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Indian Standard

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परमाणु ऊर्जा, परमाणु तकनीकियाँ एवं रेडियोलॉजिकल संरक्षण — शब्दावली

भाग 2 रेडियोलॉजिकल संरक्षण

(पहला पुनरीक्षण)

Nuclear Energy, Nuclear Technologies and Radiological Protection — Vocabulary

Part 2 Radiological Protection

(First Revision)

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NATIONAL FOREWORD

This Indian Standard (Part 2) (First Revision) which is identical with ISO 12749-2 : 2022 'Nuclear energy, nuclear technologies and radiological protection — Vocabulary — Part 2: Radiological protection' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Nuclear Energy for Peaceful Applications Sectional Committee and approval of the Chemical Division Council.

This part of IS 16902 provides terms and definitions for general nuclear energy concepts dealing with radiological protection and other related concepts. These concepts include protection for human health and the environment; radiation measurement methods and instruments; and the prevision or direct determination of the effect of ionizing radiation on the body.

Unambiguous communication of radiological protection concepts is crucial taking into account the relevant implications that may arise from misunderstandings with regard to equipment and materials involved in the standards dealing with this subject. The market of radiological protection is a heterogeneous one because it comprises equipment designed, built and operated along the safe practices defined by the radiological protection specialists. This market also includes nuclear reactors, nuclear fuel cycle, cosmic radiation, scientific research industrial applications, nuclear medicine and radiotherapy, and instruments to monitor both personnel and facilities and sites. In view of the foregoing, and the large number of people involved who have different levels of scientific and technical knowledge, there can be widely divergent understandings and assumptions about concepts. The results are poor communication, high risk of accidents and duplication of effort as different groups are going to define concepts according to their perspectives.

Conceptual arrangement of terms and definitions is based on concepts systems that show corresponding relationships among radiological protection concepts. In Annex A there is a detailed explanation of this subject. Such arrangement provides users with a structured view of this special sub domain within the nuclear energy sector and will facilitate common understanding of radiological protection concepts. Besides, concepts systems and conceptual arrangement of terminological data will be helpful to any kind of user because it will promote clear, accurate and useful communication. At the end of this document an alphabetical index shows the terms followed by their corresponding notation.

This part was originally published in 2018 by adopting ISO 12749-2 : 2013 on dual number basis. The revision of this standard has been undertaken in order to align it with the latest version of ISO 12749-2 : 2022. The major changes in this revision are as follows:

a) Merging of the headings "Terms related to radiological monitoring" and "Terms related to measurement"; and
b) Addition of the heading "Terms related to emergency".

This Indian Standard is published in several parts. The other parts in this series are:

Part 1 General terminology
Part 3 Nuclear fuel cycle
Part 4 Dosimetry for radiation processing
Part 5 Nuclear reactors
Part 6 Nuclear medicine

(*Continued on third cover)*

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Introduction

This document will provide terms and definitions for general nuclear energy concepts dealing with radiological protection and other related concepts. These concepts include protection for human health and the environment; radiation measurement methods and instruments; and the prevision or direct determination of the effect of ionizing radiation on the body.

Terminological data are taken from ISO standards developed and revised by ISO/TC 85/SC 2 and other technically validated documents such as the IAEA Basic Safety Standards, ISO/IEC 80000-10, ICRP, ICRU 51, ICRU 85a, VIM and BIPM.

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Conceptual arrangement of terms and definitions is based on concepts systems that show corresponding relationships among radiological protection concepts. In Annex A there is a detailed explanation of this subject. Such arrangement provides users with a structured view of this special sub domain within the nuclear energy sector and will facilitate common understanding of radiological protection concepts. Besides, concepts systems and conceptual arrangement of terminological data will be helpful to any kind of user because it will promote clear, accurate and useful communication. At the end of this document an alphabetical index shows the terms followed by their corresponding notation.

Indian Standard

NUCLEAR ENERGY, NUCLEAR TECHNOLOGIES AND RADIOLOGICAL PROTECTION — VOCABULARY

PART 2 RADIOLOGICAL PROTECTION

(First Revision)

1 Scope

This document defines terms and definitions related to radiological protection concepts in the subject field of nuclear energy, nuclear technology and the different nuclear applications. It is intended to facilitate communication and promote common understanding.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 General terms related to radiological protection

3.1.1
radiological protection
radiation protection
protection of people and the environment from the harmful effects of exposure to ionizing radiation and the means for achieving such protection while allowing its beneficial uses

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — “and the environment” and “while allowing its beneficial uses” was added and the demonstrative pronoun “that” was replaced with “such protection”.]

Note 1 to entry: People include workers, patients and members of the public.

Note 2 to entry: Environment includes biota, waters, lands, and air.

3.1.2
radiation source
source
apparatus, substance or installation, that can cause *radiation exposure* (3.3.1), by emitting ionizing radiation or releasing radioactive substances or materials

3.1.3
radioactivity
stochastic process whereby nuclei undergo spontaneous random disintegration, usually accompanied by the emission of subatomic particles, or photons

[SOURCE: ISO 12749-1:2020, 3.1.1, modified — "random" was added in the definition.]

3.1.4
radioactive material
material designated in national law or by a regulatory body as being subject to regulatory control because of its *radioactivity* (3.1.3)

Note 1 to entry: This is the 'regulatory' meaning of radioactive, and should not be confused with the 'scientific' meaning of radioactive.

Note 2 to entry: The term radioactive substance is also used to indicate that the 'scientific' meaning of radioactive is intended, rather than the 'regulatory" meaning of radioactive suggested by the term radioactive material.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

Note 3 to entry: Whenever the term "radioactive substance" is mentioned in any definition or note to entry throughout this document, it covers the concept defined in 3.1.4**.**

3.1.5
radioactive contamination
contamination
radioactive substances on surfaces, or within solids, liquids or gases (including the human body), where their presence is unintended or undesirable, or the process giving rise to their presence in such places

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — The parenthesis was deleted and replaced with commas.]

3.1.6
airborne radioactive substance
radioactive substance dispersed in the air in the form of dusts, fumes, particulates, mists, vapours, or gases

[SOURCE: ISO 16639:2017, 3.4]

3.1.7
derived air concentration
DAC
derived limit (3.1.15) on the activity concentration in air of a specified radionuclide, calculated such that the reference individual, breathing air with constant contamination at the DAC with the breathing behavior of a reference worker for a working year, would receive an *intake* (3.3.4) corresponding to the annual intake for the radionuclide in question

Note 1 to entry: The parameter values recommended by the International Commission on Radiological Protection for calculating DACs are a breathing rate of 1,2 m^3/h and a working year of 2 000 h.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.1.8
air contamination area
area accessible to individuals where the measured or calculated *radioactivity* (3.1.3) concentrations of an *airborne radioactive substance* (3.1.6) exceeds or is likely to exceed the applicable criteria

[SOURCE: ISO 16639:2017, 3.5, modified — Addition of "or calculated", "activity" was changed to "radioactivity" and deletion of "national" from "to exceed the applicable national criteria".]

3.1.9
decontamination
complete or partial removal of *radioactive contamination* (3.1.5) by a deliberate physical, chemical or biological process

Note 1 to entry: It is preferred that radioactive decontamination does not significantly change the characteristics of the surface.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — "the" was deleted from the definition and "radioactive" was added in the definition and the Note 1 to entry.]

3.1.10
justification
process of determining for an *emergency exposure situation* (3.3.26) or an *existing exposure situation* (3.3.27) whether a proposed protective action or remedial action is likely to be beneficial, whether the expected benefits to individuals and to society from introducing or continuing the protective action or remedial action outweigh the cost of such action and any harm or damage caused by the action

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — "overall" and "including the reduction in radiation detriment" were deleted.]

3.1.11
optimization (of protection and safety)
process of determining what level of protection and safety would result in the magnitude of individual doses, the number of individuals, workers and members of the public, subject to exposure and the likelihood of exposure being as low as reasonably achievable, economic and social factors being taken into account (ALARA)

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

Note 1 to entry: For *medical exposures* (3.3.29) of patients, the optimization of protection and safety is the management of the radiation dose to the patient commensurate with the medical purpose.

3.1.12
dose limit
value of the *effective dose* (3.1.24) or the *equivalent dose* (3.1.22) to individuals from *planned exposure situations* (3.3.21), or *doses* (3.1.16) to biota, that shall not be exceeded

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4)]

3.1.13
dose constraint
prospective and source related value of individual *dose* (3.1.16) that is used in *planned exposure situations* (3.3.21) as a parameter for the *optimization of protection and safety* (3.1.11) for the source, and that serves as a boundary in defining the range of options in optimization

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.1.14
annual limit on intake
ALI
intake (3.3.4) by inhalation or ingestion or through the skin of a given radionuclide in a year by reference individual which would result in a *committed dose* (3.1.17) equal to the relevant *dose limit* (3.1.12)

Note 1 to entry: The annual limit on intake is expressed in units of activity.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.1.15
derived limit
limit on a measurable quantity set, on the basis of a model, such that compliance with the derived limit may be assumed to ensure compliance with a primary limit

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.1.16
dose
measure of the energy deposited by radiation in a target

[SOURCE: IAEA. IAEA safety glossary, 2018 Edition. Vienna: IAEA, 2019. p. 278]

Note 1 to entry: When unspecified, dose refers to quantity of *absorbed dose* (3.1.20), measured in gray (1 Gy = 1 J/kg).

Note 2 to entry: Depending upon the context in which it is used, the generic term dose may also refer to *equivalent dose* (3.1.22), *effective dose* (3.1.24) or other dose-related quantities.

[SOURCE: ISO 12749-1:2020, 3.3.6]

3.1.17
committed dose
lifetime *dose* (3.1.16) expected to result from an *intake* (3.3.4)

[SOURCE: IAEA. Radiation protection and safety of radiation sources: international basic safety Standards. IAEA Safety Standards Series No, GSR Part 3. Vienna: IAEA, 2014. p. 471]

Note 1 to entry: For *radiological protection* (3.1.1) calculational purposes, lifetime is typically taken to be 50 years for adults and the time to the age of 70 years for intakes by children. (That is, for intakes by children, 70 years minus the age in years: so, for example 60 years for 10 years old child).

3.1.18
committed equivalent dose
$H_T(\tau)$
quantity $H_T(\tau)$, defined as:

$$H_T(\tau) = \int_{t_0}^{t_0+\tau} H_T(t)\,\mathrm{d}t$$

where t_0 is the time of *intake* (3.3.4), $H_T(t)$ is the *equivalent dose* (3.1.22) rate at time t in tissue or organ T and τ is the integration time elapsed after an intake of radioactive substances

Note 1 to entry: Where τ is not specified, it is taken to be 50 years for adults and the time to the age of 70 years for intakes by children. (That is, for intakes by children, 70 years minus the age in years: so, for example 60 years for a 10 years old child).

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.1.19
committed effective dose
$E(\tau)$
quantity $E(\tau)$, defined as:

$$E(\tau) = \sum_T w_T\, T_T(\tau)$$

where $H_T(\tau)$ is the *committed equivalent dose* (3.1.18) to tissue or organ T over the integration time τ elapsed after an *intake* (3.3.4) of radioactive substances and w_T is the *tissue weighting factor* (3.1.23) for tissue or organ T.

Note 1 to entry: Where τ is not specified, it will be taken to be 50 years for adults and the time to the age of 70 years for intakes by children.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.1.20
absorbed dose
D
differential quotient of $\bar{\varepsilon}$ with respect to *m*, where $\bar{\varepsilon}$ is the mean energy imparted by ionizing radiation to matter of mass *m*:

$$D = \frac{\mathrm{d}\bar{\varepsilon}}{\mathrm{d}m}$$

[SOURCE: ISO 80000-10:2019, 10.81.1]

Note 1 to entry: The gray is a special name for joule J/kg and is to be used as the coherent SI unit for absorbed dose.

3.1.21
radiation weighting factor
w_{R}
dimensionless factor by which the organ or tissue *absorbed dose* (3.1.20) is multiplied to reflect the higher biological effectiveness of high-*LET* (3.1.25) radiations compared with low-LET radiations. It is used to derive the *equivalent dose* (3.1.22) from the absorbed dose averaged over a tissue or organ

Note 1 to entry: The radiation weighting factor is used to derive the equivalent dose from the absorbed dose averaged over a tissue or organ.

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4) modified — The definition was split into a definition and a Note to entry.]

3.1.22
equivalent dose
quantity $H_{\mathrm{T,R}}$ defined as: $H_{\mathrm{T,R}} = w_{\mathrm{R}} D_{\mathrm{T,R}}$ where $D_{\mathrm{T,R}}$ is the *absorbed dose* (3.1.20) delivered by radiation type R averaged over a tissue or organ T and w_{R} is the *radiation weighting factor* (3.1.21) for radiation type R

Note 1 to entry: When the radiation field is composed of different radiation types with different values of w_{R} the equivalent dose is:

$$H_{\mathrm{T}} = \sum_{\mathrm{R}} w_{\mathrm{R}} D_{\mathrm{T,R}}$$

Note 2 to entry: The unit of equivalent dose is J/kg and its special name is sievert (Sv).

