

# University Occupational Health and Safety Guidance Notes

## MANAGEMENT OF RADIATION FACILITIES

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## 1. PURPOSE

The employer's primary duty is to ensure that all personnel, whether working directly or not with ionising radiation are protected from its potentially harmful effects.

The purpose of this Guidance Note is to assist departments in ensuring that they appropriately designate areas where ionising radiation is in use or is planned to be used to protect University employees and those that may be affected by this work.

## 2. CONSTRUCTION OF A RADIATION AREA

When considering an area of the use of radioactive materials, the department must consider how the area is constructed. The aim of the designated radiation area should be to: prevent the build-up of any potential areas of contamination from radioactive materials; to ensure that the materials are able to be stored correctly and securely; to control access to only those that should have access; and make the cleaning of the area as easy as possible.

Any laboratory fitted out to modern analytical standards will generally be suitable for the use of radioactive materials. There are several points that must be considered when planning the design and layout.

### 2.1 Flooring

Flooring in radiation areas should be covered in a surface that is highly impermeable (linoleum or vinyl). The surface should be at least several millimetres thick, so that any cuts or scratches are unlikely to pierce the full thickness of the covering.

The edges of the flooring should be banded to a height of no less than 10cm, and all edges are to be welded or sealed to create a single continuous surface.

### 2.2 Walls and Ceilings

All walls and ceilings should be smooth and should be coated in either a washable gloss paint or hard wearing emulsion. Tiling may be used, but the grouting must be chosen carefully to prevent any absorption of spilled radioactive materials.

All walls should have splash guards up to at least 50cm above the surface of the worktop/bench, the material for which should be chosen carefully to prevent the potential for fixed contamination.

### 2.3 Doors and Windows

Preferably, no wooden materials should be used. However, where this is unavoidable, all wooden surfaces should be covered with a hard-wearing varnish or gloss emulsion. Any joints in window frames should be suitably sealed.

Where windows are in place, the risk of contamination outside of the building should be assessed, and measures put in place to restrict the windows movement if this is a possibility.

All doors and windows should be suitably robust, and should any defects become apparent in their construction, this is to be reported immediately to the DRPS and URPO to ensure the security of the radioactive materials.

### 2.4 Benches and Work surfaces

All benches and worktops/benches should be smooth, hard and resist absorption of materials. They should be resistant to heat and chemical damage which may lead to cracking of the surface. The particular material chosen for worktops/benches will depend on the radioactive materials being used. For example, stainless steel may react readily under certain conditions with P-32, leading to contamination that cannot be removed.

Benches should have as few joins between them as possible to minimise the potential areas for radioactive material to collect. They should be sealed at the splash guards on the wall to form a single continuous good seal.

## 2.5 Waste Disposal Sinks

Sinks for the disposal of radioactive material must only be used for this purpose and will need to be marked as such. The material for the sink's construction will depend upon the radioactive materials being used.

For the pipework connecting the sink to the drain, as few pieces should be used with as few bends to prevent the build-up of material internally. Traps on sinks should be of as simple construction as possible to avoid accumulating material.

The pipework should lead directly into the buildings main drain, avoiding any holding tanks or grey water tanks. Again, pipework should be of a material that will prevent a reaction leading to fixed contamination and all pipework should be labelled to indicate that radioactive materials may be present inside. The point at which labelling needs to cease will be discussed as part of the radiation risk assessment.

## 3. DESIGNATION OF A RADIATION AREA

Any area that ionising radiation sources are used in must be identified, appropriately designated and recorded in the departments OHS Management Arrangements. All areas where ionising radiation is used must be given the designation from the IRR17 as either 1) **Controlled Radiation Area**, or 2) **Supervised Radiation Area**. Where this document refers to a **Designated Area**, this applies to both controlled and supervised areas.

The designation of an area is relatively simple and will be determined by the level of dose that has been assessed as part of the radiation risk assessment. Work that is carried out in a controlled area presents a significantly higher risk of receiving a radiation dose than that which is carried out in a supervised area, and work in a supervised area presents a significantly higher risk than that found in a non-designated area.

Departments should be aware that they are not only responsible for designating their own areas; should their work present a radiation risk external to their area of control, they will be required to ensure that any areas affected by the radiation are also suitably controlled. Where this may be an area external to a building, appropriate measures will need to be put in place to prevent this.

