

Spill Procedure – UCL Chemical Engineering

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1. Scope

This document is to be used as a reference for when a spillage occurs and should be followed throughout the Department of Chemical Engineering. The document covers ways to reduce spillages, the different types of spill, the contents of the spill kits and how to use each item, and the procedure to effectively deal with spills, including those that are out of the Department's control.

Though this guidance can be used in many different cases, not all spills and conditions are universal. If in doubt, contact the PI, DSO, or UCL Safety Advisor.

2. Spills

Spills can cause bodily or property damage if handled incorrectly. If handled properly, they may just only be a nuisance.

2.1. Types of Spill

For the purpose of this document spills are classified into three categories, which are defined below.

2.1.1. Minor Spill

These spills do not require any PPE other than that which would normally be available in the laboratory the chemical is used in and can be cleaned up using the contents of the standard spill kit which is located in each laboratory. In addition the spill does not spread rapidly, endanger people except by direct contact, and does not endanger the environment.

These spills can be effectively be dealt with by inexperienced researchers and does not require assistance from staff or the technician team. An example of a minor spill would be a beaker full of mildly hazardous chemical spilt on the floor, which a PhD student may clear up while wearing appropriate gloves, a lab coat, and goggles.

2.1.2. Major Spill

These spills would only be able to be effectively dealt with by an experienced researcher (e.g. postdoc) and may require specific PPE in order to be dealt with, for example respirators. In extreme situations, the lab may be shut down, or temporarily evacuated for a contractor to assist with the decontamination, clean-up, and waste management.

A major spill is one where there has either been a significant release of material or material / gas released is particularly hazardous and could cause damage to lab users, property, or the environment. These spills may require the technical team to assist, and any assistance is required, it is encouraged to contact the technical team, however it is preferred that the lab user clears up spills, as they are more likely to understand the hazards, mixture, quantity, waste procedure, etc. of the material than the technical team.

Certain chemicals are banned from escaping to the environment. If these are deposited in drains Thames Water may need to be notified. In cases where material is put into the drain that could cause harm to the plastic pipes and drains at UCL Building Estates must be notified.

An example of a major spill would be the accidental release of a large amount of fuming acid due to a broken Winchester bottle outside of a fume cupboard. An experienced researcher or staff member may be able to clear up this spill using specialist PPE. It should be noted however that the department takes the approach that 'it is better to be safe than sorry' as all spills can be potentially very hazardous. If the user suspects that they may be at risk, they should seek help immediately.

2.1.3. Specialist Spill

These spills are those which require specialist decontamination protocols and may be cleared up by experienced researchers or, in some cases, the technical team if they are suitably trained, have the necessary equipment and competence to deal with it.

These spills require specialist chemicals or PPE not found in a standard spill kit or lab. There should be specialist spill kits available in each lab that uses these specialist chemicals. This type of spill should only be cleared by those with specialist training on how to clear these spills.

An example of this type of spill would be the mercury spill larger than a tablespoon onto a non-bunded surface, which requires the use of a mercury spill kit and someone with training to clear up.

2.2. Risk Assessment

If a risk assessment details the use of chemicals it must have the procedure for what to do in the event of a chemical spill. Ensuring that there is a plan in place for a spill will reduce the consequences of that spillage.

The control measures for the spill must include how to prevent the spill and how to clear up both small and large spills. Guidance on waste handling and spillage procedures may be found on the MSDS of the chemicals that are being used.

Spills can be prevented in a number of ways. For instance:

- Carrying bottles correctly using bottle carriers, not lifting them by the lid.
- Working in a bunded area or using a fume cupboard will contain a spill from spreading and reduce clear up time.
- Ensuring that all unattended items are clearly labelled with the substance name will aid clear up if they are spilt.
- Making sure other lab users are aware of the potential hazards in the laboratory.
- Ensuring lab users know the spill response, emergency protocols, and waste procedures of the research of others.

2.3. Contents of a Spill Kit

In the Department of Chemical Engineering each wet lab (a lab that uses chemicals for research purposes) must have a spill kit. Interconnected labs may share a spill kit. Additional specialised spill kits may be required for some chemicals. The spill kits must be checked by the area safety representative every month. If they have been used and require restocking, this should be reported to the DSO.

