

SBS Policy and Code of Practice on Waste Disposal

This policy and Code of Practice should be read and understood by all persons prior to work commencing in the laboratory. The School of Biological Sciences waste flow charts are appended to this document and act as a quick reference for determining appropriate waste disposal for items.

Individuals have a duty of care to make all waste safe prior to disposal. To be familiar with both the waste they are generating and the most appropriate waste disposal route. The School also has a responsibility to ensure that we are contributing to the sustainable vision of the University by recycling waste where appropriate.

There are many different waste streams generated within SBS, with various hazards. Local risk assessments will determine the most appropriate process for disposal of all hazardous laboratory waste. There will be a number of different factors, such as associated hazards, inactivation methods and quantity, which will determine disposal route.

The most common types of waste generated within SBS are detailed here. It is not possible to give information for every possible waste type produced, so if your waste is not covered in the Code of Practice below and you are unsure of the most appropriate waste disposal method, please contact Health and Safety or your Building Management team for further advice and assistance.

A list of the collection locations for various waste streams discussed in this code of practice can be found here: <https://www.wiki.ed.ac.uk/display/SBSIntranet/Buildings+and+Centres>

CODE OF PRACTICE

1. Laboratory Waste

1.1. Waste Streams

There are several main waste streams within the SBS Laboratories, each corresponding to a different classification of waste. A brief overview of the waste streams can be found below. More detailed information on disposal of different waste types can be found in section 1.2.

Laboratory Waste (yellow waste bags)

The yellow laboratory waste bags are appropriate for:

- Identifiable laboratory waste which may or may not also be chemically contaminated e.g., gloves, wipes, lab plastics
- Laboratory waste contaminated with hazard group 1 biological agents
- **Deactivated** GM waste

- Animal/insect by-product waste e.g., tissues, blood samples, tissues, small carcasses

Yellow bags must be sealed (by means of tape/cable tie/knot) and labelled with lab of origin **before disposal**. These must then be taken to Stores or the local Stores collection point for disposal. Please ensure that the bags are not overfilled and that the weight limit is adhered to.

Autoclave Waste (clear biohazard waste bags)

The clear biohazard autoclave bags are appropriate for:

- Biologically contaminated waste and lab plastics that require autoclaving to render them safe or to inactivate any pathogens, biological agents or genetically modified organisms.
- Any liquid sent for autoclaving must be decanted into a suitable receptacle for autoclaving e.g., glass flask fitted with a bung no more than 20% full.

Autoclave bags must never be more than half filled; this is in order for them to fit into the autoclave tins. They must be loosely tied with autoclave tape and taken to the nearest wash-up collection trolley. All bags must be labelled with the wash-up facility stickers detailing, lab details, room number, bag seal by information, signature. No sharp items, which may pierce the bag, should be placed in the autoclave bags, this includes wooden sharps such as cocktail sticks.

There may be requirement for additional protocols when handling specialist waste, these will be detailed in separate risk assessments and should be discussed with the Wash-up Staff prior to generating waste.

Sharps Bin (yellow lidded yellow bin)

The yellow lidded sharps bins are appropriate for disposal of all contaminated sharps (sharps contaminated with GM material must be deactivated) e.g., glass slides and vials. These may also be chemically contaminated.

Prior to disposal, please ensure that all sharps bins are properly sealed and the lids pushed until they click shut.

Cytotoxic Bin (purple lidded yellow bin)

The cytotoxic bin is suitable for any waste that has been contaminated with a cytotoxic substance or medicinal waste. This includes waste contaminated with chemicals or substances which are carcinogenic or mutagenic for example ethidium bromide waste, gels and plastics contaminated with phenol or formaldehyde.

The following hazard statements are associated with cytotoxic substances:

- May cause/suspected of causing cancer
- May damage/suspected of damaging fertility or unborn child

- May cause/suspected of causing genetic defects

Prior to disposal, please ensure that all cytotoxic bins are properly sealed, and the lids pushed until they click shut.

General Landfill Waste (black waste bag)

This waste stream is for clean uncontaminated items only, e.g. clean plastics, paper, paper towels that cannot otherwise be recycled (e.g. cold packs).

