

Health and Safety Department

**Code of Practice for Biological** **Laboratories**

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# 1. Introduction

## Purpose

The purpose of this document is to define Loughborough University’s (LU) standards on the procurement, use, storage, handling, transportation, and disposal of biological materials in line with legislation, including:

* Control of Substances Hazardous to Health (COSHH) Regulations 2002
* Genetic Modification Organisms (Continued Use) (GMO(CU)) Regulations 2014

Schools who use biological materials must create their own local rules and procedures to implement these standards.

## Scope

The scope of this document is limited to the facility, equipment, and procedural requirements of containment level 1 and 2 laboratories. For further information on containment level 3 laboratories, contact the University’s Health and Safety Service (UHSS).

Please note there are additional policies and procedures for biological material that falls under the Human Tissue Act 2004 and ethical approval. Please see the University Human Tissue Authority (HTA) Licence Compliance Quality Manual and University Ethics guidelines for further information.

## Definition of biological agents and materials

Any laboratory where work with biological material or biological agents is carried out is considered a biological laboratory.

Biological materials are defined as any materials or fluids from or produced by a biological organism. These can include but are not limited to:

* Tissue samples,
* Blood,
* Bone marrow,
* Biopsy samples,
* Environmental samples including food, water, soil, air, sewage and
* Plant material which poses a risk of infection, allergy or toxicity or has a detrimental effect on the wider environment.

Under the COSHH Regulations, biological agents include:

* Microorganisms
	+ Bacteria,
	+ Viruses,
	+ Fungi,
	+ Microscopic parasites,
* Cell cultures, and
* Human endoparasites which may cause infection, allergy, toxicity, or poses a risk to human health

## Classification of biological agents

The Health and Safety Executive’s (HSE) Advisory Committee on Dangerous Pathogens (ACDP) categories biological agents into four hazard groups using the following criteria:

* The likelihood of the biological agent causing disease or toxicity in humans.
* The likelihood of the infection spreading to the wider community.
* The availability of prophylaxis or treatment.

Table 1 below describes the four hazard groups. The containment level of the laboratory dictates the facilities, equipment and procedures that must be in place to work with a given hazardous agent.

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| *Table 1: Description of ACDP’s hazard grouping of biological agents.**Modified from the ACDP’S Approved List of biological agents 2023.*  |
| Hazard group | Description | Containment level |
| 1 | Unlikely to cause human disease. | 1 |
| 2 | Can cause human disease and may be a hazard to employees; it is unlikely to spread to the community and there is usually effective prophylaxis or treatment available. | 2 |
| 3 | Can cause severe human disease and may be a serious hazard to employees; it may spread to the community, but there is usually effective prophylaxis or treatment available. | 3 |
| 4 | Causes severe human disease and is a serious hazard to employees; it is likely to spread to the community and there is usually no effective prophylaxis or treatment available. | 4 |

The ACDP maintains the approved list of biological agents which provides the official classification of biological agents. The classification system considers the potential ill-health effects of an otherwise ‘healthy individual’. Vulnerable groups such as immunocompromised workers and new and expectant mothers are more at risk of serious ill-health affects, and so additional considerations should be made.

Not all biological agents are included in the approved list. Before working with an unlisted agent, it must be assigned a hazard grouping using the criteria previously described. Under the COSHH regulations, the person responsible for the work must classify the unlisted agent by reviewing available evidence and selecting the most appropriate hazard group. If choosing between two hazard groups, the higher group should always be selected. Further information on classifying an unlisted agent can be found in the ACDP’s Approved List of biological agents.

Only hazard groups 1 and 2 biological agents can be used at Loughborough University.

# 2. Notifications

Experiments involving certain biological agents require notification to the HSE or other statutory bodies prior to the commencement of work. This section outlines the notifiable material and practices and how these notifications should be made.

All notifications to statutory bodies are conducted by the UHSS, contact biosafety@lboro.ac.uk for more information.

