INTRODUCTION

BACKGROUND

Terminology in IAEA safety standards

The IAEA's safety standards for nuclear installations, radiation protection, radioactive waste management and the transport of radioactive material have historically been developed in four separate programmes. For nuclear installations and radioactive waste management, safety standards programmes were set up to coordinate the development of standards covering the different parts of the subject. The radiation and transport safety standards programmes have each been centred on one key set of safety requirements — the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (the Basic Safety Standards, BSS) [1] and the Regulations for the Safe Transport of Radioactive Material (the Transport Regulations) [2], respectively — with other safety requirements and guidance elaborating on particular parts of these central publications. Each of the four groups of safety standards had developed its own terminology:

(a) In 1986, the IAEA published a Radiation Protection Glossary[1] in the former IAEA Safety Series, which provided, in English, French, Russian and Spanish, a collection of fundamental terms associated with radiation protection and their definitions. Many of the terms and definitions in this publication are now obsolete, and the Basic Safety Standards issued in 1996 [1] included more up to date definitions of key terms in radiation protection and safety.

(b) In 1982, a Waste Management Glossary was published by the IAEA as IAEA-TECDOC-264. A revised and updated version was issued in 1988 as IAEA-TECDOC-447, a third edition was published in 1993 and a fourth edition was published in 2003 [3].

(c) In nuclear safety, compilations of terms and definitions were produced for internal use, but not published. Nevertheless, the lists of definitions given in the Nuclear Safety Standards Codes published by the IAEA in 1988 provide a core set of the fundamental terms.

(d) The definitions in the 2005 edition of the IAEA Transport Regulations [2] represent the current core terminology for transport safety.

With the creation of the Department of Nuclear Safety in 1996, and the adoption of a harmonized procedure for the preparation and review of safety standards in all areas[2], the need for greater consistency in the use of terminology became apparent. The incorporation into the Department of the Office of Nuclear Security in 2004 further extended its scope. This Safety Glossary is intended to contribute towards harmonizing the use of terminology in IAEA safety standards and the IAEA's other safety and security related publications.

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[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Radiation Protection Glossary (Safety Guide), Safety Series No. 76, IAEA, Vienna (1986).

[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Preparation and Review of Safety Related IAEA Publications (Version 2.2), IAEA, Vienna (1998).

Scope of 'protection and safety' and coverage of 'nuclear security'

In the context of the IAEA's Major Programme on Nuclear Safety and Security, '(radiation) protection and (nuclear) safety' denotes the protection of people and the environment against radiation risks, and the safety of facilities and activities that give rise to radiation risks. 'Nuclear safety' is usually abbreviated to 'safety' in IAEA publications. In IAEA safety standards, 'safety' means 'nuclear safety' unless otherwise stated. 'Protection and safety' (i.e. radiation protection and nuclear safety) encompasses the safety of nuclear installations, radiation safety, the safety of radioactive waste management and safety in the transport of radioactive material; it does not include aspects of safety not related to radiation.

Safety is concerned with both radiation risks under normal circumstances and radiation risks as a consequence of incidents, as well as with other possible direct consequences of a loss of control over a nuclear reactor core, nuclear chain reaction, radioactive source or any other source of radiation. 'Radiation' in this context means ionizing radiation. 'Incidents' includes initiating events, accident precursors, near misses, accidents and unauthorized acts (including malicious and non-malicious acts).

'Safety measures' include actions to prevent incidents and arrangements put in place to mitigate their consequences if they were to occur. 'Nuclear security' denotes the prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities.

Safety measures and security measures have in common the aim of protecting human life and health and the environment. The safety standards concern the security of facilities and activities to the extent that they require 'security for safety' measures that contribute to both safety and security, such as:

(a) Appropriate provisions in the design and construction of nuclear installations and other facilities;

(b) Controls on access to nuclear installations and other facilities to prevent the loss of, and the unauthorized removal, possession, transfer and use of, radioactive material;

(c) Arrangements for mitigating the consequences of accidents and failures, which also facilitate measures for dealing with breaches in security that give rise to radiation risks;

(d) Measures for the security of the management of radioactive sources and radioactive material.