1.2 Hazardous Waste Types

It is the responsibility of the Principal Investigator (PI) / Supervisor to ensure that the autoclave cycles and disinfectants in use sterilise / provide a suitable log reduction for the biological agents they use or material such as blood / body fluids etc. which may be or is known to contain the biological agents. For example, it should be noted some micro-organisms and agents are resistant to conventional autoclave heat treatment (e.g., Prions which require 1340C for a holding time of 18 minutes).

The Assessor must identify what waste types and disinfectants are required to inactivate the biological waste within the relevant risk assessment (RA) form. If other disinfectants are used which are not identified here, then please add the relevant information in the RA in the same format. Information on autoclave settings and chemical inactivation can be found in Appendix 2.

General Laboratory Waste e.g., gloves, plastics etc

The route for disposal of general laboratory waste, such as contaminated plastic pipettes, used gloves and other used plastics, will depend on what it has been contaminated with.

Waste from Containment Level 1 Laboratories can be disposed of to the yellow laboratory waste bags. Any items which have light chemical contamination can also be disposed of to the yellow laboratory waste bag.

Waste from Containment Level 2 Laboratories should be disposed of to the autoclave waste bag for inactivation. Waste may also be disposed of to the yellow laboratory waste bag, following an approved chemical inactivation method.

Genetically Modified Waste

All biological waste generated from research under the Genetic Modified (GM) organisms contained use Regulations (2014) must be inactivated via a validated method before leaving the School.

Genetically modified organisms can be microorganisms, animal or plants. Genetic modification is defined as the altering of the genetic material of an organism in a way that does not occur naturally by mating or natural recombination or both.

The most common method of inactivation within the School is via the autoclave waste route. GM waste may be disposed of through the laboratory yellow bag waste after it has been inactivated by an approved chemical method.

Liquid GM waste may be decanted into a suitable receptacle and autoclaved or inactivated via an approved chemical method.

The disposal for all GM waste should be outlined in the GM Risk Assessment for the work.

Microbiological Culture Waste

The term microbiological culture includes tissue, bacteria and virus cultures.

The preferred method of inactivation for all cultures is via steam sterilisation (autoclave), rather than by chemical sterilisation. In certain situations, however it may be necessary, or more desirable, to sterilise cultures with chemical disinfectant.

If cultures are treated with chemical disinfectant, it must be of a validated type, with the correct contact time and the working concentration being calculated to reflect the culture volume and contents.

If cultures are to be steam sterilised, then they must be sent as autoclave waste. Prior chemical treatment is not required, unless outlined by a specific risk assessment. Care must be taken, as some chemicals/disinfectants must never be used in autoclaves, due to hazardous aerosol by-products which can be produced from the process.

Cultures for autoclave treatment should be sent in an appropriate culture vessel. The culture vessel must be robust and sealed, so not to permit any leakage. These vessels should be securely transported to the waste collection point where they must be stored in an upright position.

Gels

Solid agarose or acrylamide gels can be disposed of to the yellow laboratory waste bag (prior decontamination may be necessary depending on what the gel has been contaminated with).

Ethidium bromide gels **must be disposed** of to the cytotoxic waste bins.

Chemical Waste

Information on the disposal of chemicals should be outlined on the appropriate COSHH risk assessment.

Bulk drums or disposal of common liquid chemical waste are available at Stores. These include:

- Formaldehydes e.g., formalin, formaldehyde and paraformaldehyde solutions

- Chlorinated waste e.g., chloroform, phenol and chloroform mixes, chloroform-methanol-acetic acid mix
- Non-chlorinated waste e.g., formamide, acetone, ethanol, methanol, IMS, isopropanol, ether, non-halogenated waste, butan-1-ol, DMSO, xylene and xylene-alcohol mixes.
- Waste oils
- HPLC wastes e.g., acetonitrile, trifluoroacetic acid and water.

Organic solvents should be collected in 2.5 litre bottles, ensure items are clearly labelled with waste disposal sticker and taken to the appropriate location for collection. Please see the waste wiki pages for collection locations.

For all other hazardous chemical waste, please arrange a chemical uplift through the Buildings Team, information available from:

<https://www.wiki.ed.ac.uk/display/SBSIntranet/SBS+Chemical+Waste>.

All items must be in a suitable container and clearly labelled with a hazardous waste sticker.

