



Australian Government

**Australian Radiation Protection
and Nuclear Safety Agency**

CODE – CONSULTATION DRAFT

Radiation Protection in Planned Exposure Situations

**Radiation Protection Series C-1
MMMM 201Y**

*This publication was approved by the Radiation Health Committee on ##
201# and on ## #### 201# the Radiation Health and Safety Advisory
Council advised the CEO to adopt this generic code*

Comment on the draft document should be forwarded by **5 JUNE 2015** to:

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

Radiation Protection Series

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) produce a number of publications to promote practices which protect human health and the environment from harmful effects of radiation. For the publication categories within the Radiation Protection Series, namely **Fundamentals**, **Codes** and **Guides**, ARPANSA is assisted in this task by the Radiation Health Committee (RHC), which oversees the preparation of draft documents and recommends publication to the Radiation Health and Safety Advisory Council, which endorses documents and recommends their publication by the CEO of ARPANSA.

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 publication are informed by public comment during drafting, and are also subject to a process of assessment of regulatory impact. Further information on these consultation processes may be obtained by contacting ARPANSA.

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ARPANSA also produces a range of other publications that provide general or technical information on radiation related topics. This includes technical reports, fact sheets, regulatory guides etc. While these are also published by ARPANSA, they are produced independently from the RHC.

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Further information can be obtained by telephoning ARPANSA on 1800 022 333 (freecall within Australia) or +61 (03) 9433 2211.



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

Published by the Chief Executive Officer of ARPANSA in MMMM 201Y

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 radiation 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 (201Y)* 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.

This Code is not intended to apply to existing exposure situations, emergency exposure situations other than where the emergency situation arises from the planned activity, or exposure of a person to radiation received as a patient undergoing medical diagnosis or therapy, as a volunteer in medical research, or non-occupational exposure received as a consequence of assisting an exposed patient. These exposure situations are expected to be dealt with by later publications in the RPS or, in the case of medical exposures, by the *Code of Practice for Radiation Protection in the Medical Applications of Ionizing Radiation (2008)* and supporting Safety Guides.

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 (republished 2002)* (RPS1).

Carl-Magnus Larsson
CEO of ARPANSA

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Note: Terms described in the Glossary appear in **bold type** on their first occurrence in the text.

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1. INTRODUCTION

1.1 Citation

This publication may be cited as the *Code for Radiation Protection in Planned Exposure Situations (201Y)*.

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 ICRP (ICRP 1990). Since then, new ICRP recommendations have been published (ICRP 2007) and the International Atomic Energy Agency (IAEA) has published the *IAEA Safety Fundamentals* [IAEA, 2006]. Together with guidance on security developed by the IAEA in collaboration with its Member States, these documents have informed the development of Australia's *Fundamentals for Protection Against Ionising Radiation (2014)*, which sets out the underlying principles that form the basis of the system of **radiation protection** used to manage risks from **ionising radiation** in Australia. This publication is referred to as the Fundamentals in this Generic Code.

As stated in the *Fundamentals*, the objective of radiation protection, safety and security is to protect people and the **environment** from harmful effects of ionising radiation. This objective must be achieved without unduly limiting the operation of facilities or the conduct of activities that give rise to radiation risks and where the use of radiation has been deemed to result in net benefit, i.e. is **justified**. Therefore, the system of radiation protection and safety aims to assess, manage and control **exposure** to radiation so that radiation risks, including risks of health effects and risks to the environment, are reduced to the extent reasonably achievable and radiation doses remain within limits.

The *Fundamentals* set the overall strategy for Australia in relation to radiation protection; the high-level principles set out in the *Fundamentals* may be implemented through adoption of relevant Codes and Guides. This Code applies to **planned exposure situations**.

1.3 Purpose

The purpose of this document is to set out the requirements in Australia for the protection of occupationally exposed persons, the public and the environment in planned exposure situations.

This Code is directed 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 planned exposure situations.

Regulators will use this document in the regulation of radiation **practices** in planned exposure situations.

36 **1.4 Scope**

37 This Code applies to planned exposure situations and the control of **occupational exposure**,
38 **public exposure** and **environmental exposure**.