GENERAL REMARKS

Purpose

The Safety Glossary serves a number of different purposes:

(a) To explain the meanings of technical terms that may be unfamiliar to the reader;

(b) To explain any special meanings ascribed to common words or terms (since words can have several different meanings, it may be necessary to clarify which meaning is intended, particularly for non-native English speakers);

(c) To define precisely how terms — whose general meaning may be clear to readers — are used in a particular publication or set of publications, in order to avoid ambiguity concerning some important aspect(s) of their meaning;

(d) To explain the connections or differences between similar or related terms, or the specific meanings of the same technical term in different contexts;

(e) To clarify and, if possible, reconcile differences in the usage of specialist terms in different subject areas, since such differences in usage may be potentially misleading;

(f) To recommend terms that should be used in IAEA publications and documents (and those that should not), and the definitions that should be ascribed to them.

Definitions of the type used in legal texts such as the Convention on Nuclear Safety [4] or the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management [5], or in regulations such as the Transport Regulations [2], are intended primarily for purpose (c) and, in some cases, do not serve the other purposes at all. Furthermore, definitions of this nature tend to be tailored to the needs of the specific text to which they relate, and hence are often not generally applicable. The 'definitions' included in other safety standards are, however, less easily classified, tending towards a mixture of definition and explanation, and of context specific and generally applicable definitions and/or explanations.

For the purposes of the Safety Glossary, an effort has been made to distinguish between the 'definition' — material that could be used in the definitions in an individual publication — and 'explanation', which is provided to assist drafters and reviewers but is not part of the 'definition'. However, this distinction is not always as clear cut as might be wished.

Note that a glossary is not the place to specify requirements or guidance. The definition of a term should contain the conditions that must be met in order for the term to be applicable, but not other conditions. This is best illustrated by an example. The definition of *regulatory body* indicates the conditions that must be met in order for an organization to be described as a *regulatory body*, but not the attributes of a *regulatory body* as required by IAEA safety standards. Hence, the definition specifies that it is "designated by the government of a State as having legal authority for conducting the regulatory process" — otherwise, it is not a *regulatory body*. However, the definition does not, for example, specify that it is "independent of organizations or bodies charged with the promotion of nuclear technologies" — it can be a *regulatory body* without being independent, even though it would then not satisfy the IAEA Safety Requirements on legal and governmental infrastructure for safety.

Scope

The scope of the Safety Glossary is necessarily limited, and is intended to focus on the key terms that are specific to, or that are used in a specific way in, protection and safety (and, to a limited extent, security). A number of general categories of terms that may be used in safety related publications have been specifically excluded from this Safety Glossary (except where a specific point needs to be made about a specific term). These groups of excluded terms include:

(a) Basic terms from radiation and nuclear physics (e.g. alpha particle, decay, fission, radionuclide). An understanding of these terms is assumed.

(b) The specialized terminology of fields other than protection and safety (e.g. geology, seismology, meteorology, medicine and computing). This terminology may be used in protection and safety contexts, but the definition of such terms is left to the experts in the relevant fields.

(c) Very specialized terminology from a specific field within protection and safety (e.g. the detailed terminology of dosimetry and safety assessment). If necessary, such terminology can be defined in the specialized publications to which it is relevant.

