

# Radiation Management Plan

## Booklet 10 - Emergency procedures and incident management

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## 1. Possible types of Radiation Accidents

### 1.1 Background

It is a legal requirement to report radiation accidents to the NSW EPA if said accidents meet the requirements outlined in 1.2. The university must report and investigate apparent radiation accidents within specified time frames, maintain a record of radiation accidents, rectify faults or defects identified, and inform individuals who may have been exposed to radiation as a result of any radiation accident. Reporting of radiation accidents to the NSW EPA will be performed by the Radiation Safety Committee.

**NOTE:** A radiation accident is defined as an unplanned or unexpected emission of radiation (including spillage or leakage of a radioactive substance or damage to radiation apparatus), misuse of radiation apparatus, or maladministration of a radioactive substance used for therapeutic or diagnostic purposes.

### 1.2. Possible Types of Incidents

Incidents can occur that result in one or more of the following events:

- Radiation exposure of a member of staff, student, or visitor
- Incorrect radiation exposure of a volunteer
- Radioactive contamination of one or more persons and/or the environment
- Loss of a radioactive source (including suspected theft)

Near misses are also included in this process in order to mitigate future radiation accidents.

### 1.3. Definition of a Radiation Accident

The legislative definition of a radiation accident or incident as per the NSW the Protection from Harmful Radiation Regulation 2013 (2023) is as follows:

- (1) For the purposes of this Regulation, a radiation accident is to be treated as having occurred if there is an occurrence that involves the unplanned or unexpected emission of radiation (including spillage or leakage of a radioactive substance, or damage to radiation apparatus) that is of such a nature or extent that it is likely:

- (a) that one or more persons have, or could have, received an effective dose of radiation equal to or in excess of:
    - (i) 5 millisieverts, in the case of an occupationally exposed person, or
    - (ii) 1 millisievert, in any other case; or
  - (b) that the premises or the environment may have become contaminated within the meaning of section 21 of the Act.
- (2) For the purposes of this Regulation, a radiation accident is to be treated as having occurred if there is an occurrence that involves the misuse of radiation apparatus or maladministration of a radioactive substance used for medical purposes and that involves any of the following:
- a) the administration of a radioactive substance for diagnostic purposes in a quantity of more than 50 % more than that prescribed;
  - b) the administration of a radioactive substance for therapeutic purposes at an activity differing by more than 15 % from that prescribed;
  - c) the administration of a therapeutic dose of radiation from radiation apparatus or a sealed source device which differs from the total prescribed treatment dose by more than 10%;
  - d) the administration of a dose of radiation from a radiation apparatus for diagnostic and/or interventional purposes that results in one or more persons receiving an effective dose of radiation equal to or in excess of 1 millisievert;
  - e) the unintended administration of radiation as a result of a malfunction of radiation apparatus;
  - f) the administration of a radiation dose to the wrong patient or to the wrong part of a patient's body;  
or
  - g) the administration of a radiopharmaceutical otherwise than as prescribed.

## 2. Response to incidents (e.g. exceeding the dose constraints, radioactive source is lost or damaged, investigation of the radiation incident)

### The Radiation Management Licence Holder

It is the ultimate responsibility of the RML holder to ensure that accidents and incidents are investigated and reported, and that all using radiation are appropriately trained and are cognisant of their responsibilities. The RML holder has delegated this task to the Radiation Safety Committee.

### The Radiation Safety Committee

The RSC will assist in the response to the incident and will be responsible for ensuring that the incident and details of the radiation levels/exposures are reported to the RML holder and an appropriate notification is provided within the required timeframe to the NSW EPA.

### The WHS Manager

The WHS Manager will be responsible for assisting the RSC in the duty of investigation and reporting all incidents to the RML holder and to the EPA, if required.

### The Technical Manager or Equivalent of the Facility

The Technical Manager (or equivalent) must ensure that any person using the facility has had training regarding a radiation accident, and notifies the RSC and WHS unit immediately upon learning of such a situation.

## The Radiation User Licence Holder

The Radiation User Licence holder must follow the procedures detailed below, report the incident as soon as practicable, and provide information to authorised officers (CSU and/or EPA) investigating the incident.

## Emergency procedures – description of the type of emergencies that could occur

### Procedure

#### IMMEDIATELY FOLLOWING AN INCIDENT OR ACCIDENT

- (a) Any person becoming aware of an incident or accident shall immediately:
  - (i) take steps to minimise further contamination, if safe to do so;
  - (ii) inform all people in the laboratory;
  - (iii) inform the technical manager;
  - (iv) inform the principal investigator; and
  - (v) inform the WHS Unit
- (b) All persons not involved with the accident/incident should move to the designated assembly point.
- (c) Persons suspected of being contaminated by radioactive material are not to leave the facility but are to move away from the site of contamination. If there is a risk of injury from fire, gas release, or toxic materials (other than radiation), then the area is to be evacuated, with those contaminated being isolated away from the site.
- (d) If it is obvious that first aid is required, contact a first aid officer.