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278. modified — The definition was split into a definition and two Notes to entry.]

3.1.23
tissue weighting factor
w_{T}
multiplier of the *equivalent dose* (3.1.22) to an organ or tissue used for *radiological protection* (3.1.1) purposes to account for the different sensitivities of different organs or tissues to the induction of *stochastic effects* (3.2.5) of radiation

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.1.24
effective dose
E
tissue-weighted sum of the *equivalent doses* (3.1.22) in all specified tissues and organs of the body, given by the expression:

$$E = \sum_{T} w_T \sum_{R} w_R D_{T,R} \text{ or } E = \sum_{T} w_T H_T$$

where H_T or w_R $D_{T,R}$ is the equivalent dose in a tissue or organ, T, and w_T is the *tissue weighting factor* (3.1.23)

Note 1 to entry: The unit for the effective dose is J/kg, and its special name is sievert (Sv).

Note 2 to entry: In order to evaluate the effective dose different anthropomorphic reference models are used; they can be adapted to sex and age.

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4)]

3.1.25
linear energy transfer
LET
quotient of the mean energy, dE_Δ, lost by the charged particles due to electronic interactions in traversing a distance, d*l*, minus the mean sum of the kinetic energies in excess of Δ of all the electrons released by charged particles and d*l*:

$$L_\Delta = \frac{dE_\Delta}{dl}$$

[SOURCE: ISO 80000-10:2019, 10.85]

3.1.26
relative biological effectiveness
RBE
ratio of a dose of a low-*LET* (3.1.25) reference radiation to a dose of the radiation considered that gives an identical *biological effect* (3.2.1)

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4)]

Note 1 to entry: The most used reference radiation is 250 keV x-rays.

3.2 General terms related to biological effect

3.2.1
biological effect
effect of ionizing radiation in living cells

EXAMPLE Erythema, damage to the haemopoietic system, and acute radiation syndrome.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.2.2
deterministic effect
tissue reaction
radiation induced health effect for which generally a threshold level of *dose* (3.1.16) exists above which the severity of the effect is greater for a higher dose

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.2.3
acute radiation syndrome
acute radiation sickness
ARS
acute illness caused by irradiation of the entire body (or most of the body) by a high *dose* (3.1.16) of penetrating radiation in a very short period of time (usually a matter of minutes)

Note 1 to entry: The required conditions for Acute Radiation Syndrome (ARS) are:

— The radiation dose is large (i.e., greater than 0,7 Gy).

— The dose is usually from an external exposure.

— The radiation is penetrating.

— The entire body (or a significant portion of it) has received the dose.

[SOURCE: Brochure for Physicians, Acute Radiation Syndrome, Centers for Disease Control and Prevention, https://www.cdc.gov/nceh/radiation/emergencies/pdf/ars.pdf]

Note 2 to entry: With the assumption of the linear-non-threshold dose response for stochastic radiation effects (*LNT model* (3.2.8)) in the low dose range (< 100 mSv) and, under the conditions of the described concept of calculation, *effective dose* (3.1.24) is an additive quantity. At higher radiation doses, when tissue reactions (*deterministic effects* (3.2.2)) can occur, the *absorbed doses* (3.1.20) in organs and tissues have to be used for risk evaluation.

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4)]

3.2.4
threshold dose
dose estimated to result in only 1 % incidence of tissue reactions

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4)]

3.2.5
stochastic effect
radiation induced health effect, whose probability of occurrence is greater for a higher radiation *dose* (3.1.16) and which severity, if it occurs, is independent of dose

Note 1 to entry: Stochastic effects may be *somatic effects* (3.2.9) or *hereditary effects* (3.2.10), and generally occur without a threshold level of dose. Examples include solid cancers and haematologic cancers (leukaemia and lymphoma).

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — "the probability of occurrence of which" was replaced with "whose probability of occurrence" and "leukemia" was replaced with "haematologic cancers".]

3.2.6
risk coefficient
lifetime risk or *radiation detriment* (3.2.7) assumed to result from exposure to unit *equivalent dose* (3.1.22) or *effective dose* (3.1.24)

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.2.7
radiation detriment
total harm that would eventually be incurred by a group that is subject to exposure and by its descendants as a result of the group's exposure to radiation from a source

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p.278]

3.2.8
linear-non-threshold model
LNT model
dose-response model, which is based on the assumption that, in the low dose range, radiation *doses* (3.1.16) greater than zero will increase the risk of excess cancer and/or heritable disease in a simple proportionate manner

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4)]

Note 1 to entry: Low doses (below about 100 mSv) and low dose rates.

3.2.9
somatic effect
radiation induced health effect that occurs in the exposed individual

Note 1 to entry: Somatic effect includes effects occurring after birth that are attributable to exposure in uterus.

Note 2 to entry: *Deterministic effects* (3.2.2) are normally also somatic effects.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — The note was split in two and "stochastic effects may be somatic effects or hereditary effects" was deleted in the second one.]

3.2.10
hereditary effect
radiation induced health effect that occurs in a descendant of the exposed individual

Note 1 to entry: The less precise term 'genetic effect' is also used, but hereditary effect is preferred.

Note 2 to entry: Hereditary effects are usually *stochastic effects* (3.2.5).

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.3 Terms related to radiation exposure

3.3.1
radiation exposure
state or condition of being subject to ionizing radiation

Note 1 to entry: Exposure to ionizing radiation can be broadly divided into categories of exposure according to the status of the individual.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — "irradiation" was replaced with "ionizing radiation".]

3.3.2
internal exposure
exposure to radiation from a source within the body

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.3.3
specific absorbed fraction
SAF
fraction of energy of that emitted as a specified radiation type in a source region, S, that is absorbed per unit mass of a target tissue, T

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4) modified — "that is absorbed in 1 kg" was replaced with "that is absorbed per unit mass".]

3.3.4
intake
act or process of taking radionuclides into the body by inhalation or ingestion or through the skin

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278 modified — The phrase "by the operator" was deleted.]

EXAMPLE Intake by injection of a radiopharmaceutical, via a wound, or any other possible exposure pathway.

3.3.5
absorption
transfer of material to blood regardless of mechanism, generally applied to dissociation of particles and uptake into blood of soluble substances and material dissociated from particles

[SOURCE: ISO 16638-1:2015, 3.1, modified — "movement" was changed to "transfer", "which generally" with "generally" and "the uptake" with "uptake".]

3.3.6
human alimentary tract model
HATM
biokinetic model for describing the movement of ingested materials through the human alimentary tract

[SOURCE: ICRP, 2015. Occupational Intakes of Radionuclides: Part 1. ICRP Publication 130. Ann. ICRP 44 (2), modified by that published in publication 100 (ICRP, 2006)]

3.3.7
human respiratory tract model
HRTM
biokinetic model for describing the deposition, translocation, and *absorption* (3.3.5) of inhaled materials in the human respiratory tract

[SOURCE: ICRP, 2015. Occupational Intakes of Radionuclides: Part 1. ICRP Publication 130. Ann. ICRP 44 (2), modified — The definition was split into a definition and a Note to entry. modified by that published in publication 66 (ICRP, 1994a) and updated in this report.]

3.3.8
reference bioassay function
set of tabulated values $m(t)$ predicted by a reference biokinetic model describing the time course of the activity in the body following an acute *intake* (3.3.4), at time t

Note 1 to entry: A retention function $m(t)$ represents the predicted activity of a radionuclide in the body, organ, or tissue at a time t after the intake.

3.3.9
retention fraction
ratio of the activity measured in the body, or in excreta, to the *intake* (3.3.4)

[SOURCE: NCRP Composite glossary. Bethesda: NCRP, 2011. p. 217]

3.3.10
excretion function
set of tabulated values $m(t)$ predicted by a reference biokinetic model describing the time course of the activity excreted in body fluids or waste, e.g., urine or faeces, following an acute *intake* (3.3.4) at time t

Note 1 to entry: An excretion function $m(t)$ represents the predicted activity of a radionuclide in a 24 h excreta sample at a time t after the intake.

[SOURCE: ICRP, 2015. Occupational Intakes of Radionuclides: Part 1. ICRP Publication 130. Ann. ICRP 44 (2), modified — The definition was split into a definition and a Note to entry.]

3.3.11
excretion fraction
fraction of an *intake* (3.3.4) excreted per unit of time after a given time has elapsed since the intake occurred

[SOURCE: ICRP. 1994. Dose coefficient for intake of radionuclides by workers. ICRP. Publication 68, Ann. ICRP 24 (1-3)]

3.3.12
biological clearance
net effect (3.4.36) of the biological processes by which radionuclides are removed from the body or from a tissue, organ or region of the body

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — "clearance" was replaced with "biological clearance", "from a tissue, organ or area of the body" with "from the body or from a tissue, organ or region of the body" in the definition.]

Note 1 to entry: The rate of biological clearance is the rate at which these biological processes occur.

3.3.13
total dose
dose from *external exposure* (3.3.14) in a given period plus the *committed dose* (3.1.17) from *intakes* (3.3.4) of radionuclides in that same period

EXAMPLE Annual dose.

[SOURCE: IAEA. Radiation protection and safety of radiation sources: international basic safety Standards. IAEA Safety Standards Series No. GSR Part 3. Vienna: IAEA, 2014. p. 471]

3.3.14
external exposure
exposure to radiation from a source outside the body

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.3.15
partial-body dose
equivalent dose (3.1.22) to specified tissue, organs or parts of the body

Note 1 to entry: Identified by the name of the part of the particular tissue, organ or body, e.g. bone marrow dose, skin dose, hand dose or dose to the lens of the eyes.

3.3.16
kerma
K
for uncharged ionizing radiation, the differential quotient of E_{tr} with respect to m, where E_{tr} is the mean sum of the initial kinetic energies of all the charged ionizing particles liberated in a mass m of a material:

$$K = \frac{dE_{tr}}{dm}$$

[SOURCE: ISO 80000-10:2019, 86.1]

Note 1 to entry: It is expressed as $K = dE_{tr}/dm$

Note 2 to entry: The unit is J/kg. The special name for the unit of kerma is gray (Gy).

3.3.17
back-scatter factor
ratio of air *kerma* (3.3.16) in front of a *phantom* (3.4.71) to the air kerma at the same position free-in-air without the phantom

Note 1 to entry: Radiation field is considered to be unidirectional with a direction of incidence perpendicular to the phantom surface

[SOURCE: ISO 4037-3:2019, 3.1, modified — The definition was split into a definition and a Note to entry.]

3.3.18
conversion coefficient
protection or operational quantities are calculated from physical quantities describing the radiation field by multiplication with a conversion coefficient

Note 1 to entry: This term is used in *external exposure* (3.3.14) situations, while in internal dosimetry the ratios of dose quantities and activity quantities are called *dose coefficients* (3.3.19).

[SOURCE: ICRU Report 95. 2020. Operational quantities for external radiation exposure. Journal of the ICRU 20 (1). Bethesda: ICRU, 2020]

3.3.19
dose coefficient
dose (3.1.16) per unit *intake* (3.3.4) of a radioactive substance

Note 1 to entry: Sometimes it is also used to describe other coefficients linking quantities or concentrations of activity to doses or dose rates, such as the external dose rate at a specified distance above a surface with a deposit of a specified activity per unit area of a specified radionuclide.

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4), modified — The wording was split into a definition and a Note to entry.]

3.3.20
exposure situation
circumstances of the exposure of the individual(s) or the environment to ionizing *radiation sources* (3.1.2)

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — “or the environment” was added and “undergoing exposure” was replaced with “ionizing radiation sources”.]

3.3.21
planned exposure situation
situation of "https://kos.iaea.org/iaea-safety-glossary/1158" \h exposure that arises from the planned operation of a source or from a planned activity that results in an exposure due to a source.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.3.22
discharge
planned and controlled release of (gaseous or liquid) *radioactive material* (3.1.4) to the environment

[SOURCE: ISO 18417:2017, 3.2, modified — “gas” was replaced with “gaseous”.]

3.3.23
occupancy factor
typical fraction of the time for which a location is occupied by an individual or group.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.3.24
potential exposure
exposure that is not expected to be delivered with certainty but that may result from an accident at a source or an *event* (3.3.25) or sequence of events of a probabilistic nature, including equipment failures and operating errors

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4)]

3.3.25
event
any unintended occurrence, including operating error, equipment failure or other mishap, and deliberate action on the part of others, the consequences or potential consequences of which are not negligible from the point of view of protection and safety

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — The phrase "by the operator" was deleted.]

3.3.26
emergency exposure situation
situation of exposure that arises as a result of an accident, a malicious act or other unexpected *event* (3.3.25), and requires prompt action in order to avoid or to reduce adverse consequences

Note 1 to entry: Exposure in an emergency can include both occupational exposure and public exposure, and can include unplanned exposures resulting directly in the emergency exposure situation and planned exposures to *emergency workers* (3.7.11) and helpers in an emergency undertaking actions to mitigate the consequences of the emergency.