The requirement to designate an area falls to the HoD, and this must be done in advance of any work starting with ionising radiation.

### 3.1 Supervised Radiation Area

A supervised radiation area is the minimum required designation for most University areas where work with radioactive materials or generators are used. This area is where either:

- It is necessary to keep the working conditions under review to ensure that, if it becomes necessary, the area will be re-designated as a controlled area.
- Or**
- It is considered likely that any person working in a supervised area will receive an effective dose greater than 1mSv in a calendar year.

### 3.2 Controlled Radiation Area

A controlled radiation area is an area where:

- It is necessary, due to the potential for significant radiation doses, to prevent, or closely supervise, access to the area by employees who are unconnected with the work with ionising radiation and other processes while that work is underway.

Or

- Any person working in the area is likely to receive an effective dose greater than 6mSv in a year or an equivalent dose greater than three-tenths of any applicable dose limit.

## 4. DEMARCATION OF DESIGNATED AREAS

Once the designation of an area has been determined, then the area itself must be demarcated so that it is obvious to everyone that the area may present a risk to their health or wellbeing.

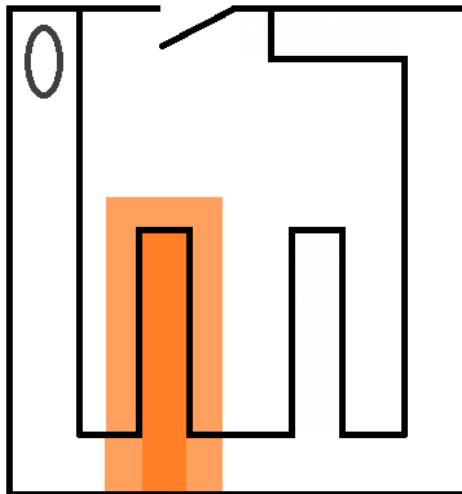
There are several points to consider when determining where the boundary line should be for the area, and what physical measures should be used to demarcate the area.

### 4.1 Supervised Areas

For a supervised area, the main issue would be ensuring that non-radiation workers are kept safe from the low levels of radiation that may be present in the demarcated area. It is common for supervised areas to be found within larger laboratories, and as such, the choice of location within the room is important to ensure that all persons are protected.

Some examples of room layouts can be found below, which will give an indication as to how a supervised area should be located.

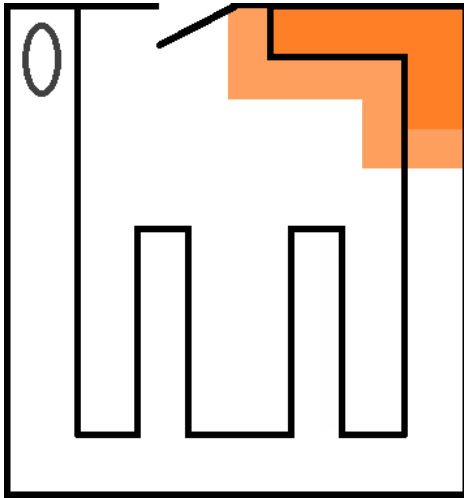
#### Example 1.



In this example, the worktop/bench has been designated as the supervised area. This will be difficult to maintain, as it will be difficult to ensure that non-radiation workers are excluded.

Demarcating this area will be difficult as well, due to the transit of people into non-supervised parts of the lab.

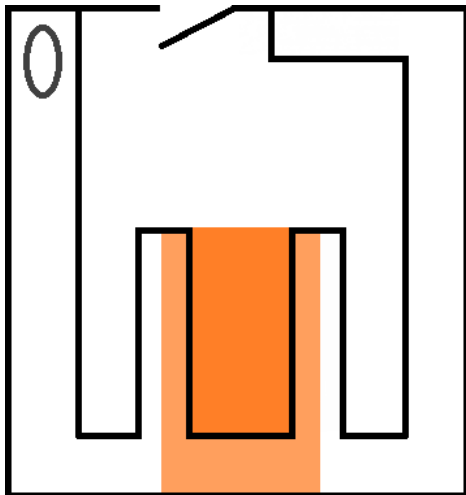
**Example 2.**



The positioning of the designated area in this example is much improved than that shown in Example 1, as it now makes it simpler to exclude non-radiation workers, but the demarcation will still be difficult, as there is no defined point of entry.