39 This Code does not apply to:

- 40 (a) **existing exposure situations**
- 41 (b) **emergency exposure situations**, except for emergency situations arising from the
42 planned activity
- 43 (c) patients undergoing medical or dental procedures involving radiation
- 44 (d) participants in medical research involving exposure to radiation
- 45 (e) clients of chiropractors undergoing chiropractic procedures involving exposure to
46 radiation.

47 **1.5 Interpretation**

48 In this Code, unless the contrary intention appears, a reference to a clause is a reference to the
49 relevant clause of this Code; and a reference to a Schedule, or part thereof, is a reference to
50 the relevant Schedule, or part thereof, of this Code.

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

54 The term 'must' when it appears in this Code means that something is mandatory.

55

56 2. RESPONSIBILITIES OF THE RESPONSIBLE PERSON

57 2.1 Control of exposure to radiation

58 2.1.1 The Responsible Person must ensure protection from exposure to radiation by the
59 application of radiation control measures that are:

60 (a) **optimised** taking into account:

61 (i) the exposures controlled

62 (ii) the social and economic factors

63 (iii) the impact on beneficial uses of radiation

64 (b) based on a hierarchy as follows:

65 (i) elimination of the radiation exposure hazard

66 (ii) substitution of the radiation hazard by a method that does not involve a
67 source of radiation

68 (iii) incorporation of engineered controls to:

69 A. limit access to radiation by designation of **controlled** and **supervised**
70 **areas**

71 B. reduce radiation levels in the workplace

72 C. reduce intakes of **radioactive materials** in the workplace

73 D. reduce the amount of radioactive waste generated

74 (iv) application of administrative controls through:

75 A. work procedures

76 B. training

77 C. installation of warning signs and labels

78 (v) where other means of controlling exposure are not practicable, not
79 sufficient, or may not optimise protection, the use of appropriate personal
80 protective equipment.

81 2.2 Radiation Management Plan

82 2.2.1 The Responsible Person must ensure that:

83 (a) a radiation management plan incorporating the components listed in Part A1 of
84 Schedule A of this Code is developed, documented, resourced, implemented and
85 regularly reviewed

86 (b) the radiation management plan prepared under clause 2.2.1(a) addresses
87 protection commensurate with the level of radiation risk that it seeks to mitigate of:

88 (i) occupationally exposed persons

89 (ii) members of the public

90 (iii) the environment

- 91 (c) all occupationally exposed persons affected by the radiation management plan
92 prepared under clause 2.2.1(a):
- 93 (i) comply with the radiation management plan
94 (ii) are aware of, and comply with, the obligations imposed on occupationally
95 exposed persons outlined in Section 3.
- 96 2.2.2 Where a practice generates radioactive waste, the Responsible Person must ensure
97 that the Radiation Management Plan specified in clause 2.2.1 includes a section on
98 Radioactive Waste Management incorporating the components listed in Part A2.1 of
99 Schedule A of this Code.
- 100 2.2.3 The Responsible Person must ensure that:
- 101 (a) the Radiation Management Plan is implemented for all stages of development and
102 operation of the practice¹, and
- 103 (b) the dose limits specified in Schedule B for occupationally exposed persons under
104 their care and Schedule C for members of the public are not exceeded.
- 105 2.2.4 Where a practice may result in an incident or accident that could deliver a high dose of
106 radiation² or severe contamination³ of the environment, the Responsible Person must
107 ensure that the radiation management plan includes a response plan containing the
108 provisions included in Schedule D.
- 109 2.2.5 The Responsible Person must ensure that radiation protection is optimised by the
110 adoption of appropriate **dose constraints** into the radiation management plan during:
- 111 (a) all stages of development and operation of the practice¹
112 (b) the design, construction and operation of the workplace
113 (c) design and implementation of work procedures.
- 114 2.2.6 The Responsible Person must periodically provide written advice to the **relevant**
115 **regulatory authority**:
- 116 (a) stating the extent of compliance with the radiation management plan
117 (b) detailing steps taken to remediate areas of non-compliance.
118

¹ For example, this includes preparatory work, decommissioning and waste management when the radiation source is radioactive material.

² A high dose of radiation is more than 1 Sv, where acute effects of short-term exposures will occur.

³ Severe contamination is where evacuation or access control is required.