#### TYPICAL PROTOCOL FOR DECONTAMINATION OF PERSONS

Any obvious injuries should be treated immediately, taking care to avoid the spread of contamination to wounds, eyes, nostrils, or mouth.

Contaminated clothing should be removed, and a contamination survey of the person should be performed. Personal decontamination should be undertaken according to the area(s) of the body contaminated, as follows:

- (a) eyes should be irrigated with saline solution (a 0.9 % sodium chloride solution), or with distilled or mains water;
- (b) hands should be washed with tepid water and mild soap or handwash solution (preferably neutral pH). If this is inadequate, repeat once or twice. Contaminated fingernails may be scrubbed lightly with a soft nail brush. For contamination that is difficult to remove, disposal rubber gloves may be worn for several hours to promote perspiration of the hands, which may assist in removing of contamination while preventing its spread to other surfaces;
- (c) skin, other than that of the hands, should be swabbed gently with a cotton wool pad soaked in a mild soap or handwash solution (preferably neutral pH) and rinsed well. Do not vigorously scrub the skin or use detergents as this may affect the natural skin barrier and increase the risk of internal contamination;
- (d) contaminated wounds should be washed under a fast-running tap. If the wound is on the face, care should be taken not to contaminate the eyes, mouth, or nostrils. Finally, a gentle antiseptic and a waterproof dressing applied.

Attempts to remove all contamination from skin may not be feasible or desirable. Some radioactivity may be trapped in the outermost layers and will remain until normal sloughing occurs (12-15 days). Personal decontamination should be continued until monitoring shows that less than 10% of the residual contamination is removed at each cycle, unless there is the risk of the contamination entering the bloodstream through the roughening or breaking of the skin.

## DECONTAMINATION OF SURFACES OR CONTAMINATED EQUIPMENT

Consultation with appropriately qualified persons is a necessary requirement before any decontamination is conducted.

See RMP Section 6 Radiation Safety in Laboratories for Spill Procedures.

# 3. Procedures for reporting faults in regulated material

## Repair and Maintenance of Radiation Apparatus

Radiation apparatus must only be maintained and repaired by qualified service engineers who possess a current radiation licence and whose licence allows them to repair the specific radiation apparatus.

The RSC will be informed of intended maintenance by the named person responsible for the instrument, of any inspection, or intended repair and the details of the person or company carrying out the work, prior to the work taking place.

Whenever the repair or maintenance may have compromised the performance of the equipment or any of the radiation safety features, the relevant compliance tests must be repeated and passed before the equipment is reused either for research or clinically.

If an x-ray tube of a clinical unit is replaced, full compliance tests must be performed by a CRE.

The RSC will be sent a report by the faculty staff responsible for the instrument. The report will include the date of completion and an overview of the maintenance, inspection, or repair as soon as possible following the work. It will include the name of the person or company who carried out the work.

For repairs needing compliance tests, a Certificate of Compliance must be sent to the RSC, and a copy maintained at the site of the unit.

Where the CRE has certified the apparatus as compliant, but has specified that minor repairs are necessary to satisfy all the registration requirements, the named person responsible for the instrument must:

- (a) inform the RSC of the need for these repairs and the specified timeframe;
- (b) ensure that these repairs are carried out within the timeframe specified in the CRE's report;
- (c) adhere to any restrictions in the use or operation of this apparatus specified by the CRE until the apparatus is fully repaired; and
- (d) inform the RSC when the repairs have been completed.

## The Reporting of Faults That Could Compromise Safety, Diagnosis or Analysis

The named person responsible for the instrument will:

- (a) report to the RSC and WHS any suspected problems with a unit of ionising equipment that has or may present a health hazard; and
- (b) notify the RSC and WHS within 2 days if the radiation apparatus:
  - (i) fails or ceases to satisfy the requirements for registration;
  - (ii) has an x-ray tube insert replaced; or
  - (iii) is relocated (fixed units only).

The RSC/WHS will:

- (a) report to the RML holder any suspected problems with a unit of ionising equipment that has presented or may present a health hazard;
- (b) notify the RML holder within 4 days if the radiation apparatus;

- (i) fails or ceases to satisfy the requirements for registration;
- (ii) has an x-ray tube insert replaced; or
- (iii) is relocated (fixed units only).