Chemical waste is only appropriate for disposal down the drain if it is classified as non-hazardous at the point of disposal.

Ethidium Bromide Waste

Ethidium Bromide is mutagenic, and possibly also carcinogenic and teratogenic. It's highly toxic to the respiratory system, and irritating to the eyes, skin, mucous membranes and upper respiratory tract.

Solutions contaminated with Ethidium Bromide should be decontaminated using an appropriate type of activated carbon filter or destaining bag.

Any contaminated gels, carbon filters and destaining bags should be disposed of as cytotoxic waste.

Drosophila and Insect Waste

GM flies/insects and associated waste materials should be autoclaved (134°C for a holding time of 5 minutes) then disposed via the yellow (clinical) waste stream.

No fly food should be disposed of as liquid waste to the drains. All bottles and vials are disposable.

All animal (vertebrate and invertebrate; including non-GM *Drosophila*, and all other insects such as mealy bugs, gall wasps, beetles, moths etc.) material and associated waste materials must be disposed of via the yellow bag waste stream, post any required sterilisation processes that may be required.

Where appropriate, freeze waste prior to uplift or keep refrigerated.

Small Animal Waste

Non-infected, including GM, animal carcasses (e.g. mice and rats) tissue and blood/body fluids are frozen before disposal via the University's licensed waste contractor for incineration. Any carcass / tissue waste, out-with BVS managed areas, must be returned to BVS prior to disposal as above. Infected, including GM, animal carcass, tissue and blood/body fluids are autoclaved prior to disposal as above for incineration.

Waste materials such as bedding which is non-infected will be disposed via black (general) waste stream while infected material will be autoclaved prior to disposal via the University's licensed waste contractor.

Autoclave settings are managed by Central Bioresearch Services. 110°C, 30 mins usually only for fluids and carried out at night to allow cooling. 124°C for 21mins cycle takes an hour.

Plant Waste

All genetically modified plant material and waste soil used within the glasshouse/growth rooms is to be kept within the containment area, after which is it autoclaved at 135°C for a holding time of 3 minutes and 30 seconds.

Any wastewater from hand wash basins and condensate from fan coil units will be collected and made safe through a specialised unit where it is held at 135°C for 2 minutes.

1.3 Laboratory Recycling

Lab Electrical

Laboratory electrical equipment must be decontaminated, and a decontamination certificate attached. If it is in working condition, please contact your Building Manager to place the item on the SBS reuse hub or list the item on Warpit. Any items that are no longer working can be placed in appropriate waste electrical equipment collection points. For larger items, please complete a WEE uplift request. Information on collection points and the request form is available from: <https://www.wiki.ed.ac.uk/display/SBSIntranet/Buildings+and+Centres>

Recyclable Plastics

Plastic bottles, which are recyclable, should be rinsed, labels fully defaced and then placed in the Biffa mixed recycling bins.

Polystyrene

Some companies offer takeback schemes for polystyrene waste and boxes e.g., NEB and Promega. Please check if this is the case prior to disposal. Affix the appropriate return label and return to the supplier in the outgoing mail.

Take all other polystyrene to the appropriate collection point for the building, this can be found on the wiki pages. Unfortunately, this waste is compacted and disposed of through general waste, so please check if a takeback scheme is available.

Laboratory Glass

Winchester bottles, 2.5L can be used to store chemical waste prior to uplift or for ethanol refills.

Unfortunately, due to the treatment of laboratory glass bottles, they cannot be recycled so please do not place these in general glass recycling. Please rinse all bottles, deface the labels and place them into the laboratory glass waste bin.

Gas Canisters

Empty gas canisters should be taken to your local collection point where they will be collected for recycling.

Cold Packs

Liquid cold packs can be pierced, and the liquid contents poured down the drain. Please then rinse the container and place it in the plastic recycling bin.

NEB cold packs can be returned to stores for recycling.

Foam or gel cold packs must be disposed of as general waste.

Tin Foil

Clean tin foil can be collected and recycled into the Biffa mixed recycling bins. Prior to disposal, please take care to remove any tape.

