Environment Protection Authority

Radiation Standard 1: Monitoring Devices

September 2025

NSW GOVERNMENT

Acknowledgement of Country

The NSW Environment Protection Authority acknowledges the Traditional Custodians of the land on which we live and work, honours the ancestors and the Elders both past and present and extends that respect to all Aboriginal people.

We recognise Aboriginal peoples' spiritual and cultural connection and inherent right to protect the land, waters, skies and natural resources of NSW. This connection goes deep and has since the Dreaming.

We also acknowledge our Aboriginal and Torres Strait Islander employees who are an integral part of our diverse workforce and recognise the knowledge embedded forever in Aboriginal and Torres Strait Islander custodianship of Country and culture.

Aboriginal artwork by Worimi artist Gerard Black

Contents

Introduction

This monitoring devices standard is for the information of persons responsible under section 6 and persons accredited under section 8 of the *Protection from Harmful Radiation Act 1990* as consulting radiation experts. It is to be used by consulting radiation experts for the calibration of monitoring devices.

This document sets out the minimum requirements for compliance of personal monitoring devices, mandated area monitoring device, and monitoring devices used for compliance testing, which are stated as 'must' statements. Recommendations for non-mandated area monitoring devices are also included.

Division 2 'Radiation Monitoring in the workplace' of Part 4 'Radiation safety and public health' of the Protection from Harmful Radiation Regulation 2025 (Regulation) sets out the requirements for various types of radiation monitoring.

Section 50 of the Regulation has mandatory requirements for personal monitoring devices. These are requirements for employers to provide approved personal monitoring devices for certain occupationally exposed persons.

Section 51 of the Regulation has mandatory requirements for the keeping of personal radiation exposure records by the employer.

Section 52 of the Regulation is not mandatory unless an employer has been directed by the EPA to take specified action with respect to the monitoring of radiation on specified premises. If an employer has been directed to have monitoring devices, then the requirements of this section must be met.

Section 53 of the Regulation places mandatory requirements on an employer to ensure that all monitoring devices provided or installed in accordance with the requirements of Division 2 are checked, maintained, and calibrated in accordance with this Standard.

Condition 6 of the Consulting Radiation Expert (CRE) Accreditation requires that any radiation monitoring device used by the accredited person to conduct activities allowed under their accreditation must comply with each requirement of this Standard.

1 Personal monitoring devices

1.1 As defined in the Protection from Harmful Radiation Regulation 2025, a personal monitoring device means a device used to monitor the levels of radiation exposure of persons that is –

a. worn by, or otherwise attached to, a person, and

b. able to detect and measure cumulative exposure to ionising radiation.

1.2 Common personal monitoring devices include:

- thermoluminescent dosimeters (TLD)
- optically stimulated luminescent dosimeters (OSLD)
- direct reading pocket dosimeters
- direct ion storage devices (DIS)
- radon monitors.

Other specialised personal monitoring devices are available for monitoring the radiation dose received by a person if there is a possibility of exposure to neutron radiation.

1.3 TLD, OSLD and radon personal monitoring devices can be obtained from an organisation that is approved by the Authority to offer a personal monitoring service and that the specific personal monitoring device is approved by the Authority.

1.4 A personal monitoring device is issued, for a defined period, to an individual who is occupationally exposed to radiation. It is for their use only and must not be used by any other individual or for any other purpose during that period of time. It must be subjected to the following conditions:

a. a TLD, OSLD or radon monitor must be used for the duration of its issue period, unless the person leaves prior to the end of the issue period. At the end of that period it must be returned promptly to the issuing organisation for assessment of the radiation dose that it has recorded. A new dosimeter is issued for the next issue period.

b. a direct reading pocket dosimeter must be read at the end of the issue period. It can only be re-issued to the original wearer, or another wearer, after its reading has been noted and recorded.

c. a direct ion storage device (DIS) used for personal monitoring must be read out at the end of its issue period, and where issued to a wearer, the radiation dose accumulated since the last readout must be recorded against their name.

1.5 Records of the dose received by each occupationally exposed person who is issued with a personal monitoring device must be kept by the employer as required by section 51 of the Protection from Harmful Radiation Regulation 2025.

