Australian Government

Australian Radiation Protection and Nuclear Safety Agency

CODE

Radiation Protection in Planned Exposure Situations

Public consultation draft – Round 2 – 16 September 2016

Submissions close 9.00am Monday 10 October 2016

Email: national_uniformity@arpansa.gov.au

All submissions will be held in a register of submissions, and unless marked confidential, may be made public.

Radiation Protection Series C-1

Radiation Protection Series

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) publishes Fundamentals, Codes and Guides in the Radiation Protection Series (RPS), which promote national policies and practices that protect human health and the environment from harmful effects of radiation. ARPANSA develops these publications jointly with state and territory regulators through the Radiation Health Committee (RHC), which oversees the preparation of draft policies and standards with the view of their uniform implementation in all Australian jurisdictions. Following agreement and, as relevant, approvals at the Ministerial level, the RHC recommends publication to the Radiation Health and Safety Advisory Council, which endorses documents and recommends their publication by the CEO of ARPANSA.

To the extent possible and relevant for Australian circumstances, the RPS publications give effect in Australia to international standards and guidance. The sources of such standards and guidance are varied and include the International Commission on Radiological Protection (ICRP); the International Commission on Non-Ionizing Radiation Protection (ICNIRP); the International Atomic Energy Agency (IAEA); and the World Health Organization (WHO).

Fundamentals set the fundamental principles for radiation protection and describe the fundamental radiation protection, safety and security objectives. They are written in an explanatory and non-regulatory style and describe the basic concepts and objectives of international best practice.

Codes are regulatory in style and may be referenced by regulations or conditions of licence. They contain either general safety or security requirements which may be applicable for all dealings with radiation, or practice-specific requirements. They provide overarching requirements and are expressed as 'must' statements which are to be satisfied to ensure an acceptable level of safety and/or security.

Guides provide recommendations and guidance on how to comply with the Codes or apply the principles of the Fundamentals. They are written in an explanatory and non-regulatory style and indicate the measures recommended to provide good practice. They are generally expressed as 'should' statements.

These three categories of publications are informed by public comment during drafting and are subject to a process of assessment of regulatory impact.

All ARPANSA publications (including earlier editions of codes and guides for which ARPANSA is now responsible) are available in electronic format, and can be downloaded free of charge by visiting ARPANSA's website at www.arpansa.gov.au/Publications.

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Public Consultation Draft

16 September 2016

This publication was prepared jointly with the *Radiation Health Committee*. The *Radiation Health and Safety Advisory Council* advised the CEO to adopt the Code.

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The mission of ARPANSA is to protect the Australian people and the environment from the harmful effects of radiation.

Published by the Chief Executive Officer of ARPANSA in XXX 201X

FOREWORD

The management of risks from ionising radiation requires actions that are based on fundamental principles of radiation protection, safety and security. The *Fundamentals for Protection Against Ionising Radiation (2014)* (RPS F-1) was published as part of ARPANSA's Radiation Protection Series (RPS) to provide an understanding of the effects of ionising radiation and associated risks for the health of humans and of the environment. RPS F-1 is the top tier document in the Australian national framework to manage risks from ionising radiation and explains how radiation protection, safety and security can work individually and collectively to manage such risks. Finally, it presents ten principles and their application in management of radiation risks.

RPS F-1 acknowledges that activities involving radiation are introduced for a purpose, and the regulatory framework should not unduly limit justified use of radiation. An exposure arising from the planned operation of a source or from a planned activity that causes exposure to a source is called a 'planned exposure' and in these planned exposure situations, some level of exposure can be expected to occur.

This *Code for Radiation Protection in Planned Exposure Situations* (2016) sets out the requirements in Australia for the protection of occupationally exposed persons, the public and the environment in planned exposure situations. The primary means of controlling exposure in planned exposure situations is by good design of facilities, equipment, operating procedures and through training – all of which contribute to optimisation of protection.

ARPANSA, jointly with state and territory regulators in the Radiation Health Committee (RHC), has developed this Code based on the 'requirements' relating to planned exposure situations described in the Safety Requirements of the International Atomic Energy Agency (IAEA); *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards General Safety Requirements Part 3, GSR Part 3* [IAEA 2014], generally referred to as the Basic Safety Standards or BSS.

This Code, and its sister *Code on Radiation Protection in Medical Exposure Situations (201Z*) (RPS C-3), cover all planned exposures. It is expected that Codes for existing exposure situations and emergency exposure situations other than where the emergency situation arises from the planned activity, will be dealt with in further publications of the RPS.

This publication, together with RPS F-1, supersede the *Recommendations for Limiting Exposure to Ionizing Radiation (1995) and National Standard for Limiting Occupational Exposure to Ionizing Radiation (republished 2002)* (RPS1). As RPS 1 was a joint publication with the National Occupational Health and Safety Commission, the predecessor of Safe Work Australia (SWA), formal agreement was sought, and was received, from SWA to withdraw RPS 1.

This Code is intended to complement the requirements of the relevant Work Health and Safety legislation in each jurisdiction. The relevant regulatory authority should be contacted should any conflict of interpretation arise. A listing of such authorities is provided at www.arpansa.gov.au/Regulation/Regulators.

Carl-Magnus Larsson
CEO of ARPANSA

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1. INTRODUCTION

1.1 Citation

This publication may be cited as the *Planned Exposure Code (2016)*.

1.2 Background

Australia's 1995 *Recommendations for limiting exposure to ionizing radiation, and National Standard for Limiting Occupational Exposure to Ionizing Radiation (republished March 2002)*, were based on the 1990 recommendations of the International Commission on Radiological Protection (ICRP 1990). The ICRP published updated recommendations in its *2007 Recommendations of the International Commission on Radiological Protection,* ICRP *Publication 103* (ICRP 2007). The recommendations in *ICRP 103* take a consistent approach for all types of radiation **exposure** situations, with the central consideration being the **optimisation** of **radiation protection**.

The International Atomic Energy Agency (IAEA) *Fundamental Safety Principles, Safety Fundamentals No. SF-1,* published in 2006 [IAEA 2006], together with the ICRP *Publication 103* recommendations and the guidance on nuclear **security** developed by the IAEA in collaboration with its Member States, have informed the development of the ARPANSA Radiation Protection Series publication RPS F-1, *Fundamentals for Protection against Ionising Radiation* [ARPANSA 2014]. This publication sets out the underlying principles that form the basis of the system of radiation protection used to manage risks from **ionising radiation** in Australia. It is referred to as the *Fundamentals* in this Code.

