Decommissioning of Laboratories used for Work with Unsealed Radioactive Sources

Please also refer to 'Vacating Premises' – HSD022M

Introduction

Occasionally laboratories that have been used for work with unsealed radioactive material will be reassigned to different, non-radioactive work. It is important that before doing so, steps are taken to confirm that there is no remaining radioactive material, radioactive contamination or articles that could be construed as being radioactive or containing radioactive material, left in the laboratory. This guidance note outlines a protocol which, if followed, will adequately demonstrate that these steps have been undertaken.

Note that this protocol is intended for laboratories in which radioactive work will definitely cease. If it is likely that a lab may be reused for radioactive work in the short term, it might be worth maintaining it as a designated room/area. In this case removable, accessible contamination should be removed, but the room/area designation notice may be left on display, and the Departments records/local rules annotated accordingly.

A checklist is attached as an addendum to this guidance note to help work through the protocol for any particular room/area. Also attached is 'Decontamination – Helpful Tips'.

Procedure

1. **All radioactive material and waste must be removed** from the department via an appropriate route. This includes reference and calibration standards, uranium salts and any internal sources of equipment. Consult RPO/RPA for further advice.

2. **The use and disposal records must be completed** to show that all radioactive material and waste has been removed, i.e. when and by what disposal route. The records must be returned to the RPS and filed.

3. All **containers** used for the keeping of radioactive material or waste must be removed from the area after checks to **ensure that they are not contaminated**. (All markings relating to their radioactive contents must then be removed or made illegible).

4. Comprehensive **contamination monitoring of the area** must be carried out using a suitable contamination monitor and the results recorded (and other steps noted on a suitable checklist). Consult RPO/RPA for further advice. Keep all records of monitoring in safe/secure place – note there is no maximum 'time limit' for the records to be kept.

5. All loose surface contamination must be removed using conventional laboratory **decontamination** methods. If, after decontamination, the count rate on the contamination meter is greater than or equal to twice the background count rate, then wipe tests should be performed. If the count rate on the wipes is above background, then cycles of decontamination followed by further wipe testing should be carried out until no significant reading can be detected on the wipes; this shows that no readily removable contamination is left (but see 8, below). Where direct

monitoring is not appropriate, e.g. tritium contamination, all monitoring should be carried out by wipe tests.

6. Consideration needs to be given to contamination inside **drainage pipe** work from the points of disposal. Sinks which could have been used for disposal or radioactivity should have the sink trap dismantled (discuss with Department DSO in terms of other hazards) and checked by monitoring and, if necessary, wipes. If this shows contamination fixed into the pipes, there might be a need to look for contamination further downstream; seek advice from the Radiation Protection Officer/Adviser.

7. It will be necessary to check for contamination in the extract from any **fume cupboards**. This should be done by checking as close as possible to the point where the ductwork leaves the top of the fume cupboard. If there is a filter present, the surface behind (i.e. downstream of) the filter should also be checked. Iodine-125 is the most likely isotope to have been used extensively in the fume cupboard. It has a 2 month half-life and emits weak gamma radiation (use a 44A or similar scintillation counter). If there is contamination present, the Radiation Protection Officer/ Adviser should be contacted. The need for further checks on higher levels of duct-work will depend on the findings from this initial survey (RPO/RPA advice needed).

8. If after decontamination there remains any **fixed contamination** in the laboratory, the Radiation Protection Officer/Adviser should be contacted for advice.

9. After removal of radioactive materials and waste and any decontamination, **all radiation warning notices should be removed** from doors, cupboards, fridges, sinks etc. Radiation warning signs should be shredded/ made unrecognisable before disposing with normal refuse.

10. The **Radiation Protection Officer/Adviser should then be contacted.** They may wish to undertake a final survey to ensure, that the lab can be confirmed as decommissioned.

If work in the laboratory/area is ceasing and the whole premises is to be vacated (not just the one room/area), then it may be necessary to inform the enforcement authorities. This will be done on behalf of the department by the University Radiation Officer/Adviser.

Documents and Records

Departments should document the decommissioning process; this should include photographs and plans of the area.

The following records applicable to the area must be kept for a period specified by the University RPO/RPA after the date of cessation of radioactive work in the area:

- Usage and disposal records;
- Routine monitoring records;
- Determination\calculations for the relative fractions of activity disposed by each route;
- Decommissioning monitoring records; and
- Decommissioning Checklist (see over).

Checklist

Decommissioning of Laboratory used for work with radioactive substances.

Department:……..

Identification of Laboratory:……

Date of Decommissioning:……..…..