Note 2 to entry: Exposure in an *emergency* (3.7.1) can be reduced only by protective actions and other response actions.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.3.27
existing exposure situation
situation of exposure that already exists when a decision on the need for control needs to be taken

Note 1 to entry: Existing exposure situations include exposure to natural background radiation that is amenable to control; exposure due to residual *radioactive material* (3.1.4) that derives from past practices that were never subject to regulatory control; and exposure due to residual radioactive material deriving from a nuclear or radiological *emergency* (3.7.1) after an *emergency exposure situation* (3.3.26) has been declared ended.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.3.28
reference level
level of *dose* (3.1.16), risk or activity concentration, for an *emergency exposure situation* (3.3.26) or an *existing exposure situation* (3.3.27), above which it is not appropriate to plan to allow exposures to occur and below which *optimization of protection and safety* (3.1.11) would continue to be implemented

Note 1 to entry: The value chosen for a reference level will depend upon the prevailing circumstances for the exposure under consideration.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — The sentence syntactics was changed.]

3.3.29
medical exposure
exposure incurred by patients for the purposes of their own medical or dental diagnosis (diagnostic exposure) or medical treatment (therapeutic exposure); by caregivers and comforters; and by volunteers subject to exposure as part of a programme of biomedical research

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.3.30
diagnostic reference level
DRL
level used in medical imaging to indicate whether, in routine conditions, the *dose* (3.1.16) to the patient or the amount of radiopharmaceuticals administered in a specified radiological procedure is unusually high or unusually low for that procedure

[SOURCE: IAEA. Radiation protection and safety of radiation sources: international basic safety Standards. IAEA Safety Standards Series No. GSR Part 3. Vienna: IAEA, 2014. p. 471]

Note 1 to entry: In the case of radio pharmaceuticals, DRL is level of activity for typical examination for a group of standardized patients or standard *phantom* (3.4.71) for broadly defined types of equipment.

Note 2 to entry: These levels are indicative of good practice when not exceeded, for standard procedures when good and normal practice regarding diagnostic and technical performance is applied.

[SOURCE: IAEA. Optimization of the radiological protection of patients undergoing radiography, fluoroscopy and computed tomography. IAEA TECDOC 1423. Vienna: IAEA, 2004. p. 121, modified — "a radio pharmaceuticals" was replaced with "radio pharmaceuticals".]

3.3.31
occupational exposure
exposure of workers incurred in the course of their work

[SOURCE: IAEA. Radiation protection and safety of radiation sources: international basic safety Standards. IAEA Safety Standards Series No, GSR Part 3. Vienna: IAEA, 2014. p. 471]

3.3.32
public exposure
exposure incurred by members of the public from *radiation sources* (3.1.2), excluding any occupational or *medical exposure* (3.3.29)

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4), modified — "and the normal local natural background radiations" was deleted.]

3.4 Terms related to measurement and radiological monitoring

3.4.1
measurement
process of experimentally obtaining one or more quantity values that can reasonably be attributed to a quantity

[SOURCE: ISO 12749-1:2020, 3.4.1]

3.4.2
biological dosimetry
assessment of the *absorbed dose* (3.1.20) of ionizing radiation using indicators found in biological material, particularly peripheral blood

[SOURCE: ISO 21243:2008, 3.4, modified — "particularly peripheral blood" was added.]

3.4.3
chromosome aberration
change in the normal structure of a chromosome involving both chromatids of a single chromosome at the same locus as observed in metaphase

[SOURCE: ISO 20046:2019, 3.10]

3.4.4
unstable chromosome aberration
chromosomal aberration which is lethal to the cell

EXAMPLE Dicentrics/centric rings/acentric fragments.

3.4.5
stable chromosome aberration
chromosomal aberration which is not lethal to the cell and can be passed on to daughter cells (e.g. simple translocation)

EXAMPLE Translocations/insertions/inversions.

3.4.6
radiobioassay
bioassay
procedure used to determine the nature, activity, location, or retention of radionuclides in the body by *in vivo measurement* (3.4.8) or by *in vitro measurement* (3.4.7) of material excreted or otherwise removed from the body

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.4.7
***in vitro* measurement**
measurements (3.4.1) to determine the presence of, or to estimate the amount of, *radioactive material* (3.1.4) in the excreta or in other biological materials removed from the body

[SOURCE: ISO 28218:2010, 3.14, modified — "in vitro radiobioassay" was replaced with "in vitro measurement".]

3.4.8
in vivo measurement
direct measurements
measurement (3.4.1) to determine the presence of or to estimate the amount of *radioactive material* (3.1.4) in a living organism

Note 1 to entry: Normally, the measurement devices are whole-body or partial-body (e.g. lung, thyroid) counters.

3.4.9
whole-body counter
WBC
equipment for the determination of the presence, location, and/or amount of *radioactivity* (3.1.3) in the body

3.4.10
lung counter
equipment for the determination of the presence, location, and/or amount of *radioactive materials* (3.1.4) taken up by the lung(s)

3.4.11
thyroid counter
equipment for the determination of the presence, location, and/or amount of *radioactive materials* (3.1.4) taken up by the thyroid

3.4.12
dosemeter
dosimeter
device having a reproducible, measurable response to radiation that can be used to measure *absorbed dose* (3.1.20) or *personal dose equivalent* (3.4.76)

3.4.13
irradiated dose
H_{ref}
conventional quantity value (3.4.26) of the *dose* (3.1.16) to which the *dosemeter* (3.4.12) is irradiated

[SOURCE: ISO 14146:2018, 3.10]

3.4.14
passive integrating dosemeter
dosemeter (3.4.12) that utilizes one or more *detectors* (3.4.39) to integrate information about the absorbed energy and needs a readout unit to display the information

[SOURCE: ISO 15690:2013, 3.2.2, modified — "personal" was deleted at the beginning of the sentence.]

3.4.15
ageing
change with time of physical, chemical or electrical properties of a component or module under specified operating conditions, which could result in degradation of significant performance characteristics

[SOURCE: ISO 21909-1:2021, 3.1.1]

3.4.16
fading
loss of signal under certain circumstances such as storage, transmission, humidity or temperature change

[SOURCE: ISO 21909-1:2021, 3.1.3]

3.4.17
fading rate
$\dot{F}$
fading (3.4.16) in a time interval, divided by this time interval

Note 1 to entry: The fading rate is expressed as a percentage per day.

[SOURCE: ISO 28057:2019, 3.14]

3.4.18
control (background) dosemeter
personal, area or environmental *dosemeter* (3.4.12) that provides an estimate of any radiation *dose* (3.1.16) received by the evaluation sample apart from that given by the irradiating facility

Note 1 to entry: The control dosemeter provides a means of estimating and eliminating the contribution to the dose from background radiation and that received during the time between zeroing and read out, i.e. the dose during handling, transportation.

[SOURCE: ISO 14146:2018, 3.2, modified — "environmental" was added, "laboratory" was changed to "facility" in the definition and "of intended use" was replaced with "between zeroing and read out" in the Note 1 to entry.]

3.4.19
personal dosemeter
meter designed to measure the *personal dose equivalent* (3.4.76)

Note 1 to entry: A personal dosemeter can be worn on the trunk (whole-body personal dosemeter), at the extremities (extremity personal dosemeter) or close to the eye lens (eye lens dosemeter).

[SOURCE: ISO 21909-1:2021, 3.1.5]

3.4.20
active integrating dosemeter
personal dosemeter (3.4.19) that utilizes one or more *detectors* (3.4.39) to integrate information about the absorbed energy and to convert and display this as *personal dose equivalent* $H_p(d)$ (3.4.76)

Note 1 to entry: The integration time is usually as short as a one entry period into *controlled areas* (3.6.5). These detectors normally give a direct reading of the *personal dose equivalent* (3.4.76). Alarms can warn the worker when preset *dose* (3.1.16) or dose rate levels are exceeded. They are normally connected to electronic readout units at exit from controlled areas. The output is used to assess the personal dose equivalent and entered into computers with dose registers.

[SOURCE: ISO 15690:2013, 3.2.3]

3.4.21
approved dosemeter
approved dosimetry system
personal, area or environmental *dosemeter* (3.4.12) and associated processing system that has been approved or authorized for use by the qualification body.

Note 1 to entry: Several dosemeters designs can be operated using the same associated processing system (dosemeter reader, etc.). Then, they are regarded as several dosemeters/dosimetry systems.

[SOURCE: ISO 14146:2018, 3.1, modified — "environmental" was added in the definition.]

3.4.22
dosimetry service
organization that operates a personal, area and/or environmental dosimetry system which includes the evaluation of the reading of *dosemeters* (3.4.12) after their use and includes:

— providing the user with dosemeters;

— recording the results;

— reporting the results to the user.

Note 1 to entry: The dosimetry service fulfils basic quality management and independency requirements if it fulfils the requirements stated in ISO/IEC 17025.

Note 2 to entry: The user includes not only external clients but also internal personnel who wear dosemeters provided by their own organization and are engaged in radiation protection activities inside or outside the organization. The same quality of dosimetry service which is provided to external users is also provided to organizations' employees (internal users), in accordance with their own quality management system.

[SOURCE: ISO 14146:2018, 3.4]

3.4.23
minimum recording value
H_{min}
minimum value of *dose* (3.1.16) which is recorded, i.e. the lower limit of the dose range, defined by the *dosimetry service* (3.4.22)

[SOURCE: ISO 21909-1:2021, 3.3.8]

3.4.24
calibration
documented comparison of the *measurement* (3.4.1) device to be calibrated against a traceable reference standard/device

Note 1 to entry: A calibration may be expressed by a statement, calibration function, calibration diagram, calibration curve, or calibration table. In some cases, it may consist of an additive or multiplicative correction of the *indication* (3.4.42) with associated measurement uncertainty.

Note 2 to entry: Calibration should not be confused with adjustment of a measuring system, often mistakenly called "self-calibration", nor with verification of calibration.

Note 3 to entry: Often, the first step alone in the above definition is perceived as being calibration.

[SOURCE: JCGM. International vocabulary of metrology – Basic and general concepts and associated terms (VIM). 3er.edit. JCGM 200, 2012. p. 108, modified — The definition is simplified by mentioning only some characteristics of the concept.]

3.4.25
calibration quantity
physical quantity used to establish the *calibration* (3.4.24) of the *measurement* (3.4.1) device

[SOURCE: ISO 21909-1:2021, 3.3.5, modified — "dosemeter" was replaced with "measurement device".]

3.4.26
conventional quantity value
quantity value attributed by agreement to a quantity for a given purpose

[SOURCE: JCGM. International vocabulary of metrology – Basic and general concepts and associated terms (VIM). 3er.edit. JCGM 200, 2012. p. 108]

Note 1 to entry: The conventional quantity value H_0 is the best estimate of the quantity to be measured, determined by a primary standard or a secondary or working *measurement* (3.4.1) standard which are traceable to a primary standard.

[SOURCE: ISO 29661:2012, 3.1.8]

3.4.27
calibration coefficient
$N(\mathrm{U},\alpha)$
quotient of the *conventional quantity value* (3.4.26) to be measured and the corrected *indication* (3.4.42) of the *dosemeter* (3.4.12) normalized to *reference conditions* (3.4.31)

3.4.28
measured dose equivalent
H_M
product of the reading, *M,* and the *calibration coefficient* (3.4.27), *N*:

$$H_M = M \cdot N$$

[SOURCE: ISO 21909-1:2021, 3.3.10]

3.4.29
reference source
radioactive secondary standard source for use in the *calibration* (3.4.24) of the measuring instruments

[SOURCE: ISO 11665-1:2019, 3.1.30]

3.4.30
reference value for calibration
value of an *influence quantity* (3.4.34) or of the measured quantity , to which the *calibration coefficient* (3.4.27) refers and for which it is valid without further corrections

[SOURCE: ISO 28057:2019, 3.36]

3.4.31
reference condition
operating condition prescribed for evaluating the performance of a measuring instrument or measuring system or for comparison of *measurement* (3.4.1) results

Note 1 to entry: Reference operating conditions specify intervals of values of the measurand and of the influence quantities.

[SOURCE: JCGM. International vocabulary of metrology – Basic and general concepts and associated terms (VIM). 3er.edit. JCGM 200, 2012. p. 108]

Note 2 to entry: The term "reference condition" refers to an operating condition under which the specified instrumental *measurement* (3.4.1) uncertainty is the smallest possible.

[SOURCE: IEC 60050-300, 311-06-02]

3.4.32
standard reference conditions
conditions of temperature and pressure to which *measurements* (3.4.1) are referred for standardization

Note 1 to entry: Unless it would not be possible, for *radiological protection* (3.1.1) purposes, the standard reference conditions are temperature of 25 °C and pressure of 101 325 Pa.

Note 2 to entry: Used to convert air densities to a common basis. Other temperature and pressure conditions may be used and should be applied consistently.