119 2.3 Implementation of the Radiation Management Plan

120 2.3.1 The Responsible Person must:

- 121 (a) demonstrate that the radiation dose estimated to have been received by:
- 122 (i) any occupationally exposed person under their care does not exceed the
- 123 dose limits specified in Schedule B
- 124 (ii) any member of the public does not exceed the dose limits specified in
- 125 Schedule C
- 126 (b) if applicable, engage with other Responsible Persons at the same site⁴ to ensure
- 127 coordination of radiation protection efforts at the site
- 128 (c) have access to expert advice sufficient to develop and implement the radiation
- 129 management plan
- 130 (d) provide for consultation with occupationally exposed persons who may be
- 131 exposed to radiation in their work
- 132 (e) document the induction and training programs conducted in accordance with the
- 133 radiation management plan and record participation
- 134 (f) ensure that all necessary resources for implementing the radiation management
- 135 plan are provided, including personal protective equipment, safety devices, and
- 136 radiation monitoring equipment
- 137 (g) ensure that when an occupationally exposed female has declared to the
- 138 Responsible Person that she is pregnant, additional controls are considered to
- 139 protect the embryo/foetus to a level broadly similar to that provided for members
- 140 of the public
- 141 (h) ensure that persons exposed to radiation from sources within the practice that
- 142 are not required by or directly related to their work have the same level of
- 143 protection against such exposure as members of the public
- 144 (i) not employ a person under the age of 16 under conditions where that person may
- 145 be exposed to radiation exceeding the **effective dose** limit for members of the
- 146 public specified in Schedule C
- 147 (j) for each dose constraint that has been adopted, demonstrate that:
- 148 (i) the level of protection achieved is compatible with that constraint
- 149 (ii) an appropriate review is undertaken if the constraint has been exceeded
- 150 (k) when any person reports a matter that may compromise radiation protection,
- 151 ensure that appropriate action is taken to investigate and, if necessary, rectify the
- 152 matter
- 153 (l) report without delay to the relevant regulatory authority each incident or
- 154 accident that exceeds criteria specified in the radiation management plan

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

- 155 (m) take appropriate action in the event of an incident or accident as set out in the
156 radiation management plan
- 157 (n) advise the relevant regulatory authority as soon as practicable of:
- 158 (i) the cause of each incident or accident
- 159 (ii) the consequences of each incident or accident
- 160 (iii) the steps taken to remedy the situation
- 161 (iv) the steps taken to prevent a recurrence
- 162 (o) keep records relating to exposure of the workforce
- 163 (p) provide a copy of the dose record of an occupationally exposed person to that
164 person:
- 165 (i) periodically
- 166 (ii) on request
- 167 (iii) on termination of employment
- 168 (q) provide details of the doses estimated to have been received by an occupationally
169 exposed person to the relevant regulatory authority or its approved central record
170 keeping agency
- 171 (r) maintain records of radioactive waste inventories
- 172 (s) ensure measures are in place to optimally protect visitors from exposure to
173 radiation
- 174 (t) control access to specified areas.

175 **2.4 Radiation monitoring and dose assessment**

- 176 2.4.1 The Responsible Person must ensure that the system for radiation monitoring for
177 occupational, public and environment exposures provides for the establishment and
178 maintenance of a monitoring program that addresses:
- 179 (a) identification of sources of radiation exposure and pathways
- 180 (b) radiation dose assessment allowing for all exposure pathways
- 181 (c) detection of changes in the circumstances of exposure
- 182 (a) acquisition of sufficient information to enable **optimisation** measures to be
183 adopted and reviewed.
- 184

185 **2.5 Assessment of compliance with radiation protection requirements**

186 2.5.1 The Responsible Person must keep sufficient evidence to be able to demonstrate, at
187 any time, that:

- 188 (a) all doses estimated to have been received by occupationally exposed persons
189 under their care are below the relevant limit in Schedule B
- 190 (b) all doses to members of the public are below the relevant limit in Schedule C
- 191 (c) optimisation of radiation protection has been carried out.

192 **2.6 Record keeping**

193 2.6.1 The Responsible Person must ensure that a record keeping system is implemented that
194 includes the following:

- 195 (a) **authorisations** granted by the relevant regulatory authority
- 196 (b) the radiation management plan
- 197 (c) details of training courses and of participation by occupationally exposed persons
- 198 (d) details of radiation monitoring and dose assessment specified in clause 2.4.1(e)
- 199 (e) inventories of radiation sources and radioactive waste
- 200 (f) details of incidents and accidents involving exposure to radiation and of corrective
201 measures taken.

