

University of Sussex
Safety Procedures & Guidance number 32 revised 2009
Emergency Spillage

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1.0 Introduction

The purpose of this guide is to provide the requisite guidance and information to staff, in order to effectively deal with spillages of all descriptions, minimising environmental impacts to the lowest practicable level, especially with regard to aqueous discharges to main sewage systems and controlled watercourses.

Detailed and careful planning of procedures likely to be needed in the event of a spillage must form part of risk assessments carried out under the Control of Substances Hazardous to Health Regulations 2002 and Management of Health and Safety at Work Regulations 1999.

This Emergency Spillage Guide will advise on containing the spillage incident, which in turn will minimise potential effects on people and the extent of the damages to resources and the environment.

All work where spills of harmful/toxic materials or pollutants are a possibility must have a risk assessment to cover this eventuality. The risk assessment and subsequent safe system of work must ensure that the relevant safety equipment and neutralizing agents are available in the area before work commences and that those undertaking the work are aware of this document.

2.0 Spillage prevention

Always keep volumes to a minimum

If decanting volumes greater than 1 litre ensure that spill trays are used

Always store containers in spill trays of sufficient capacity to hold the volume (plus 10%) of the container. Ensure that appropriate spill kits or granules are at hand in dispensing and storage areas where volumes are greater than 5litres.

3.0 Discharges of spillage down drain

Following a spillage of a chemical / hazardous aqueous liquid, it is tempting to wash it with water hoses into the drainage system leading to the main sewers. Where the material spilt is relatively non-toxic and water-soluble this may be appropriate. However, this procedure should only be adopted if water authority regulations permit.

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4.0 Emergency materials and equipment

A wide variety of products are available to deal with spillages or to contain spills in emergency containment areas, some of which are listed below.

Proprietary absorbents

- **Absorbable spill pillows, mats and socks**, oblong or square, which can be placed in or over the spill, or sausage shaped, to surround the spill and contain it. Note: unless specifically indicated these pads are not always suitable for concentrated corrosive acids such as hydrochloric and sulphuric acids. Acid neutralisers or absorbent granules should be used- see below.
- A **collapsible mop** is now commercially available on which **absorbent spillage pads are Velcro fastened** for ease of removal and replacement. These pads draw liquid into an absorbent core where they are turned into a non-drip gel. This system has the advantage of the user not having to bend over the vapours of potentially dangerous chemicals while applying or retrieving spill pads and are easily to dispose of (these pads are not suitable for corrosive acids).
- **Commercial neutralisers for concentrated acids and alkalis** are available (this creates heat, 2-3 minutes should be allowed between treatments). An **inactivator for formaldehyde** and **chemical absorbents for solvents** are also available.
- A number of different types of general **spillage absorbent granules and chemical binders** are available. As with neutralisers (above), these have the disadvantage of having to be scooped or swept up after application.

- **Booms**

Booms designed to divert or contain spillages or isolate drains may be used. Absorbent booms are filled with absorbent material, as above, which can be suitable for hydrocarbons, aqueous chemicals or both.

- **Sealing devices and substances for damaged containers**

These devices and materials are designed for use when a tank, storage drum, valve or pipe has been punctured or damaged. Leak sealing devices may take the form of a pad or clamp which is put over the damaged area like a plaster, or they may be pre-shaped, inserted into the damaged area and then inflated. Leak sealing putties are also available, ready made or supplied in a dry powder form for mixing with water. These are applied over the damaged area to form a temporary seal. A more permanent method may be required before moving the damaged vessel.

NB: All contaminated (used) absorbents must be treated as hazardous waste

Personal Protective Equipment

Suitable personal protective equipment (PPE) should also be used where appropriate for protection during management of spillage incidents as indicated by the risk assessment.

Incidents may require more specialist PPE, such as Respiratory Protective Equipment - RPE, to protect individuals involved in dealing with spillage incidents

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- **Respirator** (use half mask, suitable for the fumes*)
 - **Gloves (Do not use latex gloves)**, gloves with wide chemical resistance such as *nitrile* should be used. However, *neoprene*, *PVC* or *butyl* gloves give greater protection than nitrile against certain chemicals; for example some concentrated acids. The risk assessment should identify the most suitable glove material.
 - **Eye protection** - goggles, visors
 - **Chemical resistant apron or gown**
- *NB If vapours penetrate the respirator and the chemical smell becomes apparent, the wearer should use the emergency number 3333 to notify security the nature of the spill and request the attendance of the Fire Rescue Service.
- **Footware** - wellington boots