## 2.1. Scheduled Agents

Part V of Schedule 3 of the COSHH Regulations details additional requirements for certain biological agents, known as scheduled agents. These include all hazard group 3 and 4 agents, and the following hazard group 2 agents:

* *Bordetella pertussis*
* *Corynebacterium diphtheriae*
* *Neisseria meningitidis*

The HSE requires notification on the first use of a new scheduled agent **at least 20 working days** in advance. This notification is carried out by the UHSS. Work with a new scheduled agent may only begin once the HSE has acknowledged the receipt of the notification. The HSE must be notified of any alterations to processes or procedures involving scheduled agents which impacts health and safety.

## 2.2. Genetic modification

There is a requirement to categorise genetically modified organisms (GMOs) into one of four classes by evaluating the hazards the following pose to human health and the environment:

* Donor organism,
* Gene,
* Vector,
* Recipient host organism and
* Resultant GMO

This occurs as part of completing a genetic modification (GM) risk assessment. Table 2 describes the classes of GMO work and their associated containment level.

Under the Genetic Modified Organisms (Contained Use) Regulations (GMO (CU)) 2014, class 1 work can be approved by a suitably competent individual. Work involving class 2 and above GMOs must be approved by a genetic modification committee.

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| *Table 2: Description of the classification and containment level of GMOs. Modified from the SAGCM’s Compendium of guidance.* |
| Class | Description | Containment level |
| 1 | Contained use of no or negligible risk. | 1 |
| 2 | Contained use of low risk. | 2 |
| 3 | Contained use of moderate risk. | 3 |
| 4 | Contained use of high risk. | 4 |

GM(CU) Regulations requires organisations to notify the HSE of the first usage of class 1 GMOs, known as a premises notification. Loughborough University has made a premise notification therefore no subsequent notifications of class 1 work are necessary.

The HSE must be informed of all class 2 projects using the HSE’s CU2 form. This notification is conducted by the UHSS. The HSE must send an acknowledgement of receipt to the organisation within 10 working days of receiving the notification.

If this is the first instance of class 2 work, the work can begin if:

* 45 days have elapsed since the acknowledgement of the receipt was received, or
* The HSE have confirmed in writing that the work may commence sooner.

For all future notifications of class 2 work, the project may begin once the HSE has sent an acknowledgement of receipt.

The HSE must also be informed if there is the transfer of a notified activity from one organisation to another. This notification will be conducted by the UHSS.

### 2.2.1 Changes to notification

Schools must inform the UHSS of any changes of circumstances involving their class 1 and class 2 work. The UHSS will notify the HSE of these changes.

Administrative changes to notifications:

* Changes to the details of the person making the notification,
* Changes to the details of the person responsible for supervising the contained use,
* The address and description of the premises where the contained use is undertaken,
* Cessation of a contained use,
* Cessation of all contained uses and closure of a facility or building,
* Recommencement of contained use that the notifier had previously sent a cessation notice for, and
* Use of additional premises that are added to those already notified.

The HSE must be updated if there have been signification changes to the contained use including:

* A change to the premises or the contained use which may have significant consequences for the risks arising from the contained use, or
* New information becomes available which impacts the risks arising from the contained use.

Table 3 lists possible changes which would require a notification to the HSE. Guidance 15 of the HSE’s Guidance on regulations L29 provides further information about significant changes to genetic modification work.

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| *Table 3: Types of changes of GM work that would be considered a significant change. Adapted from GMO (CU) Regulations 2014.* |
| Significant change | Example |
| Changes to containment and control measures | Changes to procedures such as different research procedures/techniques that increase the risks to users.  |
| Use of different organisms or strains of organisms with different inherent characteristic | Substituting an attenuated strain for a virulent strain.  |
| Use of different vector, recipient organisms or genetic inserts for GM work | Using an insert with more harmful properties |
| Change in the nature of work. | Moving from *in vitro* to *in vivo* work. |
| New information emerges that changes the consequences of exposure | If the results of new research impacts the rationale which the risk assessments is based upon, the harm posed by the contained use could be greatly increased.  |

### 2.2.2 Accidents involving GMOs

The HSE must be notified if there are accidents involving GMOs that involve a significant and unintended release of GMOs which may result in an immediate or delayed hazard to human health or the environment.

## 2.3. Animal pathogens

The Specified Animal Pathogens Order (SAPO) 2008 classifies animal pathogens into hazard groups by considering the risk they pose to the economy, agriculture, food and the environment. SAPO does not consider the protection of workers, instead the primary focus to prevent the spread of, mostly exotic, pathogens that could have serious consequences for animals if they were to be introduced. SAPO outlines the necessary control measures and procedures required for working with specified animal pathogens to prevent the release of the pathogens into the environment.

