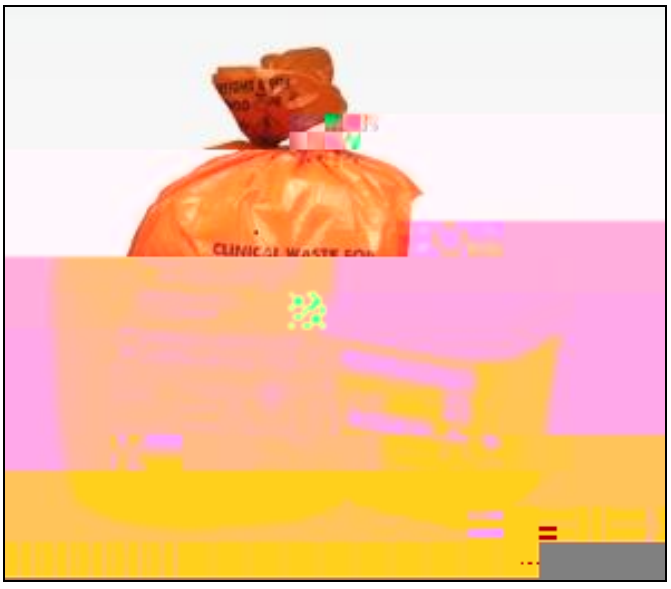

Gretta Roberts
Biological & Scientific Safety Adviser
Health and Safety Services
Office of the University Secretary
Tel 0118 378 8888

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Biological and clinical waste from research and teaching laboratories must be segregated into a number of waste streams to meet legislative requirements and University environmental policies and to reduce costs. These laboratories generate wastes that must be decontaminated before disposal as they contain, or may contain, hazardous microorganisms or because they contain genetically modified organisms. This document provides guidance on how biological and clinical waste from laboratories should be segregated and decontaminated, prior to disposal via an appropriate disposal route.

See also Safety Code of Practice 28 for details of disposal routes for hazardous waste, including discharges from laboratory sinks.

The Sub-Committee for Biological Safety is responsible for approving the University's policy on biological & clinical waste, and for monitoring compliance through periodic audits.

Facilities Management Directorate, and its waste contractor, is responsible for supplying waste services in accordance with this CoP, and in particular the adoption of the waste classification/colour coding scheme and disposal routes.

Heads of Schools and other managers have responsibility for ensuring that:

- local rules are in place for managing biologically hazardous wastes, including disinfection policies and procedures
- all staff and research students receive appropriate information, instruction and training to enable them to follow local rules.

Principal Investigators must ensure that:

- activity risk assessments identify decontamination and disposal methods for all forms of hazardous waste produced.
- where activities involve biological agents in Hazard Group 2 or above, or any genetic modification (GM) work, then these risk assessments must be reviewed and the work approved by the Sub-Committee for Biological Safety.
- all workers under their supervision are given sufficient information, instruction and training regarding waste segregation, decontamination and disposal
- procedures for managing waste are followed.

Laboratory workers have a duty of care to ensure that waste is managed properly and disposed of safely via the correct waste stream. Waste streams must not be mixed.

All new members of laboratory staff and students should receive training in local waste disposal procedures as part of their induction. All staff and students should be made familiar with the laboratory local rules specifying waste disposal procedures and any specific procedures required under GM or Biological agents risk assessments.

Clinical waste consists wholly or partly of human or animal tissue, blood, excretions or any other bodily fluids and any other waste w

Table 2

Biological waste consists of, or material contaminated with biological agents (i.e. “micro-organism, cell culture, or human endoparasites which may cause any infection, allergy, toxicity or otherwise create a risk to human health”). This includes waste from bacteriology, virology and tissue culture laboratories.

Genetically Modified Organisms (GMO) waste - consists of, or material contaminated with genetically modified microorganisms, cell cultures or other (higher organisms) which may cause any infection, allergy, toxicity or otherwise create a risk to human health or to the environment”. All waste contaminated with GMOs must be inactivated by validated means before disposal. The waste routes must be specified in the risk assessment and local rules. All risk assessments are approved by the Sub-Committee for Biological Safety.

A summary of the recommended disposal routes is given in Table 3 below:

Table 3 Typical biological and GM wastes

Waste from: Hazard Group 1 & 2 Biological Agents or Class 1 & 2 GMOs	Liquids	HG1/Class 1 HG2/Class 2
	Solids	
	Serological pipettes and pipette tips	
	Glass Pasteur pipettes	
	Sharps	
Waste from Containment Level 3 laboratories		

The requirements for autoclaves for the sterilisation of laboratory wastes are specified in the ACDP guidance “The management, design and operation of microbiological containment laboratories 2001” and in the Genetically Modified Organisms (Contained Use) Regulations 2000 (as amended 2005).

