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GB

**National Standard
of the People's Republic of China**

GB 27742-2011

**Active concentration for material not requiring
radiological regulation**

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Issued on: December 30, 2011

Implemented on: December 1, 2012

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine;**

Standardization Administration Committee.

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Foreword

The contents of Chapter 4, Chapter 5, Chapter 6, 7.1, 7.4, 7.5, 7.7 of this Standard are mandatory, the rest are recommended.

This Standard is formulated by referring to IAEA safety guide “Application of the Concepts of Exclusion, Exemption and Clearance” (No. RS-G-1.7), and combining the actual situations in China.

The Appendix A of this Standard is informative, the Appendix B is nominative.

This Standard was proposed by National Nuclear Corporation.

This Standard shall be administered by National Standardization Technical Committee of Nuclear Energy (SAC/TC 58).

Main drafting organization of this Standard: Institute of Nuclear Industry Standardization.

Main drafter of this Standard: Xia Yihua.

Active concentration for material not requiring radiological regulation

1 Scope

This Standard specifies the active concentration for material not requiring radiological regulation (hereinafter referred to as regulation-exempted concentration).

This Standard applies to activities such as production operation, trade, landfill or recycle of large amount (more than 1 ton) material. However, it does not apply to the following conditions:

- Food, water, animal feed and any substances used in food or animal feed;
- Radon in the air (optimized action level of radon concentration in the air is shown in Appendix H of GB 18871-2002);
- Material in transporting (managed according to transportation standard);
- Liquid and gas effluents generated by approved practice (they belong to the scope of approved emission);
- Radioactive residues in the environment (including field soil) .

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB 17567-2009 Clearance levels for recycle and reuse of steel, aluminum, nickel and copper from nuclear facilities

GB 18871-2002 Basic standards for protection against ionizing radiation and for the safety of radiation sources

3 Terms and definitions

The following terms and definitions apply to this Standard.

3.1

Material

The collective term of substances and materials, including large amount of solid raw materials, auxiliary materials or materials intend to be deposited involved in the activities such as production operation, trade, recycle and landfill disposal.

3.2

Natural radionuclides

The radionuclides that is naturally existed in the earth with significant amount. It mainly refers to the native radionuclides ^{235}U , ^{238}U , ^{232}Th and theirs decay daughter.

3.3

Exclusion

Outside the application scope of standard, it specifically refers to those irradiation situations that can not control the irradiation size and possibility through implementing the requirements of this Standard, such as the irradiation caused by ^{40}K in human body and the cosmic ray reaching to the earth's surface.

3.4

Exemption

The practice and the source in practice that comply with the specified exemption requirements and levels, and they are exempted from regulatory requirements after agreed by the regulatory authorities.

3.5

radiation, the additional criterion is: the effective dose possibly caused by this kind of low probability events shall not exceed 1 mSv/a, at the same time the exemption regulation criterion of equivalent dose to the skin is also assumed as 50 mSv/a.

Note: The irradiation scenarios, ways, main relevant parameters taken into account when deducing regulation-exempted concentration for artificial radionuclides are shown in Appendix A.

5 Regulation-exempted concentration value

5.1 Regulation-exempted concentration value of natural radionuclides

The regulation-exempted concentration value of natural radionuclides is shown in Table B.1.

5.2 Regulation-exempted concentration value of artificial radionuclides

The regulation-exempted concentration value of artificial radionuclides is shown in Table B.2.

5.3 Regulation-exempted concentration value of inert gas

For inert gas, USE the exemption concentration for artificial radionuclides given in Appendix A of GB 18871-2002 as regulation-exempted concentration.

5.4 Materials containing various of radionuclides

5.4.1 Materials containing different natural radionuclides

For materials containing different mixtures of natural radionuclides, it shall be required that each active concentration for natural radionuclides shall meet the requirements of relevant values listed in Table B.1.

5.4.2 Mixture of artificial radionuclides

For materials containing various of mixtures of artificial radionuclides, it shall be required that the sum of RATIOS of each activity concentration for artificial radionuclides AND the respective regulation-exempted concentration values shall be less than 1, that is meeting the requirements of formula (1):

management.

6.4 Material and equipment with contaminated surfaces

For those materials or equipment only with contaminated surfaces, they shall be executed according to the specifications of B 2.2 in GB 18871-2002.