[SOURCE: ISO 16639:2017, 3.20]

3.4.33
standard test condition
range of values of a set of influence quantities under which a *calibration* (3.4.24) or a determination of response is carried out

[SOURCE: ISO 21909-1:2021, 3.3.16, modified — "conditions represented by the" was deleted at the beginning and "of a set of" between "values" and "influence quantities" were added.]

3.4.34
influence quantity
quantity that, in a direct *measurement* (3.4.1), does not affect the quantity that is actually measured, but affects the relation between the *indication* (3.4.42) and the measurement result

[SOURCE: JCGM. International vocabulary of metrology – Basic and general concepts and associated terms (VIM). 3er.edit. JCGM 200, 2012. p. 108]

3.4.35
gross effect
measurement (3.4.1) effect caused by the *background effect* (3.4.38) and the *net effect* (3.4.36)

[SOURCE: ISO 11929-1:2019, 3.22]

3.4.36
net effect
contribution of the possible radiation of a *measurement* (3.4.1) object (for instance, of a *radiation source* (3.1.2) or radiation field) to the measurement effect

[SOURCE: ISO 11929-1:2019, 3.21]

Note 1 to entry: The *background effect* (3.4.38) can be due to natural radiation sources or *radioactive materials* (3.1.4) in or around the measuring instrumentation and also to the sample itself (for instance, from other lines in a spectrum).

3.4.37
background
ambient signal response recorded by the *measurement* (3.4.1) instruments that is independent of radiation contributed by the *radiation source* (3.1.2)

[SOURCE: ISO 12749-1:2020, 3.4.12]

3.4.38
background effect
measurement (3.4.1) effect caused by signal other than that caused by the object of the measurement itself

Note 1 to entry: The background effect can be due to natural *radiation sources* (3.1.2) or *radioactive materials* (3.1.4) in or around the measuring instrumentation and also to the sample itself (for instance, from other lines in a spectrum).

[SOURCE: ISO 11929-1:20219, 3.19, modified — "radiation" was changed to "signal".]

3.4.39
detector
radiation detector
apparatus or substance which, in the presence of radiation, provides by either direct or indirect means a signal or other *indication* (3.4.42) suitable for use in measuring one or more quantities of the incident radiation

[SOURCE: IEC. Electropedia: The World's Online Electrotechnical Vocabulary, 881-13-01]

EXAMPLE Ionization chamber, proportional counter, Geiger-Müller counter, semiconductor or scintillation material.

3.4.40
detector efficiency
ratio between the instrument net reading in counts per time unit after *background* (3.4.37) subtraction, and the activity or the surface emission rate of a source in a specified geometry relative to the source

[SOURCE: ISO 7503-1:2016, 3.1.10, modified — The word "instrument" was replaced by with "detector" in the term, "in counts per time unit after background subtraction, and the activity" was added and "under given geometrical conditions" was replaced with "in a specified geometry relative to a source".]

3.4.41
relative detection efficiency
ratio, expressed in percentage, of the count rate in the ^{60}Co 1 333 keV total peak to the one obtained with a 3 × 3 inch NaI (Tl) scintillator for normal incidence and at 0,25 m from the source

[SOURCE: ISO 18589-7:2013, 3.1.5, modified — "absorption" was deleted.]

3.4.42
indication
quantity value provided by a measuring instrument or a measuring system

Note 1 to entry: An indication may be presented in visual or acoustic form or may be transferred to another device. An indication is often given by the position of a pointer on the display for analogue outputs, a displayed or printed number for digital outputs, a code pattern for code outputs, or an assigned quantity value for material measures.

Note 2 to entry: An indication and a corresponding value of the quantity being measured are not necessarily values of quantities of the same kind.

[SOURCE: JCGM. International vocabulary of metrology – Basic and general concepts and associated terms (VIM). 3er.edit. JCGM 200, 2012. p. 108]

3.4.43
minimum detection amount
MDA
smallest amount (activity or mass) of a measurand in a sample that will be detected with a probability of non-detection (Type B error) while accepting a probability of erroneously deciding that a positive (non-zero) quantity of measurand is present in an appropriate blank sample (Type A error)

3.4.44
minimum detection level
MDL
smallest measurable amount (e.g. counting rate or *dose* (3.1.16) that will be detected with a probability β of non-detection (Type B error) while accepting a probability α of erroneously deciding that a positive (non-zero) quantity present in an appropriate *background* (3.4.37) sample (Type A error)

3.4.45
detection limit
smallest true value of the measurand which ensures a specified probability of being detectable by the *measurement* (3.4.1) procedure

[SOURCE: ISO 11929-1:2019, 3.13]

Note 1 to entry: This term is based on Bayesian statistics.

3.4.46
screening level
SL
values that are set up by the laboratory taking into account the characteristics of the measuring equipment and the test method to guarantee that the test result and its uncertainty obtained are fit for purpose for comparison with the *reference levels* (3.3.28)

Note 1 to entry: The screening level is less than the reference level.

Note 2 to entry: Food is safe for consumption if the screening level is not exceeded.

3.4.47
radiological monitoring
radiation monitoring
measurement (3.4.1) of exposure, *dose* (3.1.16), dose rate or activity for reasons relating to the assessment or control of exposure to radiation or exposure due to radioactive substances, and the interpretation of the results.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.4.48
sampling
collection of a radioactive substance on media such as filters, adsorbers or absorbers that is analyzed for radioactive content after collection

[SOURCE: ISO 16639:2017, 3.19]

3.4.49
air sampler
device designed to pass a known volume of air containing a radioactive substance through a filter or other media and thereby trapping the *airborne radioactive substance* (3.1.6) on the *sampling* (3.4.48) media

[SOURCE: ISO 16639:2017, 3.6]

3.4.50
special monitoring
monitoring performed to quantify significant exposures following actual or suspected abnormal *events* (3.3.25)

[SOURCE: ISO 20553:2006, 3.15.1.2, modified — "programme" was deleted.]

3.4.51
continuous monitoring
active and continual monitoring of activity concentration in room air in near real time

Note 1 to entry: This approach uses *continuous air monitors* (3.4.52) to assess activity concentration in air and can alarm when predetermined levels are exceeded.

[SOURCE: ISO 16639:2017, 3.11]

3.4.52
continuous air monitor
CAM
instrument that continuously monitors the airborne activity concentration on a near real-time basis

[SOURCE: ISO 16639:2017, 3.10]

3.4.53
workplace monitoring
radiological monitoring (3.4.47) using *measurements* (3.4.1) made in the working environment

[SOURCE: ISO 20553:2006, 3.15.2.3]

3.4.54
area monitoring
form of *workplace monitoring* (3.4.53) in which an area is monitored by taking *measurements* (3.4.1) at different points in the area

3.4.55
surface contamination
radioactive contamination (3.1.5) deposited on surfaces of facilities (floor surface, work bench tops, machines, etc.), equipment or personnel

3.4.56
fixed surface contamination
surface contamination (3.4.55) which cannot be removed or transferred by non-destructive means

[SOURCE: ISO 7503-1:2016, 3.1.3]

3.4.57
direct measurement of surface contamination
measurement (3.4.1) of activity or surface emission rate by means of a calibrated contamination meter or monitor

[SOURCE: ISO 7503-1:2016, 3.1.5, modified — "of activity or surface emission rate" was added.]

3.4.58
removable surface contamination
surface contamination (3.4.55) that can be removed from surfaces by non-destructive means, including casual contact, wiping or washing

Note 1 to entry: It should be noted that under the influence of moisture, chemicals, etc., or as a result of corrosion or diffusion, fixed contamination may become removable or *vice versa* without any human action. Furthermore, surface contaminations may decrease due to evaporation and volatilization.

Note 2 to entry: It should be emphasized that the ratio between fixed and removable contamination can vary over time, and that some decisions, such as those related to clearance, should be based on total activity with the potential to become removable over time, not just the amount that is removable at the time of a survey.

[SOURCE: ISO 7503-1:2016, 3.1.4]

3.4.59
indirect evaluation of removable surface contamination
evaluation of the removable activity on a surface by means of a *wipe test* (3.4.60)

[SOURCE: ISO 11932:1996, 3.7, modified — "smear sample" was changed to "wipe test".]

3.4.60
wipe test
test to determine if *removable surface contamination* (3.4.58) is present through wiping the surface with a dry or wet material, followed by evaluation of the wipe material for removable contamination

[SOURCE: ISO 7503-1:2016, 3.7, modified — "surface" was added between "removable" and "contamination".]

3.4.61
wiping efficiency
ratio of the activity of the radionuclides removed from the surface by a *wipe test* (3.4.60) to the activity of the radionuclides of the *removable surface contamination* (3.4.58) prior to this *sampling* (3.4.48)

[SOURCE: ISO 7503-1:2016, 3.1.8, modified — "one wipe sample" was changed to "a wipe test".]

3.4.62
surface emission rate of a source
number of particles of a given type above a given energy or of photons emerging from the front face of the source per unit time

[SOURCE: ISO 7503-1:2016, 3.1.9]

3.4.63
directional dose equivalent
$H'(d,\Omega)$
dose equivalent (3.4.75), at a point in a radiation field that would be produced by the corresponding expanded field, in the *ICRU sphere* (3.4.73) at a stated depth, *d,* on the radius in a specified direction, Ω

Note 1 to entry: The unit of directional dose equivalent is J/kg and its special name is sievert (Sv).

[SOURCE: ICRU Report 51. 1993. Quantities and units in radiation protection dosimetry. Bethesda: ICRU, 1993. p. 25]

3.4.64
ambient dose equivalent
$H^*(d)$
dose equivalent (3.4.75), at a point in a radiation field, that would be produced by the corresponding expanded and aligned field, in the *ICRU sphere* (3.4.73) at a depth, *d*, on the radius opposing the direction of the aligned field

Note 1 to entry: The special name for the unit of ambient dose equivalent is sievert (Sv). The unit: J/kg.

[SOURCE: IAEA. Radiation protection and safety of radiation sources: international basic safety Standards. IAEA Safety Standards Series No. GSR Part 3. Vienna: IAEA, 2014. p. 471]

3.4.65
routine monitoring
monitoring carried out at regular intervals during *planned exposure situations* (3.3.21) and *existing exposure situation* (3.3.27)

3.4.66
environmental monitoring
measurement (3.4.1) of external *dose* (3.1.16) rates due to sources in the environment or of radionuclide concentrations in environmental media

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.4.67
personal monitoring
individual monitoring
monitoring using *measurements* (3.4.1) by equipment worn by individual workers, or measurements of quantities of *radioactive material* (3.1.4) in or on the bodies of individual workers, or measurement of radioactive material excreted by individual workers

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.4.68
monitoring interval
period between two consecutive times of *measurement* (3.4.1)

[SOURCE: ISO 16637:2016, 3.25]

3.4.69
personal air sampling
PAS
sampling (3.4.48) of air in the immediate vicinity of an individual´s nose and mouth, usually by a portable sampling pump and collection tube worn on the body

EXAMPLE Lapel sampler.

3.4.70
personal air monitor
personal *air sampler* (3.4.49) located in the immediate vicinity of an individual's nose and mouth, usually by a portable *sampling* (3.4.48) pump and collection tube

3.4.71
phantom
object constructed to simulate the scattering and *absorption* (3.3.5) properties of the human body for a given ionizing radiation

[SOURCE: ISO 21909-1:2021, 3.3.11]

3.4.72
reference phantom
computational *phantom* (3.4.71) for the human body (male and female voxel phantoms based on medical imaging data) with the anatomical and physiological characteristics

Note 1 to entry: The characteristics are defined in the report of ICRP Task Group on Reference Man (ICRP 2002).

[SOURCE: ICRP. 2009. Adult reference computational phantoms. ICRP Publication 110. Ann. ICRP 39 (2)]

3.4.73
ICRU sphere
sphere of 30 cm diameter made of *tissue equivalent material* (3.4.78) with a density of 1 g/cm^3 and a mass composition of 76,2 % oxygen, 11,1 % carbon, 10,1 % hydrogen and 2,6 % nitrogen

Note 1 to entry: ICRU sphere is used as a *reference phantom* (3.4.72) in defining *dose equivalent* (3.4.75) quantities.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.4.74
quality factor
$Q(L)$
number by which the *absorbed dose* (3.1.20), D, is multiplied to reflect the *relative biological effectiveness* (3.1.26) of the radiation, the result being the *dose equivalent* (3.4.75)

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified -by deleting "in a tissue or organ" and the two notes]

3.4.75
dose equivalent
H
product of D and Q at a point in tissue, where D is the *absorbed dose* (3.1.20) and Q is the *quality factor* (3.4.74) for the specific radiation at this point, thus:

$$H = DQ$$

Note 1 to entry: The unit of dose equivalent is J/kg, and its special name is sievert (Sv).

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4)]

3.4.76
personal dose equivalent
$H_p(d)$
dose equivalent (3.4.75) in soft tissue, at an appropriate depth, d, below specified point on the body

Note 1 to entry: The special name for the unit of personal dose equivalent is sievert (Sv). The unit: J/kg.