The positioning also makes it difficult to implement additional control measures to prevent the exposure of others working in the area to radiation or to impede any potential spills.

**Example 3.**



In this third example, access to the area is much easier to control. There is a single access point into the supervised portion of the lab, which will assist in ensuring the demarcation is easily maintained, and it is simpler to exclude anyone who does not have permission to access the area.

With some suitable bench top guarding (such as splashbacks etc.), the entire area can be enclosed therefore reducing the risk of radiation exposure or potential for contamination considerably.

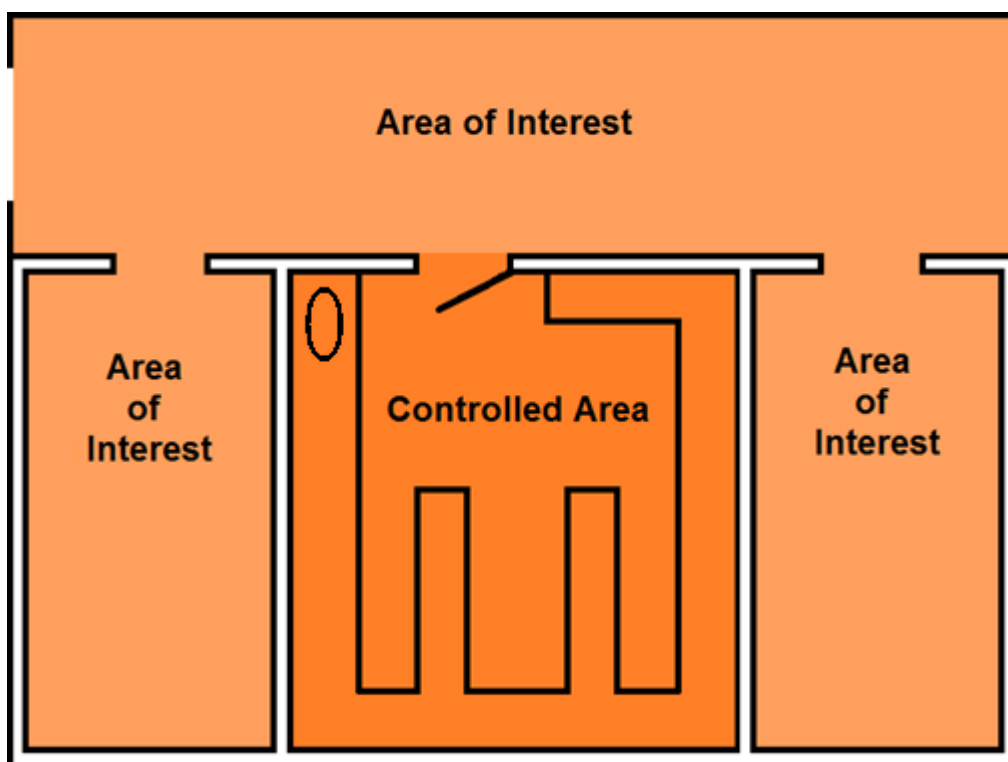
## 4.2 Controlled Radiation Areas

Access to and from Controlled Radiation Areas must be physically barred. Tape on the floor or a chain across the access point is not a suitable level of demarcation.

Once the extent of the area has been defined, it must be segregated from any adjoining areas. Controlled Radiation Areas should be in separate rooms in which the entire area is designated as controlled and this must be described in the local rules for the area. Access to a Controlled Radiation Area should preferably be through a single entrance to ensure ease of controlling access.

In the following example, the entirety of the controlled area is in a single space with only one access point to the area. Due to the nature of some work that occurs in controlled areas, it will be prudent to ensure that adjoining areas are examined (both to the sides of the designated area, as well as the floors above and below). These areas of interest should be routinely monitored to ensure that any doses present in adjoining areas are not in excess of those allowed for a supervised area.