5.0 Location of kits

Type of kit	Location	Contact details
All chemical	JMS - spills cupboard situated in the Foyer GDSC - all laboratories CRPC - level 4 corridor Chichester III - teaching laboratory (lab 15) Chichester 3/Arundel level 3 by stores Arundel Level 3 by room 305 Chichester and JMS solvents stores. Chemistry Superintendent's Office, rescue team vehicle	ext 8730 ext 8383 ext 3333
Oils	Mech Workshop CRPC 3.3 Pev I Mech Workshop Engineering 2 engine test cells waste engine store near Engg 2 loading bay. rescue team vehicle	ext 2798 ext 8067 ext 3333
Biohazard	JMS - spills cupboard situated in the Foyer CRPC - Biochemistry Superintendent's office 5.11	ext 7014
Mercury	Chemistry Superintendent's Office, JMS - spills cupboard situated in the Foyer	ext 8383
Radiation	in each of the laboratories where radionuclides are used	

6.0 Chemical spillages

Immediate action when spillage occurs:

The member of staff first on the scene must immediately alert other staff,

Make decision to:

- **Evacuate the local area affected**
- **Evacuate the building - using fire alarm to call point**
- **Control the spillage**

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- a) **If the Chemical is unknown or staff are unable to deal safely with it-
Set the fire alarm off immediately and use the emergency number 3333 to notify security the nature of the spill and request the attendance of the Fire Rescue Service.**

If the nature of the spillage or uncontrolled release is unknown, or if the staff present are not trained in the use of PPE and suitable spillage kits, the fire alarm must be set off immediately. The person who raises the alarm should await the arrival of the Emergency Response Team and/or the Fire Brigade at the building fire control point and provide details of the spillage.

- b) **If the Chemical is known and the staff trained and equipped-
Deal with the spillage locally only if it is safe to do so**

A spillage may only be dealt with locally if the nature of the spillage is known and by staff who are trained in the use of the required PPE and chemical spillage kits. Staff working on the floor directly below should be informed where possible.

If the spillage has occurred in a **biological or radiation hazard area** the Biological Safety Officer or Radiation Protection Supervisor (or RPO) must be informed and any further risks assessed.

First carefully assess the situation and inform others that you intend to deal with the spill. Two trained members of staff should act as a response team.

1. Flammable liquids

- **Eliminate ignition sources**, such as naked flames.
- If a large spill, contact EF&M, and ask for **electrical supply to be isolated**
Do not use switches in the immediate area as spark from the switch may ignite spill.
- **Ventilate area and close doors.** Open windows (where possible). Do not cross the spill or move further into the room to close doors. If safe, ask others to close doors from adjacent rooms. If possible open fume cabinet sash to high position to increase ventilation and allow fumes to be drawn out of the building.
- **Isolate spill.** Where appropriate seal off the area and display warning signs on the doors. If there is a possibility the chemical could seep to the floor below, the occupants must be warned and evacuated.
- **Assemble equipment** required and make preparations to deal with the spill in an adjacent but safe room.

2. Formaldehyde: Never attempt to deal with large spillages of formaldehyde

Evacuate the room and if the spill is large evacuate the building (use the fire alarm to do this). In this event use the emergency number 3333 to notify security the nature of the spill and request the attendance of the Fire Rescue Service.

3. Mercury:

1. If you spill mercury, clean it up thoroughly and at once. Special care must be taken when treating mercury spillages.
2. Spillage units for the safe collection of spilt mercury are located with Gordon Verth and in JMS foyer.
3. Contain the spillage to as small an area as possible.

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4. Follow instructions in the spills kit
5. Inform Gordon Verth, Diane Ellis, Graham Frost or Ray Francke who will arrange disposal of the spillage.

4. Lithium Aluminium Hydride:

Spillages should be dealt with at once, as follows:

- Wearing a face shield and gloves, cover the spillage with dry sodium carbonate (soda ash, which must be available in the area of work with this substance), shovel into a dry bucket and transport to a secure area outside the building.
- Still wearing the face shield, add the soda ash mixture to a large excess of dry propan-2-ol.
- Leave to stand for 24 hours and run to waste diluting greatly with running water. Further details are given in the RSC Lab Haz Data Sheet No.5 1982.