2. General Waste

2.1 General Recycling

Non-lab Electrical Equipment

If electrical items are in working condition, please contact your Building Manager to place the item on the SBS reuse hub or list the item on Warpit. Any items that are no longer working can be placed in appropriate waste electrical equipment collection points. For larger items please complete a WEE uplift request. Information on collection points and the request form is available from: <https://www.wiki.ed.ac.uk/display/SBSIntranet/Buildings+and+Centres>

Cardboard

Cardboard can be collapsed down and taken to the local collection trolley, for cardboard recycling. This can also be taken to the Biffa recycling bin.

Batteries

There are battery boxes distributed throughout the buildings at various battery recycling collection points.

Rechargeable batteries must be disposed of as hazardous waste.

Recyclable Plastics

Non-laboratory recyclable plastics can be disposed of to the plastic recycling bins located in the SBS Buildings corridors or to the Biffa mixed recycling bins.

Printer Cartridges

Used printer cartridges can be returned to stores for recycling.

2.2 General Waste

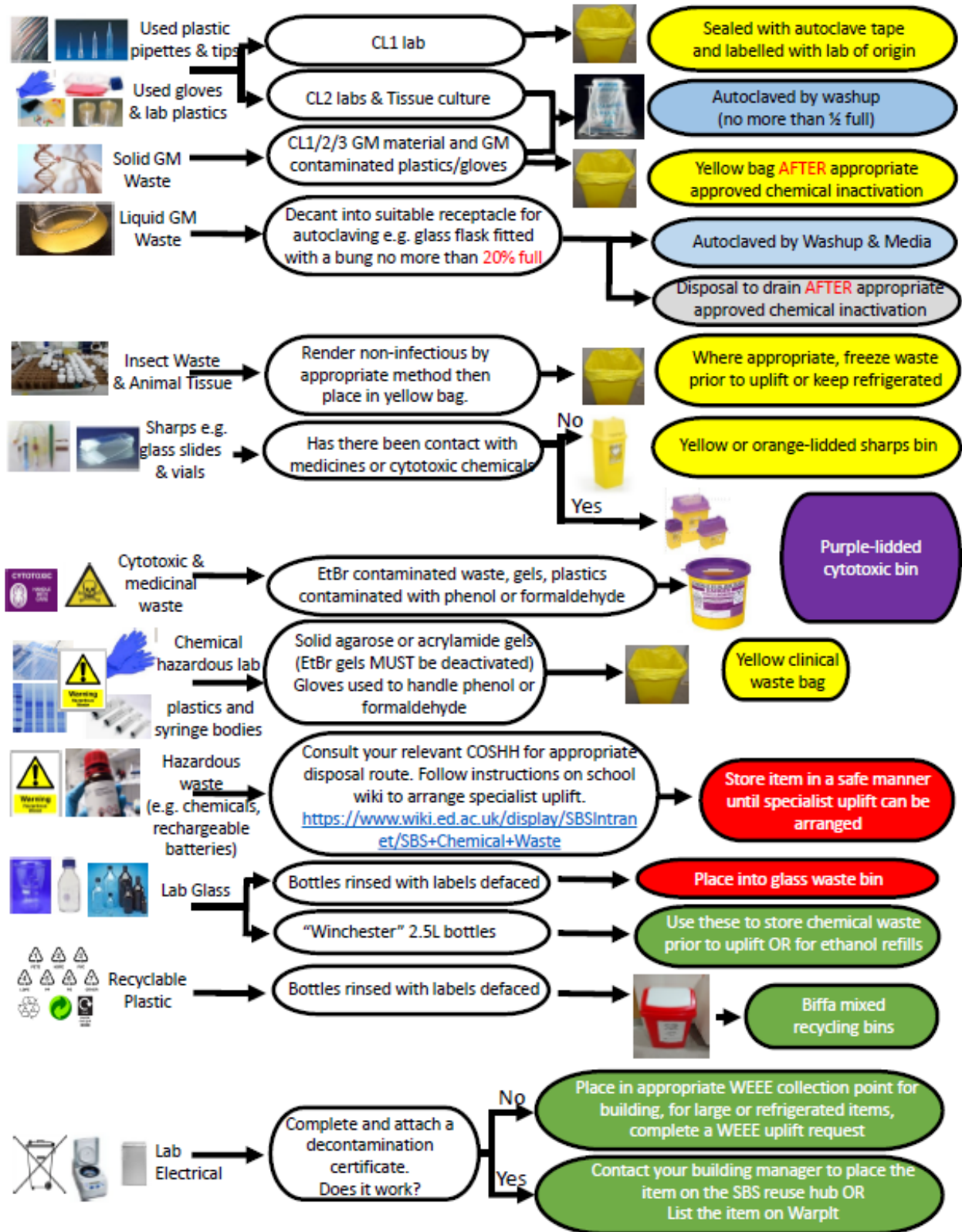
All non-recyclable plastic packaging, paper towels, and all other non-recyclable waste must be disposed of to the general waste stream.