### Example 4.



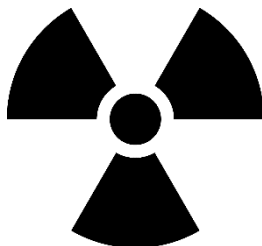
## 5. CONTROL MEASURE FOR AREAS DESIGNATED FOR RADIATION USE

Given the potential hazards present within designated areas, all designated areas must be appropriately sign posted with appropriate signage and information relating to the expected hazard, so that anyone attempting to enter the area is informed of the potential hazards.

Access to all designated areas should only be possible to the radiation workers who are authorised to access them.

### 5.1 Signage

Any laboratory that is designated as a radiation area is required to display the radioactive trefoil hazard symbol. This symbol is to be displayed at entry points to the area at all times.



The signage may only be removed when there is no possible risk of radiation exposure. This would normally only be when the area has been fully decommissioned if using radioactive materials or when all radiation generators have been de-energized and cannot be restarted without warning.

Any person wishing to remove radioactive hazard signage is to contact the URPO prior to removing any signage, in accordance with Section 6 (Decommissioning of a Radiation Area).

Example signage can be found in Appendices A and B for different levels of designated area.

### 5.2 Local Rules

Local rules are a legal requirement under the IRR17. This document is required at the entrance to any radiation area within the University.

The local rules will detail, at a minimum, the following: The area and its designation

- The dose investigation level in force for the area (for all areas, this will be 0.1mSv/quarter);
- A summary of all contingency arrangements, highlighting any reasonably foreseeable accident scenarios;
- The name and contact details of the DRPS;
- The area that the Local Rules are applicable to;
- A summary of the working arrangements in place for the area, including the written arrangements for non-classified persons entering a controlled area.

Additional content can be added to the Local Rules where it is found to be useful. For example, the DRPS may find it useful to include items such as:

- The testing / maintenance regime of all engineered controls, design / safety features and warning devices;
- Details of the areas that are subject to radiation / contamination monitoring and the periodicity this is carried out on;
- The requirements for personal dosimetry;
- Arrangements for pregnant or breastfeeding employees;
- The triggers for conducting investigations;
- How to contact the URPO.

Other relevant information can be referenced in the Local Rules. All procedures and processes relating to radiation must be brought to the attention of anyone entering the area.

The Local Rules for each radiation area remain the responsibility of the DRPS. The Local Rules are to be reviewed annually, or whenever work or processes change to ensure they remain up to date and relevant to the work being carried out within.

This document is to be signed by the DRPS responsible for the area, and is to be displayed immediately adjacent to, or on, the door leading into the designated area.

Anyone entering the area is to familiarise themselves with the local rules before entering the designated area.

**Further Information:** [Radiation Area Local Rules](#)

### **5.3 Controlling Access**

Any area that contains sealed or unsealed sources or houses any form of X-ray generator needs to be secured to ensure the safety and security of the material or generator inside.

All access routes to areas where such materials or equipment are housed must be secured by a physical lock. A physical manual lock is the preferred method for this, rather than an electronic lock, as this will ensure that the materials stay secure, even in the event of a power outage.

The physical lock should be either a double action lock or a digital pin code lock, and departments should ensure that only those with authorised access to the area can access the area.

#### **5.3.1 Double Action Key Lock**

Only radiation workers authorised to access radioactive materials or radiation generators should be have to access the key. Departments should create an authorised key holder list to track those who are authorised to access a designated area. This list is to be kept up to date

Should a key be lost or stolen, the department should ensure that the lock is updated or changed.

A key should be immediately available in an emergency, so that access is available to the emergency services.

#### **5.3.2 Digital PIN Lock**

A digital PIN lock is a physical lock that has a code entry panel to control access to an area. These are preferred over Key Locks due to the ease with which the codes can be changed. In the event of a radiation worker leaving the University, the code should be changed and distributed to remaining members of staff to ensure that work is not disrupted.

Codes for the area should be changed on a regular basis to ensure continued security of the area.

Arrangement should be made to enable a copy of the code is immediately available in an emergency.

### **5.4 Authorised Users List**

The department should maintain an authorised user list of each radiation area under their control. These lists will identify those who are authorised to access a particular area, and have received relevant training.

No unauthorised personnel are allowed access to a Controlled Radiation Area without being on the authorised user list, unless they are accompanied by a competent member of the department with authority to be in the area. This extends to members of Estates Services and Security staff.