The *Fundamentals* describe the basic concepts and objectives of international best practice for Australia in relation to radiation protection. Section 2 of this Code outlines the relationship between the *Fundamentals* and the management of radiation risks in **planned exposure situations.** The Code is based on the relevant requirements of the IAEA. *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards General Safety Requirements Part 3, GSR Part 3* [IAEA 2014], which in a regulatory style (as 'shall' statements), integrates ICRP's *Publication 103* with the IAEA safety standards.

The requirements in Section 3 of this Code are derived from those listed in GSR Part 3 for planned exposure situations. Appendix 1 lists the requirements cross-referenced to GSR Part 3. GSR Part 3 is published on the IAEA website.

For national uniformity purposes, the numbered paragraphs within Section 3 of this Code may be applied across all jurisdictions, either singly or *in toto*, as licence conditions on authorised **practices** for users of **radiation sources**, should the **relevant regulatory authority** so require.

1.3 Purpose

The purpose of this document is to set out the requirements in Australia for the protection of **occupationally exposed person**s, the public and the **environment** from the harmful effects of ionising radiation in planned exposure situations.

This Code is directed principally to the **Responsible Person** who conducts an activity that results in planned exposures, and sets out the measures that must be put in place for radiation protection in such situations.

Relevant regulatory authorities around Australia will use this document in the regulation of radiation practices in planned exposure situations.

1.4 Scope

This Code applies to planned exposure situations and the control of **occupational exposure**, **public exposure** and **environmental exposure**. The requirements for planned exposure situations apply to the following practices:

(a) The production, supply and transport of **radioactive material** and of devices that contain radioactive material, including **sealed** and unsealed sources

(b) The production and supply of devices that generate radiation, including linear accelerators, cyclotrons, and fixed and mobile radiography equipment

(c) Any activities within the nuclear fuel cycle that involve or could involve exposure to radiation or exposure due to radioactive material

(d) The use of radiation or radioactive material for medical, industrial, veterinary, agricultural, legal or security purposes

(e) The use of radiation or radioactive material for education, training or research, including any activities relating to such use that involve or could involve exposure to radiation or exposure due to radioactive material

(f) The mining and processing of raw materials that involve exposure due to radioactive material

(g) Any other practice as specified by the relevant regulatory authority.

The requirements of this Code should be applied using a **graded approach**. A licensee also needs to comply with any requirements specified by the relevant regulatory authority, including the need for a Safety Assessment (clauses 3.1.21 to 3.1.23). Not all requirements specified in this Code are relevant for every practice or source, or for all the actions specified in 3.1.9.

This Code does not apply to:

(a) **existing exposure situations**

(b) **emergency exposure situation**s, except for emergency situations arising from the planned activity

(c) patients undergoing medical diagnosis or therapy involving radiation

(d) participants in research involving exposure of human volunteers to radiation

(e) non-occupational exposure received as a consequence of assisting an exposed patient

(f) dealings with material below the **exemption** limit prescribed by the relevant regulatory authority

(g) dealings with bulk amounts[1] of material below the **clearance level** prescribed by the relevant regulatory authority.

1.5 Interpretation

The presence of the term 'must' when it appears in this Code indicates that the requirements to which it refers is mandatory.

Each of the terms in bold type on first use has the meaning given in the Glossary together with any amplification given in this Code. In particular, the term 'radiation' means 'ionising radiation', as defined in the Glossary.

[1] A bulk amount is considered to be more than about the order of a tonne.

2. OBJECTIVES OF RADIATION PROTECTION FOR PLANNED EXPOSURE SITUATIONS

The *Fundamentals* outline the system of radiation protection in Australia. Section 4 of the *Fundamentals* describes the ten principles that guide actions to manage radiation risks to protect human health and the environment from the harmful effects of ionising radiation, namely:

1. Clear division of responsibilities
2. Legislative and regulatory framework
3. Leadership and management for safety
4. Justification
5. Optimisation of protection
6. Limitation of risks
7. Protection of present and future generations
8. Prevention of **accident**s and malicious acts
9. Emergency preparedness and response
10. Protective actions to reduce existing or unregulated radiation risks.

The wording of each of these principles can be found in Appendix 2.

The approach to radiation protection taken in the *Fundamentals* is based on three types of radiation exposure situations: planned, emergency, and existing exposure, consistent with the *Recommendations of the International Commission on Radiological Protection, ICRP Publication 103* [ICRP 2007].

A planned exposure situation arises from the deliberate introduction or operation of a source, or from a planned activity that results in an exposure from a source. In such situations, radiation protection can be planned in advance before exposures occur and the magnitude and extent of exposures can be reasonably predicted.

The approach to managing radiation risks in planned exposure situations is guided by principles 1-8. Principles 9 and 10, concerning protective actions to reduce emergency and existing or unregulated radiation risks, are covered in corresponding RPS publications on radiation protection in emergency and existing situations.

The primary means of controlling exposure in planned exposure situations is by good design of facilities, equipment and operating procedures. In that manner, protection of those exposed (e.g. workers and the public, and organisms in the natural environment) can be **optimised** (see 2.2). In the case of workers and the public, **dose** limits are set and must be complied with in order to ensure there is an adequate level of radiation protection.

2.1 Justification

Regulation of planned exposure situations in Australia is well established. Each state and territory has its own regulatory body to oversee dealings with ionising radiation by the private sector and internal government departments within their respective jurisdictions. ARPANSA

regulates Commonwealth entities around Australia and in some overseas locations. In consultation with the other jurisdictions, each regulatory body ensures that:

- provision is made for:
  - the **justification** of any type of practice
  - review of the justification, as necessary
- only **justified** practices are authorised.

However, the following practices are deemed to be not justified:

- practices, except for justified practices involving **medical exposure**, which result in an increase in activity, by the deliberate addition of radioactive substances or by activation, in food, feed, beverages, cosmetics or any other commodity or product intended for ingestion, inhalation or percutaneous intake by, or application to, a person
- practices involving the use of radiation or radioactive substances in commodities or in consumer products such as toys and personal jewellery or adornments, which result in an increase in activity, by the deliberate addition of radioactive substances or by activation
- human imaging using radiation that is performed as a form of art or for publicity purposes
- human imaging using radiation for theft detection purposes.

Human imaging using radiation that is performed for occupational, legal or health insurance purposes, and is undertaken without reference to clinical indication, is usually considered to be not justified. If, in exceptional circumstances, the relevant regulatory authority decides that such human imaging for specific practices is justified, the requirements of this Code will apply.

Human imaging using radiation for the detection of concealed objects for anti-smuggling purposes is normally deemed to be not justified. If, in exceptional circumstances, the relevant regulatory authority decides that the justification of such human imaging is to be considered, the requirements of this Code will apply.