5. Ethidium Bromide - Disposal of EtBr down the sink or drains is strictly prohibited

- Spills of EtBr solution should be immediately absorbed onto a neutral absorbent material e.g. paper towels, vermiculite or X-sorb and the area decontaminated (see below).
- Avoid raising dust when cleaning up solid spills by gently mixing with water and then absorbing the solution as above.
- All spill clean-up materials and absorbents should be double-bagged in polythene bags or placed in a sealed container and disposed of as hazardous chemical waste as per the department's procedures.
- If necessary use a hand-held UV lamp to check for residual EtBr contamination following a clean-up. A reddish-orange fluorescence can be detected under both 'long' and 'short' UV wavelengths. Remember that there are additional hazards associated with the use of UV, all persons must wear suitable PPE to cover the skin and eyes (close fitting lab coats, long cuffed gloves and UV face shields).
- The following method can also be used to decontaminate equipment and areas and could be of particular use after a serious spillage or for a difficult decontamination. This decontamination solution must be prepared immediately prior to use.

Mix 20ml of **hypophosphorus acid** (50%) (H_3PO_2) to a solution of 4.2g sodium nitrite (NaNO_2) in 300ml water. Prepare this solution in a fume cupboard as a small amount of nitrogen dioxide may be given off when the solution is initially mixed. Care should be taken due to the acidity of the solution (pH 1.8). (*LUNN AND SANSONE 1987*)

Decontamination procedure:

1. Wash the contaminated surface or equipment once with a paper towel soaked in freshly prepared decontamination solution.
2. Wash the area/equipment 5 times with paper towels soaked in tap water, using a fresh towel each time.*
3. Using a UV light, check to ensure that all the EtBr has been removed (absence of reddish-orange fluorescence).
4. Soak all towels in the decontamination solution for 1 hour.
5. Neutralise used decontamination solution and towels with sodium bicarbonate.
6. Discard the towels in the general waste and rinse the solution to normal drain with copious amounts of water.

Safe waste disposal after spillage

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All chemical waste must be disposed of in accordance with the University of Sussex guidelines. When the spillage has been contained and it is considered safe to return to the area, proceed with the clean-up procedure below: Wearing PPE, place the waste in a suitable container with a tight fitting lid or a suitable sealable plastic bag (which can be later placed in a container with a lid). Clearly label and identify the chemical waste. If the waste is volatile or fuming, the waste container must be placed open in a fume cupboard (not a recirculating model) to allow complete evaporation to take place before sealing. The floor and contaminated surfaces should then be washed with fresh soapy water. On leaving the area all PPE must be removed carefully and either disposed of or washed. Care must be taken not to take off the respirator and eye protection until the contaminated gloves are first removed.

6.0 Fuel or lubricant oil spillages

In the event of any spillage regardless of quantity the workshop manager must be informed immediately. If possible you must also try to contain the spillage and whenever possible prevent it from entering any watercourse, which could lead to a major pollution incident.

Spillage Prevention Checklist :

- Ensure the volume of the receiving tank is sufficient to receive the total amount of fuel oil being delivered.
- Check the conditions of the hose and taps visually.
- Make sure all connections are tight before commencing delivery.
- Make sure all appropriate valves have been opened before delivery and that the tank is vented.
- When making a bulk delivery make sure that the tank vent can cope with the speed of the delivery.
- Slow down discharge towards end of delivery.
- Remember that interconnected tanks take time to balance.
- If delivering through an offset fill, make sure there is room in the tank for the delivery and make sure all pipe work is inspected and the other end of the pipe is connected to the tank.

Dealing with spills

For **oil spills**, use absorbent pads or granules initially to contain the spill area and prevent seepage into soil or running to drains. If contamination to soil or drains can not be avoided contact the Safety Office or Estates help desk for advice and assistance.

For **fuel spills** the procedure is the same as above for oil spills with the additional precautions:-

Ventilate the area

Remove sources of ignition if safe to do so

For spills of greater than 2 liters in a confined space, where ventilation is not possible and sources of ignition can not be removed then vacate the area and call 3333.

Safe disposal of waste

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Using shovel or similar and wearing rubber gloves collect the contaminated absorbent material into double plastic bags and take to the wasteoil store outside Eng 2 loading bay and place in spill tray. Inform TSM that waste oil requires collection.

7.0 Biological Material (incl material contaminated with blood)

- a) **small spills – should be dealt with at local level**
- b) **Large spills or spills of category III organisms – Evacuate the room or area and immediately inform the BSO**

The containment of the spillage is best achieved using either a chlorine releasing, granular disinfectant if available, or absorbent paper hand towels. A sufficient amount of either must be used to absorb the spillage and to stop spread. If possible, a member of staff should then guard the area until such time as the person designated to disinfect the area arrives.

