

**National standard for
limiting occupational exposure
to ionizing radiation**

[NOHSC:1013(1995)]

June 1995

The National Occupational Health and Safety Commission has declared *a National standard for limiting occupational exposure to ionizing radiation*.

National standards declared by the National Commission under s.38(1) of the *National Occupational Health and Safety Commission Act 1985 (Cwlth)* are documents which prescribe preventive action to avert occupational deaths, injuries and diseases. Most national standards deal with the elimination/reduction or management of specific workplace hazards. In appropriate circumstances, national standards may take the form of national model regulations.

The expectation of the Commonwealth Government and the National Commission is that national standards will be suitable for adoption by Commonwealth, State and Territory governments. Such action will increase uniformity in the regulation of occupational health and safety throughout Australia and contribute to the enhanced efficiency of the Australian economy.

It should be noted that National Commission documents are instruments of an advisory character, except where a law, other than the National Occupational Health and Safety Commission Act, or an instrument made under such a law, makes them mandatory. The application of any National Commission document in any particular State or Territory is the prerogative of that State or Territory.

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Preface

This *National standard for limiting occupational exposure to ionizing radiation* will serve to identify the provisions which are to be made in the regulations of States, Territories and the Commonwealth for the control of occupational exposure to radiation. It is recognised that legislation, including regulations, may already exist which covers all or part of the scope of this *Standard*. It is also recognised that it may not be appropriate to take up this *Standard* verbatim because of differing legislative frameworks and drafting conventions in each State and Territory and in the Commonwealth. However, it is expected that the implementation of the provisions contained in this *Standard* will be nationally consistent. This *Standard* deals only with occupational health and safety matters related to exposure to ionizing radiation; the appropriate authority should be consulted about other radiation control requirements which may apply.

The complementary *Recommendations for limiting exposure to ionizing radiation* (1995) is a guidance note which describes the principles and practice on which this *Standard* is based and provides interpretive and reference material. Technical terms used in this *Standard* have the meaning given in the Glossary. It should be noted that one of the established principles of radiation protection is the concept of 'optimization' of exposure to ionizing radiation, that is, the requirement to keep exposures as low as reasonably achievable; economic and social factors being taken into account. This concept is compatible with occupational health and safety standards in other fields which require safety measures to be undertaken to an extent that is 'practicable'. Optimization of protection is also compatible with the concept of minimizing risk to health, used in other occupational health and safety contexts.

In applying the requirements of the *Standard* relating to pregnant employees, care should be taken to avoid unlawful discrimination on the basis of sex. Men and women may be treated differently for a legitimate reason, provided that it involves no less favourable treatment for one or the other.

The *Standard* and the *Recommendations* were developed by an Expert Working Group on behalf of both the National Occupational Health and Safety Commission (NOHSC) and the National Health and Medical Research Council (NHMRC), and were released for a three-month period of public comment from May to July 1994. Comments relating to occupational exposure and to the *Standard* were reviewed by a joint NHMRC/NOHSC Expert Review Group, and all the public comments together with the joint Expert Review Group report were reviewed by the Radiation Health Standing Committee of the NHMRC. The Radiation Health Standing Committee then prepared a final draft which was submitted to the National Health Advisory Committee of the NHMRC and to the Standards Development Standing Committee of the NOHSC with the recommendation that it be forwarded to the Council and to the National Commission.

The National Commission, having ensured that the public comment on the draft had been taken into account, now declares this *National standard for limiting occupational exposure to ionizing radiation* under s.38(1) of the National Occupational

Health and Safety Commission Act 1985. The Standard is endorsed by the National Health and Medical Research Council. Adoption of this *Standard* will promote a consistent basis for the control of exposure to ionizing radiation in workplaces throughout Australia. The *Standard* will be subject to periodic review.

1. Citation

1.1 This *Standard* may be cited as the *National standard for limiting occupational exposure to ionizing radiation* (1995).