Only the relevant regulatory authority will determine if human imaging using radiation for the detection of concealed objects that can be used for criminal acts, and that pose a national security threat, is justified. Where the relevant regulatory authority deems such human imaging to be justified, the requirements of this Code will apply.

Procedures with inspection imaging devices in which radiation is used to expose persons for the purpose of detection of concealed weapons, contraband or other objects on or within the body is considered to give rise to public exposure.

2.2 Optimisation and Limitation

2.2.1 Dose Constraints and dose limits

In planned exposure situations, a **dose constraint** provides a prospective source–related value of individual dose, which is set below the **dose limit**[2]. It is a tool to be established and used in the optimisation of **protection and safety** by the person or organisation responsible for a source, facility or an activity. Dose constraints are not dose limits but will support actions to prevent dose limits to be exceeded; however, exceeding a dose constraint does not represent non-compliance with regulatory requirements but could result in follow-up actions.

For occupational exposure the dose constraint is a value of individual dose used to narrow the range of options for managing the exposure such that only options resulting in a dose below the constraint are considered in the planning process. Actual doses are, thus, normally expected to be below the dose constraint.

For public exposure in planned exposure situations, the regulatory body ensures the establishment or approval of dose constraints, taking into account the characteristics of the site and of the source, facility or activity, the scenarios for exposure and the views of interested parties. Measures should then be undertaken to optimise protection at or below the dose constraint and, as for occupational exposure, actual exposures are normally expected to be below the constraint.

After exposures have occurred, the dose constraint may be used as a benchmark for assessing the suitability of the optimised strategy for protection and safety (referred to as the protection strategy) that has been implemented and for making adjustments as necessary. The setting of the dose constraint needs to be considered in conjunction with other health and safety provisions and the technology available.

2.2.2 Risk Constraints

Exposures may be either certain or almost certain to occur, or potential which means that they are not expected to occur but may do so under certain circumstances. Such **potential exposures** may be more appropriately approached by constraining the risk, or setting a risk target that e.g. outlines the requirements for protective capability of a disposal facility for radioactive waste in the distant future. The risk constraint or target can be formulated as the product of probability of the exposure, and resulting consequence. Optimisation can also be applied to reduce the risk. Dose constraints and risk constraints or targets can be used in combination. The ambition is to reduce all doses to levels that are as low as reasonably achievable, economic and societal factors being taken into account.

[2] Dose limits for occupationally exposed persons and for members of the public are given in Schedules A and B, respectively, of this Code.

2.3 Aligning safety and security objectives

Safety measures and security measures have in common the aim of protecting human life and health and the environment. These measures need to be applied, as necessary and appropriate, to all sources, facilities and activities, and to radiation sources and radioactive material in any form.

The **safety** objective is the same as the objective of radiation protection, i.e. to protect people and the environment from the harmful effects of radiation. The *Fundamentals* state, consistent with the IAEA *Fundamental Safety Principles* [IAEA 2006], that measures should be taken to:

(a) Restrict the likelihood of events that might lead to a loss of control over a nuclear reactor core, nuclear chain reaction, radioactive source or any other source of radiation.

(b) Control the radiation exposure of people and the release of radioactive material to the environment.

(c) Mitigate the consequences of such events if they were to occur.

The security objective can be described in similar terms, placing emphasis on the protection of people, property, society and the environment, from harmful effects of radiation following a security event. It links in with the protective elements of the *Code of Practice for the Security of Radioactive Sources (2007)* (RPS11), the objectives of which are to:

(a) Achieve and maintain a high level of safety and security of radioactive sources.

(b) Prevent unauthorised access or damage to, and loss, theft or unauthorised transfer of, radioactive sources, so as to reduce the likelihood of accidental harmful exposure to such sources or the malicious use of such sources to cause harm to individuals, society or the environment.

(c) Mitigate or minimise the radiological consequences of any accident or malicious act involving a radiation source.

It is important that safety and security measures are designed and implemented in an integrated manner so that security measures do not compromise safety and safety measures do not compromise security.

Security infrastructure and safety infrastructure need to be developed, as far as possible, in a well-coordinated manner. All organisations involved need to be made aware of the commonalities and the differences between safety and security so as to be able to factor both into development plans.

The synergies between safety (this Code) and security (RPS11) have been developed so that safety and security complement and enhance one another.

2.4 A graded approach to implementation

The requirements of this Code are intended to be applied in accordance with a graded approach, wherein the protective measures to be implemented are commensurate with the radiation hazard associated within the planned exposure situation. Not all the requirements of this Code are relevant for every practice or source, or for all the actions specified in clause 3.1.10.

The concept of a graded approach relating to the implementation of the requirements in this Code refers to Requirement 6 of GSR Part 3, which states that:

> *The application of the requirements of these Standards in planned exposure situations shall be commensurate with the characteristics of the practice or the source within a practice, and with the likelihood and magnitude of exposures*.

2.5 The role of the Responsible Person

As defined in the glossary of this Code, the Responsible Person will be, generally, the person who holds the **authorisation** to deal with a source of radiation and will therefore have management responsibility over the source of radiation along with control over who may use it.

The Responsible Person has the responsibility for setting up and implementing the technical and organisational measures necessary for protection and safety for the practices and sources for which the relevant regulatory authority authorises them. The Responsible Person may designate a suitably qualified person to carry out tasks relating to these responsibilities but the Responsible Person retains the prime responsibility for protection and safety.

The Responsible Person is responsible for maintaining control over the sources of exposure for the protection of:

- workers who are occupationally exposed
- the public, and
- the environment.

Rather than classify workers, *ICRP 103* recommends the classification of work areas as **controlled areas** and **supervised areas**.

While the responsibility for protection and safety remains consistent across the range of use of radiation sources, the magnitude of the task to maintain protection and safety will vary considerably. Clearly in accordance with a graded approach as outlined in clause 2.4 above, the technical and organisational measures needed for protection and safety of a low activity calibration source are far less than those for a sterilisation plant or a reactor, or for a dental X-ray unit than they would be for a high energy linear accelerator.

3. SAFETY REQUIREMENTS FOR PLANNED EXPOSURE SITUATIONS

This section of the Code outlines the general requirements on the Responsible Person (section 3.1) and more specific requirements that relate to occupational exposure (section 3.1) and exposure of the public and the environment (section 3.3).

The numbered paragraphs have varying degree of applicability depending on type of source, activity or facility, and the specifics of the relevant legal framework. They should be applied in a manner that is commensurate with the hazard and with the nature of the source, activity or facility. They can be used as licence conditions individually or in their entirety by the relevant regulatory authority or authorities.