1.	All radioactive material and waste removed?	
2.	Usage and disposal records completed to show that all radioactive material and waste has been removed, when and by what disposal route?	
3.	All empty containers checked, removed or markings removed or made illegible?	
4.	Contamination monitoring carried out and result recorded?	
5.	All loose surface contamination removed?	
	Fixed contamination refer to the Radiation Protection Officer/Adviser	
6.	Sinks traps checked?	
	Contamination fixed on pipes refer to the Radiation Protection Officer/Adviser	
7.	Extract from fume cupboards checked?	
	If contamination present refer to the Radiation Protection Officer/Adviser	
8.	All radiation warning notices removed from doors, cupboards, fridges, sinks etc?	
9.	Radiation Protection Officer/Adviser contacted for final survey?	
10.	All records up-to-date, available and filed with RPS?	
	1. Usage and disposal records 2. Routine monitoring records 3. Determination(s) or the relative fractions of activity disposed to each route 4. Decommissioning monitoring records 5. This Checklist	
11.	Further comments E.g. type of monitor used, wipe tests performed?	

Name of person completing checklist:……..

Role:……...

Signature:……

Date:……

For advice on any of the above topics please contact the University Radiation Protection Officer/ Adviser at the Safety Office.

DECONTAMINATION
HELPFUL TIPS

NB All personnel involved in decontamination procedures should be protected by the use of appropriate PPE. Use of chemicals will require COSHH assessments to be made.

Glassware

For glassware, use an alkaline detergent, proprietary decontaminating solutions, or ammonium citrate.

Plastics

For plastics, treat as for glassware, and in addition, dilute nitric acid is sometimes effective.

Metals

For metals, if mild detergent solutions have no effect, use a heavy duty detergent or dilute sulphuric acid; or for stainless steel a mild proprietary abrasive cream is usually very effective.

Paintwork

For paintwork, a detergent in water should usually suffice. If this proves unsuccessful, a gel type paint stripper should be used.

Floors

For cleaning PVC floorcoverings, the protective emulsion coating that these floors should have, can be removed with hot water. If hot water or a detergent cleaner does not remove the contamination, then the affected parts may have to be cut out and replaced.

For cleaning other floorcoverings, that may have a waxed surface coating, use a suitable solvent to remove this protective layer, and hopefully the contamination will be removed. If not, the floorcovering may have to be replaced.

Benchtops

Varnished bench tops can be cleaned as for paintwork, and formica bench tops can be washed with the proprietary cleaning solutions, or if necessary, a mild abrasive cream can be used.

'Corian' bench tops can even be rubbed down - 'wet & dry' emery paper.

Dealing with PPE

Disposable gloves, sleeves or aprons which become contaminated, can be disposed of with the solid radioactive waste. However if laboratory coats become contaminated, the contaminated area should be washed with a proprietary detergent in the laboratory before re-monitoring before sending it to the laundry, or the coat may need to be left in a safe place for the activity to decay, or in extreme situations it may have to be discarded as radioactive waste.

On no account must contaminated clothing be sent to the laundry.

Personal decontamination

For all personal contamination, the possible need to seek medical advice should be borne in mind.

For contamination of the skin, e.g. arms, hands, etc., the first step is to wash the affected area with soap and water, as normal. If the contamination persists, it should be washed and scrubbed gently, using a soft brush, with a deep cleansing soft soap or liquid soap, such as 'Clearasil' or 'Dermactyl'. Care must be taken not to break the skin.

If the contamination persists after several wash and scrub treatments and the contamination is restricted to parts of the hands, these may be cleansed with a saturated potassium permanganate solution. This will remove a superficial layer of skin, and care must be taken to ensure that no undissolved crystals are present. The brown discolouration left by the permanganate can be removed with a 10% solution of sodium metabisulphate. If any other parts of the body are contaminated and the contaminant is not easily removed by ordinary washing then specialist medical help should be obtained. (A&E Addenbrookes, who have access to Medical Physics staff).

An alternative to this rather harsh treatment can be used for the removal of P-32 contamination. Mild acids are very effective surface decontaminants for phosphates and rather than using something from the chemistry lab, vinegar or citric acid can be used. This is obviously much less alarming to the contaminated worker and just as effective.

If serious injury, cuts and wounds are associated with the contamination, if possible these should be irrigated and first aid measures then taken before dealing further with the contamination. Body openings, such as eyes, ears, nose and mouth should always be decontaminated first. Decontamination of any 'hot spots' on other parts of the body should be dealt with next. Care should be taken to ensure that washings do not contaminate other areas. If the casualty has to go to hospital for treatment of wounds only superficial removable contamination should be dealt with as a first aid measure. Do not delay treatment or removal to hospital because of difficult 'fixed' contamination.

Emergency "full body" showers are rarely the best solution for dealing with a contaminated person as these can spread the contamination. For hand arm and head contamination it is better to use a hand wash basin (and eyewash attachment if available) and for legs a footbath can be effective.