2. Objective

2.1 The objectives of this *Standard* are to limit the risk to health arising from exposure to ionizing radiation in the workplace and to optimize radiation protection by setting common essential requirements for the control of exposure to radiation, including the specification of employer's duties and employee's duties.

3. Scope and application

3.1 This *Standard* shall apply to all workplaces in which employees are occupationally exposed, or in which there is a potential for occupational exposure, to ionizing radiation, unless exempted by the appropriate authority. A workplace may be exempted from implementing the measures required by this *Standard* if the exemption criteria given in **Schedule 2** are met.

3.2 When exposure to ionizing radiation occurs, or may occur, in a workplace to which the *Standard* has not been applied, the employees in that workplace shall be treated as members of the public for dose limitation purposes by the operator responsible for the operation which causes the exposure.

4. Interpretation

4.1 This *Standard* is based on the principles described in the *Recommendations for limiting exposure to ionizing radiation* (1995) and terms used in this *Standard* have the meaning given in the *Recommendations*. In addition, the words 'shall' and 'should' have a special meaning. 'Shall' indicates that the requirement to which it refers is considered to be mandatory. 'Should' indicates a recommendation - that is; a requirement that is to be applied as far as is practicable in the interests of reducing risk.

5. Employers' duties

5.1 An employer shall ensure that a program of radiation protection is devised and implemented. In fulfilling this requirement, the employer shall:

- (a) ensure that, at the planning stage of an operation, the workplace and work procedures are designed to keep exposures to ionizing radiation as low as reasonably achievable, economic and social factors being taken into account, making use of dose constraints, where appropriate, for particular categories of employee, including employees not directly involved in work with radiation (see Chapter 7);
- (b) obtain all necessary approvals and authorizations for the practice from the appropriate authority (see Chapter 8);

- (c) appoint a Radiation Safety Officer, or Officers, as required by the appropriate authority;
- (d) provide for consultation with employees who may be exposed to radiation in their work, and with employees' representatives, where appropriate;
- (e) provide information to and appropriate induction and on-going training for employees who may be exposed to radiation in their work (see Chapter 9);
- (f) ensure that a plan for the control of exposure to radiation is developed, approved, implemented and regularly reviewed, and that the workforce is consulted in the planning and review process (see Chapter 10);
- (g) ensure that all necessary resources for implementing the plan for the control of exposure are provided, including personal protective equipment and radiation monitoring equipment;
- (h) ensure that a plan for monitoring exposure to radiation and for assessing radiation doses received by those exposed is developed, approved, implemented and regularly reviewed (see Chapter 11);
- (i) endeavour to ensure that exposure to radiation in the workplace is kept as low as reasonably achievable, economic and social factors being taken into account;
- (j) not employ persons under the age of 16 under conditions where they are directly that involved in work with radiation;
- (k) demonstrate that the doses estimated to have been received by employees comply with the dose limits specified in **Schedule 1** (see Chapter 12);
- (l) demonstrate that, where a dose constraint has been adopted in the design of the working environment for employees not directly involved in work with radiation, the level of protection achieved is compatible with that constraint (see Chapter 12);
- (m) when an employee declares that she is pregnant, ensure that appropriate measures are taken to control her exposure so that doses which may be received by the foetus during the remainder of the pregnancy, while the employee is at work, are consistent with the public effective dose limit specified in **Schedule A** of the Recommendations;
- (n) when an employee reports a matter which may compromise radiation protection, as required in Subsection 6.1(g), ensure that appropriate action is taken to investigate and, if necessary, rectify the problem;
- (o) ensure that a plan for dealing with incidents, accidents and emergencies involving exposure to radiation is developed, approved, implemented and regularly reviewed, and that the workforce is consulted in the planning and review process (see Chapter 13);
- (p) inform the appropriate authority without delay of the occurrence of an incident or accident and, as soon as practicable, of its cause and consequences and of the steps taken to remedy the situation and to prevent a recurrence (see Chapter 13);
- (q) keep records relating to exposure of the workforce (see Chapter 14);
- (r) provide copies of an employee's dose records to the employee on request and on termination of employment; and

- (s) provide a periodic report to the appropriate authority, as required, evaluating the performance of the radiation protection program.