The RML holder will:

- (a) Ensure that any suspected problems with a unit of ionising equipment that have or may present a health hazard are reported to the Therapeutic Goods Administration (TGA) or the EPA, depending on the classification of the equipment;
- (b) Ensure that the EPA is informed within 7 days if a radiation apparatus:
  - (i) fails or ceases to satisfy the requirements for registration;
  - (ii) has an x-ray tube insert replaced; or
  - (iii) is relocated (fixed units only).

**NOTE:**

Typical problems include deficiencies in labelling, instructions, or packaging, defective components, performance failures, poor construction, or design.

**NOTE:**

Details of how to report the problem can be found at the TGA website.

## 4. Reporting requirements (internal and to the radiation regulatory authority)

### Investigation and Reporting Requirements

All incidents, including 'near misses', should be reported using the CSU Health and Safety Portal ([Protecht](#)), and subsequently investigated to minimise the likelihood of such incidents occurring again. The investigation should be aimed at:

- (a) establishing what happened;
- (b) identifying the failure;
- (c) deciding on remedial action to minimise the chance of a similar failure; and
- (d) estimating the likely radiation doses received by staff, student, and/or member of the public.

All incidents, including 'near misses', will be investigated by the RSC together with the facility manager and the principal investigator, and an incident report will be lodged online within 24 hours of the incident. This form includes:

- (i) date, time and place of the incident and the period during which emission of radiation was uncontrolled;
- (ii) a description of the incident, including particulars of the area over which any radioactive substances may have been dispersed;
- (iii) particulars of any steps taken at the time of the incident to rectify the accident;
- (iv) names, addresses, contact details of persons involved, including witnesses;
- (v) details of any injuries; and
- (vi) estimation of the likely radiation doses received by staff, student, and/or member of the public.

Any person accidentally irradiated must be informed (through interpretation services if required) of the event in writing (includes electronically), and their likely exposure. Expert advice and independent counselling as to the likely implications of the unintended exposure will be offered.

The Principal Investigator shall review the radiation safety processes and shall update the current risk assessment, control procedures, and document and organise additional training for staff and/or students to minimise the likelihood of a repeat of the incident.

The WHS unit will send a copy of the Incident Report to the presiding officer of the RSC to be evaluated executively and tabled at the next RSC meeting.

The RSC shall add the Incident Report to the Register of Radiation Incidents.

The Principal Investigator will send to the RSC any updated risk assessments, additional control procedures, and any additional training for staff or students as proposed amendments to their RSC application for approval.

Certain radiation incidents must be reported to the EPA. The RSC shall decide whether a particular incident must be reported, in accordance with EPA requirements.

If a report to EPA is required:

- (i) The EPA shall be notified by the RSC in writing within forty-eight hours of a radiation accident occurring. This is most easily achieved by sending an email to [radiation@environment.nsw.gov.au](mailto:radiation@environment.nsw.gov.au)
- (ii) A copy of this notification must be sent to the WHS Manager and the DVC (RDI).

The Head of Department, WHS Manager, and the DVC (RDI) shall be notified immediately if the accident involves an injury or illness to workers, where Workers Compensation is or may be payable. The Workcover Authority shall be notified immediately by WHS if a radiation accident causes a fatality, serious injury, or illness to workers, or was immediately life threatening but without fatality or serious injury.

If an accident has been notified to the EPA, a full report must be prepared for the EPA, following the accident investigation, which includes the following requirements (Section 27 of the Regulation):

- particulars of the accident, indicating, as far as possible, the place where it occurred and the period during which emission of radiation was uncontrolled;
- particulars of the area over which any radioactive substances may have been dispersed;
- particulars of any steps taken to rectify the accident;
- particulars of any personal injury or exposure that may have resulted;
- particulars of any assessment of the radiation dose to which any person may have been exposed as a result of the accident; and
- particulars of all measures put in place to prevent a recurrence of the accident.

This report must be sent to EPA within 10 days of the incident, and a copy of this report must be provided to the DVC (RDI), WHS Manager, RSC, and the HOD.

### Contact Details

- (a) CSU Work Health and Safety, Division of People and Culture ..... Ph: 02 6338 4884
- (b) CSU Radiation Safety Committee, Research Integrity Unit ..... Ph: 02 6338 4504
- (c) CSU Security ..... 1800 931 633
- (d) Environmental Protection Agency, Radiation Control Branch ..... Ph: 02 9995 5000

**Documentation**

Incident Report on the CSU Health and Safety Portal ([Protecht](#))

**Audit**

All radiation incident reports are to be tabled and discussed at the RSC meetings.

Auditing is to take place every 2 years for a full audit of records.