease to apply.

Article 15

This Rulebook shall enter into force on the eighth day from the date of its publication in the Official Gazette of the Republic of Macedonia.

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Skopje

Director,
PhD Rumen Stamenov

APPENDIX 1
Maximum permitted levels of radionuclides in food

Table 1. Maximum permitted levels of radionuclides in food (Bq/ks)

Radionuclide	Infant food	Milk and dairy products	Food excluding non-essential food	Non-essential food	Liquid food and potable water
Strontium- 90	75	125	750	7500	125
Iodine-131	150	500	2000	20000	500
Alpha emitters, Plutonium isotopes especially Pu-239 and Am-241	1	20	80	800	20
Other radionuclides with a half-life longer than 10 days, especially Cs-134 and Cs-137, (excepting K-40, H-3, C-14)	400	1000	1250	12500	1000

Table 2.
List of foods used at insignificant levels

Product description
Garlic (<i>Allium sativum</i> L.), fresh or cooled
Root of manioca (<i>Manihot esculenta</i> L.), salep (<i>Orchis mascula</i> L.), tuber vegetables with high amounts of starch or inulin, fresh, chilled, frozen or dried, in pieces or agglomerated in the form of granules
Peels of citrus fruits (<i>Citrus</i> L.), watermelons (<i>Citrulus vulgaris</i> L.) or melons (<i>Cucumis melo</i> L.), fresh, frozen, pickled, conserved in sulphur or other substances, dried
Peppers (<i>Capsicum annum</i> L.), fruit of the species <i>Capsicum</i> , dried or ground
Vanilla (<i>Vanilla</i> spp.L.)
Canella (<i>Cinnamomum Zeylandicum</i> L.) and canella flower
Clove (<i>Syrygium aromaticum</i> L.) (flowers, buds and roots)
Manioca sago
Hop (<i>Humulus lupulus</i> L.) cones, fresh or dried, crushed, ground, granulated or powdered
Plants, parts of plants, seeds and fruit of the species used principally in perfumery, medicine or as insect- or parasite-deterrent devices, fresh, dried, crushed or powdered
Natural varnish, clay, resin, resin clay and balm
Plant juices and extracts, pectin substances, pectinates and pectates, agar-agar and other sticky substances, extracted from plants or modified
Greases, oils and fractions thereof, derived from fish or other marine animals, refined but chemically unaltered
Caviar and caviar-substitutes
Cocoa (<i>Theobroma cacao</i>) in whole or crushed granules, raw or baked
Cocoa skin and other cocoa residues
Cocoa mass and degreased cocoa mass
Vegetables, fruits, fruit rinds and other parts of plants, boiled in sugar syrup (squashed, sweetened or crystallised)
Yeasts (active or non-active), other non-active unicellular microorganisms (excepting vaccines)
Vitamins and provitamins, natural or synthetic, and natural concentrates, as well as products thereof, used principally as vitamins, mixed or not mixed in any type of solutions
Essential oils (terpeneless or not), including concretes and absolutes; resinoids; extracted oleoresins; concentrates of essential oils in fats, in fixed oils, in waxes or the like, obtained by enfleurage or maceration; terpenic by-products of the deterpenation of essential oils; aromatic distillates and aqueous solutions of essential oils

APPENDIX 2
Products and berries

Table 1. List of products and berries

Product description
Live horses (except for breeding) intended for slaughter
Live bovine animals (except for breeding)
Live pigs (except for breeding)
Live sheep (except for breeding)
Live goats (except for breeding)
Live poultry: hens, roosters, ducks, geese, turkeys
Other live animals
Meat and meat preparations intended for human consumption
Milk and dairy products, birds' eggs, natural honey, animal products
Mushrooms (except cultivated from the genus Agaricus), fresh or chilled
Mushrooms (except cultivated from the genus Agaricus), boiled or not, frozen
Mushrooms (except cultivated from the genus Agaricus), provisionally preserved in sulphur dioxide, marinated, preserved in sulphur or otherwise conserved, but not intended for human consumption in that state
Mushrooms (except cultivated from the genus Agaricus) dried, cut into pieces, cuttings, ground or powdered, but not otherwise treated
Fresh blueberries and other fruit of the genus Vaccinium
Blueberries of the genus Vaccinium myrtilloides, cooked on not by steaming or by boiling in water, frozen, containing added sugar or other sweetening matter
Blueberries of the genus Vaccinium myrtilloides provisionally preserved (in sulphur dioxide, marinated, in sulphurous water or by adding other substances), but not intended for consumption in that state
Sausages and similar products of meat, blood, food preparations based on these products
Other prepared or preserved foods of meat, offal and blood
Meat extracts and juices
Mushrooms (except cultivated of the genus Agaricus) prepared or preserved by vinegar or acetic acid
Mushrooms (except cultivated of the genus Agaricus) prepared or preserved otherwise than by vinegar or acetic acid

Table 2. List of milk and dairy products

Product description
Milk and cream, not concentrated nor containing added sugar or other sweetening matter
Milk and cream, concentrated or containing added sugar or other sweetening matter
Curdled milk, concentrated or containing added sugar or other sweetening matter, unflavoured, not containing added fruit or cocoa
Buttermilk, yogurt, yeasted milk and cream, kephir and other fermented or acidified milk and cream (except curdled milk), concentrated, containing added sugar or other sweetening matter, unflavoured, not containing added fruit or cocoa
Whey cheese concentrated or containing added sugar or other sweetening matter, products of natural milk components or products not elsewhere specified or included