5.2 The employer may seek an exemption from some of these requirements, where they are not all appropriate in a particular circumstance, by making application to the appropriate authority.

6. Employees' duties

6.1 Employees who may be exposed to radiation in the workplace shall, to the extent that they are capable, comply with all reasonable measures to control and assess exposure to radiation in the workplace, including:

- (a) following the radiation protection practices specified in the plan for the control of exposure to radiation;
- (b) complying with the legitimate instructions of the employer, the Radiation Safety Officer or their agents, in relation to radiation protection;
- (c) participating in training related to radiation protection, as required;
- (d) making proper use of the training received to ensure their own health and safety and that of other persons;
- (e) making proper use of protective and monitoring equipment provided by the employer;
- (f) upon employment, providing to the employer, or assisting the employer in obtaining, details of their prior radiation exposure, as necessary; and
- (g) reporting to the employer, the Radiation Safety Officer or their agents any matter of which they are aware which may compromise radiation protection.

6.2 An employee who becomes pregnant should advise the employer as soon as practicable, so that appropriate measures may be taken to control her exposure and to provide the level of protection recommended in Subsection 5.1(m).

7. Planning and design

7.1 The employer shall ensure that the workplace and work procedures are designed to keep exposure to radiation as low as reasonably achievable and to keep doses received below the relevant dose limits. Dose constraints for particular categories of employee should be used when appropriate. For employees not directly involved in work with radiation, a dose constraint shall be adopted which shall normally be related to the public effective dose limit specified in the *Recommendations*.

7.2 A program of radiation protection shall be devised which shall include:

- a plan for the control of exposure to radiation in the workplace;
- a plan for monitoring radiation exposure and for assessing the doses received by exposed employees; and
- a plan for dealing with incidents, accidents and emergencies involving exposure to radiation.

8. Approvals and authorizations

8.1 The employer shall obtain approvals and authorizations, as necessary, from the appropriate authority before putting into operation a practice which may expose employees to ionizing radiation and before varying operations within a practice in a manner which may significantly increase exposures to radiation.

9. Induction and training

9.1 The employer shall provide induction and on-going training to all employees who may be exposed to ionizing radiation in their work. The extent of training shall be consistent with the type and degree of risk associated with the proposed duties of the employee. Induction and training shall be carried out in a manner appropriate to the participating employees.

9.2 Induction and training programs shall be documented, and employee participation shall be recorded.

10. Control of exposure to radiation

10.1 The employer shall ensure that the plan for control of exposure to radiation in the workplace is based on a hierarchy of controls, including:

- avoidance of exposure, where practicable;
- isolation of sources of radiation, where practicable, through shielding, containment and remote handling techniques;
- engineering controls to reduce radiation levels and intakes of radioactive materials in the workplace;
- adoption of safe work practices, including work methods that make use of time, distance and shielding to minimize exposure; and
- where other means of controlling exposure are not practicable or not sufficient, the use of approved personal protective equipment.

10.2 Other measures should be used when appropriate, including:

- the designation of controlled areas and supervised areas;
- the use of appropriate signs and labels; and
- the use of investigation levels of exposure for specific categories of work.

11. Radiation monitoring and dose assessment

11.1 The employer shall ensure that a radiation monitoring program is designed, approved, implemented and regularly reviewed. The program shall provide for:

- identification of relevant sources of radiation exposure within a workplace;
- assessment of the radiation doses received by employees, including determination of parameters which affect the assessed dose, as required by the appropriate authority;

- detection of changes in the circumstances of exposure, as necessary; and
- acquisition of sufficient information on radiation exposure in the workplace to enable optimization measures to be adopted.

11.2 Dose assessments shall be made for all relevant employees, using the methodology approved by the appropriate authority.