[SOURCE: ICRU Report 51. 1993. Quantities and units in radiation protection dosimetry. Bethesda: ICRU, 1993. p. 25, modified by splitting the wording into a definition and a Note to entry.]

3.4.77
ICRU tissue
material with a density of 1 g/cm^3 and a mass composition of 76,2 % oxygen, 10,1 % hydrogen, 11,1 % carbon, and 2,6 % nitrogen

[SOURCE: ICRU Report 33. 1980. Radiation quantities and units. Bethesda: ICRU, 1980. p. 20]

3.4.78
tissue equivalent material
material designed to have, when irradiated, interaction properties similar to those of soft tissue

Note 1 to entry: Used to make *phantoms* (3.4.71), such as the *ICRU sphere* (3.4.73)

Note 2 to entry: The tissue equivalent material used in *the ICRU sphere* (3.4.73) has a density of 1 g/cm^3 and an elemental composition, by mass, of 76,2 % oxygen, 11,1 % carbon, 10,1 % hydrogen and 2,6 % nitrogen, but materials of various other compositions (e.g. water) are considered suitable for particular applications.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.4.79
tissue equivalence
property of a material that approximates the *absorption* (3.3.5) and scattering properties of biological tissue for a given radiation

3.5 Terms related to technical aspects

3.5.1
interlock
device that automatically shuts off or reduces the radiation emission rate to acceptable levels

[SOURCE: NCRP Composite glossary. Bethesda: NCRP, 2011. p. 217, modified — "from an accelerator" was deleted.]

3.5.2
radiation shield
shielding
material interposed between a source of radiation and persons, equipment or other objects, in order to attenuate the *radiation source* (3.1.2)

[SOURCE: ISO 12749-1:2020, 3.1.7]

3.5.3
shielding factor
factor describing the reduction of the *background* (3.4.37) count rate by the effect of *radiation shield* (3.5.2) caused by the *measurement* (3.4.1) object

[SOURCE: ISO 11929-1:2019, 3.23]

3.5.4
build-up factor
ratio of the total (secondary and scattered plus unscattered) radiation at any point to the radiation that has not undergone interactions (unscattered) from the source to the point

[SOURCE: NCRP Composite glossary. Bethesda: NCRP, 2011. p. 217]

3.5.5
sealed radioactive source
radioactive material (3.1.4) sealed in a capsule or associated with a material to which it is closely bonded, this capsule or bonding material being strong enough to maintain leak tightness of the sealed source under the conditions of use and wear for which it was designed

[SOURCE: ISO 2919:2012, 3.10, modified — "radioactive" was added to the term.]

3.5.6
aerosol
dispersion (3.6.4) of solid or liquid particles in air or other gas

Note 1 to entry: An aerosol is not only the aerosol particles.

[SOURCE: ISO 16639:2017, 3.3]

3.5.7
high-efficiency particulate air filter
HEPA filter
high-efficiency filter used for removing *aerosol* (3.5.6) particles from an air stream

Note 1 to entry: A HEPA filter usually collects aerosol particles at the most penetrating particle size (between 0.1 µm and 0.3 µm diameter) with a high efficiency and is designed to collect greater fractions of aerosol articles with diameters either larger or smaller. The minimum efficiency of a HEPA filter is not defined in an International Standard.

[SOURCE: ISO 2889:2021, 3.37]

3.5.8
protection factor
protection factor for clothing
ratio of the average concentrations of pollutant measured under test conditions in the ambient atmosphere and inside the helmet of the suit at the point where the wearer draws breath

[SOURCE: ISO 8194:1987, modified — "under test conditions" was added and the No was deleted.]

3.5.9
personal protective equipment
equipment including clothing or other special equipment, that is issued to individual workers to provide protection against actual or *potential exposure* (3.3.24) to *radioactive contamination* (3.1.5) and ionizing radiation

Note 1 to entry: Includes partial or full-face respirators, face masks, gloves, safety glasses, boots, whole body anti-contamination coveralls, and self-contained breathing apparatus (SCBA), leaded overall, depending on conditions.

3.5.10
barrier
structural element, which defines the physical limits of a volume with a particular radiological environment and which prevents or limits releases of radioactive substances from this volume

EXAMPLE *Containment enclosure* (3.5.14), shielded cell, filters.

[SOURCE: ISO 16647:2018, 3.3]

3.5.11
confinement
arrangement allowing users to maintain separate environments inside and outside an enclosure, blocking the movement between them, of process materials and substances resulting from physical and chemical reactions which are potentially harmful to workers, the external environment, or to the handled products

[SOURCE: ISO 16647:2018, 3.6]

3.5.12
dynamic confinement
action allowing, by maintaining a preferential air flow circulation, to limit back-flow between two areas or between the inside and outside of an enclosure, in order to prevent radioactive substances being released from a given physical volume

[SOURCE: ISO 16647:2018, 3.8]

3.5.13
worksite containment
specific containment implemented to cover the temporary and evolving nature of worksite activities

[SOURCE: ISO 16647:2018, 3.7]

3.5.14
containment enclosure
enclosure designed to prevent either the leakage of products contained in the pertinent internal environment into the external environment, or the penetration of substances from the external environment into the internal environment, or both simultaneously

[SOURCE: ISO 16647:2018, 3.10]

3.5.15
radon exposure
time integral over the activity concentration of radon for a defined period of time

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.5.16
equilibrium factor
ratio of the equilibrium equivalent concentration of ^{222}Rn or ^{220}Rn to the actual ^{222}Rn or ^{220}Rn activity concentration respectively

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — "^{220}Rn" and "respectively" were added.]

3.5.17
equilibrium equivalent radon concentration
activity concentration of radon in air, in equilibrium with its short-lived decay products, which would have the same potential alpha energy concentration as the existing non-equilibrium mixture

[SOURCE: ICRP. 2014. Radiological protection against radon exposure. ICRP Publication 126. Ann. ICRP 43 (3)]

3.5.18
particle fluence
Φ
differential quotient of N with respect to a, where N is the number of particles incident on sphere of cross-sectional area a:

$$\Phi = \frac{\mathrm{d}N}{\mathrm{d}a}$$

Note 1 to entry: The unit of fluence is m^{-2}.

[SOURCE: ISO 80000-10, 10.43]

3.6 Terms related to regulation

3.6.1
regulator
regulatory body
authority or a system of authorities designated by the government of a State as having legal authority for conducting the regulatory process, including issuing authorizations, and thereby regulating the nuclear, radiation, *radioactive waste* (3.6.8) and transport safety

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.6.2
radiation protection officer
radiation safety officer
RSO
person technically competent in radiation protection matters relevant for a given type of practice who is designated by the registrant or licensee to oversee the application of relevant requirements established in international nuclear safety standards

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.6.3
radiation protection expert
RPE
individual or group of individuals who have the knowledge, training and experience necessary to provide advice on radiation protection, authorized by the competent authority, in order to ensure the effective protection of people and environment, in the use of ionizing radiation

3.6.4
dispersion
spreading of radionuclides in air (aerodynamic dispersion) or water (hydrodynamic dispersion) resulting mainly from physical processes affecting the velocity of different molecules in the medium

Note 1 to entry: Often used in a more general sense combining all processes (including molecular diffusion) that result in the spreading of a plume.

Note 2 to entry: The terms atmospheric dispersion and hydrodynamic dispersion are used in this more general sense for plumes in air and water, respectively.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — The definition was redrafted and additional information in two Notes to entry was stated.]

3.6.5
controlled area
defined area in which specific protection measures and safety provisions are or could be required for controlling exposures or preventing the spread of contamination in normal working conditions, and preventing or limiting the extent of *potential exposures* (3.3.24)

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.6.6
supervised area
defined area not designated as a *controlled area* (3.6.5) but for which *occupational exposure* (3.3.31) conditions are kept under review, even though specific protection measures or safety provisions are not normally needed

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.6.7
access control
process of granting or denying specific request:

a) for obtaining and using information and related information processing services; and

b) to enter specific physical facilities (e.g. buildings, military establishments, and border crossing entrances)

[SOURCE: Committee on National Security Systems (CNSS) Instruction No. 4009; 26 April 2015]

3.6.8
radioactive waste
material for which no further use is foreseen that contains, or is contaminated with, radionuclides at activity concentrations greater than clearance levels as established by the *regulatory body* (3.6.1)

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.6.9
source-related assessment
assessment concerned with the exposures resulting from a single *radiation source* (3.1.2)

Note 1 to entry: In source-related assessments, the individual doses have to be supplemented by information on the number of people exposed.

[SOURCE: ICRP. 1991. 1990 Recommendations of the International Commission on Radiological Protection. ICRP Publication 60. Ann. ICRP 21 (1-3)]

3.6.10
recording level
level of *dose* (3.1.16), exposure or *intake* (3.3.4) specified by the *regulator* (3.6.1) at or above which values of dose to, exposure of or intake by workers are to be entered in their individual exposure records

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.6.11
exemption
determination by a *regulator* (3.6.1) that a source or practice need not be subject to some or all aspects of regulatory control on the basis that the exposure, including *potential exposure* (3.3.24), due to the source or practice is too small to warrant the application of those aspects or that this is the optimum option for protection irrespective of the actual level of the *doses* (3.1.16) or risks

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — "potential exposure" was added.]

3.6.12
exclusion
deliberate exclusion of a particular category of exposure from the scope of an instrument of regulatory control on the grounds that it is not considered amenable to control through the regulatory instrument in question

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

Note 1 to entry: This kind of exposure is termed excluded exposure. This term is most commonly applied to those exposures from natural sources that are least amenable to control, such as cosmic radiation at the Earth's surface, potassium-40 in the human body or naturally occurring *radioactive material* (3.1.4) in which the activity concentrations of natural radionuclides are below the relevant values given in IAEA safety standards.

Note 2 to entry: The concept is related to those of clearance (which is normally used in relation to materials) and *exemption* (3.6.11) (which relates to practices or sources).

3.6.13
naturally occurring radioactive material
NORM
material containing no significant amounts of radionuclides other than naturally occurring radionuclides, that may be raw material or material in which the activity concentrations of the naturally occurring radionuclides have been changed by some process and that their contribution to the exposure of people and the environment is not negligible from a *radiological protection* (3.1.1) point of view

Note 1 to entry: The exact definition of "significant amount" would be a regulatory decision.

[SOURCE: 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4), modified by statements made in ICRP. 2007. Scope of radiological protection control measures. ICRP Publication 104. Ann. ICRP 37 (5).]

3.7 Terms related to emergency

3.7.1
emergency
non-routine situation that necessitates prompt action, primarily to mitigate a hazard or adverse consequences for human life and health, property and the environment

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

Note 1 to entry: This includes nuclear and radiological emergencies and conventional emergencies such as fires, release of hazardous chemicals, storms or earthquakes. It includes situations for which prompt action is warranted to mitigate the effects of a perceived hazard.

3.7.2
projected dose
dose (3.1.16) that would be expected to be received if planned protective actions were not taken

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.7.3
protective action guide
PAG
value against which to compare the *projected dose* (3.7.2) to an individual from a release of *radioactive material* (3.1.4) at which a specific protective action to reduce or avoid that *dose* (3.1.16) is warranted

[SOURCE: EPA 400/R-17/001. PAG manual: protective action guides and planning guidance for radiological incidents. Washington: EPA, 2017. p. 112]

3.7.4
averted dose
dose (3.1.16) prevented by the protective actions

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.7.5
residual dose
dose (3.1.16) expected to be incurred after protective actions have been terminated (or after a decision has been taken not to take protective actions)

Note 1 to entry: Residual dose applies for an *emergency exposure situation* (3.3.26) or for an *existing exposure situation* (3.3.27).

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.7.6
iodine prophylaxis
administration of a compound of stable iodine (usually potassium iodide) to prevent or reduce the uptake of radioactive isotopes of iodine by the thyroid in the *event* (3.3.25) of an accident involving radioactive iodine

Note 1 to entry: The iodine prophylaxis is an urgent protective action.

Note 2 to entry: The term ‘thyroid blocking’ is sometimes used.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278, modified — The wording of Note 1 to entry was rearranged.]

3.7.7
emergency preparedness
capability to take actions that will effectively mitigate the consequences of an *emergency* (3.7.1) for human life, health, property and the environment

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.7.8
emergency planning zone
area for which planning is needed to assure that prompt and effective actions can be taken to avoid or reduce the *public exposure* (3.3.32)

3.7.9
ingestion exposure planning zone
IEPZ
ingestion exposure pathway zone
IEPZ
area surrounding a nuclear or radiological installation where action could be necessary to protect the public from the ingestion of contaminated water and foods

[SOURCE: EPA 400/R-17/001. PAG manual: protective action guides and planning guidance for radiological incidents. Washington: EPA, 2017. p. 112, modified — The phrase "of approximately 50 miles radius" was deleted and "a nuclear power plant" was replaced with "a nuclear or radiological installation".]