The full list of animal pathogens is listed in Schedule 1 of SAPO. Prior to working with a new animal pathogen, Schedule 1 must be consulted to confirm the classification of the pathogen.

Before any work can commence using groups 2-4 pathogens, a SAPO licence must be obtained from the HSE. The UHSS will facilitate the licence application with involvement from the relevant School. The HSE estimates it can take up to three months to complete the licensing process which may involve a pre-licensing inspection.

The containment measures required for SAPO animal pathogens are detailed in Appendix 2 of the HSE’s Guidance for licence holders on the containment and control of specified animal pathogens.

Contact the UHSS prior to working with new animal pathogens.

## 2.4. Plant Health Order 2015

The Plant Health Order is concerned with preventing the introduction and spread of pests and pathogens that pose a risk to the environment.

The Plant Health Order requires organisations to notify the Home Office and apply for a licence to import, store, use and dispose of any materials listed in Schedules 1-6 of the order. This notification is conducted by the UHSS.

Contact the UHSS prior to working with Schedule 1-6 plant material.

## 2.5. Anti-terrorism, Crime and Security Act 2001

Part 7 of the Anti-terrorism, Crime and Security Act (ATCSA) requires institutions to notify the Home Office if they intend to use any microorganism or toxin or relevant genetic material listed in Schedule 5 of the Act. Scheduled 5 materials include not only the microorganism itself but also any nucleic acid sequence coding for the toxin and any GMO containing the any such sequence. This notification is conducted by the UHSS.

Contact the UHSS prior to working with Schedule 5 organisms.

# 3. Risk assessments

A suitable and sufficient risk assessment must be conducted prior to acquiring new biological material. The biological risk assessment template should be used. The risk to human health and the environment should be assessed to determine the level of containment and the control measures required. The COSHH regulations and, if relevant, the GMO (CU) regulations set out various criteria that must be considered as part of the risk assessment process.

As part of completing the risk assessment, the following must be considered:

* Biological agents (including hazard grouping),
* Any potential hazard including its risk, and the harm that it may cause,
* Prevention and substitution of the hazard,
* Carcinogenetic and mutagenetic effects,
* Exposure routes (Skin absorption, inhalation, ingestion, injection),
* Adequate control measures,
* PPE requirements,
* Workplace environment (Welfare facilities, confined spaces),
* Waste disposal routes,
* Emergency procedures,
* Health surveillance (occupational asthma and skin disease),
* Vulnerable groups (immunocompromised individuals, young workers and new and expectant mothers).

The results of the risk assessment will inform what processes and procedures are necessary to effectively control the hazard and reduce the risk to human health, safety and the environment.

The risk assessment should be conducted by a suitably competent person with the necessary skills, experience, and qualifications. Advice can be sought from the School Safety Officer (SSO), the Departmental Safety Officer (DSO), and UHSS upon request. Please see section 9.2 for more information on training.

## 3.1 Risk assessment approval process

Table 4 details the required approvers for biological and genetic modification risk assessments. The number of approvers are dependent on the hazard groups of the biological agents and, if relevant, the classification of GM work.

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| *Table 4: Approvers for biological and genetic modification risk assessments.*  |
| Approver | Hazard group 1 | Hazard group 2 | GM1 | GM2 |
| Biosafety supervisor | ✓ | ✓ | ✓ | ✓ |
| School Safety Officer | X | ✓ | ✓ | ✓ |
| Genetic Modification and Biosafety Committee | X | X | X | ✓ |
|  | Increasing level of risk |

## 3.2. Recording and reviewing risk assessments

All health and safety documents should be easily accessible. They can be either paper or digital. However digital is recommended as the files are version controlled and can be recovered more easily. The UHSS’s template for biological and genetic modification risk assessments must be used.

Healthy and safety documents should be reviewed to ensure they are still suitable and updated when any major changes occur. The frequency of the review depends on the risk rating of the activity, as described in table 5. Further information on risk rating activities can be found in the University’s Risk Assessment and Safe Working Methods Policy.