12. Assessment of compliance with the *Standard*

12.1 To comply with this *Standard* the employer shall demonstrate that:

- all doses estimated to have been received by employees in the workplace are below the relevant limit in **Schedule 1**;
- where a dose constraint has been adopted in the design of the working environment for employees not directly involved in work with radiation, the level of protection achieved is compatible with that constraint;
- optimization of protection has been carried out, as required by the appropriate authority; and
- all other requirements of this *Standard* have been met.

13. Emergencies, accidents and incidents

13.1 In circumstances where exposure to high doses of radiation or severe contamination with radioactive materials might occur in the workplace, the employer shall ensure that comprehensive emergency plans are prepared, as required by the appropriate authority. The plans shall include provision for:

- availability of trained personnel and emergency equipment;
- specified procedures to bring the situation under control;
- assessment of doses received as a consequence of an incident or accident;
- access to appropriate medical care of overexposed persons; and
- acquisition of information for assessing the cause of the incident or accident.

13.2 All incidents and accidents shall be reported without delay to the appropriate authority. The appropriate authority shall be advised as soon as is practicable of the cause of the incident or accident, its consequences and the steps taken to remedy the situation and to prevent a recurrence.

13.3 In the event of an accident which causes or which may lead to high doses of radiation or severe contamination of persons with radioactive materials, and following any immediate first aid and medical assistance provided, the appropriate authority shall be consulted without delay for advice on the medical management of those exposed. Appropriate counselling shall be provided to the persons affected.

13.4 Corrective measures shall be taken, as necessary, to bring an accident under control and to prevent a recurrence. Doses received by employees who volunteer to take part in emergency action to save lives or to bring an accident under

control shall be restricted to ensure that deterministic effects are avoided; these doses shall be treated separately from the employees' normal occupational exposures. Once an accident has been brought under control, doses received during any further remedial work shall be treated as occupational exposure.

14. Record keeping

14.1 For all practices to which this *Standard* applies, the employer shall ensure that a record keeping system is implemented, as required by the appropriate authority. Records shall include the following, as appropriate:

- approvals and authorizations granted by the appropriate authority;
- specifications of the plans for control of radiation exposure in the workplace;
- specifications of the plans for radiation monitoring and dose assessment;
- specifications of the plans for dealing with emergencies and accidents;
- details of training courses and of participation by employees;
- doses assessed to have been received by employees who work directly with radiation and by other employees as required by the appropriate authority, including details of monitoring results and of dose calculation methods, as required by the appropriate authority; and
- details of incidents and accidents involving exposure to radiation and of corrective measures taken.

14.2 Records shall be made available for inspection by the appropriate authority and shall be kept for a period of time specified by the appropriate authority. Records of doses assessed to have been received by an employee, including details of monitoring results and dose calculation methods, as required by the appropriate authority, shall be kept during the working life of the employee and afterwards for not less than 30 years after the last dose assessment and at least until the employee reaches, or would have reached, the age of 75 years. When an operation terminates, the employer shall pass to the appropriate authority the retained records of doses assessed to have been received by employees and any other records specified by the appropriate authority.

Schedule 1

Occupational dose limits

Effective dose limit ¹	20mSv per year, averaged over a period of 5 consecutive calendar years ^{2,3}
Effective dose limit in a single year ¹	50mSv
Equivalent dose limit in the lens of the eye	150mSv per year
in the skin ⁴	500mSv per year
in the hands and feet	500mSv per year

1. The limits shall 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. Subject to any special limit set by the appropriate authority when it is satisfied that exceptional circumstances exist, as specified in the *Recommendations*. When, in exceptional circumstances, a temporary change in the dose limitation requirements is approved by the appropriate authority, one only of the following conditions shall apply: (a) the effective dose limit shall not exceed 50mSv per year for the period, which shall not exceed 5 years, for which the temporary change is approved, or (b) the period for which the 20mSv per year average applies shall not exceed 10 consecutive years and the effective dose shall not exceed 50mSv in any single year.
3. When an employee declares that she is pregnant, the embryo or foetus should be afforded the same level of protection as required for members of the public, as specified in the *Recommendations*.
4. The equivalent dose limit for the skin applies to the dose averaged over any 1cm² area of skin, regardless of the total area exposed.