Autoclaves must be designed, installed and maintained in accordance with the Provision and

A system should be in place to facilitate collection of items for sterilisation from laboratories and the contained and secure storage of these prior to treatment.

Autoclave bags used for sterilisation should be clear or translucent so that incorrect items can be easily detected. Autoclave bags should be clearly labelled with biohazard. They should be placed in appropriate holders in the laboratories with integral drip trays.

Bags ready for sterilisation should be sealed and removed to a clearly labelled collection point within the laboratory. Bottles containing contaminated liquids (treated with disinfectant as appropriate) should be sealed with foil. All waste should be transported to the autoclave room in rigid sealed containers to contain any leaks, and should be clearly labelled with the original laboratory details. Waste should only be transported to the autoclave room immediately prior to treatment and care should be taken to prevent stockpiling of waste. Waste must not be left in unsecured locations (including corridors). Arrangements must be made to ensure that general cleaning staff know not to handle this waste.

Note: Liquids containing radioactive material, toxic or flammable chemicals should not be autoclaved and may require alternative treatment. This treatment must be considered on a case-by-case basis. Contact H&S Services for more advice.

Chemical disinfection may be used routinely for the decontamination of liquids containing Hazard Group 1 and Class 1 genetically modified microorganisms.

It is recommended that HG2 and GM Class 2 liquid wastes are chemically disinfected in the laboratory prior to transportation from the laboratory to the autoclave.

Chemical disinfection in the laboratory prior to transfer to the autoclave is required for HG3 and Class 3 GM.

The following points should be considered when selecting disinfectants:

All disinfectants are hazardous substances in their own right. Disinfectants with the lowest risk to human health possible should be used where practical, in accordance with the principles of COSHH. Where practical liquid or tablet forms should be purchased in preference to powder forms to prevent inhalation.

Efficacy

the of disinfectants varies against different microorganisms, users must check with the manufacturers' activity data.

– sufficient time is required for the disinfectant to be in contact with the material to enable effective decontamination.

–the FINAL DILUTION should be taken into account when disinfecting liquids to ensure that the concentration of disinfectant remains in the effective range.

disinfectants can be affected by factors such as the presence of organic matter, chemicals, pH, temperature and age.

Validation – disinfectants should be used in accordance with manufacturers' instructions. For HG or Class 3 materials the disinfectant must be validated under working conditions using in-house experimental data.

Types of disinfectants available include:

Hypochlorites

Chlorine based disinfectant which is highly effective against vegetative bacteria, viruses and fungi. Inactivated by organic matter. Has limited shelf life. Should not be mixed with acids or formaldehyde as toxic gas is released. Incompatible with cationic detergents. Corrodes some metals and damages rubber. Recommended concentration 2500 ppm for discard jars.

Peroxygen disinfectants (e.g Vikon)

Wide ranging efficacy against bacteria and viruses, may cause corrosion on metal.

Virkon is available in liquid, tablet and powder form (note the powder is a respiratory irritant). The solution has a built-in colour indicator can be stable for up to 7 days when diluted and must be replaced when colour fades. The usual effective dose is 2% final conc. Highly concentrated solutions have reduced efficacy (>4%). Autoclaving should be avoided or only undertaken in an autoclave that is connected to the mains water supply and that is externally exhausted as Virkon can generate sulphur dioxide when heated.

Trigene Advanced

This is a micro-emulsion disinfectant with broad-range bacterial and virucidal activity. Trigene is available as a low-hazard solution with a diluted shelf life of 6 months. For disinfection of liquids a final concentration of 10% is recommended.

ACDP guidance "The management, design and operation of microbiological containment laboratories 2001.

Genetically Modified Organisms (Contained Use) Regulations 2000 (as amended 2005).

Provision and Use of Work Equipment Regulations 1998.

Pressure Systems Safety Regulations 2000.

BS 2646 "Autoclaves for Sterilization in Laboratories".

BS EN 123 47 "Biotechnology: Performance criteria for steam sterilizers and autoclaves".

BS EN 12740: 1999. "Biotechnology. Laboratories for research, development and analysis. Guidance for handling, inactivating and testing of waste".

Safe management of healthcare waste. Version 2.0 England. Department of Health, March 2011.

"Working with Biological Agents". Medical Research Council 2003.

Note: Municipal waste

non-laboratory environment and where they are similar to household wastes,