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| *Table 5: Frequency of risk assessment reviews.*  |
| Risk level of activity | Frequency of reviews |
| Low-risk | Every three years |
| Medium-risk | Every two years |
| High-risk | Annually |

Schools and departments should keep a log of all health and safety documents including:

* Title of document
* Author
* Approver
* Date of approval
* Date of next review
* Version number

# 4. Procurement

Schools must have a procedure in place to manage the authorisation, purchase, acquisition, recording and receipt of biological material in line with the relevant legislation. Schools should ensure biological materials are only procured from reputable suppliers.

When ordering on Agresso the following codes must be used:

* P\_LYG for biological material
* P\_LYH for genetically modified material

All biological material procured or gifted into the university from other higher education institutions or research facilities must be accompanied by a Material Transfer Agreement (MTA). Contact the Research Officer for more information on MTAs.

# 5. Cell culture

The COSHH Regulations define cell culture as the *in-vitro* growth of cells derived from multicellular organisms. Uncontaminated cell cultures do not appear to present a significant hazard.

The main risk posed by cell cultures is their ability to sustain adventitious agents and allow for the cellular proliferation of the agents. When considering the necessary containment level for cell culture work, the risks associated with adventitious agents must be considered. Table 6 is modified from the HSE’s Scientific Advisory Committee on Genetic Modification (SACGM) guidance on cell cultures and provides suggested containment levels depending on the cell type used.

*Table 6: Cell cultures and containment levels. Modified from the SAGCM’s Compendium of guidance.*

|  |  |
| --- | --- |
| Cell type | Containment level |
| Well characterised or authenticated finite or continuous cell line of human or primate origin with a low risk of endogenous infection with a biological agent, presenting no apparent harm to laboratory workers and which have been tested for the most serious pathogens. | Containment level 1 |
| Finite or continuous cell lines/strains of human or primate origin not fully characterised or authenticated, except where there is a high risk of endogenous biological agents, e.g. blood borne viruses | Containment level 2. Any work that could give rise to infectious aerosols should take place in a biological safety cabinet  |
| Cell lines with endogenous biological agents or cells that have been deliberately infected. | Containment level to be appropriate to the biological agent.  |
| Primary cells from blood, neural tissue, lymphoid cells of human or simian origin.Primary cell lines cultured for more than 100 hours. | Containment level to be appropriate to the potential risk. A minimum of containment level 2 is recommended.  |

Factors to consider in a cell culture risk assessment:

* **Species**: The presence of adventitious agents that cause disease and infection in humans are more likely to be present in human or primate cells compared to avian or insect cells. The risk from a cell line should consider the likelihood of contamination and the ability of the cell line to support the proliferation of pathogens.
* **Tissue types:** Cells derived from human blood or lymphoid cells have the greatest likelihood of contamination with human pathogens including hepatitis B and C, and HIV.
* **Source population**: When working with human samples it is important to have the clinical history to identify if there is an increased risk in the presence of pathogens, in particular blood borne viruses.

Precautions and procedures for working with cell cultures include:

* Only using cell strains that have been authenticated or have a documented history of safe use.
* Avoiding cross contamination of cultures. Only handle a single cell line at any one time and ensure suitable decontamination processes are followed.
* Conducting work that produces infectious aerosols in a biological safety cabinet to prevent exposure via inhalation.
* Considering the components of the cell culture media that could act as a source of contamination, in particular growth medium supplements of animal origin.

## 5.1. Primary cell cultures

Primary cell cultures are a particular concern as they can undergo spontaneous transformation. This happens more frequently in rodent cells but can occur with human and primate cells. If there's a suspicion of a primary culture transformation or contamination of a cell culture, reassess the current control measures and, if necessary, transfer to a higher level of containment.

The signs that may indicate transformation or presence of virus particles include:

* Changes to phenotype of cell, e.g. alteration of shape, size, and cell confluence, loss of contact inhibition
* Speed of cell division

Additional precautions for work with primary cultures include:

* Researchers **must not use their own cells** (or cells of anyone else who is working in the laboratory) for experimental purposes. This presents a particular hazard as any self-inoculation injury could have potentially serious consequences, as cells re-introduced back in the circulatory system of the host it will not be recognised as foreign by the immune system.
* Wherever practicable primary cells should be cultured for a short-term period. In the case of blood cultures this will normally be for a maximum of 48-72 hours. This will reduce the possibility of spontaneous transformation to virtually zero.
* Where possible tissues should be sourced only from screened sources and/or low risk sources.
* Records of primary cell cultures and the individuals from whom they were isolated should be kept.

