

# University Occupational Health and Safety Guidance Notes

## EXAMPLE RADIATION INCIDENT RESPONSE PLANS

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## 1. PURPOSE

The aim of this document is to provide a set of examples and basic guidance for departments involved in a planning radiation incident response plans. Particular incident scenarios are presented with immediate actions that may need to be taken in the event of any of the listed emergency scenarios.

This document lists **example** radiation incident response plans. These are not intended for direct implementation by departments. Departments should ensure that their contingency plans are detailed and are applicable to their own area of work.

## 2. DEFINITIONS

To assist departments in planning their responses to radiation incidents, the University has established the following definitions which should be used when developing their response plans.

### 2.1 Minor spill of radioactive material

*A minor spill is any spill that has occurred within containment of the working area, can be quickly contained and has not contaminated any additional surfaces (e.g. a floor) and **HAS NOT** contaminated any persons.*

A minor spill should normally be able to be handled by the department themselves with those involved following their training and departmental processes under guidance from the DRPS.

Where the DRPS requires additional support or on-site assistance, the incident is to be treated as a major spill, and appropriate procedures are to be followed.

### 2.2 Major spill of radioactive material

*A major spill is one that has occurred out with containment of the working area, cannot be quickly contained or has contaminated additional surfaces (e.g. a floor) or **IS ANY SPILL THAT CONTAMINATES A PERSON.***

A major spill is an event that will not be normally managed by the department without additional resources being allocated by the University. In the event of a major spill, the DRPS is to be informed immediately.

**Contact MUST be attempted with the URPO, regardless of time of the incident. Contact can be made by contacting SHaW during working hours on 0141 548 (x4673) or through security out of hours on 0141 548 (x2222). If the UPRO is not available, SHaW is to be contacted on x2726 for advice.**

**Any instance of a major spill is legally required to be notified to the HSE.**

### 2.3 Dealing with a contaminated person(s)

*A contaminated person is someone who has, or has the reasonable belief that they have, radioactive materials on their skin or clothing, or who may have inhaled or ingested radioactive materials.*

Any person that is contaminated is to notify a colleague immediately that they may be contaminated by any means possible, without leaving the affected area. The affected person should restrict movement as much as possible to prevent the spread of contamination, but should ensure they are distanced from the danger if possible.

Due to the potential need to remove items of clothing, a chaperone of the contaminated persons choosing must be present during any decontamination process.

**Contact MUST be made with the URPO, regardless of time of the incident. Contact will be made with the URPA by the URPO, as appropriate for advice. If the UPRO is not available, SHaW is to be contacted on x2726.**

### 2.4 Dealing with a suspected over exposure

An overexposure is the breach of any relevant legal dose limit that applies to the radiation worker or exceeds the limit enforced locally by the University.

Any breaches of the University Dose Investigation Limit (DIL) will be investigated by the URPO with assistance from the URPA and DRPS as needed.

Any breaches of statutory dose limits will be investigated by the URPO and URPA with assistance from the department. This incident is likely to also be investigated by the Health & Safety Executive.

## **2.5 Management of an area of high dose not already designated.**

This is any source or device giving rise to a dose rate in an area accessible to workers which is in excess of 2.5µSv/hr or a dose rate in excess of 7.5µSv/hr where the area has not already been appropriately designated.

## APPENDIX A – MINOR SPILL OF RADIOACTIVE MATERIAL

*A minor spill is one that has occurred within containment of the working area, can be quickly contained and has not contaminated any additional surfaces (e.g. a floor) and **HAS NOT** contaminated any persons.*