1.6 The person issued with a personal monitoring device must take care to ensure that it is not subjected to environmental conditions or mishandling which may affect its reading or damage the device. Factors that may cause adverse effects include mechanical impact and

exposure to heat, chemicals, electrical power sources or water. This also applies to any control monitoring device issued by the service provider.

1.7 Each monitoring device issued must be worn under the specific conditions for the monitoring purpose intended, i.e. either over or under protective garments, or at torso, shoulder or eye position.

2 Area monitoring devices

As defined in the Protection from Harmful Radiation Regulation, **area monitoring device** means a device used to monitor the levels of radiation exposure of persons by monitoring the levels of radiation within a specific area.

In some cases, a portable or fixed monitor designed to measure radiation dose rates may also be capable of measuring integrated doses.

2.1 Types of area monitoring devices

- Radon monitor
- Radionuclide air sampler
- Uptake monitor for clearance of a radionuclide within a person
- Radiation dose rates

2.2 Mandated area monitoring devices

Under Division 2 of the Protection from Harmful Radiation Regulation, the Authority may, by notice in writing served on an employer, direct the employer to take specified action with respect to the monitoring of radiation on specified premises, and to ensure that specified premises are equipped with approved monitoring devices for the purpose of monitoring the presence and level of radiation on the premises.

2.2.1 Requirements

When using an area monitoring device the following requirements must be observed:

2.2.1.1 The employer must ensure that the monitor is suitable for the type of measurement for which it is to be used and that it is always fully operational and properly calibrated.

a. If a monitor is used to measure ionising radiation dose rates, it **must** be capable of measuring the type of radiation being assessed over the range of energy and dose rate required.

b. If a monitor is used to measure radioactive contamination, it **must** be capable of measuring the type of radiation emitted by the contamination over a sufficient range of contamination levels.

2.2.1.2 The person using the monitor **must** be familiar with the instrument and its capabilities and must be able to interpret its readings correctly.

2.2.1.3 The batteries of a portable area monitor **must** be checked each time before use and must be replaced when the monitor battery indicator shows that this is necessary.

2.2.1.4 Each portable area monitor **must** be checked to ensure it is functioning correctly, as per manufacturers requirements, prior to each use. This may be a test mode or using a suitable radioactive check source.

2.2.1.5 Each portable or fixed area monitor **must** allow for a clearly audible, and/or visual alarm capable of being set to any required level.

2.2.1.6 Each fixed area monitor **must** be checked, at least once every week, with a suitable radioactive check source, to ensure that it is operating correctly.

2.3 Recommendations for area monitoring devices

For those not directed by the Authority under Division 2 of the Regulation, the points under 2.1.1 are recommendations only.

3 Calibration requirements

3.1 Area monitoring devices

Each portable and fixed area monitor **must** be calibrated either at intervals specified by the manufacturer, or at least once every **12 months** and each time after it has been serviced or repaired. The calibration **must** be traceable to a:

a. national primary standard, or

b. a secondary or tertiary standard that is traceable to the national primary standard.

The term 'traceable to the national standard' may be interpreted as traceable to an international standard or the primary national standard of any country.

3.2 Consulting Radiation Expert (CRE) equipment for compliance testing

3.2.1 Diagnostic imaging apparatus (DIA)

A consulting radiation expert **must** make sure any radiation monitoring device used for compliance testing is:

- suitable for the type of measurement for which it is to be used
- used only when it is fully operational and properly calibrated
- capable of measuring the type of radiation being assessed over the range of energies and dose rates required
- calibrated at least every two years to an Australian or international primary or secondary standard satisfactory to the manufacturer's requirements.

3.2.2 Fixed radiation gauge (FRG)

Wipe tests

Measurement of a wipe-test medium used to check the leakage of radioactive contamination from a fixed radiation gauge (FRG) **must** be carried out in a low-background area with analysis equipment which has a calibrated contamination reference source traceable to a national primary standard.

Traceability of wipe-test measurements

Ideally the calibrated contamination reference source should be the same as the radionuclide contained in the FRG. If this is not possible the calibrated contamination reference source radionuclide **must** be selected with energies and type of radiation close to those expected.

The results of the wipe-test measurement report provided to the CRE **must** contain:

a. information which establishes how the traceability is achieved

b. the activity measured on the wipe medium and the date measured

c. full details of the calibrated contamination reference source (radionuclide, serial number, activity and assay date)

d. details of the analysis equipment used (type, serial number, and manufacturer).