## 5.2. Continuous cell lines

Whilst continuous cell lines pose less risk than primary cell lines, some continuous cell lines have been shown to be susceptible to infection from specific agents.

Examples of such cell lines and infectious agents include:

* The B95-8 B-lymphocyte cell line with Epstein Barr virus (EBV)
* The MTA T-cell line with Human T-cell lymphocyte virus (HTLV)

Where possible, it is recommended that cell lines are procured from established suppliers such as the European Collection of Cell Cultures (ECACC) or the American Type Culture Collection (ATCC). Cells from the ECACC and ATCC are screened for human pathogens, characterised (including karyotype and DNA profiling) and are generally low risk unless specified otherwise in the data sheet. Well-characterised cell lines can still be contaminated, so it is crucial that the precautions and procedures outlined previously are followed.

# 6. Blood donations

Staff and students donate blood for teaching and research purposes at LU. When working with donated blood the following health and safety standards must be met:

* A suitable and sufficient risk assessment must be in place prior to commencing any phlebotomy work. This risk assessment should indicate the PPE requirements, disposal routes of sharps and contaminated materials, and appropriate disinfection methods.
* Only a suitably trained and competent phlebotomist can perform phlebotomy.
* Phlebotomy can only occur in a designated phlebotomy room. If this is not reasonably practicable, there must be a dedicated phlebotomy area within the space.
* All blood donations must be given voluntarily, with informed consent that is documented and signed. No form of compensation can be received for donating blood.
* All donors must complete a health screen questionnaire to identify if they have a blood borne virus or disorder which may make them unsuitable to donate blood.
* Each donation should be recorded with the date, donor, volume of blood taken, and the name of the phlebotomist.

Activities involving blood donation may require ethical approval, refer to the University Ethics guidelines for further information.

# 7. Work with Soil

Contaminated soil can contain soil-borne human pathogens, some of which are permanent soil inhabitants and complete their entire life cycle within a soil environment. The pathogens can be bacterial, fungal, or parasitic in nature. Examples of bacteria that can be found in contaminated soil from the UK include:

* *Clostridium botulinum*
* *Clostridium tetani*
* *Listeria monocytogenes*

The likelihood of soil samples containing biological agents depends on the origin of the sample, previous work completed on the sample, and any potential contamination. Soils that have previously been exposed to or treated with animal manure are likely to be contaminated with *Clostridium tetani. C. tetani* is a hazard group 2 agent and causes tetanus. If it is suspected that a wound has been contaminated with soil, seek guidance from the Occupation Health Service on anti-tetanus treatment.

Soils that have been imported from outside the UK may contain exotic biological agents. Importation of soil requires a licence from the Department for Environment, Farming and Rural Affairs (DEFRA), the licence application will be facilitated by the UHSS.

If interested in importing soil, contact the UHSS**.**

# 8. Work with Sewage

Untreated sewage and wastewater contain pathological microorganisms and therefore can only be stored, handled and used in a laboratory that meets a minimum specification of containment 2 level to limit the exposure of workers to pathogens.

*Leptospira,* causing Leptospirosis, is a hazard group 2 agent which can be present in untreated sewage and wastewater contaminated with rat urine.

If working with untreated sewage and/or wastewater, Schools must meet the following standards:

* Complete suitable and sufficient risk assessments for working with untreated sewage and/or wastewater.
* Provide sufficient information, training and supervision to workers on the risks.
* Provide suitable PPE including gloves, footwear, eye and respiratory protection.
* Adequate welfare facilities, including clean water, soap, nailbrushes, disposable paper towels, and where heavy contamination is foreseeable, emergency showers.
* Ensure first-aid equipment is readily available, including clean water or sterile wipes for cleansing wounds, and a supply of sterile, waterproof, adhesive dressings.
* Make arrangements for health surveillance if necessary.