Should Estates Services personnel require access to any area designated as a radiation area, they are to contact the DRPS responsible for the area at least 1 week in advance of the work being carried out. This will provide sufficient time to plan in the work and to



provide the personnel from Estates Services with suitable information and training where needed.

In the event of an emergency, Security personnel may enter a designated area, but ONLY after consulting with a competent member of staff, either from the department or from the URPO in SHaW.

## 6. DECOMMISSIONING OF A RADIATION AREA

When an area that has been designated as either a Supervised or Controlled Radiation Area is no longer required, the area must be returned to Estates Services in a satisfactory state. To ensure that the area meets this requirement, the area must be decommissioned appropriately by the department in line with this document and will be subject to an inspection by the URPO / URPA, which must be completed to ensure that the area is fit to be handed back to Estates Services.

The following section provides guidance on how this can be achieved.

On completion of the decommissioning process, a "Certificate of Decommissioning" will be issued by the URPO. This must be included in departmental records and a copy must be given to Estates Services when the area is handed back over.

**The URPO is to be contacted before the decommissioning work begins to ensure that all relevant steps are considered.**

### 6.1 Before Starting

The department must appoint a nominated person (NP) to oversee the decommissioning of the area. This does not need to be the DRPS, but should be someone who has been involved in the work that has been carried out in the lab or is aware of the risks presented by the materials. The DRPS will still retain management oversight of the area until the final decommissioning certificate has been issued.

To assist the NP in the process of decommissioning the area, a checklist of items can be found at Appendix C

### 6.2 Removal of radioactive sources

All radioactive materials or sources are to be removed from the area prior to decommissioning starting. These materials must be offered to other departments that could make use of them before disposal to the environment is considered.

If no use can be found for the materials within the University, they may be disposed of via the department's normal disposal routes. The URPO should be consulted with prior to disposal to ensure the disposed activities remain within the University's operating permits.

Where sources are transferred to another department's control, [eRad](#) is to be updated to indicate the new responsible person.

All final movements or disposals of radioactive sources are to be entered into [eRad](#) as per usual departmental process

### 6.3 Removal of equipment

All items that are being removed from the area must be surveyed for radioactive contamination. Where the item is complex (i.e. it is a container, has multiple parts, or has internal parts that are not immediately accessible), all accessible surfaces of the item are to be swabbed and surveyed using appropriate equipment.

If an item is identified as contaminated (where the monitor gives a count rate of  $\geq 5$  cps above background), then it must be placed within a double layered plastic bag, taped closed and placed in a secure location. The URPO must be contacted to inspect the item.

All items that are being removed that are not to be disposed of must be free of any radioactive labelling or signage before they are to be moved to another area. Where it is not possible to remove these markings, the markings must be rendered illegible. Embossed or engraved containers are not to be used in a non-radioactive area, and should be surrendered to the URPO for disposal.

All surveys of equipment are to be recorded and retained by the department completing the decommissioning along with the final decommissioning certificate.

#### 6.4. Contamination survey

A comprehensive contamination survey (An example template can be found here: [Routine Contamination Survey Form](#)) is to be conducted of the area, taking into account all hard surfaces, walls, ceilings and floors. All instances of loose contamination are to be managed using normal departmental cleaning methods until readings are below detectable levels.

If the contamination is not removed after several cycles of cleaning, then the contaminated area is to be marked using an indelible marker to indicate the extent of fixed contamination. The URPO is to be contacted, as specialist methods may be required to remove the contaminated material.

**No mechanical methods of removal (sand paper, cutting or grinding) are to be used, as any fixed contamination may become airborne and could potentially be inhaled.**

To ensure that there is no contamination of any pipework, all sinks and drains in the lab (even those not listed as designated) are to be surveyed. Where sinks or associated pipework have been identified as contaminated, The URPO is to be contacted, as specialist methods may be required to remove the contaminated material.

**Under no circumstances should Estates Services carry out removal of any contaminated equipment. In all cases where fixed contamination is found, the URPO is to be contacted.**

**No sinks or pipe working are to be detached, dismantled or cut until the URPO has been contacted.**

A record of the complete area survey is to be documented, and retained by the decommissioning department for a period of no less than 5 years.