3.2.3 Calibration certificates

The CRE must request the following information from their calibrating organisation to ensure compliance with requirements of the Authority:

a. how each radiation source used in the calibration process was calibrated in accordance with the national standard

b. any 'secondary standard' instrument used to calibrate the organisation's radiation sources/fields and its calibration traceability.

The calibration certificate **must**:

1. clearly explain and define all terms used on the certificate/report such as response, stability, accuracy, error etc
2. provide information on all conversion factors used in the calibration process
3. state the confidence level of the calibration
4. include the following information, as a minimum:
   a. the name and address of the calibration organisation, the date of the calibration and a unique identification number which identifies the calibration certificate/report. This identification number **must** appear on each page of the calibration certificate/report
   b. identification (manufacturer, model type/number, serial number), the name and address of the owner, the date it was received for calibration and the date of calibration
   c. a description of the calibration conditions, calibration method and calibration standards used including:
      i. a description of the radiation source(s) used for the calibration including its beam quality or energy, the distance from the source to the calibration position, the size of the field at the calibration position and the exposure rate, kerma rate or absorbed dose rate during calibration
      ii. a description of reference conditions of the radiation survey meter
      iii. a detailed description of the calibration procedure i.e. direct substitution technique
      iv. details of the secondary standard instrument used by the calibration organisation and the date of its most recent calibration traceable to a national primary standard
   d. the calibration factor(s) to be used with the radiation survey meter under calibration, specifying how it is to be applied to the responses of that meter:
      i. the temperature, pressure and humidity at which the calibration factor has been normalised must be stated, where appropriate
      ii. the uncertainty, or accuracy, associated with the calibration factor must be stated together with an explanation of its derivation.

References and further reading

International Atomic Energy Agency, Calibration of Radiation Protection Monitoring Instruments, Safety Reports Series No. 16, IAEA, Vienna (2000)

International Atomic Energy Agency, Radiation Protection and Safety in Medical Uses of Ionizing Radiation, IAEA Safety Standards Series No. SSG-46, IAEA, Vienna (2018)

NSW Environment Protection Authority, Radiation Guideline 3 Recommendations for minimum standards and safety requirements for fixed radiation gauges (sealed source devices) (2013)

NSW Environment Protection Authority, Radiation Standard 6 Compliance requirements for ionising radiation apparatus used in diagnostic imaging (2024)

Definitions

In this Standard:

Act means the *Protection from Harmful Radiation Act 1990*.

Authority means the NSW Environment Protection Authority.

Calibrating organisation means an organisation that performs calibration services for monitoring devices that are traceable to a national primary or secondary standard.

CRE means Consulting Radiation Expert

EPA means the NSW Environment Protection Authority.

Person responsible has the same meaning as in section 6 of the Act.

National primary standard means a standard with the highest metrological qualities in a specified field and is maintained at national laboratories that (a) perform research for the purposes of metrology and (b) participate in recognized international intercomparisons of primary standards laboratories. It is recognised by an official national decision as the basis for fixing the value, in a country, of all other standards of the given quantity

Radiation survey meters means dose rate or dose-equivalent rate meters and monitors, surface contamination meters and monitors.

Regulated material has the same meaning as in section 4 of the Act

Regulation means the Protection from Harmful Radiation Regulation 2025c.

Secondary standard means a standard whose value is fixed by direct comparison with a primary standard and which is accompanied by a certificate that documents this traceability.

Tertiary standard means a standard whose value is fixed by comparisons with a secondary standard.

Unless otherwise defined, all words in this standard have the same meaning as in the Act and the Regulation.

Published by NSW Environment Protection Authority

Visit:
6 Parramatta Square
10 Darcy Street
Parramatta NSW 2150

Mail:
Locked Bag 5022,
Parramatta NSW 2124

Phone:
+61 2 9995 5000 (switchboard)

TTY users:
Phone 133 677, then ask for 131 555

Speak and listen users:
Phone 1300 555 727, then ask for 131 555

Email:
info@epa.nsw.gov.au

Website:
epa.nsw.gov.au

Report pollution and environmental incidents

Environment Line:
131 555 (NSW only) or
info@epa.nsw.gov.au

ISBN 978 1 923328 36 5
EPA 2025P4622
September 2025

NSW GOVERNMENT