3.1 General Requirements

Application of the principles of radiation protection

3.1.1 The Responsible Person must ensure protection and safety in planned exposure situations.

3.1.2 The Responsible Person must, commensurate with the radiation risks associated with the exposure situation, apply the principles of radiation protection to ensure that:

(a) no practice is undertaken unless it is justified

(b) protection and safety is optimised

(c) no occupationally exposed person under their care exceeds the dose limits specified in Schedule A

(d) no member of the public exceeds the dose limits specified in Schedule B.

3.1.3 The Responsible Person must ensure protection from exposure to radiation by the application of radiation control measures that may include:

(a) elimination of the radiation exposure hazard

(b) incorporation of engineered controls to reduce radiation levels and intakes of radioactive materials in the workplace

(c) restricting access to radiation by designation of controlled and supervised areas

(d) application of administrative controls through work procedures, training and installation of warning signs and labels

(e) the use of appropriate personal protective equipment.

Radiation Management Plan

3.1.4 The Responsible Person must ensure that:

(a) a radiation management plan appropriate for the exposure situation[3] is developed, documented, resourced, implemented and regularly reviewed, and

(b) the radiation management plan implemented in accordance with sub-clause (a):

(i) adopts objectives for protection and safety in accordance with the requirements of this Code

(ii) applies measures for protection and safety that are commensurate with the radiation risks associated with the exposure situation

(iii) is adequate to ensure compliance with the requirements of this Code.

3.1.5 The Responsible Person must ensure the radiation management plan addresses protection commensurate with the level of radiation risk that it seeks to mitigate of:

(a) occupationally exposed persons

(b) members of the public

(c) the environment.

3.1.6 The Responsible Person must:

(a) permit access by authorised representatives of the relevant regulatory authority to carry out inspections of their:

(i) facilities

(ii) activities, and

(iii) protection and safety records

(b) cooperate in the conduct of inspections specified in sub-clause (a).

3.1.7 The Responsible Person must ensure that all necessary resources for implementing the radiation management plan are provided, including:

(a) personal protective equipment

(b) safety devices

(c) radiation monitoring equipment.

3.1.8 The Responsible Person must ensure that a **qualified expert** is identified and is consulted as necessary on the proper observance of this Code.

[3] The protection and safety elements of the radiation management plan are to be commensurate with the complexity of and the radiation risks associated with the activity in a graded manner.

Management for protection and safety

3.1.9 The Responsible Person must ensure that protection and safety are effectively integrated into the overall management system of the organisations for which they are responsible.

3.1.10 Unless specifically exempted by the relevant regulatory authority, a person must not, other than in accordance with the requirements of this Code and relevant legislation:

(a) adopt, introduce, conduct, discontinue or cease a practice, or

(b) as applicable, mine, extract, process, design, manufacture, construct, assemble, install, acquire, import, export, supply, provide, distribute, loan, hire, receive, site, locate, commission, possess, use, operate, maintain, repair, transfer, decommission, disassemble, transport, store or dispose of a source within a practice.

3.1.11 Any person intending to carry out any of the actions specified in clause 3.1.10 must:

(a) submit a notification to the relevant regulatory authority of such an intention

(b) unless notification alone is sufficient, apply to the relevant regulatory authority for authorisation

(c) not carry out any of the actions specified in clause 3.1.10 until the relevant regulatory authority issues the relevant authorisation.

Optimisation of protection and safety

3.1.12 The Responsible Person must ensure protection of people and the environment from exposure to radiation by the application of radiation control measures that are optimised taking into account:

(a) the exposures controlled

(b) the social and economic factors

(c) the impact on beneficial uses of radiation.

3.1.13 The Responsible Person must ensure that radiation protection is optimised by the adoption of appropriate dose constraints into the radiation management plan during:

(a) all stages of development and operation of the practice

(b) the design, construction and operation of the workplace

(c) design and implementation of work procedures.

3.1.14 The Responsible Person must for each dose constraint that has been adopted, demonstrate that:

(a) the level of protection achieved is compatible with that constraint, and

(b) an appropriate review is undertaken if the constraint has been exceeded.

Prevention and mitigation of accidents

3.1.15 The Responsible Person must:

(a) ensure that when any person reports a matter that may compromise radiation protection, appropriate action is taken to investigate and, if necessary, rectify the matter

(b) take appropriate action in the event of an **incident** or accident as set out in the radiation management plan

(c) report without delay to the relevant regulatory authority each incident or accident that exceeds criteria specified in the radiation management plan.

3.1.16 In the event of an incident or accident, the Responsible Person must advise the relevant regulatory authority as soon as practicable of:

(a) the cause of the incident or accident

(b) the consequences of the incident or accident

(c) the steps taken to remedy the situation

(d) the steps taken to prevent a recurrence.

Safety assessment

3.1.17 The Responsible Person must conduct a safety assessment that is either generic or specific to the practice or source for which they are responsible.

3.1.18 The Responsible Person must ensure that the safety assessment is documented and, where appropriate, is independently reviewed under the relevant management system.

3.1.19 Before the granting of an authorisation, the Responsible Person must submit the safety assessment to the relevant regulatory authority for review and assessment.

Record keeping

3.1.20 The Responsible Person must ensure that a record keeping system is implemented that includes the following:

(a) authorisations granted by the relevant regulatory authority

(b) the radiation management plan

(c) details of training courses and of participation by occupationally exposed persons

(d) details of radiation monitoring and dose assessment

(e) inventories of radiation sources and radioactive waste

(f) details of incidents and accidents involving exposure to radiation and of corrective measures taken.

3.1.21 The Responsible Person must ensure that records kept under this Code are available for inspection by the relevant regulatory authority.

3.1.22 The Responsible Person must ensure that records of doses assessed to have been received by an occupationally exposed person, including details of monitoring results and dose calculation methods, are kept:

(a) during the working life of the occupationally exposed person

(b) afterwards for not less than 30 years after the last dose assessment

(c) at least until the occupationally exposed person reaches, or would have reached, the age of 75 years.

3.1.23 When a practice terminates, the Responsible Person must pass to the relevant regulatory authority:

(a) the records of radiation doses assessed to have been received by:

(i) occupationally exposed persons under their care

(ii) members of the public

(b) any other records specified by the relevant regulatory authority.

3.1.24 The Responsible Person must:

(a) keep records relating to exposure of the workforce

(b) provide a copy of the dose record of an occupationally exposed person to that person periodically, on request and on termination of employment

(c) provide details of the doses estimated to have been received by an occupationally exposed person to the relevant regulatory authority or its approved central record keeping agency.