202 2.6.2 The Responsible Person must ensure that records kept under clause 2.6.1 are available
203 for inspection by the relevant regulatory authority.

204 2.6.3 The Responsible Person must ensure that records of doses assessed to have been
205 received by an occupationally exposed person, including details of monitoring results
206 and dose calculation methods, are kept:

- 207 (a) during the working life of the occupationally exposed person
- 208 (b) afterwards for not less than 30 years after the last dose assessment
- 209 (c) at least until the occupationally exposed person reaches, or would have reached,
210 the age of 75 years.

211 2.6.4 When a practice terminates, the Responsible Person must pass to the relevant
212 regulatory authority the records of radiation doses assessed to have been received by
213 occupationally exposed person under their care and members of the public and any
214 other records.

215 **2.7 Radiation Safety Training⁵**

216 2.7.1 The Responsible Person must provide induction training, refresher training and other
217 relevant information to occupationally exposed persons.

218 2.7.2 The Responsible Person must ensure that the type and level of training required under
219 clause 2.7.1 and its method of presentation is:

220 (a) consistent with the characteristics of the occupationally exposed persons to
221 whom it is directed

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

223 (c) documented, with records of participation retained in accordance with section
224 2.6.

225

226

⁵ Training and other relevant information should take into account appropriate consultation with the workforce. Training and induction programs may require recognition by the relevant regulatory authority and advice as to the suitability of a given program may need to be sought accordingly.

227 **3. RESPONSIBILITIES OF OCCUPATIONALLY EXPOSED**
228 **PERSONS**

229 **3.1 Occupationally exposed persons**

230 3.1.1 Occupationally exposed persons must, to the extent that they are capable, comply with
231 all reasonable measures to control and assess exposure to radiation in the workplace,
232 including:

- 233 (a) follow the radiation protection requirements specified in the radiation
234 management plan
- 235 (b) comply with the legitimate instructions of the Responsible Person in relation to
236 radiation protection
- 237 (c) participate in training related to radiation protection, as required
- 238 (d) make proper use of the training received to ensure their own health and safety
239 and that of other persons
- 240 (e) make proper use of protective and monitoring equipment provided by the
241 Responsible Person
- 242 (f) upon employment, provide to the Responsible Person, or assist the Responsible
243 Person to obtain, details of their prior occupational radiation exposure, as
244 necessary
- 245 (g) report to the Responsible Person any matter of which they are aware that may
246 compromise radiation protection.

247
248

249 SCHEDULE A – RADIATION MANAGEMENT PLAN

250 A1 Preparation of the Radiation Management Plan

251 A1.1 The Radiation Management Plan must:

- 252 (a) provide a brief description of the type and scope of the practice
- 253 (b) provide a summary of the radiation sources dealt with in the practice
- 254 (c) identify the authorisation documents provided by the radiation regulatory
255 authority.

256 A1.2 The Radiation Management Plan⁶ must include, where relevant to the practice:

- 257 (a) information about radiation protection principles – in particular, optimisation
258 of protection, and **limitation** of individual dose
- 259 (b) a description of each type of radiation hazard under the care of the
260 Responsible Person
- 261 (c) a safety and compliance assessment of the practice over its entire anticipated
262 life-cycle
- 263 (d) the measures to control exposures resulting from ongoing operations
- 264 (e) details of other responsible persons at the same site and of mechanisms for
265 engagement with any radiation management, or other relevant safety,
266 committee established at the site to ensure coordination of radiation
267 protection efforts
- 268 (f) the measures to be applied to ensure that protection is optimised, including:
269 (i) control of areas and equipment, and
270 (ii) the specification of dose constraints, where appropriate, for particular
271 categories of work or occupationally exposed persons (including those
272 who have declared their pregnancy),
- 273 (g) the measures to be applied to ensure environmental protection
- 274 (h) personal radiation monitoring requirements for relevant occupationally
275 exposed persons
- 276 (i) the methodology for assessing radiation doses received by those exposed
- 277 (j) the system for monitoring, recording and communicating exposure to
278 radiation
- 279 (k) details of personal protective equipment, safety devices and ancillary
280 equipment to be used by any person exposed to radiation from sources in the
281 practice

⁶ The Radiation Management Plan may make reference to, and utilise, other documented safety procedures and work practices.