#### 6.5. Final Inspection

When the department has completed its survey of the area, this is to be submitted to the URPO for review. The URPO (assisted where necessary by the URPA and Regulators) will undertake a final inspection of the area to ensure that all possible residual contamination has been removed. This final survey will be submitted to the department responsible along with a Final Decommissioning Certificate.

If the decommissioning is of the entire facility rather than a single room within a larger building, the URPO will contact the relevant regulatory bodies to inform them of the cessation of work.

#### 6.6 Records

On completion of the decommissioning, the following information must be retained by the department:

- Usage records for the area for previous 5 years.
- Disposal records for the area for previous 5 years.
- All routine monitoring records for previous 5 years.
- All monitoring records completed during decommissioning
- Decommissioning certificate when issued by the URPO

This information is to be retained for a minimum period of 5 years from the date of the decommissioning.

Appendix A – Hazard Warning Sign – Supervised area using unsealed radioactive sources



ANY PERSON REQUIRING ACCESS MUST HAVE THE PERMISSION OF THE RADIATION PROTECTION SUPERVISOR.

RPS: \_\_\_\_\_ TEL: \_\_\_\_\_

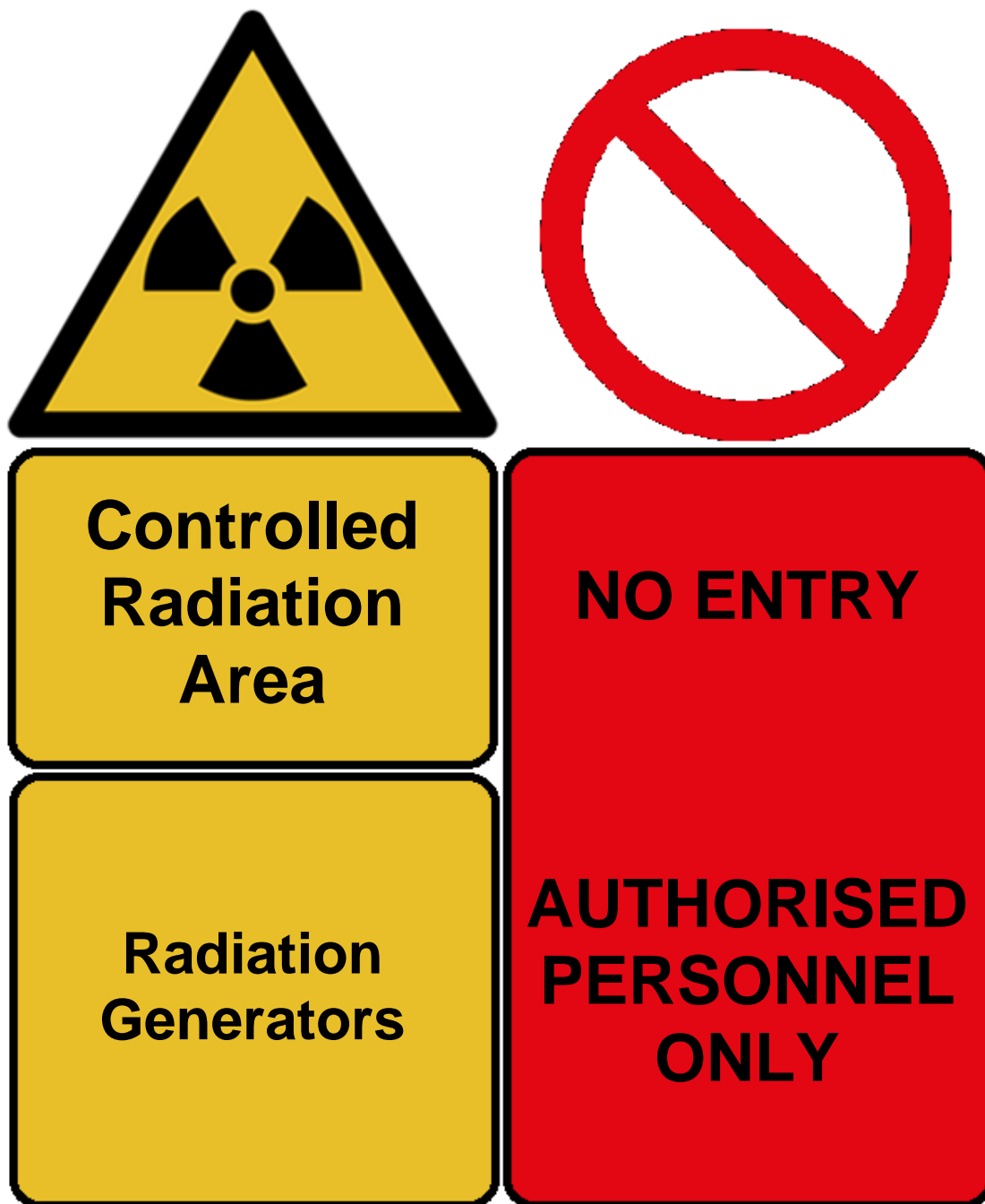
**Safety, Health & Wellbeing  
GH820 Graham Hills Building  
50 George Street  
Glasgow  
G1 1QE**