Radiation generators and radioactive sources

3.1.25 The Responsible Person must ensure that:

(a) when a radioactive source is not in use, it is stored in an appropriate manner for protection and safety

(b) arrangements are made promptly for the safe management of and control over radiation generators and radioactive sources once it has been decided to take them out of use.

Human imaging using radiation for purposes other than medical diagnosis, medical treatment or biomedical research

3.1.26 Where the relevant regulatory authority approves the use of radiation to expose persons for the purpose of detection of concealed weapons, contraband or other objects on or within the body, the Responsible Person must ensure that:

(a) the requirements for public exposure in planned exposure situations are applied

(b) optimisation of protection and safety is subject to any dose constraints for public exposure set by the relevant regulatory authority

(c) all persons who are to undergo procedures with inspection imaging devices in which ionising radiation is used are informed of the possibility of requesting the use of an alternate inspection technique that does not use ionising radiation, where available

(d) any inspection imaging device used for the detection of concealed objects on or within the body, whether it is manufactured in or imported into the jurisdiction in which it is used, conforms to applicable standards of the:

(i) International Electrotechnical Commission, or

(ii) International Organization for Standardization, or

(iii) equivalent national standards.

3.2 Requirements for Occupational Exposure

The requirements relating to occupational exposure in planned exposure situations apply to occupational exposure:

- due to a practice or a source within a practice,
- as required in emergency exposure situations, and
- as required for existing exposure situations.

For exposure due to natural sources, these requirements for occupational exposure in planned exposure situations apply, as appropriate, only to the exposure situations as follows:

- Exposure due to material in any practice specified in the Scope of this Code where the activity concentration in the material of any radionuclide in the uranium decay chain or the thorium decay chain is greater than 1 Bq/g or the activity concentration of ^{40}K is greater than 10 Bq/g
- Exposure due to ^{222}Rn and to ^{222}Rn progeny and due to ^{220}Rn and to ^{220}Rn progeny in workplaces in which occupational exposure due to other radionuclides in the uranium decay chain or the thorium decay chain is controlled as a planned exposure situation, and

- Exposure due to ^{222}Rn and to ^{222}Rn progeny where the annual average activity concentration of ^{222}Rn in air in workplaces remains above the reference level established by the relevant regulatory authority.

Responsibilities of the Responsible Person for the protection of workers

3.2.1 The Responsible Person must ensure that the system for radiation monitoring for occupational exposures provides for the establishment and maintenance of a monitoring program that addresses:

(a) identification of sources of radiation exposure and pathways

(b) radiation dose assessment allowing for all exposure pathways

(c) detection of changes in the circumstances of exposure

(d) acquisition of sufficient information to enable optimisation measures to be adopted and reviewed.

3.2.2 The Responsible Person must ensure that persons exposed to radiation from sources within the practice that are not required by or directly related to their work have the same level of protection against such exposure as members of the public.

Compliance by workers

3.2.3 The Responsible Person must ensure that each occupationally exposed person under their care complies with, to the extent that the occupationally exposed person is capable, all reasonable measures to control and assess exposure to radiation in the workplace, including:

(a) the radiation protection requirements specified in the radiation management plan

(b) the legitimate instructions of the Responsible Person in relation to radiation protection

(c) participation in training related to radiation protection, as required

(d) proper use of the training received to ensure their own health and safety and that of other persons

(e) proper use of protective and monitoring equipment provided

(f) upon employment, provide to the Responsible Person, or assist the Responsible Person to obtain, details of their prior occupational radiation exposure, as necessary

(g) reporting to the Responsible Person any matter of which they are aware that may compromise radiation protection.

Cooperation between Responsible Persons

3.2.4 Where applicable, the Responsible Person must engage with other Responsible Persons at the same site[4] to ensure coordination of radiation protection efforts at the site.

Assessment of occupational exposure and workers' health

3.2.5 The Responsible Person must arrange for appropriate monitoring to the extent necessary to:

(a) demonstrate the effectiveness of the measures for protection and safety, and

(b) assess intakes of radionuclides and the committed **effective dose**s.

3.2.6 The Responsible Person must keep sufficient evidence to be able to demonstrate at any time that:

(a) all doses estimated to have been received by occupationally exposed persons under their care are below the relevant limit in Schedule A

(b) all doses to members of the public are below the relevant limit in Schedule B

(c) optimisation of radiation protection has been carried out.

Information, instruction and training

3.2.7 The Responsible Person must provide induction training, refresher training and other relevant information to occupationally exposed persons.

3.2.8 The Responsible Person must ensure that the type and level of training required and its method of presentation is:

(a) consistent with the characteristics of the occupationally exposed persons

(b) commensurate with the radiation risks associated with the workplace

(c) documented, with records of participation retained in accordance with this Code.

3.2.9 The Responsible Person must ensure that all personnel engaged in activities relevant to protection and safety have appropriate education, training and qualification so that they:

(a) understand their responsibilities

(b) can perform their duties competently, with appropriate judgement and in accordance with the Responsible Person's radiation management plan.

[4] For example, as a member of a site radiation management committee.

3.2.10 The Responsible Person must document the induction and training programs conducted in accordance with the radiation management plan and record participation.

Conditions of service

3.2.11 The Responsible Person must make all reasonable efforts to provide workers with suitable alternate employment in circumstances for which it has been determined, either by the relevant regulatory authority or in the framework of the program for workers' **health surveillance** in accordance with the requirements of this Code, that workers, for health reasons, may no longer continue in employment under conditions where that person may be exposed to radiation exceeding the effective dose limit for members of the public specified in Schedule B.

Special arrangements for protection and safety for female workers and for persons under 16 years of age

3.2.12 The Responsible Person must ensure that when an occupationally exposed female has declared to the Responsible Person that she is pregnant, additional controls are considered to protect the embryo/foetus to a level similar to that provided for members of the public.

3.2.13 The Responsible Person must not employ a person under the age of 16 under conditions where that person may be exposed to radiation exceeding the effective dose limit for members of the public specified in Schedule B.

3.3 Requirements for Public and Environmental Exposure

The requirements relating to public exposure in planned exposure situations apply to public exposure due to a practice or a source within a practice. For exposure due to natural sources, such requirements apply only to the following types of public exposure:

- Exposure due to material in any practice specified in the Scope of this Code where the activity concentration in the material of any radionuclide in the uranium decay chain or the thorium decay chain is greater than 1 Bq/g or the activity concentration of ^{40}K is greater than 10 Bq/g, and
- Exposure due to **discharges** or due to the management of radioactive waste arising from a practice involving this type of material.