3.7.10
emergency response
performance of actions to mitigate the consequences of an emergency for human life, health, property and the environment

Note 1 to entry: The emergency response also provides a basis for the resumption of normal social and economic activity.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.7.11
emergency worker
person having specified duties as a worker in response to an emergency

Note 1 to entry: Emergency workers may include workers employed, both directly and indirectly, by registrants and licensees, as well as personnel of response organizations, such as police officers, firefighters, medical personnel, and drivers and crews of vehicles used for evacuation.

Note 2 to entry: Emergency workers may or may not be designated as such in advance of an emergency. Emergency workers not designated as such in advance of an emergency are not necessarily workers prior to the emergency.

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

3.7.12
operational intervention level
OIL
set level of a measurable quantity that corresponds to a generic criterion

[SOURCE: IAEA. IAEA safety glossary: 2018 edition. Vienna: IAEA, 2019. p. 278]

Note 1 to entry: OILs are calculated levels, measured by instruments or determined by laboratory analysis, that correspond to an intervention level or action level.

Annex A
(informative)

Methodology used in the development of the vocabulary

A.1 General

Taking into account that radiological protection concepts are found in a large number of technical standards used by a great number of stakeholders from different countries with the objective of sharing best practices, to improve efficiency, radiation safety in radiotherapy, diagnostic, interventional radiology and nuclear medicine, only to mention some of them, it is necessary to ensure the use of

— clear technical descriptions, and

— a coherent and harmonized vocabulary that is easily understandable by all potential users.

Concepts are not independent of one another, and an analysis of the relations between concepts within the field of radiological protection and the arrangement of them into concept systems is a prerequisite of a coherent vocabulary. Such an analysis was used in the development of the vocabulary specified in this document. Since the concept diagrams employed during the development process may be helpful in an informative sense, they are reproduced in A.3.

A.2 Concept relationships and their graphical representation

A.2.1 General

In terminology work, the relationships between concepts are based on the three primary forms of concept relationships indicated in this annex: the hierarchical generic (A.2.2), and partitive (A.2.3) and the non- hierarchical associative (A.2.4).

A.2.2 Generic relation

Subordinate concepts within the hierarchy inherit all the characteristics of the superordinate concept and contain descriptions of these characteristics which distinguish them from the superordinate (parent) and coordinate (sibling) concepts, e.g. the relation of mechanical mouse, optomechanical mouse and optical mouse to computer mouse.

Generic relations are depicted by a fan or tree diagram without arrows (see Figure A.1).

Example from ISO 704:2009 (5.5.2.2.1)

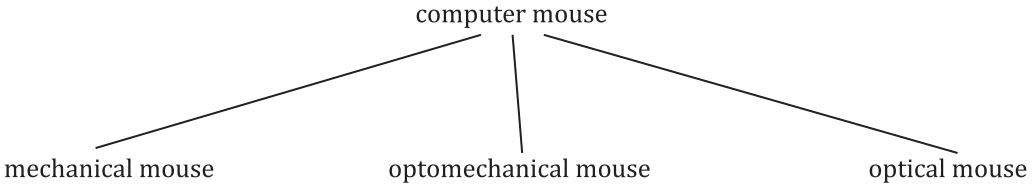

Figure A.1 — Graphical representation of a generic relation

A.2.3 Partitive relation

Subordinate concepts within the hierarchy form constituent parts of the superordinate concept, e.g. mouse button, mouse cord, infrared emitter and mouse wheel may be defined as parts of the concept

optomechanical mouse. In comparison, it is inappropriate to define red cord (one possible characteristic of mouse cord) as part of an optomechanical mouse.

Partitive relations are depicted by a rake without arrows (see Figure A.2). Singular parts are depicted by one line, multiple parts by double lines.

Example from ISO 704:2009 (5.5.2.3.1)

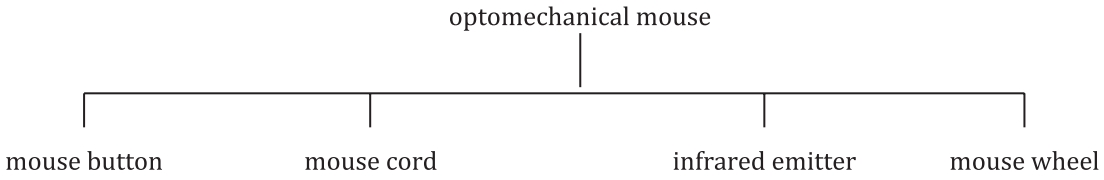

Figure A.2 — Graphical representation of a partitive relation

A.2.4 Associative relation

Associative relations cannot provide the economies in description that are present in generic and partitive relations but are helpful in identifying the nature of the relationship between one concept and another within a concept system, e.g. cause and effect, activity and location, activity and result, tool and function, material and product. Besides, associative relations are the most commonly encountered in terminology practical work, as they correspond to the concepts relations established in the real world.

Associative relations are depicted by a line with arrowheads at each end (see Figure A.3).

Example from ISO 704:2009, 5.6.2

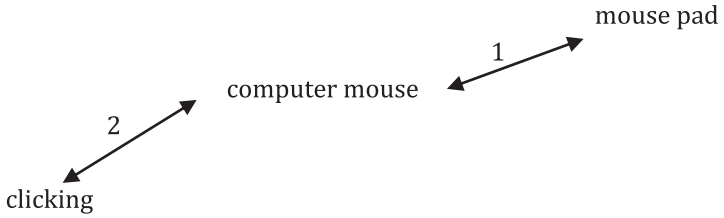

Figure A.3 — Graphical representation of an associative relation

A.3 Concept diagrams

Figures A.4 to A.9 show the concept diagrams on which the thematic groups of the radiological protection vocabulary are based.

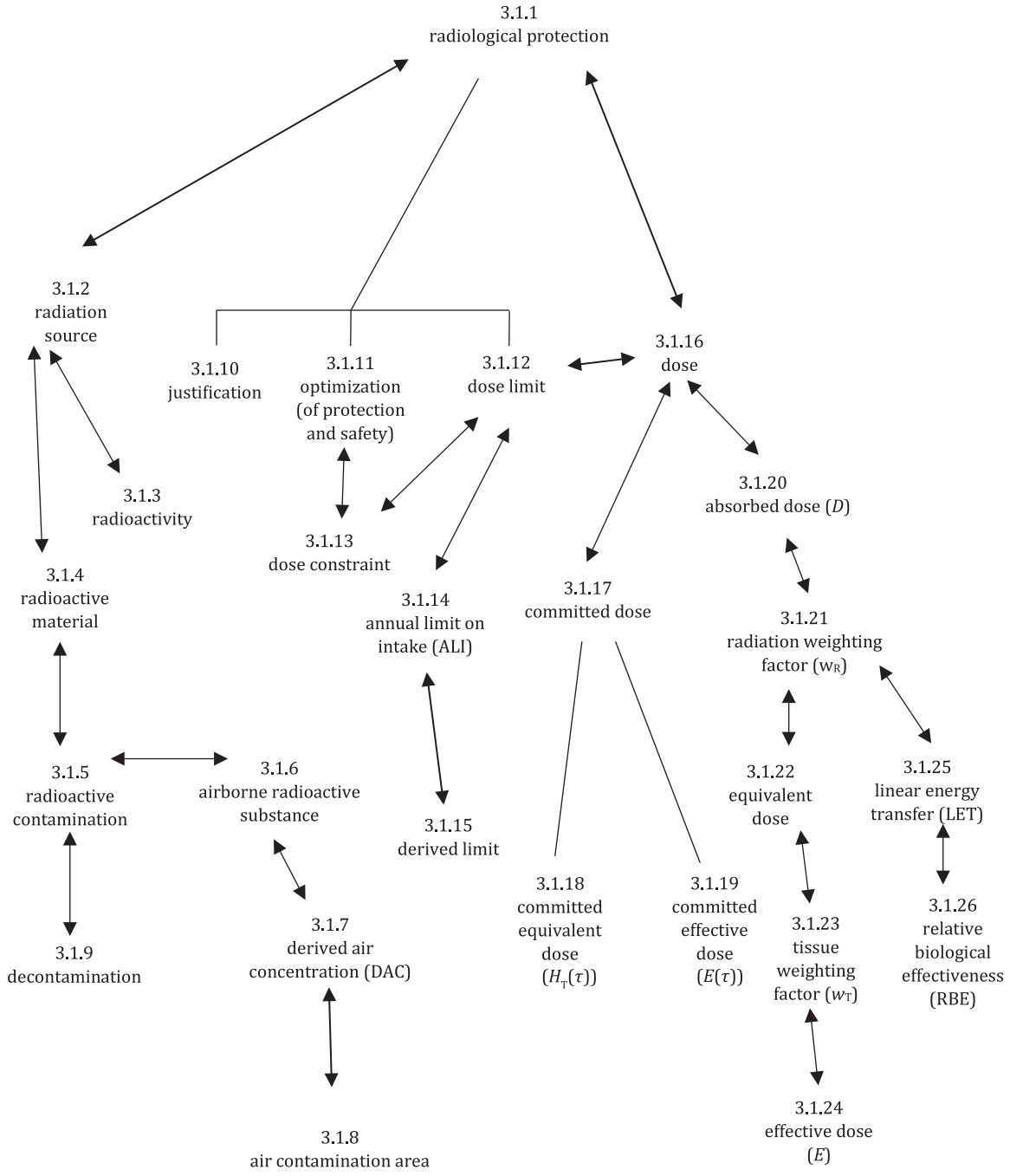

Figure A.4 — General terms related to radiological protection (3.1)

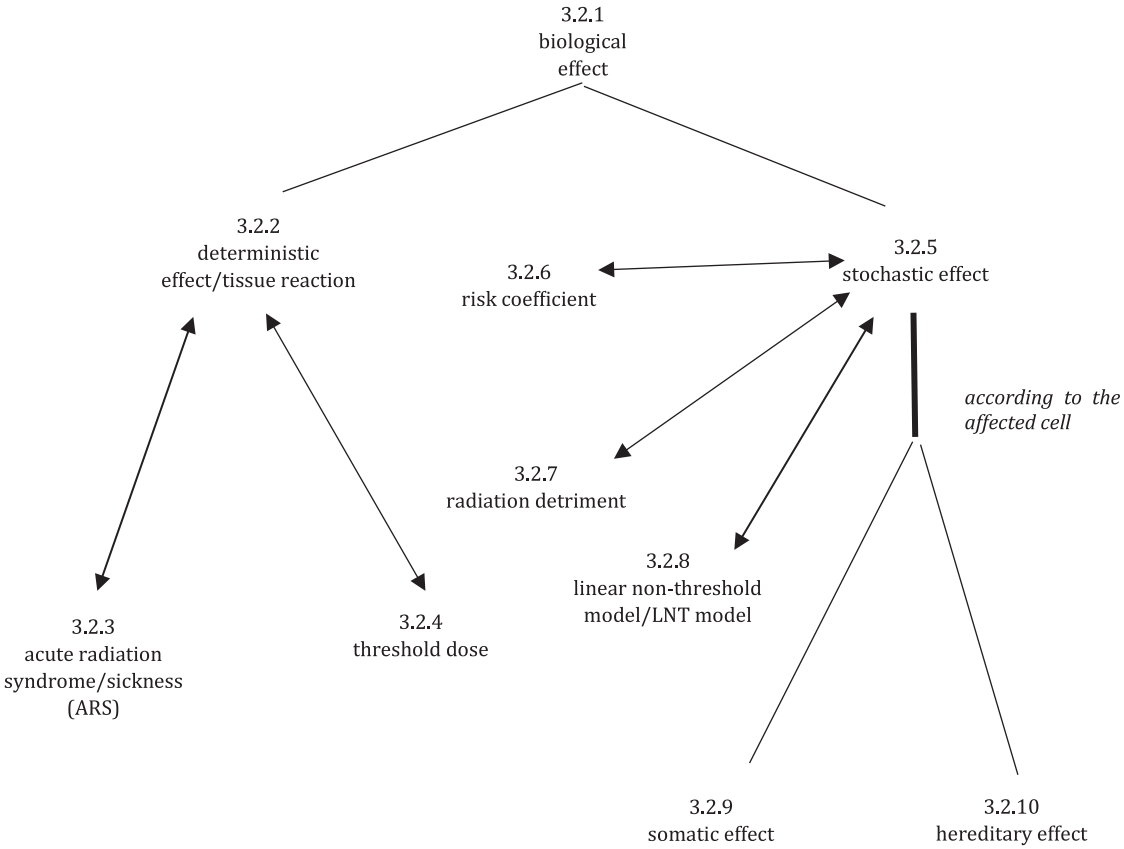

Figure A.5 — Terms related to biological effects (3.2)