- 282 (l) technical requirements, such as **defence-in-depth** and good engineering
283 practice
- 284 (m) methods for optimising shielding, where appropriate, so that external
285 radiation exposure rates are kept as low as reasonably achievable, economic
286 and social factors being taken into account
- 287 (n) security and access controls for radiation sources
- 288 (o) processes for verification of safety and security through monitoring and safety
289 assessments
- 290 (p) the radiation protection measures to ensure safe and secure storage of
291 radioactive material
- 292 (q) implementation of the requirements for the transport of radioactive material
- 293 (r) the roles and responsibilities of all persons involved in ensuring protection of
294 the public, occupationally exposed persons, and the environment
- 295 (s) the provision of information to and appropriate induction and on-going
296 training for occupationally exposed persons
- 297 (t) the training, qualifications, roles and responsibilities of occupationally exposed
298 persons
- 299 (u) arrangements for obtaining expert advice in radiation protection
- 300 (v) management systems for:
- 301 (i) establishing a safety culture
- 302 (ii) ensuring that quality management principles are applied to radiation
303 protection
- 304 (w) action to be taken if the radiation doses to occupationally exposed persons or
305 members of the public are found to exceed the dose constraints
- 306 (x) work practices and protocols for all practices involving exposure to ionising
307 radiation
- 308 (y) procedures for incident response or remedial action
- 309 (z) procedures for the reporting of any fault with a radiation source that could
310 compromise safety
- 311 (aa) a list of actions necessary to manage a radiation incident or accident, including
312 reporting (both internal and to the radiation regulatory authority) and
313 investigation of the radiation incident
- 314 (bb) a plan for responding to incidents and accidents involving exposure to
315 radiation and for mitigating their consequences
- 316 (cc) emergency procedures in response to a radiation incident
- 317 (dd) mechanisms for, and frequency of, review of the Radiation Management Plan
- 318 (ee) any other requirement that may have a bearing on radiation safety.

- 319 A1.3 Where other documented safety procedures and work practices that exist within the
320 organisation are referred to or used:
- 321 (a) the Responsible Person must have authority over the safety procedures and
322 work practices referred to
 - 323 (b) the safety procedures and work practices referred to must not be modified
324 without consideration of the effect on the Radiation Management Plan.

325 **A2 Requirements for radioactive waste management**

- 326 A2.1 A practice that includes Radioactive Waste Management must include in its Radiation
327 Management Plan:
- 328 (a) measures to control exposures resulting from
 - 329 (i) the management and disposal of radioactive waste
 - 330 (ii) waste or secondary products that may no longer require regulatory
331 control
 - 332 (b) an inventory of the radioactive waste including details of mixed waste hazards⁷
 - 333 (c) details of the necessary equipment and instructions for the safe handling and
334 disposal of all radioactive waste in accordance with any authorisation issued by
335 the relevant regulatory authority
 - 336 (d) procedures to ensure that all persons involved in the handling of radioactive
337 waste receive, understand and comply with the radioactive waste
338 management requirements
 - 339 (e) details of the storage of all radioactive waste in adequately shielded containers
340 or in a secure shielded room, as appropriate to the nature of the waste, so as
341 to ensure that no person receives an effective dose greater than the relevant
342 limit,
 - 343 (f) procedures to ensure that all radioactive waste leaving the facility, either as
344 gaseous or liquid effluent discharged to the environment or sewerage system,
345 does so within the relevant requirements,
 - 346 (g) the measures to be applied to ensure compliance with any operational limits
347 or conditions set by the relevant regulatory authority, including discharge
348 limits for radioactive materials,
 - 349 (h) the measures to be applied to ensure environmental protection
 - 350 (i) requirements for notification to the relevant regulatory authority of any
351 radiation incident which has, or may have, resulted, or may result in:
 - 352 (i) damage to the containment of radioactive waste during transport, or
 - 353 (ii) a discharge of effluent in excess of the relevant discharge limit.
- 354

⁷ Radioactive waste may also be flammable, toxic, infectious or putrescible material.

355 **SCHEDULE B – DOSE LIMITS FOR OCCUPATIONALLY EXPOSED**
 356 **PERSONS**

357 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

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

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

365 ³ The equivalent dose limit for the skin applies to the dose averaged over any 1 cm² area
 366 of skin, regardless of the total area exposed.