Radioactive waste and discharges

3.3.1 The Responsible Person must ensure that disposal of radioactive material is only carried out in accordance with an authorisation issued by the relevant regulatory authority that takes protection of the public and the environment into account.

3.3.2 Where a practice generates radioactive waste, the Responsible Person must ensure that the Radiation Management Plan specified in clause 3.1.3 includes a section on Radioactive Waste Management.

Monitoring and reporting

3.3.3 The Responsible Person must ensure that:

(a) a monitoring program, sufficient to verify and demonstrate compliance with the authorisation, is implemented to confirm that public exposure due to sources under their responsibility is adequately assessed

(b) the monitoring program specified in sub-clause (a) includes monitoring of, as appropriate:

(i) external exposure due to such sources

(ii) discharges

(iii) radioactivity in the environment

(iv) other parameters important for the assessment of public exposure

(c) appropriate records are maintained of:

(i) the results of the monitoring program

(ii) estimated doses to members of the public

(d) the results of the monitoring program are reported or made available to the relevant regulatory authority at approved intervals, including, as applicable:

(i) the levels and composition of discharges

(ii) dose rates at the site boundary and in premises open to members of the public

(iii) results of environmental monitoring

(iv) retrospective assessments of doses to the representative person

(e) any levels exceeding the **operational limits and conditions** relating to public and occupational exposure are reported promptly to the relevant regulatory authority in accordance with reporting criteria established by the relevant regulatory authority

(f) any significant increase in dose rate or concentrations of radionuclides in the environment that could be attributed to the authorised practice is reported promptly to the relevant regulatory authority in accordance with reporting criteria established by the relevant regulatory authority

(g) a capability is maintained to conduct monitoring:

  (i) in an emergency

  (ii) in the event of an unexpected increase in radiation levels, or

  (iii) in concentrations of radionuclides in the environment due to an accident or other unusual event attributed to the authorised source or facility

(h) the adequacy of the assumptions made for the assessment of public exposure and the assessment for radiological environmental impacts is verified by a qualified expert

(i) results from source monitoring and environmental monitoring programs and assessments of doses from public exposure are made available on request, as appropriate.

SCHEDULE A DOSE LIMITS FOR OCCUPATIONALLY EXPOSED PERSONS

The occupational dose limits for ionising radiation are as follows:

Type of limit	Limit[1]
Effective dose	20 mSv per year, averaged over a period of five consecutive calendar years[2]
Annual **equivalent dose** in:	
the lens of the eye	20 mSv
the skin[3]	500 mSv
the hands and feet	500 mSv

[1] The limits apply to the sum of the relevant doses from external exposure in the specified period and the 50-year committed dose from intakes in the same period.

[2] With the further provision that the effective dose must not exceed 50 mSv in any single year. Additionally, when a pregnancy is declared by an occupationally exposed female, the working conditions of that person should be such as to ensure that the additional dose to the embryo/foetus would not exceed about 1 mSv during the remainder of the pregnancy.

[3] The equivalent dose limit for the skin applies to the dose averaged over any 1 cm^2 area of skin, regardless of the total area exposed.

SCHEDULE B DOSE LIMITS FOR MEMBERS OF THE PUBLIC

The public dose limits for ionising radiation are as follows:

Type of limit	Dose Limit[1]
Effective dose	1 mSv in a year[2]
Annual equivalent dose in:	
the lens of the eye	15 mSv
the skin[3]	50 mSv

[1] The limits apply to the sum of the relevant doses from external exposure in the specified period and the 50-year committed dose (to age 70 years for children) from intakes in the same period.

[2] In special circumstances, a higher value of effective dose could be allowed in a single year, provided that the average over five years does not exceed 1 mSv per year.

[3] The equivalent dose limit for the skin applies to the dose averaged over any 1 cm^2 area of skin, regardless of the total area exposed.

APPENDIX 1 DERIVATION OF PLANNED EXPOSURE CODE CLAUSES FROM GSR PART 3 REQUIREMENTS

The following table cross-references each clause in Section 3 of this Code to the relevant requirement in *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards – General Safety Requirements. IAEA Safety Standards Series No. GSR Part 3 [IAEA 2014].* GSR Part 3 is published on the IAEA website.

IAEA GSR Part 3	RPS C-1	
Requirement	**Requirement**	**Clause(s)**
Requirement 1	Application of the principles of radiation protection	3.1.2
Requirement 4	Application of the principles of radiation protection, Radiation Management Plan, Information, instruction and training	3.1.1, 3.1.4, 3.1.6, 3.1.8, 3.1.14, 3.2.9
Requirement 5	Radiation Management Plan, Management for protection and safety	3.1.5, 3.1.9-3.1.10
Requirement 7	Management for protection and safety	3.1.11
Requirement 9	Optimisation of protection and safety, Record keeping, Information, instruction and training	3.1.12, 3.1.20-3.1.21, 3.2.10
Requirement 11	Optimisation of protection and safety	3.1.13-3.1.14
Requirement 12	Dose limits	3.1.2(c) and (d)
Requirement 13	Safety assessment	3.1.17-3.1.19
Requirement 14	Record keeping	3.1.22-3.1.23
Requirement 15	Prevention and mitigation of accidents	3.1.15
Requirement 16	Prevention and mitigation of accidents	3.1.16

IAEA GSR Part 3	RPS C-1	
Requirement	**Requirement**	**Clause(s)**
Requirement 17	Radiation generators and radioactive sources	3.1.25
Requirement 18	Human imaging using radiation for purposes other than medical diagnosis, medical treatment or biomedical research	3.1.26
Requirement 21	Responsibilities of the Responsible Person for the protection of workers	3.2.1-3.2.2
Requirement 22	Compliance by workers	3.2.3
Requirement 23	Cooperation between Responsible Persons	3.2.4
Requirement 24	Application of the principles of radiation protection, Radiation Management Plan	3.1.3, 3.1.7
Requirement 25	Assessment of occupational exposure and workers' health, Record keeping	3.1.24, 3.2.5-3.2.6
Requirement 26	Information, instruction and training	3.2.7-3.2.8, 3.2.10
Requirement 27	Conditions of service	3.2.11
Requirement 28	Special arrangements for protection and safety for female workers and for persons under 18 years of age undergoing training	3.2.12-3.2.13
Requirement 31	Radioactive waste and discharges	3.3.1-3.3.2
Requirement 32	Monitoring and reporting	3.3.3

Requirements up to and including Requirement 33 in GSR Part 3 that are not cross-referenced in the above table are obligations on the government, the regulatory body or both and are therefore not included in this Code. The provisions in those Requirements are incorporated into the *National Directory for Radiation Protection* (RPS 6), or the legislation of the relevant regulatory authority for each Australian jurisdiction.