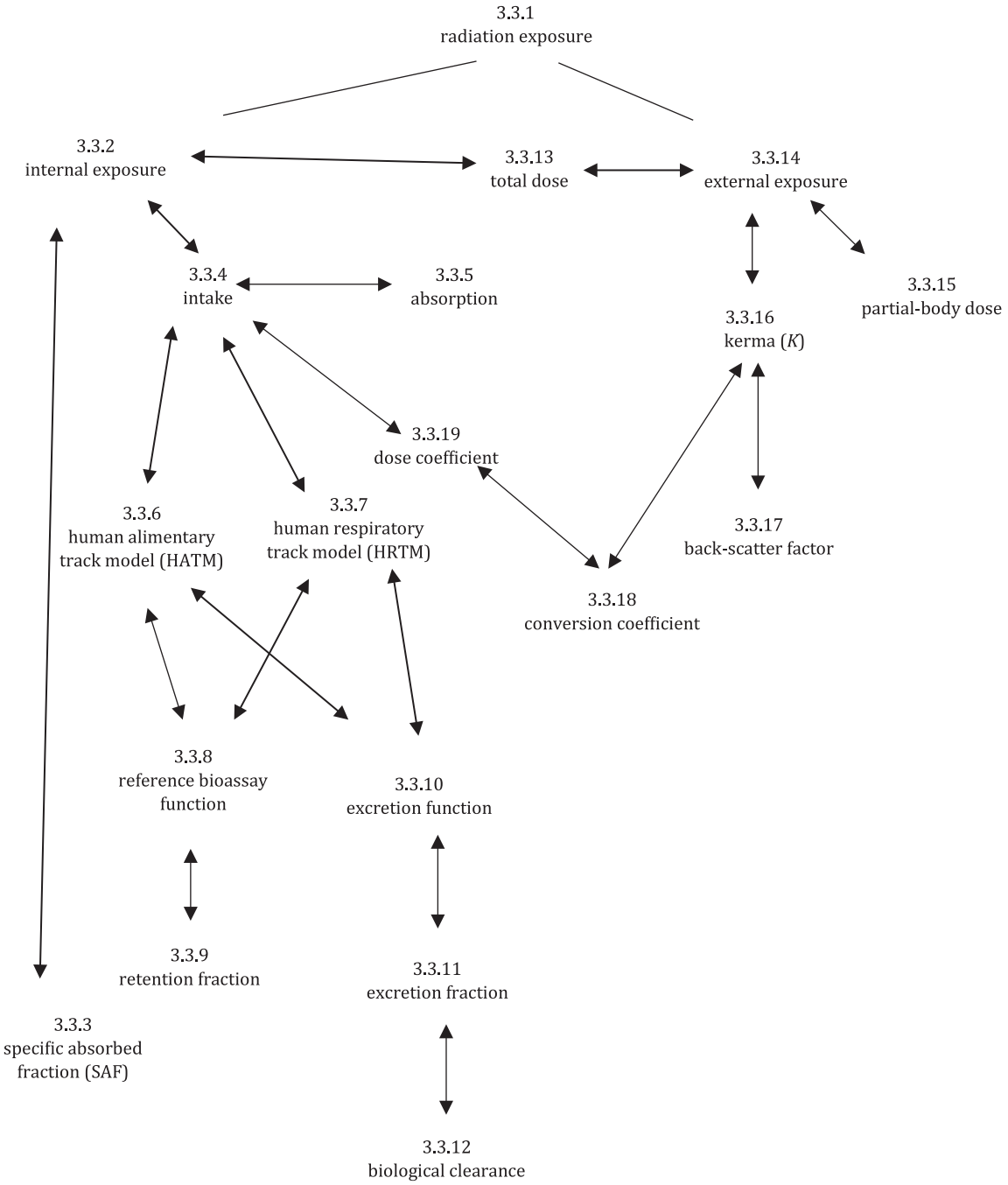

Figure A.6 — Terms related to radiation exposure (3.3)

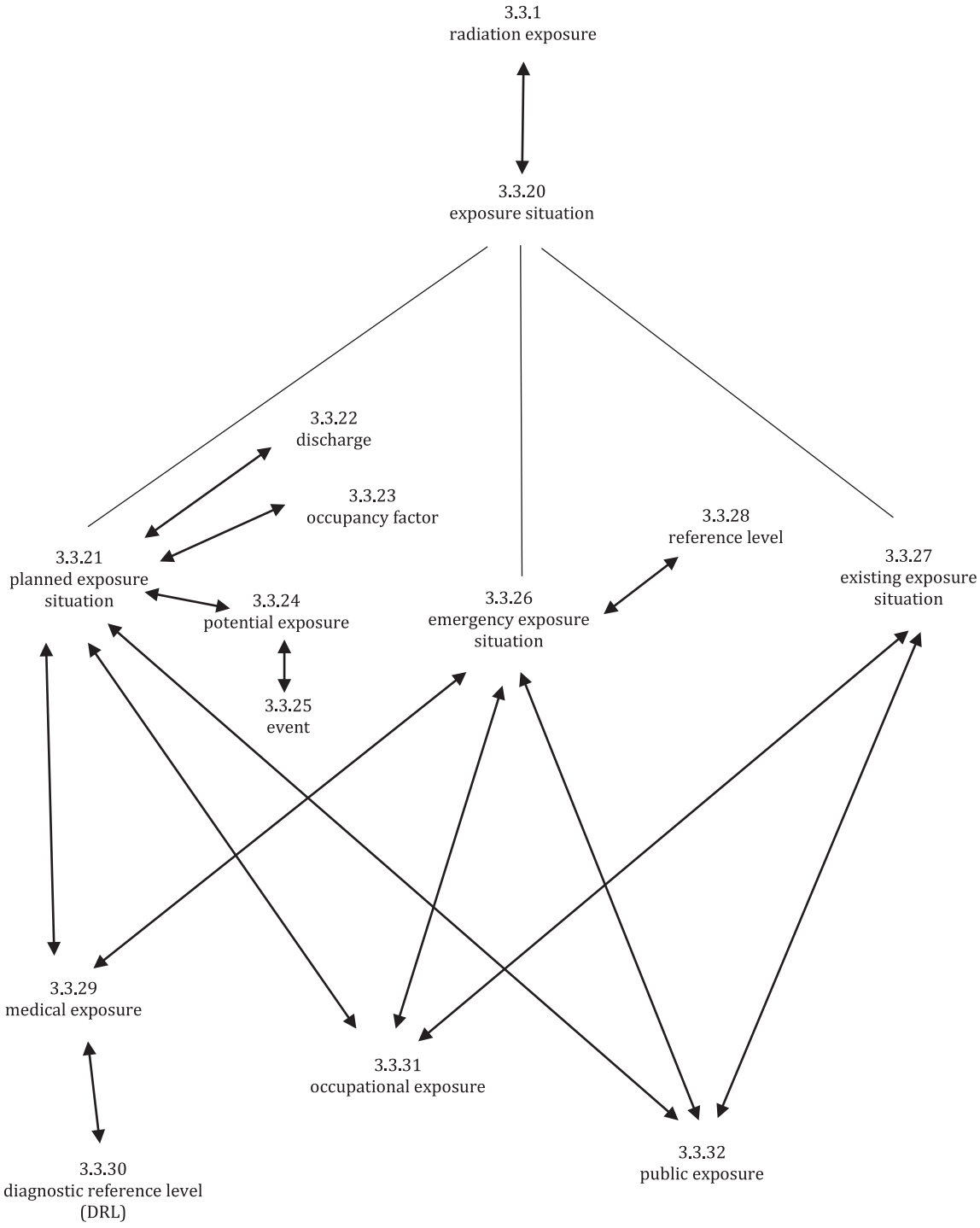

Figure A.6 — Terms related to radiation exposure (3.3) (continued)

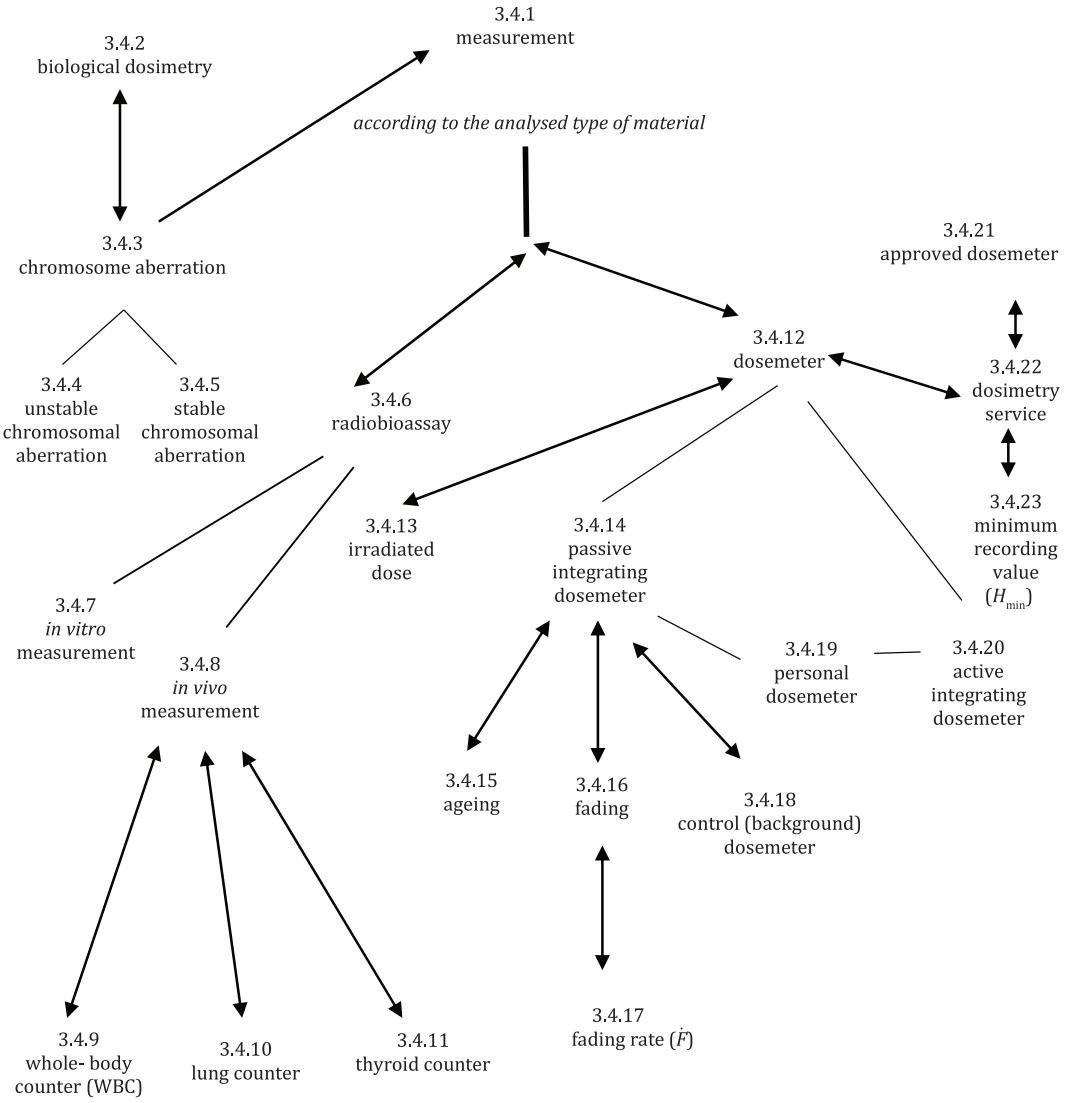

Figure A.7 — Terms related to measurement and radiological monitoring (3.4)