2.3.1. Contents of a Standard Spill Kit

- Chemical absorbent pads: These are inert absorbent pads that should be used to mop up the spill.
- Chemical absorbent pillow: The chemical pillow can absorb more liquid than the chemical pads, and thus should be used for larger spills or in hard to access areas.
- A pair of gloves: Note if the MSDS of the chemical spill indicates that different types of gloves should be used, e.g. PVA gloves, these must be used instead.
- A pair of goggles: Eye protection should be worn in a wet-lab at all times. Goggles offer more protection than safety glasses and so should be used during spill clean-up.
- Acid neutraliser: This should be spread over acids to neutralise them. Once the reaction (bubbling) has ceased, the mixture should be sufficiently non corrosive to be disposed of as general hazardous waste.
- Caustic neutraliser: The powder should be spread on alkaline spills to neutralise them. The mixture is neutralised once the powder has turned yellow. Once neutralised the mixture may go to waste.
- A dustpan and brush: Do not use the general cleaning equipment in the lab as this would then contaminate them.
- A disposal bag: To dispose the used contents. This should then be put in the appropriate waste container. Double bagging may be appropriate for liquid spills.
- An instruction sheet: Read this to ensure you are performing the actions correctly.

2.3.2. Contents of a Mercury Spill Kit

- Face Mask: This must be worn before cleaning the mercury as the fumes from mercury are extremely hazardous.
- Gloves: Gloves must be worn at all times when handling mercury.
- Calcium Hydroxide & Microfined Sulphur: These should be mixed onto the mercury in even parts. These bind to it and reduce its potentially hazardous effects.
- Scoop: The scoop is used to get rid of the powder and mercury waste into the waste bottle.
- Brush: A brush may be used to ensure all the powder is in one place.
- Syringe: Pools of mercury can be gathered up using the syringe and disposed of in the mercury waste bottle.
- Plastic Mercury waste bottle: All waste should be put in this bottle and sealed to ensure the vapours cannot escape.

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- Absorbent Metal Wool: This wool adheres to the mercury making the mercury easier to gather up. It should be used where the mercury is in tight situations.
- Instruction sheet: Follow the instructions to ensure the mercury is decontaminated correctly.

2.3.3. Hydrofluoric Acid (HF) Spill Kit

Note: Lone working with HF is forbidden, as it can cause unconsciousness and may prove fatal.

- Calcium Gluconate Gel: To be applied to the skin immediately after contact with HF.

2.4. Waste

Once a chemical spill has been fully dealt with the used materials will need to go to waste. For most cases, general hazardous waste will be appropriate. Absorbent pads that have been used to collect liquid spills must be double bagged to prevent leaking. Mitie or the technical team may be contacted if the lab user is unsure of the waste procedures.

3. Procedures to clear up Spillages

This section will go into detailed procedure for clearing up spills.

3.1. General Tips for Clearing up a Spill

The first priority when clearing a spill is staying safe and keeping others away from the spill. Ensure that other lab users are aware of the spill, by using warning signs and locking the door if appropriate. The hazards may not be obvious for other lab users.

The likelihood and severity of a spill can be reduced using good housekeeping procedures and clearing up a spill as soon as possible. Even a non-hazardous substance could present a slip hazard.

In order to minimise the risk of a pollution incident in which Thames Water or UCL Estates may have to be contacted, it is advised that:

- Work takes place in a bunded area where possible.
- Work does not take place over sinks.
- Work takes place where there is adequate ventilation.

Before dealing with a spill ensure you are wearing the correct PPE. The gloves provided in spill kits will not protect against all chemicals. Appropriate clothing must be worn at all times when clearing up chemical spillages.

There are some chemical properties that are of the most concern when preparing for chemical spills. These could be due to the fact there is a potential for fire or explosion. If there is a potential for fire or explosion seek assistance from the technical team. These chemicals can have the following properties:

- Flammable (especially when used near ignition sources)
- Reactive to Water or Air
- Oxidizers
- Corrosive
- Highly Toxic
- Volatile vapours
- Work near to a large amount of combustible material.