367

368 **SCHEDULE C – DOSE LIMITS FOR MEMBERS OF THE PUBLIC**

369 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

- 370 ¹ The limits apply to the sum of the relevant doses from external exposure in the
 371 specified period and the 50-year committed dose (to age 70 years for children) from
 372 intakes in the same period.
- 373 ² In special circumstances, a higher value of effective dose could be allowed in a single
 374 year, provided that the average over five years does not exceed 1 mSv per year.
- 375 ³ The equivalent dose limit for the skin applies to the dose averaged over any 1 cm² area
 376 of skin, regardless of the total area exposed.
- 377

378 SCHEDULE D – INCIDENT OR ACCIDENT PLANNING

379 D1 Response plans

380 D1.1 Response plans for circumstances where an incident or accident may result in
381 exposure to high doses of radiation⁸ or severe contamination⁹ of the environment
382 must include provision for:

- 383 (a) access to appropriate medical care of exposed persons
- 384 (b) identifying the roles and functions of relevant organisations that will be involved
- 385 (c) the availability of personnel trained to deal with the situation
- 386 (d) the availability of appropriate emergency equipment
- 387 (e) specified procedures to bring the situation under control
- 388 (f) specified measures to mitigate the impacts of the incident or accident
- 389 (g) assessment of doses received as a consequence of an incident or accident
- 390 (h) necessary equipment, methodologies and procedures for assessment of doses
391 received as a consequence of the incident or accident
- 392 (i) arrangements with relevant first responders and rescue service
- 393 (j) information to the occupationally exposed persons on site
- 394 (k) providing relevant information to the public
- 395 (l) appropriate counselling to any person affected
- 396 (m) acquiring information for assessing the cause of the incident or accident
- 397 (n) classifying the incident or accident
- 398 (o) reporting the incident or accident to line management and regulatory authorities
- 399 (p) consideration of non-radiological consequences of the incident or accident in the
400 context of possible evacuation of the workplace
- 401 (q) conditions, criteria and objectives to be met for declaring the incident or accident
402 terminated.
- 403

⁸ A high dose of radiation is more than 1 Sv, where acute effects of short-term exposures will occur.

⁹ Severe contamination is where evacuation or access control is required.

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423

424 GLOSSARY OF TERMS

425 **Accident**

426 An event which causes, or has the potential to cause, occupationally exposed persons or
427 members of the public to be exposed to radiation from which the individual doses or collective
428 doses received do not lie within the range of variation which is acceptable for normal
429 operation. An accident may result from human error, equipment failure or other mishap; it
430 may require emergency action to save life or to safeguard health, property or the
431 environment; it requires investigation of its causes and consequences and, possibly, corrective
432 action within the implementation of the radiation management plan; and it may require
433 remedial action to mitigate its consequences.

434 **Authorisation**

435 A written permission by the relevant regulatory authority that a proposal may be put into
436 effect.

437 **Controlled area**

438 An area to which access is subject to control and in which occupationally exposed persons are
439 required to follow specific procedures aimed at controlling exposure to radiation.

440 **Defence-in-Depth**

441 The application of more than a single protective measure for a given safety objective such that
442 the objective is achieved even if one or more of the protective measures fails.

443 **Dose**

444 A generic term that may mean absorbed dose, equivalent dose or effective dose depending on
445 context.

446 **Dose constraint**

447 A prospective and source-related restriction on the individual dose from a source, which
448 provides a basic level of protection for the most highly exposed individuals from a source, and
449 serves as an upper bound on the dose in optimisation of protection for that source. For
450 occupational exposures, the dose constraint is a value of individual dose used to limit the
451 range of options considered in the process of optimisation. For public exposure, the dose
452 constraint is an upper bound on the annual doses that members of the public should receive
453 from the planned operation of any controlled source.

454 **Effective dose**

455 The sum of the tissue equivalent doses, each multiplied by the appropriate tissue weighting
456 factor.

457 **Emergency exposure situation**

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

461 **Environment**

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

- 465 • non-human species, both animal and plant, and their biodiversity;
- 466 • environmental goods and services such as the production of food and feed;
- 467 • resources used in agriculture, forestry, fisheries and tourism;
- 468 • amenities used in spiritual, cultural and recreational activities;
- 469 • media such as soil, water and air; and
- 470 • natural processes such as carbon, nitrogen and water cycles.