NB Disinfectant granules (chlorine releasing) must not be used in the containment of urine spillage. Paper towels should be used for this purpose.

Equipment Required

The person designated to clean the area should be equipped with the following:

- Disposable gloves
- Goggles (if splashing of material likely)
- Plastic aprons
- Clinical waste bags (yellow)
- Sharps box (if necessary)
- Disinfectant granules, sodium dichloroisocyanurate (NaDCC, e.g. HazTab disinfectant granules) or a chlorine based disinfectant solution (1%, 10000ppm), or Virkon
- Detergent and cleaning equipment to clean the area after disinfection

Treatment of Spills

Small spots of blood or small spills

- Gloves and eye protection should be worn
- Contamination should be wiped up with paper towels soaked in freshly prepared **hypochlorite solution** (Milton or chlorine releasing tablets) containing 10,000 ppm (1%) available chlorine.
- If broken glass is present, first treat the spillage with hypochlorite, then carefully remove the pieces of glass with disposable forceps or scoop to a sharps bin, before wiping up as above.
- Towels and gloves should be disposed of in a yellow clinical waste bag for incineration (or an autoclave bag if in a laboratory).
- Hands must be washed following clearing up.

Larger spills other than urine (unless bloodstained)

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- Staff must be kept away from the spillage and if possible a warning sign shown, while preparation is made to handle the spill as outlined below.
- Gloves, eye protection and a disposable apron should be worn. If the spillage is extensive, disposable plastic overshoes or rubber boots may be necessary.
- Liquid spills should be covered with **chlorine releasing granules** and left for at least two minutes before clearing up with paper towels or absorbent mats.
- A specialised spillage mop with detachable absorbent pads is a convenient way of absorbing the spillage after disinfection.
- Alternatively, the spill may be covered with paper towels, or absorbent mats and gently flooded with **hypochlorite solution** (Milton or chlorine releasing tablets) containing 10,000 ppm (1%) available chlorine* (again this should be left for at least two minutes before attempting to clear up).
- If broken glass is present, first decontaminate the spillage as above, then carefully remove the pieces of glass with disposable forceps or scoop to a sharps bin, before wiping up.
- Paper towels, gloves, disposable overshoes and any contaminated clothing should be placed in a yellow clinical waste bag for incineration (or an autoclave bag if a laboratory) and hands washed (reusable PPE may need to be decontaminated with dilute disinfectant).
- Finally, the area should be washed with water and detergent and allowed to dry.

* Hypochlorite solutions (eg household bleach) may be replaced by solutions of dichloroisocyanurate prepared from tablets according to the manufacturer's instructions. Note: metals can be damaged by hypochlorite, and they should not be exposed to it for lengthy periods.

NB: Spilt blood should not be allowed to dry as potential aerosol production is greater from dried blood. Note that urine may promote the release of free chlorine from the treated area when hypochlorite or other chlorine-containing compounds are applied. Ventilation of the area may be necessary.

8.0 Radioactive spillages

The action to be taken following a radioactive spillage will depend on the activity, radioactive material and physical plus chemical form of the spillage. However the following general principles will be applicable to all radioactive spillage incidents.

All radioactive spillages must be cleared and decontaminated without delay. Radioactive spills must not be left unattended or unsecured.

The following guidelines should be adopted when dealing with radioactive spillages:

- The radioactive spillage must be isolated as soon as possible. Where necessary the area may need to be evacuated until the spillage has been cleared.
- Spillage and decontamination procedures must be followed (see relevant Local Rules)
- Spillage kits which include copies of spillage and decontamination procedures must be located in each radiation laboratory.
- Appropriate Personal Protective Equipment (PPE) must be worn as stated above.
- The materials used for clearing up the radioactive spillage must be disposed of in accordance with the department's procedure for disposal of radioactive waste.
- The area, PPE and staff must be checked for contamination; if levels cannot be reduced to background, the School Radiation Protection Supervisor must be informed and the Radiation Protection Adviser contacted regarding further measures covering decay storage or disposal; or dose assessment.
- Records must be kept, including before and after levels of contamination and action taken.

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- In the event of any unauthorised disposal or loss / theft of any radioactive substance or radioactive waste, the Environment Agency must be informed without delay.

Summary

All spills should be dealt with immediately

The majority of spills can and should be contained and absorbed using proprietary pillows or granules.

All incidents should be reported through the Universities accident/incident reporting procedure to ensure that any operational lessons can be learnt preventing a similar problem occurring in the future.