# 9. Information, training, and supervision

## 9.1. Information

### 9.1.1. Inductions

Staff, students, and visitors must receive an induction before working or entering a laboratory with suitable information on the risks they will be exposed to and the control measures in place. The induction should include information on:

* Local rules and procedures.
* Good housekeeping and laboratory practices.
* Emergency procedures.
* Reading and understanding the University’s health and safety policies that are relevant to the role.
* Reading and understanding risk assessments and standard operating procedures relevant to the role.

### 9.1.2. Local rules

Schools should create their own local rules or local code of practice that is specific to their procedures. Local rules should include:

* An introduction which explains the purpose of the local code of practice and the scope of activities covered.
* Identification and description of the area to be covered and the containment level required to control the agents being used.
* A description of the nature and range of hazardous substances which workers might be exposed to, how they will be exposed, and the safe working practices required to ensure work is done safely.
* Local laboratory rules, such as mandatory PPE requirements.
* Induction for workers, maintenance staff, contractors, and visitors.
* Procedures for the maintenance, examination and testing of equipment.
* Procedures for disinfection including types of disinfectant, efficacy, concentration and contact time.
* Procedures for waste disposal (routine and emergency).
* Emergency procedures, including procedures for dealing with accidents and incidents such as spillages or first aid.
* Health surveillance arrangements and inoculations if required.
* Training requirements for workers and training records.

### 9.1.3. Good laboratory practice

Good laboratory practice (GLP) is crucial for the integrity of experiments and the health and safety of all laboratory users and visitors. The following GLP must be in place.

* Food and drink should never be consumed in the laboratory.
* Mouth pipetting is prohibited.
* Suitable PPE must be worn at all times in the laboratory. This will be identified in the risk assessment and will likely include a Howie coat, gloves, and eye protection.
* Keep the laboratory clean and tidy. Good housekeeping must be maintained by all laboratory users.
* Keep work surfaces such as benches and sinks free of clutter.
* All fire doors should be kept shut.
* All walkways and thoroughfares should be kept clear of debris at all times.
* Use the provided storage facilities for hazardous materials, and consumables.
* Do not block fire exit routes.
* Do not remove any equipment from the laboratory without prior permission from the laboratory manager.
* Report any equipment or facilities faults to the laboratory manager.
* To minimise trip hazards, ensure all extension cables are plugged into the nearest socket and implement a cable management system.
* Limit the volume of combustible materials such as cardboard in the laboratory.

## 9.2. Training

Prior to commencing work, all staff and student must be trained. Staff and student’s training needs will vary depending on the work they will be carrying out and each School’s specific procedures. Typical training needs include:

* Training on equipment (fume cupboards, biological safety cabinets, autoclaves etc.)
* Training on techniques (aseptic techniques, manual handling etc.)
* Training on procedures (procurement of hazardous material, disposing of waste etc.)
* Risk assessment training including training on writing COSHH risk assessments and biological/genetic modification risk assessments.
* First aid training

Training needs must be reviewed on a regular basis or when there are significant changes to the work.

Please see Appendix 1 for the UHSS’s template training record for workers.

### 9.2.1. Training records

Each worker must have their own training folder with records of all training they have completed. The records must be signed off by the trainer and the trainee.

## 9.3 Supervision

The degree of supervision will vary depending on the training and experience of the individual worker, and the tasks they are completing. Undergraduate students and visitors must be supervised at all times by an authorised person while in the laboratory.

# 10. Facilities

Containment measures are required to limit workers’ exposure to biological agents and the release of biological agents into the environment. The hazard grouping of biological agents will dictate the required containment level of the laboratory. The containment level requirements are listed in the COSHH Regulations, there are also general laboratory facilities to consider when designing a laboratory. Table 7 details the standard of laboratory design and facilities expected by LU.

All biological laboratories at Loughborough University are built to containment level 2 standards.

