



The University of Sheffield

Safety Services



RADIOACTIVE WASTE DISPOSAL

The prime purpose of the Radioactive Substances Act 1993 is to ensure that members of the general public are not affected by the deliberate or accidental discharge, or disposal, of radioactive material or waste. To achieve this end, all users of radioactive materials are required to:-

1. obtain a registration certificate or certificates from the Environment Agency for the radioactive materials which they have, or intend to have, on the premises; and
2. obtain a waste disposal authorisation from the Environment Agency which details the conditions which must be observed for the disposal of radioactive waste.

The University, through Safety Services, applies for, and obtains, such documents from the Environment Agency. In general, they are issued for individual buildings or closely defined groups of buildings so that some departments may share certificates. In this case, the limits imposed by the certificates are subdivided so that each department has its own allocation. The documents which relate to a particular area, together with any departmental allocations, are posted in the buildings concerned, and persons working there must familiarise themselves with all relevant details. The maintenance of records to demonstrate compliance with the terms of the Certificates of Registration and Authorisation is required, and special forms are provided for this purpose (*see record keeping forms*). Anyone in any doubt as to what is required should consult his/her Departmental Radiation Protection Supervisor or Safety Services.

Solid Waste

Up to four methods are available for the disposal of solid waste, and it is important that you use the one appropriate to your work -

1. Disposal with ordinary waste
2. Disposal by incineration.
3. Disposal to a drain by a specified macerator unit.
4. Disposal via a specialist contractor.

1. Disposal with Ordinary Waste

The Radioactive Substances Act 1993 does permit small quantities of radioactive material to be disposed of with ordinary (black bag) waste under 'dustbin disposal limits'. However, it was never intended that this waste should be incinerated and as virtually all Sheffield's waste is incinerated we cannot utilise this method except for trace amounts of activity.

If the activity of the waste is less than 0.4 Bq/g then it is exempt from the requirements of RSA 1993, is not considered to be radioactive and can safely be discarded with ordinary waste. Please consult Safety Services if intending to dispose of waste by this route as radioactive waste disposal can be a very sensitive subject and it is important that any old radioactive labels are not legible.

2. Disposal by incineration

The main route for disposal of solid radioactive waste and scintillant waste in mini-vials is now by incineration via clinical waste incinerators operated by White Rose Environmental. Waste is deposited at one of the local radioactive waste stores in the wheelie bins provided (see your DRPS for local details). All bags of waste must be correctly labelled with details of the date deposited, department, radioisotopes and approximate activities clearly marked. Scintillant waste in mini-vials must be put into sealable plastic tubs and be kept separate from the bagged solid waste (separate accounting required).

3. Disposal via a Macerator

The preferred method of disposal of animal carcasses and animal waste, plants (but not soil), and paper tissues, is the use of an approved macerator unit. It is important that the operating instructions posted by each unit be observed, and also that activities are controlled so that the quantities

permitted for the disposal of active **liquid** waste in the authorisation issued by the Environment Agency are not exceeded. In this context it is important to remember that other people will be using the system too and if there is any doubt about the total discharge exceeding permitted values, Safety Services must be contacted. Entries must be made in the record books located by each macerator for each disposal which is made. *NB Remember when recording waste in your own records to record macerated waste as aqueous and not solid.*

NB The only macerators now available are in the Field Laboratories.

4. Disposals using Specialist Contractors

Material which by virtue of its total activity or special toxicity cannot be disposed of by one of the above means will be collected directly by Safety Services for disposal via a specialist contractor. The cost of 'Special Waste' disposal will have to be met by the originating department.

Liquid Waste (Water Soluble)

Only those sinks or sluices specially designated for the purpose may be used for the disposal of liquid waste. Non-designated sinks must not be used under any circumstances. If any doubt exists the Departmental Radiation Protection Supervisor or Safety Services must be consulted before the discharge is made.

Where practicable all liquid wastes must be diluted with the appropriate carrier before disposal. In many instances this may just be water, but some compounds tend to stick to the surface of the drains, and in this case you will need to use a carrier which will help to take up the available sticking sites so that you are not left with a 'hot' sink or sluice.

As a general guide, wastes with an activity of 100 Bq/ml or less may be discharged down designated sinks. Solutions with activities greater than this must be discharged down an approved sluice. Sinks should be rinsed before and immediately after the discharge, and sluices must be flushed at least three times - once before and twice after. For all materials other than tritium, the sink or sluice must be monitored after disposal, and any residual activity removed if reasonably practicable.

Where a communal sluice is used the details of the isotope concerned and the approximate amount must be entered into the book provided. All such entries must be signed by the user and the name of the department given.

Great care must always be exercised to prevent spillage of any active liquid. This is particularly important when any radioactive material, and that of course includes liquid waste, is moved in corridors or other areas outside graded laboratories. Wherever possible non-breakable containers should be used for this purpose (*see section on movement and transport*). If an accident should occur, however, immediate steps must be taken to prevent passers-by becoming contaminated, and to decontaminate the area as soon as possible. The Departmental Radiation Protection Supervisor and Safety Services must be informed of any such occurrence. It must be noted that only those isotopes specified in the appropriate Authorisation from the Environment Agency may be discharged. If the discharge of any non-specified material is ever contemplated, Safety Services must be approached and appropriate arrangements made well in advance.

Liquid Waste (Organic Solvents)

This mainly concerns the disposal of scintillant waste in counting vials. On no account must organic solvents be flushed down a sluice, unless they are an approved biodegradable and water miscible product.

The exemption limit for this type of waste is low, 4 Bq/ml for H-3 and C-14 and 0.4Bq/ml for other isotopes. Therefore, it will nearly always have to be treated as radioactive waste. A declaration, stating the principal radionuclides present in each container and their approximate activity, must be provided before the waste is taken to the waste store. The waste will then be removed by Safety Services for incineration.

Collection of bulk radioactive solvent waste is on an irregular basis and anyone needing collection should make arrangements with Safety Services at the time. We are authorised to store this type of waste for up to 6 months.

Gaseous Waste

Any operation which is likely to produce radioactive gas, vapour or dust, must be carried out in an approved fume cupboard. In certain special cases involving powders glove boxes may be required and the advice of Safety Services should be sought.

The fume cupboard must always be operated with an air-flow sufficiently great to ensure the contents cannot leak back into the laboratory - normally a minimum of 0.5 m/s across the face opening is required. The sash must always be kept clear so that it can be closed in the event of an emergency.

The point at which effluent air is discharged must be sited to prevent, as far as it is practicable, its entry into any part of any premises by way of windows, air-intakes etc. In certain cases, filters may be necessary. Safety Services will advise accordingly.

All proposed gaseous discharges must be cleared with Safety Services as strict daily limits have to be complied with.

It should be noted that radioactive gas or fume might sometimes be generated unwittingly. For instance the tritium sources used in vapour phase chromatography units will release tritium if over-heated, and the outlets from such units must always be vented to the outside atmosphere rather than into the laboratory. Similarly it is not unknown for some stock materials to undergo radiation decomposition with the release of fume. Stores where such materials are held must be suitably ventilated.

NB. Vials containing any isotope which could release volatile compounds during storage should be vented in a fume cupboard before use on the open bench can be considered. This affects the use of H-3, C-14, S-35 and iodine labelled material.

IMPORTANT

The law requires the maintenance of suitable records for the discharge of any form of radioactive waste. Each and every user must ensure that such records are properly kept. Failure to do so, or to comply with the other requirements of the Radioactive Substances Act 1993, could result in prosecution with penalties of fines and imprisonment.