USE OF THE SAFETY GLOSSARY

Interpretation of entries in the Safety Glossary

The entry for each term starts with one or more recommended definition(s)[3]. Alternative definitions are given:

(a) If the term is used in two or more distinct safety related contexts (e.g. the term *clearance*, which is used for an administrative mechanism for removing material from regulatory control and for a biological process affecting the movement of inhaled radionuclides in the body); or

(b) If it is necessary to include in this Safety Glossary an established definition that is still needed but is not considered suitable as a general definition (this includes, in particular, some of the definitions from the Basic Safety Standards [1] and the Transport Regulations [2] that may need to be retained in supporting publications but which would not be the preferred general definitions); or

(c) To include definitions of which drafters and reviewers of IAEA publications should be aware, even though they are unlikely to be used in IAEA publications (definitions in the main safety related conventions are an important example of this group); or

(d) For a small number of basic terms that have two distinct definitions, depending on whether they are being used in a scientific or regulatory (i.e. standards) context. An important example in the context of protection and safety is the adjective *radioactive*. Scientifically, something is described as radioactive if it exhibits the phenomenon of radioactivity or — in the somewhat less precise, but generally accepted, usage — if it contains any substance that exhibits radioactivity. Scientifically, therefore, virtually any material (including material that is considered to be waste) is radioactive. However, it is common regulatory practice to define terms such as *radioactive material* and *radioactive waste* in such a way as to include only that material or waste that is subject to regulation by virtue of the radiological hazard that it poses. Although the exact specifications vary from State to State, this typically excludes material and waste with very low concentrations of radionuclides and those that contain only 'natural' concentrations of naturally occurring radionuclides.

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[3] A few terms are included without a recommended definition. In most such cases, the term in question is the general (unqualified) term used to group a number of qualified terms, and has no special meaning in unqualified form (e.g. *action level*, *recording level*, etc., are listed under *level*, but level itself is not defined). In some cases guidance is given on usage for terms with no agreed definition (e.g. *terrorism*).

Different definitions of a given term are numbered. Unless otherwise indicated in the text, drafters should use the most appropriate definition for their purposes.

In most cases, the recommended definition(s) is/are followed by further information as appropriate, such as:

(a) Particular notes of caution, such as for terms that do not mean what they might appear to mean (e.g. annual dose), or potential conflicts with other safety or security related terminology; denoted by **!**

(b) Explanation of the context(s) in which the term is normally used (and, in some cases, contexts in which it should not be used); denoted by ⓘ

(c) Reference to related terms: synonyms, terms with similar but not identical meanings, 'contrasting' terms, and terms that supersede or are superseded by the term being described; denoted by ⓘ

(d) Miscellaneous information: for example, the units in which a quantity is normally measured, recommended parameter values and references; denoted by ⓘ.

This supplementary information is not part of the definition, but it is included to assist drafters and reviewers in understanding how to use (or not to use) the term in question. Note that the use of *italics* in the text denotes a **term** or ***subterm*** with an entry in the Safety Glossary. The use of ***bold italics*** in the text denotes a subterm.

Use by drafters

Drafters of safety and security related IAEA publications — particularly safety standards — should, as far as possible, use the terms in this Safety Glossary with the meanings given. Terms should also be used consistently, especially in safety standards. Variety of expression — a virtue in most forms of writing — should be avoided if there is any possibility of causing confusion or ambiguity. Terms that are not listed in this Safety Glossary may be used, provided that there is no suitable alternative term listed in the Safety Glossary.

A publication may contain a list of key terms used in that publication and their definitions. However, the first question concerning the inclusion of the definition of any term in a publication should always be whether the term actually needs to be defined. Terms should be defined explicitly in a publication only if a definition is essential to the correct understanding of that publication. If the term is used with its normal meaning, or if its meaning in a particular publication will be obvious to the reader from the context, then there should be no need for a definition. A term whose meaning is imprecise may need to be defined, if the imprecision actually detracts from a correct understanding of the text; in many cases, however, the precise meaning of a term will not matter for the purposes of a given publication. Similarly, obvious derivatives of a defined term need not themselves be defined unless there is some specific ambiguity that needs to be addressed.

If it is considered necessary to include a term in a list of definitions in an individual publication, the recommended definition should be used wherever possible. If the recommended definition is not suitable (e.g. if the subject of the publication falls outside the scope of the existing definition), the wording of the definition may be modified, but its meaning should not be changed. The technical officer responsible for the Safety Glossary should be informed of any such modifications to the wording of definitions.