1. Only suitably trained and competent persons must be involved in the clean-up operation, under advice from either the DRPS **OR** (URPO).
2. All cleaning operations must be in accordance with departmental local rules and University guidance.
3. Using disposable paper towels and a spray bottle containing a solution of a suitable cleaning solution, the spill should be cleaned:
  - a. Whilst wearing appropriate PPE (gloves, overshoes, coat and where appropriate, RPE), begin to wipe up the spilled material. Do not spray the decon solution directly onto the spilt material
  - b. Cleaning of the spilled material will be from the outside of the spill towards the centre, to minimise the spread of radioactive materials beyond the spill itself.
  - c. Once the material has been cleaned then, using the spray bottle, cover the area in the solution, and clean the area, again starting from the outside of the area towards the centre.
  - d. Use an appropriate monitoring technique for the isotope in question (consult with local DRPS for information) and conduct a survey of the area.
  - e. If contamination is found, clean the area again to remove any remaining contamination.
  - f. Repeat the clean and monitor stages until all residual contamination has been removed.
  - g. If contamination persists after several cycles of cleaning contact the URPO, as replacement of the worktop surface may be necessary.
  - h. All materials used in the cleaning of the spill are to be disposed of as radioactive waste.
4. DRPS should investigate the cause of the incident and a report must be made on SIRIS.
5. All radiation workers within the department should be informed of the incident and any changes in working practices or safety measures.
6. If necessary, these recommendations should be highlighted to all other radiation departments and section by the URPO.

## APPENDIX B – MAJOR SPILL OF RADIOACTIVE MATERIAL

*A major spill is one that has occurred out with containment of the working area, cannot be quickly contained or has contaminated additional surfaces (e.g. a floor) or **IS ANY SPILL THAT CONTAMINATES A PERSON.***

**Contact MUST be made with the URPO, regardless of time of the incident. Contact will be made with the URPA by the URPO, as appropriate for advice.**

**If the incident involves the contamination of a person, then decontamination of the person takes priority over other decontamination. (See relevant section below).**

**Any instance of a major spill is legally required to be notified to the HSE (This will be done by SHaW. Departments **MUST NOT** contact the HSE)**

1. The area is to be cordoned off immediately, and access it to be restricted to only those persons detailed in the department's safety plans.
2. **NO** cleaning must be undertaken until a full assessment of the hazards has been completed by the DRPS and the URPO.
3. Only suitably trained and competent persons must be involved in the clean-up operation, under advice from either, the URPO **OR** URPA. Depending upon the material, specialist equipment, monitors or PPE / RPE may be necessary.
4. All cleaning operations must be in accordance with departmental local rules and university guidance.
5. Using disposable paper towels and a suitable cleaning solution, the spill should be cleaned.
  - a) Under advice from competent personnel (The DRPS, URPO or URPA), and whilst wearing appropriate PPE (Gloves, Overshoes, coat, face mask) begin to wipe up the spilled material.
  - b) Cleaning of the material will be from the outside of the spill towards the centre, to minimise the spread of radioactive materials beyond the spill itself.
  - c) All materials used in the cleaning of the spill are to be disposed of in a radioactive waste bin.
  - d) Once all waste material has been cleaned away, use an appropriate monitoring technique for the isotope in question (consult with local DRPS for information) and conduct a survey of the area.
  - e) If contamination is found, clean the area again to remove any remaining contamination.
  - f) Repeat the clean and monitor stages until all residual contamination has been removed.
  - g) If contamination persists after several cycles of cleaning, this is to be discussed with the URPO/URPA.
6. The DRPS is to complete a report on SIRIS. The URPO **AND** URPA will investigate the cause of the incident, and complete a report detailing the full incident and report this to SEPA and the HSE as required.
7. All radiation workers within the department should be informed of any recommendations identified and these should be highlighted to all other radiation departments.

Departments will need to consider other steps that may be necessary in the event that the spill cannot be immediately resolved.

The DRPS and URPO will organise for the notification of various departments that may need to be involved in resolving the incident (E.g. USCO, External Communications, Security or Estates).

If closure of the lab affects a large space within the building, the department will need to consider the need to maintain all other business activities (Research, teaching etc.).

Advice will be provided by the URPO and the URPA if an area needs to be put out of action for a period of time.

All of the above will need to be considered, and written into the department's business continuity plans.

## APPENDIX C – DEALING WITH A CONTAMINATED PERSON(S)

Any person that is, or is believed to be contaminated is to immediately notify a colleague that they may be contaminated. They are not to travel throughout the building to prevent the spread of contamination. A nearby phone (not a mobile device) is to be used if necessary to notify a colleague. If used, this is to be highlighted to attending persons so that it can be monitored for any contamination.