*Table 7: Laboratory design and facilities including level 2 containment measures. Adapted from Schedule 3 Part II of the COSHH Regulations 2002.*

|  |  |
| --- | --- |
| Category | Criteria |
| Security  | Access to the laboratory should be restricted to authorised persons only. The laboratory should be secured either with a key, swipe-card access, or pin code lock. The laboratory must be locked when not in use.   |
| Signage | By the entry door to the laboratory there must be:* Biohazard symbol
* Containment level of the laboratory
* List of approved users
* Responsible person for the laboratory and their contact details
 |
| Laboratory coats  | Identified storage space for laboratory coats near the entry/exit to the laboratory, or in a separate annex room of the laboratory away from activities. Specific visitor and contractor laboratory coats must be available. |
| Benches  | Must be impervious to water and easy to clean, and resistant to acids, alkalis, solvents, and disinfectants.The edges of benches, cupboards, drawers, etc, (where these are made of wood or veneer over chipboard) must also be impervious to liquid spills. Bench to bench/upstands or wall joints should be sealed to prevent ingress of contamination or sufficient space allowed between benches to allow cleaning. |
| Flooring | Impervious flooring is not a requirement for containment level 2 laboratories. However, it is good practice to have impervious flooring sealed at floor/wall junctions. |
| Storage of biological agents | COSHH Regulations require the ‘safe storage of biological agents’.Any materials such as consumables should be stored in plastic containers that can be easily disinfected, cardboard boxes should be avoided as must as possible.  |
| Storage of consumables and general laboratory materials  | Suitable storage must be available for:* Hazardous chemicals including flammables, oxidisers, solvents, and corrosives.
* Consumables
* Compressed and liquefied gases.
 |
| Aerosol production  | Activities that cause the production of aerosols must be handled in a biological safety cabinet, isolator, or other suitable containment. |
| Laboratory sinks | Designated laboratory sinks that are easy to clean and resistant to disinfectants.  |
| Hand-washing skins  | Designated hand washing only sinks, located near to the exit of the laboratory.Soap dispensers and hand drying facilities should be located by the sinks, with a waste bin for paper towels. Hand-dryers are not recommended due to the aerosols produced.  |
| Disinfection  | Laboratories must have a specified disinfection procedure.Laboratories must have a cleaning schedule for daily, weekly and monthly tasks. |
| First aid  | First aid kit must be readily available and clearly signposted. Laboratory users must be informed for first aid procedures as part of their induction prior to commencing work in the laboratory.  |

# 11. Equipment

Containment level 2 has specific equipment requirements which must be meet, these include:

*Table 8: Laboratory equipment requirements including level 2 containment measures. Adapted from Schedule 3 Part II of the COSHH Regulations 2002.*

|  |  |
| --- | --- |
| Category | Criteria |
| All equipment  | All equipment must have a maintenance schedule in place in-line with manufacture’s guidance and any legal requirements. The maintenance should be recorded and conducted by a competent individual. Equipment should be cleaned, and the cleaning requirements should be a part of the laboratory cleaning schedule. |
| Biological safety cabinets (BSC) | Activities which produce aerosols of infectious agents must be conducted within a BSC to protect the operator and the environment from exposure to hazardous material. The class of the BSC will depend on the work, and the hazard group of the agent.  |
| Autoclaves | At containment level 2, autoclaves must be in the same building but do not need to be in the same laboratory or on the same floor. For laboratories that do not have an autoclave, the risk assessment should include control measures for transporting infected materials to the autoclave. |

# 12. Storage and Inventory

Schools must have inventories of all biological agents, material, and samples in their laboratories.

The inventory should include:

* Unique identifier (matching sample label),
* Research study,
* Tissue type,
* Date of collection/receipt from other establishment and origin,
* Storage location,
* Dates of sample processing,
* If relevant, information regarding transfer to and from other locations,
* Date and details of disposal,
* Reason for disposal.

Records must be updated if there are any changes such as the addition of a new sample or the disposal of a sample to ensure the traceability of materials.

# 13. Transportation

##  13.1. Within Loughborough University

Biological material should be transported in a safe and secure manner to avoid or reduce the risk of spillage and contamination. The route of travel should minimise contact with communal areas as far as possible. Schools must have a transport procedure in place and consider transportation as part of the risk assessment.

When developing procedures for the transportation of biological material, consider:

* **Route of transfer**: the layout of the building, for example if lifts or stairs will used, or any communal areas will be passed through.
* **Containment of hazard**: how the hazard will be stored when transporting it and any emergency provisions for example a spill kit, disinfectant, and gloves in case of spillages.
* **Number of staff required**: Depending on what is being transported and the volume of material, transportation may require multiple people.