Similarly, definitions of any additional — usually more specialized — terms needed in a specific publication can be provided by the drafters or the technical officer responsible for the publication, and included either in the text (in the main body of the text or footnotes) or in a list of definitions. Such definitions should be copied for information to the technical officer responsible for the Safety Glossary.

Some terms and usages that have been used in the past and/or are used in the publications of other organizations, but whose use is discouraged in IAEA publications, are included in the Safety Glossary. Such terms are listed in square brackets, and should be used only if they are essential to refer to other publications; alternative terms for use in IAEA publications are recommended. Similarly, some definitions are in square brackets, indicating that they have been included for information but should not be used as working definitions for IAEA publications.

Terms defined in this Safety Glossary are likely to be used in informing the public on matters concerning nuclear safety and security and radiation risks, and in covering these matters in the news media. The technical terms that must be used to explain difficult concepts will be interpreted and employed by writers, journalists and broadcasters who do not have a clear understanding of their significance. It must be borne in mind by drafters, reviewers and editors that certain terms that have specific and clear meanings in their scientific or technical context may be subject to misrepresentation or misunderstanding in a more general context. The incautious use of language can and does give rise to widespread false impressions among the public that are difficult or impossible to correct. In attempting to summarize, interpret and simplify technical texts so as to communicate with a broader audience, therefore, care must be taken not to oversimplify by omitting conditions and qualifications, and not to mislead in using terms with both scientific and more general meanings. Potentially misleading words include, for example, ‘attributable’, ‘contamination’, ‘[excess, statistical] deaths’, ‘exposure’, ‘illicit trafficking [in nuclear or radioactive material]’, ‘nuclear [terrorism, trafficking]’, ‘protection’, ‘radioactive’, ‘risk’ and ‘safe’, and their related words and phrases. This caution applies in particular to matters of life and health, especially fatal accidents and other major incidents, and other emotionally charged subjects.

Finally, there are cases where special ‘safety’ or ‘IAEA’ meanings are attached so strongly to words that the use of those words in their everyday sense could cause confusion. Examples include ‘activity’, ‘critical’, ‘justification’, ‘practice’, ‘requirement’, ‘recommendation’, ‘guide’ and ‘standard’ (and also ‘shall’ and ‘should’). Although it would be unreasonable to prohibit the use of such words in their everyday sense in any IAEA publications, particular care should be taken to ensure that they are not used in a manner that could be ambiguous.

The technical officer for a publication is responsible for ensuring that any definitions given in that publication are in accordance with these rules.

Use by reviewers

Reviewers should consider whether each term included in a list of definitions in an individual publication really needs to be defined, and if so, whether a list of definitions (as opposed to the text or a footnote) is the most appropriate place for the definition. (Reviewers should also consider, of course, whether any terms not defined in the publication need to be defined.)

If a draft safety standard or other safety related publication gives a definition different from that recommended in the Safety Glossary, reviewers should check:

(a) That the definition recommended in the Safety Glossary could not reasonably have been used;

(b) That the definition given in the draft publication reflects essentially the same meaning as the recommended definition.

Reviewers should make any appropriate recommendations to the IAEA technical officer responsible for the publication.

FUTURE DEVELOPMENT OF THE SAFETY GLOSSARY

The Safety Glossary is intended to be reviewed and revised to represent current terminology accurately. However, it is also intended to encourage stability and harmonization in terminology and definitions. There is, therefore, a controlled process for making changes to the Safety Glossary.

Proposed additions, deletions and changes should be submitted to the IAEA technical officer responsible for the Safety Glossary, together with an explanation of the reason for the proposal. Please see the Foreword.

The proposals received will be reviewed, and the possible implications of any proposed change for safety related publications already issued and those in preparation will be taken into account. The Safety Glossary can be reviewed, revised and reissued as necessary, subject to appropriate consultation.