**Contact MUST be made with the URPO, regardless of time of the incident. Contact will be made with the URPA by the URPO, as appropriate for advice.**

**Due to the potential need to remove items of clothing, a chaperone of the contaminated persons choosing MUST be present during any decontamination process.**

**Departments are to ensure that where a risk of personal contamination has been identified, that a suitable spill kit has been provided. Details will be provided by the URPO.**

1. Only suitably trained personnel using a suitable instrument, should monitor the person to confirm extent of contamination, ensuring to record:
  - a) Readings, location and approximate size of area(s) of contamination – use a permanent pen to mark out area(s).
2. Remove any contaminated clothing and items of jewellery – place in plastic waste bag and leave in or near the affected area. Temporary clothing (coveralls) will be supplied in the spill kit. Removed clothing and accessories may be returned if possible, but may need to be destroyed.
3. Under direction from competent personnel (URPO or URPA):
  - a) Wash the affected area thoroughly, but gently with soap and tepid water, over a plastic bowl to contain waste water and take care not to spread contamination. Wash from the edges of the contaminated area inwards to prevent the spread of contamination.  
  
Should large areas of clothing / skin be contaminated, this may necessitate the movement of the worker to an appropriate showering facility. This would be discussed and dealt with in conjunction with the URPA due to the potential for intakes by the affected person as well as disposals of radionuclides to the environment.
  - b) Washing should be gentle as vigorous rubbing may cause surface damage to the skin, permitting the material to enter the body. A brush should never be used as this will damage the skin, however a soft cloth may be used if employed gently.
  - c) Ensure the material does not risk entering the eyes, ears, nose, mouth or any wounds.
  - d) Rinse the area and dry with a gentle patting motion and then re-monitor. (All solid waste to be placed into a radioactive material waste bin).
  - e) Repeat the clean and monitor stages until all residual contamination has been removed.
  - f) If contamination remains, further abrasive actions may be taken, but only after discussion with the URPA.
4. Any contaminated wound, however trivial, should be irrigated with water or saline solution, with care being taken to limit any spread of contamination to or from other parts of the skin.
5. If there is contamination suspected in the eye, use a saline eye wash bottle, and irrigate the eye fully, making sure that water runs from the inside edge of the eye outwards, to prevent any cross contamination of the face and other eye. Use a sink or plastic bowl to collect the water and prevent the spread of contamination.
6. The spread of contamination, particularly on shoes or items of clothing of persons leaving the affected area, should be prevented. Persons who may be contaminated must be monitored immediately before leaving the area and appropriate arrangements made for their decontamination.
7. An assessment of any potential dose through an open wound may be required. This will be carried out by the URPA.
8. If considered necessary, any dosimetry normally worn by involved personnel should be sent off to Approved Dosimetry services for measurement immediately.
9. Complete an incident report on the SIRIS system.

## APPENDIX E – DEALING WITH A SUSPECTED OVER EXPOSURE

An overexposure is the breach of any relevant legal dose limit that applies to the a radiation worker or any other person not involved in the work which exceeds the limit enforced locally by the University.

In the event of an overexposure, whether actual **or** suspected, the event must be reported **IMMEDIATELY** to the DRPS and to URPO / SHaW. A full investigation into the incident will be carried out by the URPO in conjunction with the URPA.

Initial actions that will be taken include:

- The making safe and prevention of the use of any equipment or system of work responsible for the suspected overexposure.
- Preventing the individual(s) concerned taking part in any further work with ionising radiations.
- Ensuring the immediate return of any dosimeter(s) likely to relate to the incident.
- Carry out a detailed investigation to assess the actual doses received, including details of the events leading up to the exposure, the maintenance record and monitoring of any machinery involved.

Unless it can be shown beyond reasonable doubt that no overexposure could have occurred, SHaW will notify the following agencies once a full internal investigation has been completed:

- Health and Safety Executive
- In the case of a University employee, the Appointed Doctor. In the case of an outside worker, the employer(s) of the overexposed person(s).