2.3 Confidential Waste

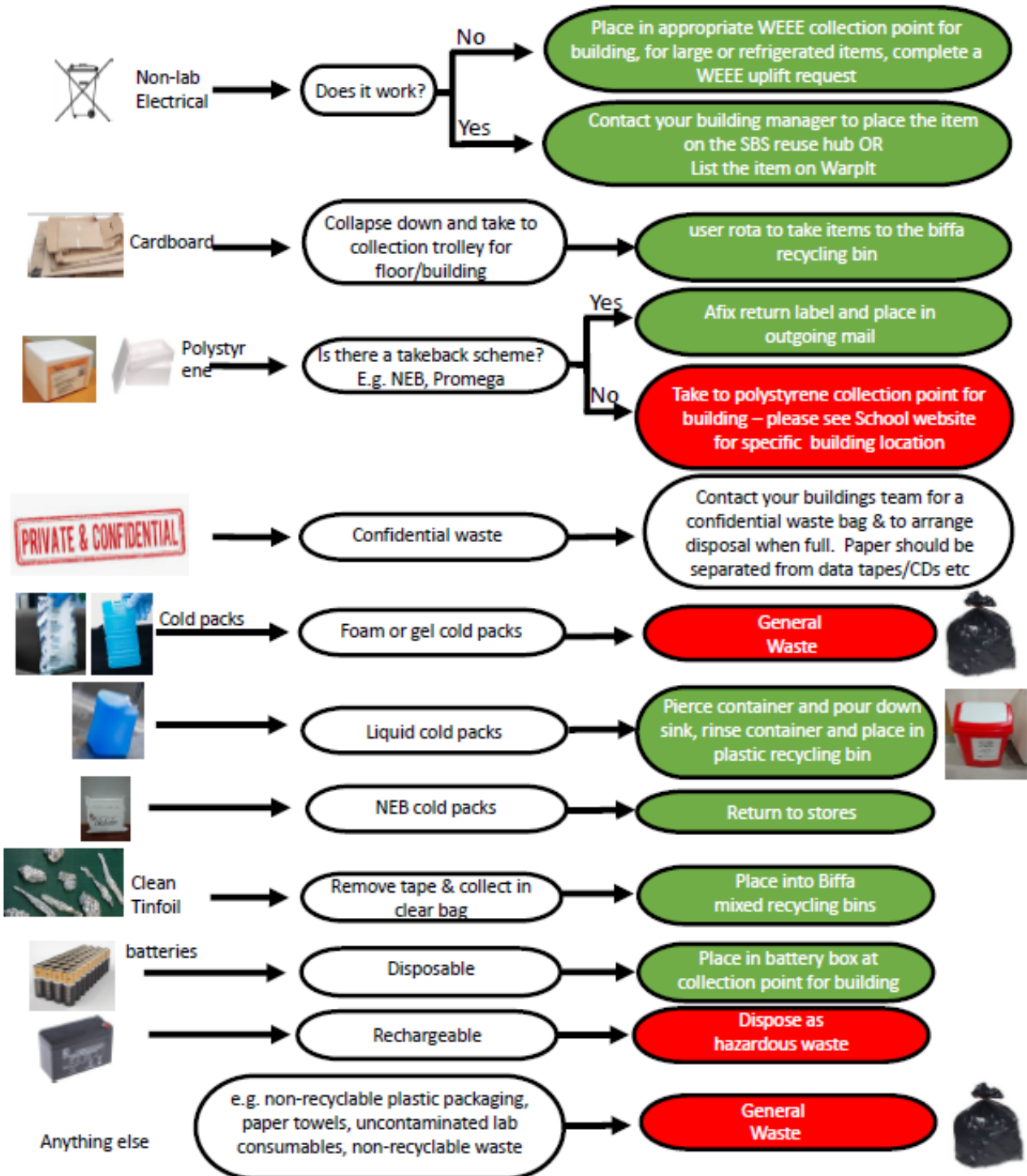
Please contact your buildings team for confidential waste bags and to arrange disposal when full. Paper should be separated from data tapes, CDs etc.