If a gas has spilt leave the room immediately. Open windows and fume cupboard sashes for volatile materials. Inform the DSO and other lab users if this is the case.

3.2. Minor Spills

The spills are small, contained, or would be able to be clearly dealt with by all-lab users and researchers including Masters, PhD, Postdoc, and Staff.

Identify the Spill

Ensure that the chemical or mixture that has caused the spill, including gases has been identified. That way the appropriate spill procedures will be used. These spill procedures are available in the MSDS of the chemical and must also be in the risk assessment. It is important to remove other items and sources of ignition from the spill area in order to facilitate the cleaning up of the spill.

PPE

Obtain the correct PPE for the chemical that has been spilt. The gloves that are provided in the spill kit these may not be appropriate for all chemicals

Contain the Spill

After locating the spill kit in the lab, place the absorbent pillow (for hard to reach places) or pads from the outside in to stop the spread of the spill. Ensure that the spill is stopped at the source, by turning off taps, valves, etc. Prevent the spread of dusts and vapours by closing the lab door and opening windows and fume cupboard sashes, etc. Note that some acids, including sulphuric acid, may need specialised pillows.

Treat (if necessary)

Some substances may need to be neutralised with the acid / base neutralisers if necessary. In both cases the powder must be sprinkled over the spill until the reaction stops. For acids, this is when the effervescence stops; for bases, when the powder turns yellow.

Absorb

Collect all liquid that has spilt using the absorbent pads and if in hard to reach places or there is a lot of spilled material, the pillow. Always work from the outside of the spill inwards.

Dispose

Using the bag provided in the spill kit dispose of the absorbent pads and pillows. If the area was treated the mixtures may be hot, so wait until cool to dispose of them. The material should be double bagged to ensure that the bag does not leak. Always use appropriate waste procedures for the chemical used. After any spill the area must be ventilated. Open any lab windows if possible.

Report

Report the spill on RiskNET and also let the DSO know about the spill kit use and what was used.

Special Precautions

- Remove all potential sources of ignition regardless of what material was spilt.

3.3. Major Spills

These spills are larger, the PPE necessary for dealing with them may not be in the lab, and they must be cleaned up by someone with experience e.g. staff member or Postdoc.

The procedure follows the Minor Spill procedure. If there is a point where the operator thinks they are not trained or the required PPE is not available and other Technical staff or the DSO also feels this way, then the lab must be shut down and Mite contacted in order to clean up the spill.

Specialist PPE can be obtained from the Facilities Manager or DSO who have a stock of PPE not available in the labs.

3.4. Specialist Spills

These spills have specialist procedures. These must be in the risk assessment when working with them.

3.4.1. Mercury

Each lab that uses mercury must have a mercury spill kit. The following procedure is for ~1 tablespoon spill on a non-bunded surface.

Identify the Spill

Ensure it is known how much mercury has been spilt. If the spill is larger than a tablespoon, then the lab must be shut down for the contractor Mitie to decontaminate the lab. If any mercury has entered the drains, Thames Water must be informed. Inform the DSO in both of these cases.

PPE

Wear the mask from the spill kit and ensure that gloves are worn with no skin exposed.

Contain the Spill

Using the scoop and brush collect the mercury into one area. Try to make the mercury droplets bind together to become bigger.

Use the Absorbent Metal Wool for mercury in hard to reach places.

Treat

Pour equal parts of the Calcium Hydroxide and Microfined Sulphur onto the mercury to bind to the mercury and reduce its potentially hazardous effects.

Absorb

Collect all mercury using the syringe and scoop and put it into the mercury waste bottle.

Dispose

Seal the bottle to ensure that vapour cannot escape. Ventilate the area by opening lab windows where possible.

Report

Report the spill on RiskNET and also let the DSO know about the spill kit use and what was used.