Schedule 2

Exemption criteria

General criterion

A practice may be exempted by the appropriate authority from implementing the measures required by this *Standard* provided that it can be demonstrated that individual occupational effective doses arising from the practice cannot reasonably be expected to exceed 1 mSv per year.

Criterion applicable to natural sources of radiation

In circumstances where the general criterion is not satisfied due solely to adventitious exposure to natural sources of radiation, practices other than those specifically involving work with radiation may be exempted, as determined by the appropriate authority. In the case of exposure to radon in the workplace, a practice may be exempted provided that it can be demonstrated that the action levels for intervention given in Annex C of the *Recommendations* are not expected to be exceeded.

Relevant authorities

A. Authorities responsible for radiation control legislation

Australian Capital Territory

ACT Health
Radiation Safety Section
GPO Box 825
Canberra ACT 2601

Tel: (06) 247 2899
Fax: (06) 257 3503

South Australia

South Australian Health Commission
Radiation Protection Branch
PO Box 6, Rundle Mall
Adelaide SA 5000

Tel: (08) 2266520
Fax: (08) 226 6255

New South Wales

Environment Protection
Authority
Radiation Control Section
PO Box 136
Regents Park NSW 2143

Tel: (02) 795 5014
Fax: (02) 649 4470

Tasmania

Department of Community and
Health Services
Health Physics Branch
GPO Box 125B
Hobart TAS 7001

Tel: (002) 33 6421
Fax: (002) 31 0735

Northern Territory

Department of Health and
Community Services
Radiation Health Branch
GPO Box 40596
Casuarina NT 0811

Tel: (089) 89 2983
Fax: (089) 89 2700

Victoria

Department of Health and
Community Services
Radiation Safety Section
GPO Box 4057
Melbourne VIC 3001

Tel: (03) 9412 7560
Fax: (03)9412 7568

Queensland

Department of Health
Radiation Health
450 Gregory Terrace
Fortitude Valley QLD 4006

Tel: (07) 3252 5446
Fax: (07) 32529021

Western Australia

Health Department of Western Australia
Radiation Health Section
GPO Box X2307
Perth WA 6001

Tel: (09) 346 2260
Fax: (09) 381 1423

B. Authorities responsible for occupational health and safety legislation

Australian Capital Territory

ACT WorkCover
1st Floor North Building
London Circuit
Civic ACT 2601

Tel: (06) 205 0200
Fax: (06) 205 0797

South Australia

Occupational Health and Safety Division
WorkCover Corporation
100 Waymouth Street
Adelaide SA 5001

Tel: (08) 233 2222
Fax: (08) 233 2466

New South Wales

WorkCover Authority
400 Kent Street
Sydney NSW 2000

Tel: (02) 370 5000
Fax: (02) 370 6111

Tasmania

Tasmania Industry Safety and Mines
Development and Resources
Gordons Hill Road
Rosny Park TAS 7018

Tel: (002) 338 333
Fax: (002) 442 117

Northern Territory

Work Health Authority
Minerals House
66 The Esplanade
Darwin NT 0800

Tel: (089) 89 5511
Fax: (089) 89 5141

Victoria

Occupational Health and Safety Organisation
PO Box 414
World Trade Centre
Melbourne VIC 3005

Tel: (03) 9628 8547
Fax: (03) 9628 8555

Queensland

Division of Workplace Health and Safety
Department of Employment,
Vocational Education, Training
and Industrial Relations
Forbes House
30 Makerston Street
Brisbane QLD 4000

Tel: (07) 3247 4711
Fax: (07) 3220 0143

Western Australia

Department of Occupational Health,
Safety and Welfare
6th Floor West Centre
1260 Hay Street
West Perth WA 6005

Tel: (09) 327 8777
Fax: (09) 321 2148

Commonwealth

Comcare Australia
GPO Box 211
Canberra ACT 2601

Tel: (06) 275 0000
Fax: (06) 275 0015

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