**Tel: 0141 548 4673**

**Email: [radiation.protection@strath.ac.uk](mailto:radiation.protection@strath.ac.uk)**

**WWW: [www.strath.ac.uk/safetyservices/](http://www.strath.ac.uk/safetyservices/)**

Appendix B – Hazard Warning Sign – Controlled area using radiation generators



ANY PERSON REQUIRING ACCESS MUST HAVE THE PERMISSION OF THE RADIATION PROTECTION SUPERVISOR.

RPS: \_\_\_\_\_ TEL: \_\_\_\_\_

**Safety, Health & Wellbeing**  
**GH820 Graham Hills Building**  
**50 George Street**  
**Glasgow**  
**G1 1QE**  
**Tel: 0141 548 4673**

**Email:** [radiation.protection@strath.ac.uk](mailto:radiation.protection@strath.ac.uk)  
**WWW:** [www.strath.ac.uk/safetyservices/](http://www.strath.ac.uk/safetyservices/)

## Appendix C - Final Decommissioning Departmental Checklist

<b>Department:</b>		<b>DRPS:</b>					
<b>Building:</b>		<b>Area(s):</b>					
Has a nominated person been appointed by the HoD / DRPS?			<input type="checkbox"/>				
Has the URPO been informed of the need to decommission an area?			<input type="checkbox"/>				
Have all radioactive sources been removed from the area?			<input type="checkbox"/>				
Have all radioactive sources been offered to other departments, to minimise disposals?			<input type="checkbox"/>				
Have all movements and disposals of radioactive sources been recorded on eRad?			<input type="checkbox"/>				
Have all containers been checked for contamination? All containers that are free from contamination are to have all markings removed are to be removed from the area. For containers with etched or engraved markings, these are to be segregated for use elsewhere or appropriate disposal			<input type="checkbox"/>				
Has an initial contamination survey been carried out to identify areas of contamination?			<input type="checkbox"/>				
Has all loose contamination been removed, and all generated waste disposed of? <ul style="list-style-type: none"> <li>• If any fixed contamination is found, report this to the URPO</li> </ul>			<input type="checkbox"/>				
Have all sinks and drains been swabbed for contamination? <ul style="list-style-type: none"> <li>• If any contamination found in non-designated sinks, report this to the URPO</li> </ul>			<input type="checkbox"/>				
Has the URPO been contacted to arrange the final inspection?			<input type="checkbox"/>				
Has the final inspection been carried out of the area to confirm the area is in a satisfactory state for return to Estates Services?							
Have all radiation warning signs been removed from doors, sinks, cupboards etc.?			<input type="checkbox"/>				
Once the decommissioning certificate is received, ensure the following is collated							
<ul style="list-style-type: none"> <li>• Usage records for the area for previous 5 years.</li> <li>• Disposal records for the area for previous 5 years.</li> <li>• All routine monitoring records for previous 5 years.</li> <li>• All monitoring records completed during decommissioning</li> <li>• Decommissioning certificate</li> </ul>			<input type="checkbox"/>				
<b>As the nominated person, I confirm that the above checklist has been completed in accordance with the above document. A copy of the decommissioning pack will be retained electronically by the department for a minimum of 5 years, and copies will be submitted to the URPO for compliance and a copy will provided to Estates Services when the area is returned.</b>							
Title:		Name (print):		Signature:		Date:	
<b>As Head of Department, I am satisfied that all the above steps have been completed.</b>							
Title		Name (print):		Signature:		Date:	