6.5 Steel, aluminum, nickel and copper with minor contamination

For the recycle and reuse of steel, aluminum, nickel and copper with minor radioactive contamination, it has already be specified in GB 17567-2009 that the clearance level of artificial radionuclides that can be melted and reused can be seen as regulation-exempted declared value. For other radionuclides regulation-exempted concentrations (including natural radionuclides) that are not given in GB 17567 -2009, it can be implemented by referring to this Standard.

6.6 Small amount of material (less than 1 ton)

For cases of small amount (less than 1 ton) material, it shall be implemented according to the exemption concentration given in the Appendix A of GB 18871-2002.

7 Verification of meeting regulation-exempted concentration values

7.1 The basic and direct verification methods are to conduct laboratory analysis of activity concentration to representative samples, it shall establish and adopt qualified verification process for activity concentration value.

7.2 Under the premise of ensuring that the active concentration for material shall not exceed the regulation-exempted concentration value of this Standard, it can adopt some indirect methods, including conducting on-site screening and measurement of γ dose rate of radioactive-contaminated materials, the method of determining the relationship between the different nuclides content according to appropriate derivation, the method of inquiring traceable

allowed without the consent of the regulatory authorities.

7.7 After the radioactive content in material meets the requirements of this Standard, it shall also meet the requirements of relevant national standards in other aspects (for example, chemical, biological toxicity, etc.).

Appendix A

(Informative)

The irradiation scenarios, ways, main relevant parameters considered when deriving regulation-exempted concentration for artificial radionuclides

Table A.1 The irradiation scenarios and relevant ways

Irradiation scenarios	Description	Individual being exposed	Relevant irradiation ways
WL	Staff at the landfill or other utilities (except melting plant)	Working staff	External irradiation at landfill; Inhaled internal irradiation at landfill; polluted materials ingested directly
WF	Staff in the melting plant	Working staff	External irradiation from equipment or waste iron heap in melting plant; Inhaled internal irradiation in melting plant; polluted materials ingested directly
WO	Other staff (such as truck driver)	Working staff	External irradiation from equipment or materials loaded by truck
RL-C	Residents near landfill or other utilities	1-year-old ~ 2-year-old children	Inhaled internal irradiation near landfill or other utilities; Ingested internal Irradiation of food growing at polluted places
RL-A		Adults > 17 years old	
RF	Residents near melting plant	1-year-old ~ 2-year-old children	Inhaled internal irradiation nearby
RH	Residents in polluted building	Adults	Indoor external irradiation

Appendix B

(Normative)

Regulation-exempted concentration value

Table B.1 Regulation-exempted concentration value of natural radionuclides

Nuclides	Regulation-exempted concentration value
Natural radionuclides	1

Note 1: Natural radionuclides, refer to any nuclide in the decay chain of which the mother nucleus is ^{238}U , ^{235}U and ^{232}Th , and in permanent balance. That is, it includes the first-of-chain natural radionuclides ^{238}U , ^{235}U and ^{232}Th in the material, and segmented-chain's first-of-chain nuclide ^{225}Ra , and every decay daughter nuclide in their decay chain.

Note 2: The value listed refers to the concentration value of this natural radionuclide's total content in the material. That is, it includes the so called natural radioactive content in the material contained "normally" in this area, and any additional concentration value brought by activities.

Note 3: For active concentration of natural ^{40}K in the material, it is not regulated.

Table B.2 Regulation-exempted concentration value of artificial radionuclides

Radionuclides	Regulation-exempted concentration Bq/g	Radionuclides	Regulation-exempted concentration Bq/g	Radionuclides	Regulation-exempted concentration Bq/g
H-3	100	Mn-56	10 *	Se-75	1
Be-7	10	Fe-52	10 *	Br-82	1
C-14	1	Fe-55	1000	Rb-86	100
F-18	10 *	Fe-59	1	Sr-85	1
Na-22	0.1	Co-55	10 *	Sr-85m	100 *
Na-24	1 *	Co-56	0.1	Sr-87m	100 *
Si-31	1000 *	Co-57	1	Sr-89	1000
P-32	1000	Co-58	1	Sr-90	1
P-33	1000	Co-58m	10000 *	Sr-91	10 *
S-35	100	Co-60	0.1	Sr-92	10 *

Radionuclides	Regulation-ex empted concentration Bq/g	Radionuclides	Regulation-ex empted concentration Bq/g	Radionuclides	Regulation-ex empted concentration Bq/g
Note: * means the half life is less than one day.					

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