3.4.2. HF

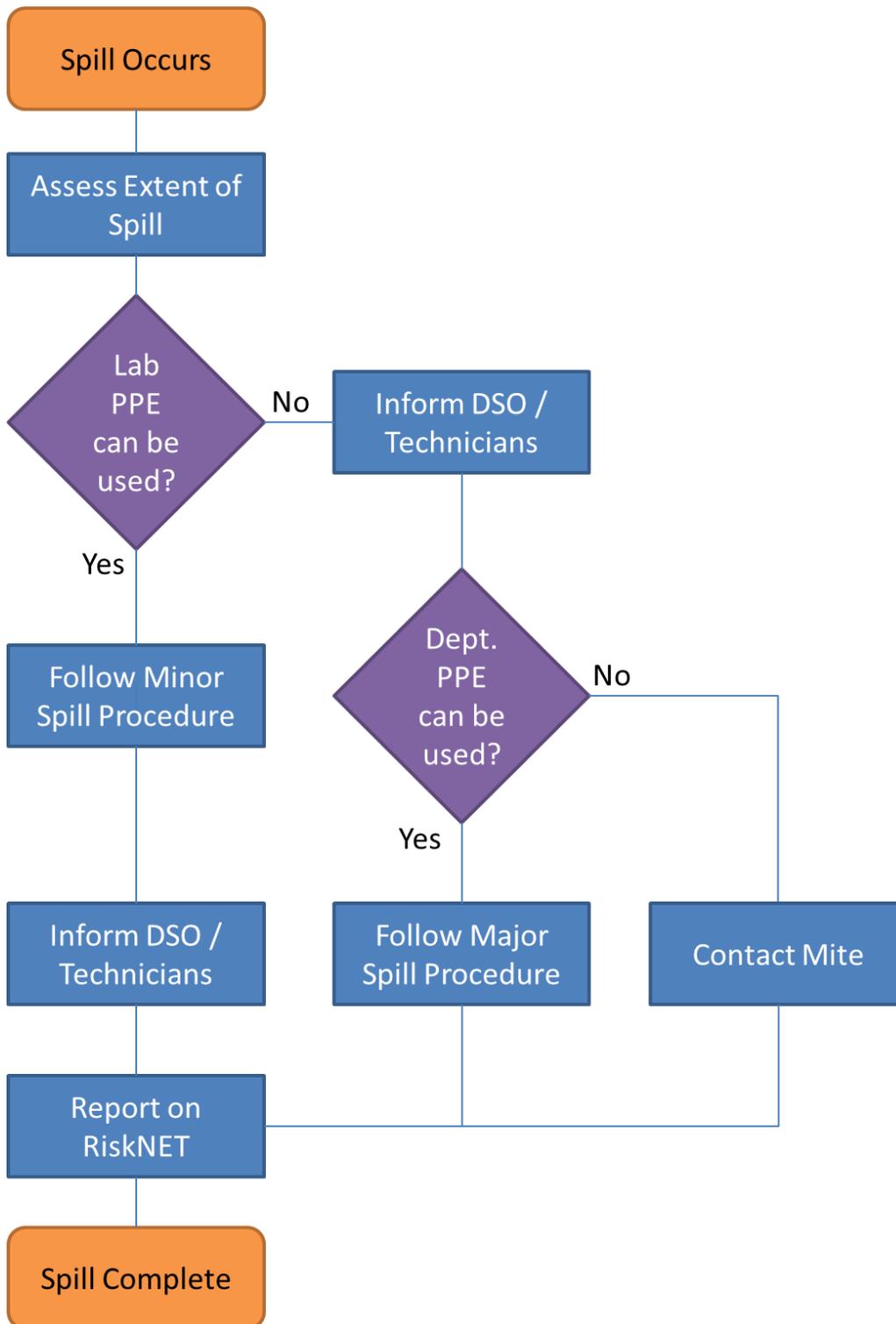
If HF has been spilled contact the DSO who will contact Mitie to clear up the spill. DO NOT attempt to clear up HF as it is potentially fatal.