## **APPENDIX F – MANAGEMENT OF AN AREA OF HIGH DOSE NOT SUITABLY DESIGNATED.**

In the event of a source or device giving rise to a dose rate in an area accessible to workers which is in excess of 2.5µSv/hr or a dose rate in excess of 7.5µSv/hr, the DRPS should carry out and consider the following:

### **Source:**

1. Immediately inform the University's RPO who will attend and offer advice. The University RPA will be also be contacted.
2. Remove all personnel from the affected area, lock all doors to the area and deny further access to any personnel.
3. Using appropriate monitors, evacuate to an area where doses are as low as practicable, but where access can still be controlled to the area.
4. Plan a means of retrieving the source (if applicable) and moving it into a safe location.
5. If source cannot be moved to a safer location, provide local shielding and demarcate the area to show the extent of the Controlled / Supervised area.
6. If doses in the general area are likely to remain higher than appropriate thresholds, despite practical measures, then consider classifying the area as supervised or controlled respectively. This will require input from the University RPA as to the requirements of the area.
7. Prepare a detailed report of the incident; including how the area was identified, persons exposed and times they have spent in the lab etc.

### **Device:**

1. If the high dose rate is coming from a device that has previously been monitored and found to be within acceptable safe limits, immediately inform the URPO who will attend and offer advice. The URPA will be contacted as required.
2. The device is to be placed out of service until further notice.
3. An investigation is to be carried out on the use of the device to determine if any physical damage may have occurred to it resulting in damage to installed shielding or misalignment of any beams / emissions
4. The device manufacturer is to be contacted for advice, and the device should be examined by a competent service engineer to establish any defects.
5. Should the device be found to be in good working order; additional measures are to be taken to ensure that personnel are protected from the emissions.
6. Should the device be found to be defective, the device is to be repaired in-situ or returned to the manufacturer / approved service agency for a full service. This must be done before the device can be considered for re-commissioning.



## **APPENDIX D – LOSS, SUSPECTED THEFT OF OR DAMAGE TO A RADIOACTIVE SOURCE.**

### **Source that can be immediately recovered**

1. If a sealed source is dropped when in use and can be immediately located and recovered, then the source is to be replaced in a safe condition, ensuring that all appropriate measures are taken to minimise exposure to radiation and keeping any dose as low as reasonably practicable (use of handling tongs, shielding etc.).
2. The URPO, through the DRPS, is to be informed of **ANY** incidents involving sealed or unsealed sources.
3. Once the source has been recovered, a wipe test of the source is to be carried out to ensure that no damage has occurred. This should be recorded on the sources electronic record.

### **Source that cannot be immediately recovered**

1. If a sealed source is lost and cannot be immediately located or recovered, then the DRPS is to inform the URPO **IMMEDIATELY**. The area is to be closed off and access is to be denied to all personnel.
2. SHaW will contact the URPA for advice as required.

### **Source is believed lost or suspected stolen**

1. If it is discovered that a source is missing from a department, the DRPS is to be informed immediately. The areas where the source is typically located and also the area in which the source was last used are to be quarantined, and an immediate audit of all radioactive sources to verify the inventory of the department's holdings is to be conducted.
2. The URPO is to be contacted immediately if initial efforts to locate the source are unsuccessful.
3. A thorough search of the department is to be conducted, using appropriate monitors to assist in the location of the source and to minimise any potential personal doses.
4. If the source is deemed to have been irretrievably lost or the department has cause to believe it has been stolen, SHaW will contact the URPA and relevant enforcing authorities to inform them of the situation as required by the IRR17. Security Services will also be informed in the event the source cannot be located.

### **Damage to, or leakage from, a sealed source**

In the event of damage to a sealed source that results in the material contained leaking or becoming exposed, the following steps should be carried out:

1. The area is to be immediately evacuated, and access to the area of the source is to be restricted to only the DRPS, the URPO and the URPA. Contact is to be made with SHaW and inform them of the situation immediately. The URPO will attend and offer advice and contact the URPA as required
2. The source is to be immediately placed onto the nearest hard, non-porous surface E.g. Lab benchtop, and a suitable container that will prevent the dispersal of any of the material contained in the source is to be located. The source should then be moved to the container **ONLY UNDER DIRECTION FROM THE URPO**.
3. The source will be examined by the URPO, and only if it is deemed safe will the source be moved into an approved waste disposal container for movement out of the area to the University radioactive waste store.
4. Once the container has been removed, then the area the source was being used in and the persons that were using the source are to be monitored for contamination. If any is found, then the appropriate procedures are to be followed.