Requirements 34-42 in GSR Part 3 apply to **medical exposure** situations, Requirements 43-46 in GSR Part 3 apply to emergency exposure situations and Requirements 47-52 in GSR Part 3 apply to existing exposure situations. The provisions in those Requirements will be incorporated into separate Codes in the Radiation Protection Series.

APPENDIX 2 THE TEN PRINCIPLES OF RADIATION RISK MANAGEMENT FROM THE *FUNDAMENTALS FOR PROTECTION AGAINST IONISING RADIATION* (2014)

The following ten principles of radiation risk management are explained in detail in Section 4 of the Fundamentals for Protection Against Ionising Radiation (2014) (RPS F-1):

1. Clear division of responsibilities

   The prime responsibility for management of radiation risks must rest with the person or organisation responsible for facilities and activities that give rise to radiation risks.

2. Legislative and regulatory framework

   An effective framework including legislation, regulation and guidance to promote management of radiation risks, including an independent regulatory body, must be established and sustained.

3. Leadership and management for safety

   Effective leadership and management of radiation risks must be established and sustained in organisations concerned with, and facilities and activities that give rise to, radiation risks.

4. Justification

   Facilities and activities that give rise to radiation risks must yield an overall benefit.

5. Optimisation of protection

   Protection must be optimised so that radiation risks are as low as reasonably achievable.

6. Limitation of risks

   Measures for controlling radiation risks must ensure that no individual bears an unacceptable risk of harm, and that the environment is protected.

7. Protection of present and future generations

   People and the environment, present and future, must be protected against radiation risks.

8. Prevention of accidents and malicious acts

   All practical efforts must be made to prevent and mitigate accidents, and acts with malicious intent, that may give rise to radiation risks.

9. Emergency preparedness and response

   Arrangements must be made for emergency preparedness and response for incidents, accidents and malicious acts that may give rise to radiation risks.

10. Protective actions to reduce existing or unregulated radiation risks.

    Protective actions to reduce existing or unregulated radiation risks must be justified and optimised.

GLOSSARY

Accident

Any unintended event, including operating errors, equipment failures and other mishaps, the consequences or potential consequences of which are not negligible from the point of view of protection and safety.

Authorisation

The granting by a relevant regulatory body of written permission for a Responsible Person to conduct specified activities.

Clearance level

A value, established by the relevant regulatory authority and expressed in terms of activity concentration, at or below which regulatory control may be removed from a source of radiation within a notified or authorised practice.

Controlled area

A 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.

Discharges

Planned and controlled releases into the environment, as a legitimate practice, within limits authorised by the relevant regulatory authority, of liquid or gaseous radioactive materials.

Dose

1. A measure of the energy deposited by radiation in a target.
2. Absorbed dose, committed dose (i.e. committed equivalent dose or committed effective dose), effective dose, equivalent dose or organ dose, as indicated by the context.

Dose constraint

A prospective and source related value of individual dose (dose constraint) or of individual risk (risk constraint) that is used in planned exposure situations as a parameter for the optimisation of protection and safety for the source, and that serves as a boundary in defining the range of options in optimisation. For occupational exposures, a constraint on individual dose to workers used by Responsible Persons to set the range of options in optimising protection and safety for the source. For public exposure, the dose constraint is a source related value established or approved by the relevant regulatory authority, with account taken of the doses from planned operations of all sources under control.

Dose limit

The value of the effective dose or the equivalent dose to individuals in planned exposure situations that is not to be exceeded.

Effective dose, *E*

The quantity *E*, defined as a summation of the tissue or organ equivalent doses, each multiplied by the appropriate tissue weighting factor:

$$E = \sum_{T} w_T \, . \, H_T$$

where H_T is the equivalent dose in tissue or organ T, and
w_T is the tissue weighting factor for tissue or organ T.

From the definition of equivalent dose, it follows that:

$$E = \sum_{T} w_T \, . \sum_{R} w_R \, . \, D_{T,R}$$

where w_R is the radiation weighting factor for radiation type R, and
$D_{T,R}$ is the average absorbed dose in the tissue or organ T delivered by radiation type R.

The SI unit for effective dose is joule per kilogram (J/kg), termed the sievert (Sv). An explanation of the quantity is given in Annex B of *International Commission on Radiological Protection Publication 103*.

Effective dose is a measure of dose designed to reflect the amount of radiation detriment likely to result from the dose.

Effective dose cannot be used to quantify higher doses or to make decisions on the need for any medical treatment relating to deterministic effects.

Values of effective dose from exposure for any type(s) of radiation and any mode(s) of exposure can be compared directly.

Emergency exposure situation

A situation of exposure that arises as a result of an accident, a malicious act, or any other unexpected event, and requires prompt action in order to avoid or reduce adverse consequences.

Environment

The conditions under which people, animals and plants live or develop and which sustain all life and development; especially such conditions as affected by human activities. Protection of the environment includes the protection and conservation of:

- non-human species, both animal and plant, and their biodiversity
- environmental goods and services such as the production of food and feed
- resources used in agriculture, forestry, fisheries and tourism
- amenities used in spiritual, cultural and recreational activities

- media such as soil, water and air
- natural processes such as carbon, nitrogen and water cycles.

Environmental exposure

The exposure of wildlife. This includes exposure of animals, plants and other organisms in the natural environment.

Equivalent dose

The quantity $H_{T,R}$, defined as:

$$H_{T,R} = w_R \cdot D_{T,R}$$

where $D_{T,R}$ is the absorbed dose delivered by radiation type R averaged over a tissue or organ T, and
w_R is the radiation weighting factor for radiation type R.

When the radiation field is composed of different radiation types with different values of w_R, the equivalent dose is:

$$H_T = \sum_R w_R \, . \, D_{T,R}$$

The SI unit for equivalent dose is joule per kilogram (J/kg), termed the sievert (Sv). An explanation of the quantity is given in Annex B of *International Commission on Radiological Protection Publication 103*.

Equivalent dose is a measure of the dose to a tissue or organ designed to reflect the amount of harm caused.

Equivalent dose cannot be used to quantify higher doses or to make decisions on the need for any medical treatment relating to deterministic effects.

Values of equivalent dose to a specified tissue or organ from any type(s) of radiation can be compared directly.