3.4.3. Nanomaterials

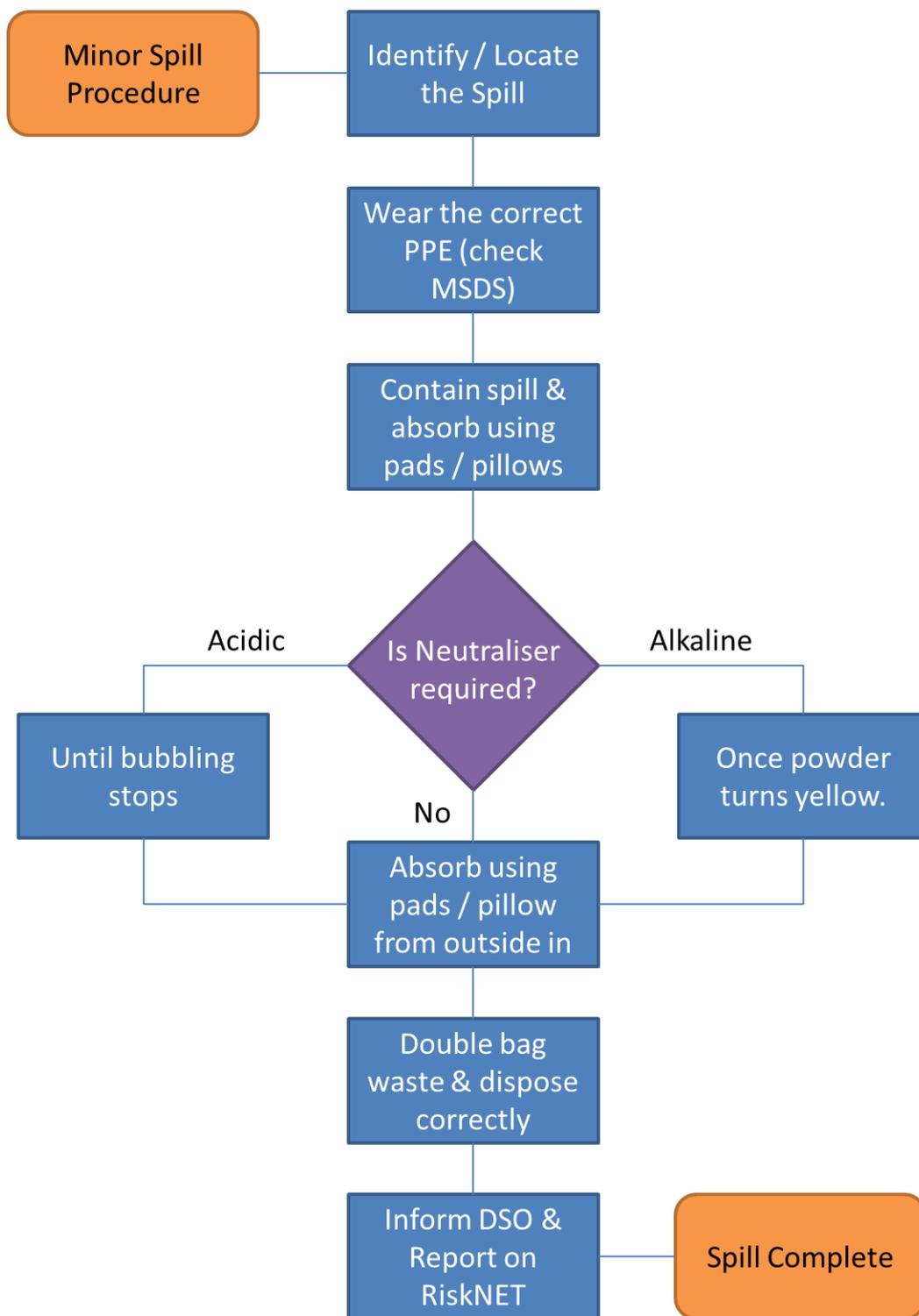
Nanomaterials should not be swept up as this can disperse them into the air. Add a miscible liquid, e.g. water or a hydrocarbon to disperse the material in the liquid phase then clean that up.

4. Flow Charts

4.1. General



4.2. Minor Spills



4.3. Major Spill