Appendix 1: SBS Waste Flow Chart

SBS Lab Waste Flow Chart



SBS General Waste Flow Chart



If unsure, please contact a member of your buildings team for advice

Appendix 2: Material Inactivation

Following heat inactivation via autoclaving or disinfection procedures the resultant waste requires to be disposed of as per the guidance above.

Autoclave Settings

1. Plastic discard (e.g. plastic-ware such as pipettes, flasks, tubes etc.) - the standard autoclave setting is 134°C for a holding time of 5 minutes. Disposed via the clinical waste stream through a University approved contractor.

2. Liquid discard (e.g. samples, culture supernatants, tissue culture media) – the standard autoclave setting is 121°C for a holding time of 15 minutes. Disposed to drain.

It should be noted the some micro-organisms and agents are resistant to conventional autoclave heat treatment (e.g. Prions which require 134°C for a holding time of 18 minutes).

Autoclaves are maintained, serviced and inspected as per the requirements of the Pressure Systems Safety Regulations 2000 and the relevant parts of the British Standard BS 2646. See University guidance, Biological Agent Risk Assessment, Section 9.8.2 Autoclaving, page 20:

http://www.docs.csg.ed.ac.uk/Safety/bio/guidance/bio_agents/ba_risk_assessment.pdf

Chemical Disinfection

The material safety data sheet and efficacy literature must be checked to ensure the disinfectant is suitable for the biological agent in use as well as contact times, concentrations and efficacy degradation over time. There are many types of disinfectants available for use and must be chosen taking into account:

- The biological agents to be disinfected;
- The nature of surfaces to be disinfected;
- The presence of organic materials (e.g. a serum sample's high protein content);
- The hazards to health that may be represented by the disinfectant;
- Stability and compatibility of the disinfectant;
- Contact times;
- Validation requirements.

Common disinfectants include:

- Chlorine-containing compounds (or products which generate chlorine) such as Presept
- Peroxygen compounds such as Virkon
- Alcohols

When making a solution of a disinfectant the container should be labelled with the disinfectant, concentration, date produced, date of disposal and relevant hazard warning labels.

Waste residues including cell culture waste which cannot be autoclaved can be inactivated by treatment with disinfectant:

Virkon

a. 1% solution for:

- Plasticware (pipettes, pastettes) with surface contamination - soak for a minimum of 2 hours fully immersed
- Treatment of minor contamination (minimum 10 min contact time) and surface disinfection (benches and floors)

b. 2% final concentration (overnight contact) for disinfection of liquid cultures and supernatants

c. Powder or granules can be used to both absorb the liquid and disinfect a spillage or use with liquid waste. For spillages, allow aerosols to settle and then working from the outside of the spill, apply powdered Virkon to the liquid (minimum contact time 10 minutes) before mopping up with paper towels, wiping the area with 1% Virkon and disposing of all solid waste via the clinical (orange bag) waste stream.

Virkon is a pink coloured substance and although, through time / in use the pink colour will diminish it should not be relied upon as a true indicator of the concentration as colour perception varies between individuals.

Presept

a. 1,000 ppm free chlorine solution for general cleaning of equipment and benches

b. 2,500 ppm free chlorine, final concentration (overnight contact) free chlorine solution for discard containers / liquid cultures.

c. Granules can be used to both absorb the liquid and disinfect a spillage or use with liquid waste. For spillages, allow aerosols to settle and then working from the outside of the spill, apply the Presept granules to the liquid (minimum contact time 10 minutes) before mopping up with paper towels, wiping the area with 1,000 ppm free chlorine solution and disposing of all solid waste via the clinical (orange bag) waste stream. If no granules are available then 10,000 ppm free chlorine, final concentration should be used.

Alcohols

Microbial agents such as fungal spores, Gram +/- bacteria, enveloped viruses and mycoplasma are susceptible to ethanol, usually 70% v/v.