

**Radiation safety procedures during maintenance, repair,  
commissioning or compliance testing activities**

# Radiation safety procedures for persons using radiation sources during maintenance, repair, commissioning or for compliance testing activities

## Introduction

These radiation safety procedures have been formulated for the purpose of ensuring that all practices involving the use of radiation sources during maintenance, repair, commissioning or for compliance testing activities are conducted with a view to minimising radiation doses to personnel.

### 1. Definitions

The following clarification is made about the terms used in this document:

**Licensee** means the person who is the holder of a licence authorising the use of a radiation source during maintenance, repair, commissioning or compliance testing.

**Possession licensee** means the person who holds a licence authorising possession of the radiation source or sealed source apparatus being maintained, repaired, commissioned or compliance tested.

**Radiation safety officer** means the person appointed as the radiation safety officer by the possession licensee.

**Use of a radiation source** means using the radiation source while maintaining, repairing, commissioning or compliance testing whether or not, in the case of a radioactive substance, the source is incorporated in a sealed source apparatus.

### 2. Responsibilities

The licensee is responsible for ensuring radiation safety during the use of a radiation source.

### 3. Personal protective equipment

- During the use of radiation sources, the licensee must use, and make available to other persons providing assistance, the personal protective equipment relevant for the work being conducted. Examples of this equipment are lead aprons, lead sleeves, protective eye wear, and special fire resistant clothing.
- The licensee must ensure that personal protective equipment is checked for wear, tear, and correct operation once every six months, or as recommended by the manufacturer, by persons qualified to perform such checks.

### 4. Radiation monitoring equipment

- The licensee must use appropriate radiation monitoring equipment during the use of the radiation source.
- The radiation monitoring equipment must have the sensitivity, accuracy, range and energy response appropriate to the radiation produced by the source.
- Only persons who are qualified to perform calibration checks must perform such checks on the radiation monitoring equipment.

- The radiation monitoring equipment must be checked for correct calibration at intervals of not more than twelve months or following damage or repair.
- The monitoring equipment must be re-calibrated if the check yields erroneous results by a calibration service provider that has a calibration service that uses reference sources directly traceable to the Australian National Standards as required by the *National Measurement Act 1960*.

## 5. Personal radiation monitoring

- A licensee who uses an ionising radiation source must monitor his or her radiation exposure using a personal monitoring device provided by the licensee.
- A licensee who has a person assisting him or her in the use of an ionising radiation source must also monitor the assistant's radiation exposure using a personal monitoring device provided by the licensee.
- The licensee must ensure that personal monitoring devices are obtained from, and assessed by, a provider who has a personal radiation monitoring service that uses reference sources directly traceable to the Australian National Standards as required by the *National Measurement Act 1960*.
- The personal monitoring devices used must be assessed every three months.

## 6. Working procedures

The following procedures must be complied with by persons using, or intending to use, a radiation source during maintenance, repair, commissioning or for compliance testing activities

- a. The licensee must review the proposed service schedule to determine whether adequate safety precautions have been included and whether additional safeguards, such as restricting access to designated areas or wearing protective clothing, are required. The licensee should be particularly attentive when the work schedule includes a proposal to disarm interlocks.
- b. The licensee must advise the possession licensee or the radiation safety officer of all proposed procedures requiring the use of the radiation source that may affect the level of radiation safety in the possession licensee's premises or adjoining areas. The licensee must ensure the occupancy of affected areas is restricted while the licensee is using the radiation source.
- c. The licensee must take all precautions necessary to prevent the unauthorised or inadvertent exposure from the radiation source: for example, by retaining possession of the key to the operating controls or shutter, or taking other appropriate actions if there is no provision for locking the controls.
- d. Where there is a need to use the radiation source, the licensee must ensure that only personnel essential for the proposed procedure are present and that:
  - they are informed of the hazards associated with exposure to radiation and of the risks associated with the proposed procedure, and the precautions to be taken to minimise them;

- they wear personal monitoring devices and all personal protective equipment issued during the procedure is worn; and
  - adequate arrangements have been made to restrict access to areas where unusually elevated radiation levels may occur to prevent unauthorised personnel occupying them. This may be achieved, for example, by using placards or barriers or by locking the area.
- e. The licensee must ensure that, if safety interlocks are disarmed as part of his or her use activities, they are rearmed and confirmed to be operating in compliance with the manufacturer's specifications. Adequate arrangements must be in place to ensure that access is restricted to the radiation source at all times while safety interlocks are not engaged. Once the work has been conducted, the possession licensee and radiation safety officer are given written confirmation that the equipment has been returned to its operational state
- f. When proceeding to energise or expose the radiation source, the licensee must take all steps necessary to ensure radiation exposures are kept as low as reasonably achievable. For example, while dealing with ionising radiation apparatus, the licensee should restrict the size of the field, direct the primary beam towards unoccupied areas and select the lowest operating parameters (kV (peak) mA, exposure duration) consistent with operational requirements.
- g. The licensee must immediately notify the possession licensee of any unexpected or unusual findings, discovered during the use of the radiation source, which might affect safety.
- h. The licensee must ensure that wipe tests performed on sealed source apparatus containing radioactive substances are in compliance with *ISO 9978 Radiation Protection - Sealed Radioactive Substance - Leakage test methods*.
- i. On completion of the procedures involving the use of the radiation source, the licensee must review his or her activities and, if necessary, inspect the radiation source to determine whether its safety status is in compliance with the relevant radiation safety standards and with the manufacturer's specifications.
- j. Following completion of the review, the licensee must provide a written report of his or her findings to the possession licensee.

## 7. Records

In addition to service or other source-related information relating to the work performed, the following records must be kept by the licensee:

- personal monitoring records for the licensee and, if relevant, his or her assistant; and
- calibration certificates for the radiation monitoring equipment used.

## 8. Emergency procedures

- a. In the event of an actual or suspected malfunction of the radiation source causing, or suspected of causing, exposures exceeding those expected, the licensee must:

- take all steps necessary to ensure radiation exposures are minimised, for example switch off the power to radiation apparatus as quickly as possible, or close the shutter in the case of sealed source apparatus;
  - take precautions to prevent the unauthorised or inadvertent use of, or exposure from, the radiation source by posting prominent warning signs near the source, by retaining possession of the key to the operation controls or shutter, or by taking other appropriate actions if there is no provision for locking the controls; and
  - immediately notify the possession licensee or the radiation safety officer of the situation.
- b. The licensee must arrange for personal monitoring devices to be returned to the personal radiation monitoring service provider for immediate assessment.
- c. In the event of any unexpected occurrence, the licensee must immediately advise the Chief Executive, Queensland Department of Health of the details of the unexpected exposure and provide a written report on the occurrence within seven days.

This advice and subsequent report must include the following:

- a description of incident;
- details of radiation exposures received by person;
- action taken; and
- proposals to prevent a recurrence.