471 **Environmental exposure**

472 The exposure of wildlife¹⁰. This includes exposure of animals, plants and other organisms in the
473 natural environment.

474 **Equivalent dose**

475 The absorbed dose delivered by a type of radiation averaged over a tissue or organ multiplied
476 by the radiation weighting factor for the radiation type.

477 **Existing exposure situation**

478 A situation of exposure that already exists when a decision on the need for control needs to be
479 taken, including prolonged exposure situations after emergencies.

480 **Exposure**

481 The circumstance of being exposed to radiation,

482 **Incident**

483 An event that causes, or has the potential to cause, abnormal exposure of employees or of
484 members of the public and that requires investigation of its causes and consequences and may
485 require corrective action within the program for control of radiation, but which is not of such
486 scale as to be classified as an accident.

487 **Ionising radiation**

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

¹⁰ An animal or plant living within its natural environment.

490 **Justified**

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

495 **Limitation**

496 The requirement that radiation doses and risks should not exceed a value regarded as
497 unacceptable.

498 **Medical exposure**

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

503 **Occupational exposure**

504 All exposure of workers incurred in the course of their work, with the exception of excluded
505 exposures¹¹ and exposures from exempt practices or exempt sources.

506 **Optimisation**

507 Optimisation of protection (and safety) is the process of determining what level of protection
508 and safety makes exposures, and the probability and magnitude of potential exposures, 'as low
509 as reasonably achievable, economic and societal factors being taken into account' (ALARA), as
510 required by the International Commission on Radiological Protection System of Radiological
511 Protection.

512 **Optimised**

513 See 'Optimisation'.

514 **Planned exposure situation**

515 A situation involving the deliberate introduction and operation of sources. Planned exposure
516 situations may give rise both to exposures that are anticipated to occur (normal exposures)
517 and to exposures that are not anticipated to occur (potential exposures).

¹¹ Excluded exposures include uncontrollable exposures and exposures that are essentially not amenable to control regardless of their magnitude. Uncontrollable exposures are those that cannot be restricted by regulatory action under any conceivable circumstance, such as exposure to the radionuclide potassium-40 incorporated into the human body. Exposures that are not amenable to control are those for which control is obviously impractical, such as exposure to cosmic rays at ground level.

- 518 **Practice**
- 519 A type of human activity, including a business undertaking or a medical application, which may
520 expose people to ionising radiation and which is, in principle, subject to regulatory
521 requirements for radiation protection.
- 522 **Public exposure**
- 523 Exposure incurred by members of the public from radiation sources, excluding any
524 occupational or medical exposure and the normal local natural background radiation but
525 including exposure from authorised sources and practices.
- 526 **Radiation**
- 527 Electromagnetic waves or quanta, and atomic or sub-atomic particles, propagated through
528 space or through a material medium.
- 529 **Radiation protection**
- 530 The protection of people from harmful effects of exposure to ionising radiation, and the means
531 for achieving this.
- 532 **Radiation source**
- 533 Anything that may emit ionising radiation.
- 534 **Radioactive material**
- 535 Material which spontaneously emits ionising radiation as a consequence of radioactive decay.
- 536 **Relevant regulatory authority**
- 537 The radiation protection authority or authorities designated, or otherwise recognised, for
538 regulatory purposes in connection with protection and safety relating to applications of
539 ionising radiation. A list of relevant regulatory authorities in Australia can be found on
540 ARPANSA's website at www.arpansa.gov.au/Regulation/Regulators.
- 541 **Responsible person**
- 542 In relation to any radioactive material, radiation-producing equipment, prescribed radiation
543 facility or premises on which radiation sources are stored or used means the legal person:
- 544 (a) having overall management responsibility including responsibility for the security and
545 maintenance of the radioactive source, radiation-producing equipment, facility or
546 premises
- 547 (b) having overall control over who may use the radioactive source, radiation-producing
548 equipment, facility or premises
- 549 (c) in whose name the radioactive source, radiation-producing equipment, facility or
550 premises would be registered if this is required.
- 551 **Supervised area**
- 552 an area in which working conditions are kept under review but in which special procedures to
553 control exposure to radiation are not normally necessary.