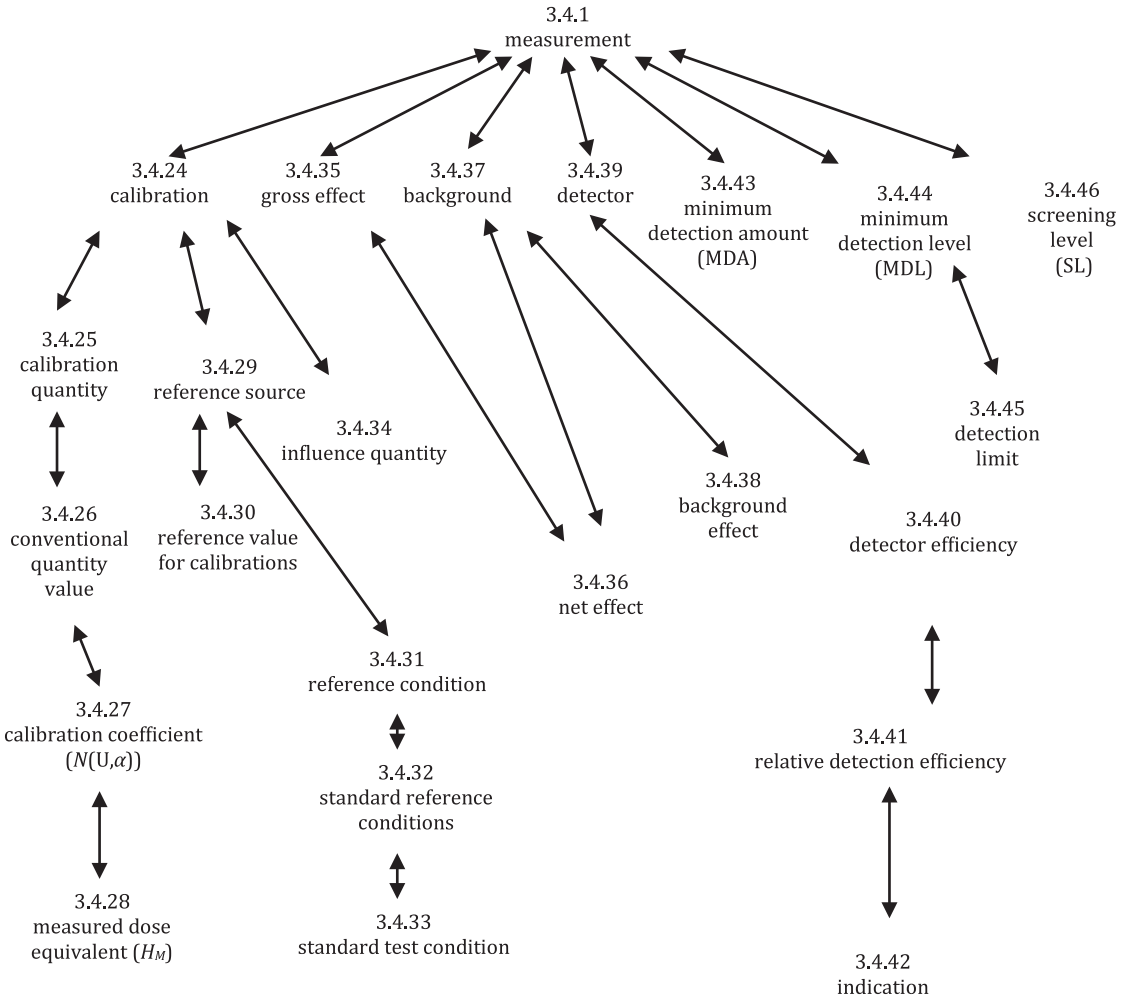

Figure A.7 — Terms related to measurement and radiological monitoring (3.4) (continued)

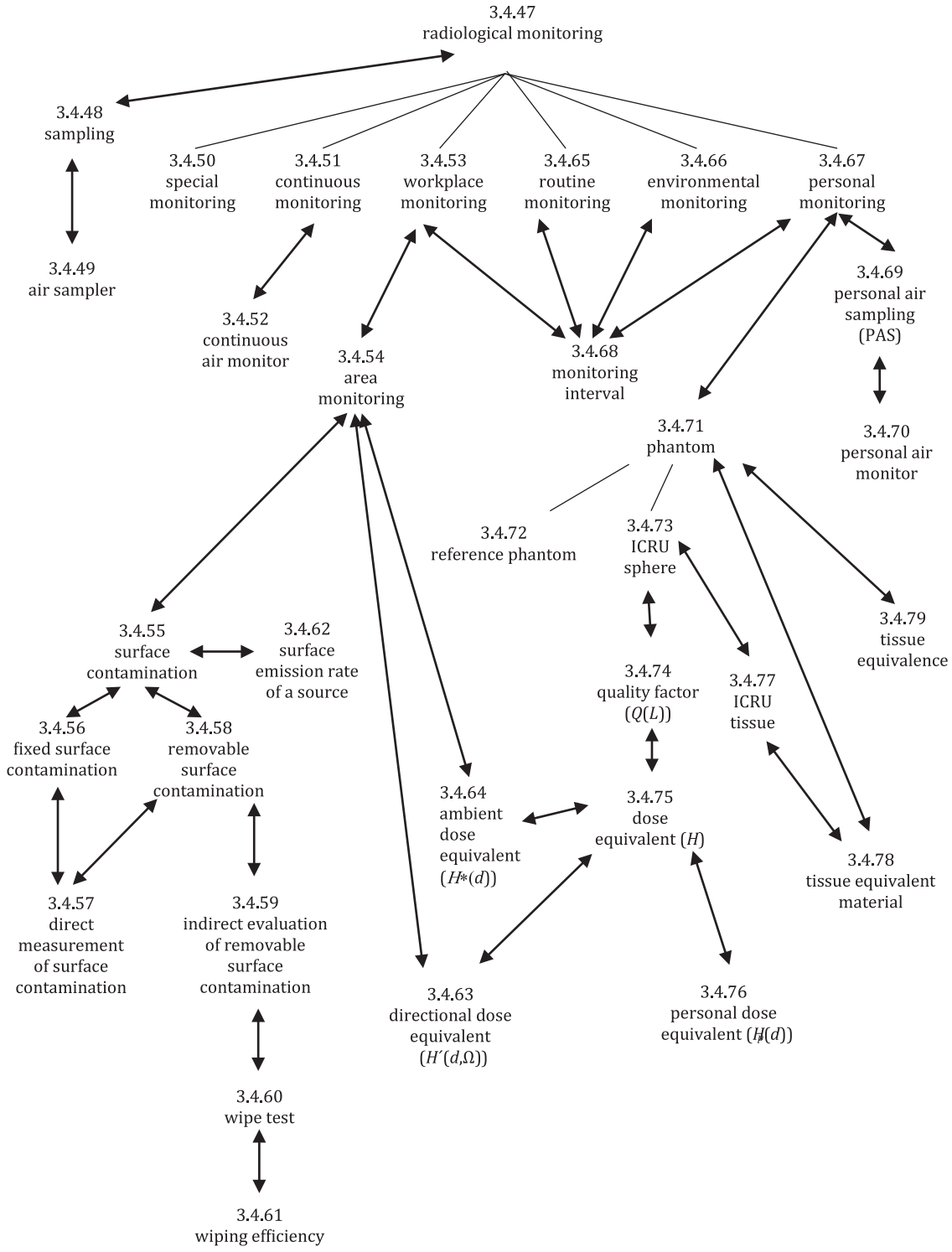

Figure A.7 — Terms related to measurement and radiological monitoring (3.4) (continued)

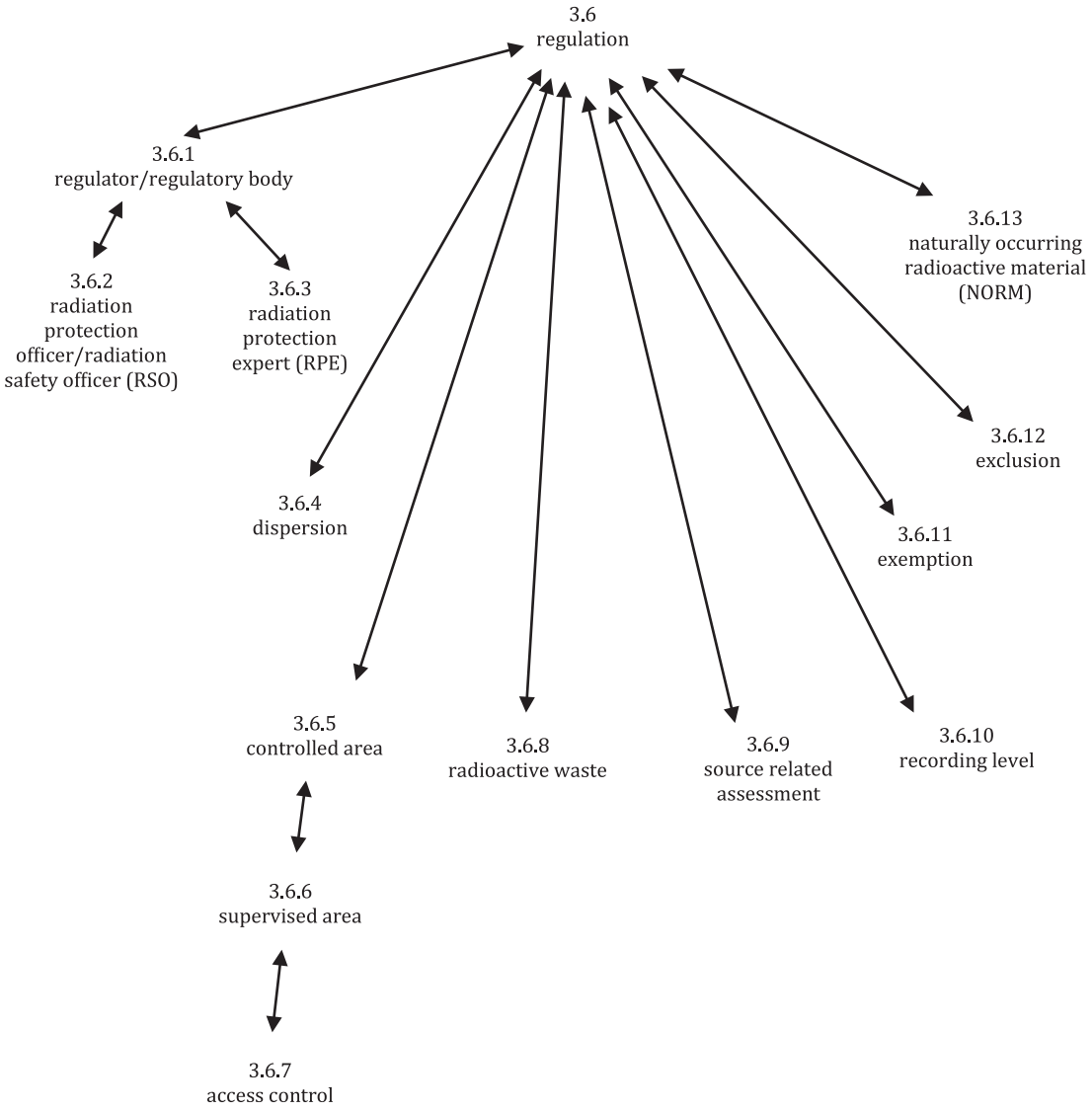

Figure A.8 — Terms related to regulation (3.6)

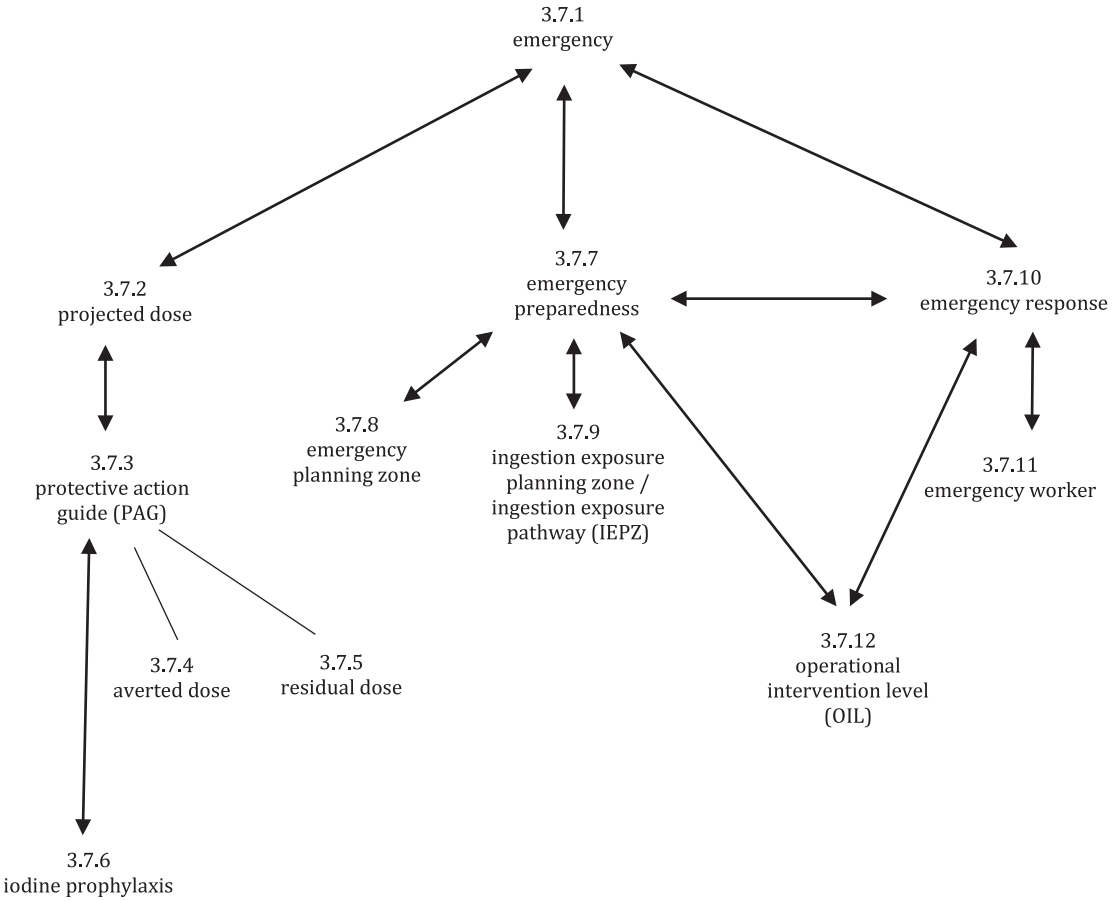

Figure A.9 — Terms related to emergency (3.7)

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