Exemption

The determination by the relevant regulatory authority that a source or practice need not be subject to some or all aspects of regulatory control on the basis that the exposure and the potential exposure due to the source or practice are 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 or risks.

Existing exposure situation

A situation of exposure that already exists when a decision on the need for control needs to be taken. Existing exposure situations include exposure to natural background radiation that is amenable to control; exposure due to residual radioactive material 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 after an emergency has been declared to be ended.

Exposure

The state or condition of being subject to radiation. External exposure is exposure to radiation from a source outside the body. Internal exposure is exposure to radiation from a source within the body.

Graded approach

An application of safety requirements that is commensurate with the characteristics of the facilities and activities or the source and with the magnitude and likelihood of the exposures.

Health surveillance

Medical supervision intended to ensure the initial and continuing fitness of workers for their intended tasks.

Incident

Any unintended event, including operating errors, equipment failures, initiating events, accident precursors, near misses or other mishaps, or unauthorised act, malicious or non-malicious, the consequences or potential consequences of which are not negligible from the point of view of protection and safety.

Ionising radiation

For the purposes of radiation protection, radiation capable of producing ion pairs in biological material(s).

Justified

See 'Justification'

Justification

For a planned exposure situation, the process of determining whether a practice is overall, beneficial, i.e. whether the expected benefits to individuals and to society from introducing or continuing the practice outweigh the harm (including radiation detriment) resulting from the practice.

Medical exposure

Exposure incurred by patients as part of their own medical or dental diagnosis (diagnostic exposure) or treatment (therapeutic exposure); by persons, other than those occupationally exposed, knowingly, while voluntarily helping in the support and comfort of patients; and by volunteers in a program of biomedical research involving their exposure.

Occupational exposure

Exposure of workers incurred in the course of their work.

Occupationally exposed person

A worker who is exposed to ionising radiation in the course of their work.

Operational limits and conditions

A set of rules setting forth parameter limits, the functional capability and the performance levels of equipment and personnel approved by the relevant regulatory authority for safe operation of an authorised facility.

Optimisation

For planned exposure situations, optimisation of protection (and safety) is the 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).

Optimised

See 'Optimisation'.

Planned exposure situation

The situation of exposure that arises from the planned operation of a source or from a planned activity that results in an exposure due to a source. Since provision for protection and safety can be made before embarking on the activity concerned, associated exposures and their probabilities of occurrence can be restricted from the outset. The primary means of controlling exposure in planned exposure situations is by good design of installations, equipment and operating procedures. In planned exposure situations, a certain level of exposure is expected to occur.

Practice

Any human activity that introduces additional sources of radiation or additional exposure pathways, or that modifies the network of exposure pathways from existing sources, so as to increase the exposure or the likelihood of exposure of people or the number of people exposed.

Protection and safety

The protection of people against exposure to ionising radiation or exposure due to radioactive material and the safety of sources, including the means for achieving this, and the means for preventing accidents and for mitigating the consequences of accidents if they do occur. For the purposes of this Code, 'protection and safety' includes the protection of people against ionising radiation and safety; it does not include non-radiation-related aspects of safety. 'Protection and 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. Safety measures include actions to prevent incidents and arrangements put in place to mitigate their consequences if they were to occur.

Public exposure

Exposure incurred by members of the public due to sources in planned exposure situations, emergency exposure situations and existing exposure situations, excluding any occupational exposure or medical exposure.

Qualified expert

An individual who, by virtue of certification by appropriate boards or societies, professional licence or academic qualifications and experience, is duly recognised as having expertise in a relevant field of specialisation, e.g. medical physics, radiation protection, occupational health, fire safety, quality management or any relevant engineering or safety specialty.

Radiation

In this Code, the term 'radiation' refers only to ionising radiation unless otherwise stated. For the purposes of radiation protection, ionising radiation is capable of producing ion pairs in biological material(s).

For most practical purposes, it may be assumed that strongly penetrating radiation includes photons of energy above about 12 keV, electrons of energy more than about 2 MeV, and neutrons.

For most practical purposes, it may be assumed that weakly penetrating radiation includes photons of energy below about 12 keV, electrons of energy less than about 2 MeV, and massive charged particles such as protons and alpha particles.

Radiation protection

The protection of people from harmful effects of exposure to ionising radiation, and the means for achieving this.

Radiation source

Anything that may cause radiation exposure — such as by emitting ionising radiation or by releasing radioactive substances or radioactive material — and can be treated as a single entity for purposes of protection and safety.

Radioactive material

Scientific meaning: Material exhibiting radioactivity; emitting or relating to the emission of ionising radiation or particles.

Legal meaning: Material designated by the relevant regulatory body as being subject to regulatory control because of its radioactivity.

Relevant regulatory authority

The radiation protection authority or authorities designated, or otherwise recognised, for regulatory purposes in connection with protection and safety relating to applications of ionising radiation. A list of relevant regulatory authorities in Australia can be found on ARPANSA's website at www.arpansa.gov.au/Regulation/Regulators.

Responsible person[5]

In relation to any radioactive material, radiation-producing equipment, prescribed radiation facility or premises on which radiation sources are stored or used means the legal person:

(a) having overall management responsibility including responsibility for the security and maintenance of the radioactive source, radiation-producing equipment, facility or premises

(b) having overall control over who may use the radioactive source, radiation-producing equipment, facility or premises

(c) in whose name the radioactive source, radiation-producing equipment, facility or premises would be registered if this is required.

Safety

For the purposes of this Code, 'safety' means the protection of people and the environment against radiation risks, and the safety of facilities and activities that give rise to radiation risks. 'Safety' as used here includes 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 non-radiation related aspects of safety.

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. Safety measures include actions to prevent incidents and arrangements put in place to mitigate their consequences if they were to occur.

Sealed (radioactive) source

A radioactive source in which the radioactive material is:

(a) permanently sealed in a capsule, or

(b) closely bonded and in a solid form.

Security

The prevention of, detection of, and response to, criminal or intentional unauthorised acts involving or directed at nuclear material, other radioactive material, associated facilities, or associated activities.

Supervised area

A defined area not designated as a controlled area but for which occupational exposure conditions are kept under review, even though specific protection measures or safety provisions are not normally needed.

[5] Note: A Responsible Person has the same meaning as a Person Conducting a Business or Undertaking (PCBU), as defined in the Commonwealth *Work Health and Safety Act 2011*, who is conducting a business or undertaking that uses radiation and requires an authorisation under appropriate legislation.

Unsealed (radioactive) source

A radioactive source in which the radioactive material is neither:

(a) permanently sealed in a capsule, nor

(b) closely bonded and in a solid form.

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