## 13.2. Between Loughborough University and external organisations

Staff or students wishing to transfer or receive biological material to/from another organisation must first contact their SSO or DSO and arrange a formal Materials Transfer Agreement (MTA) and contact the Research Office for further details.

Any biological material must be packed, labelled, and marked in accordance with the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009.

# 14. Disinfection and Disposal

## 14.1. Disinfection

Under the COSHH regulations, there must be a disinfection procedure in place for containment level 2 laboratories. This must be included in the School’s local rules as previously mentioned.

When creating a disinfection protocol, Schools should consider:

* The appropriate disinfectant for the nature of the microorganisms,
* The types of surfaces that require decontamination,
* The presence of organic materials,
* The hazardous properties of the disinfectant,
* The stability of working dilutions,
* The concentration of the disinfectant and the contact time,
* The validation of the disinfectant method,
* The arrangements for routine use and spills.

Under GMO (CU) regulations, all contaminated waste as a result of class 2, 3 and 4 work must be inactivated by a validated means prior to disposal. This is not required for class 1 work so long as the GMO:

* does not have the potential to cause harm to human health or the environment,
* is biologically contained (e.g. possess multiple disabling mutations or restrictive nutrient requirements that cannot be met outside the laboratory),
* does not have the capacity to establish and multiply in the environment, and
* does not have capacity to transfer genetic material to other micro-organisms (e.g. non-mobilisable plasmid).

## 14.2 Disposal

All waste must be disposed of correctly and in accordance with LU’s Environmental management system and relevant legislative requirements. Schools are responsible for managing waste disposal at a local level and implementing systems and procedures.

It is important for School to consider the waste disposal route before purchasing or using biological material as part of the risk assessment. All biological material must be deactivated prior to disposal.

All equipment which has been used in conjunction with biological material must be decontaminated and assessed for any residual risk posed before it is released for maintenance, repair, or disposal. Please speak to the UHSS for clearance certificates, including extractions clearance certificates.

## 14.3 Fumigation

BSCs should be fumigated:

* Following a major spillage, or after any spillage resulting in the contamination of inaccessible surfaces that cannot be easily decontaminated,
* Before routine maintenance work where access to potentially contaminated parts is necessary such as a HEPA filter replacement or when filter penetration tests are being carried out,
* When there is a significant change to the work such as the use of a significantly different pathogen.

When developing a fumigation procedure the following should be considered:

* **Properties of the fumigant**:
	+ Must be biocidal against the micro-organisms(s) in use.
	+ Hazardous properties of the fumigant must be identified as part of a risk assessment including the Work Exposure Limit (WEL) of the fumigant if applicable.
	+ Ideally able to penetrate organic materials such as culture media and porous surfaces.
* **Removal of the fumigant:** procedure for how the fumigant will be removed after fumigation has occurred.
* **Training**: Fumigation should be conducted by a trained individual.
* **Notification**: Staff must be notified of fumigation works and suitable signage affixed on entry doors to warn of fumigation works. Signage must be removed once the works have been completed and the fumigant removed.
* **Validation** **testing**: Identify a procedure to confirm if the contaminant has been removed and that the fumigation was successful.

# 15. Inspections

Inspections ensure that the workplace conforms to a specified standard. Inspections occur frequently and are an opportunity for issues to be identified and reported as a near-miss or accident.

The UHSS has a template inspection checklist (Appendix 2) for biological laboratories that can be used and modified to suit individual laboratories requirements. Schools must inspect biological laboratories every six months, the UHSS recommends a quarterly inspection cycle.

The UHSS conducts annual audits of biological laboratories, using the audit template in Appendix 3.

# 16. Emergency procedures

Schools should have procedures for foreseeable emergencies such as spillages and accidental release of biological agents and GMOs.

When considering emergency procedures, schools should consider:

* **Characteristics of the agent**: Hazard group, routes of transmission, infectious dose, viability of the sample, and in the cases of genetically modified material the potential impact on the environment should be considered.
* **Severity**: Volume of material that has been released and the form (aerosols, liquids, contaminated waste).
* **Location**: If the accident is well contained, for example in a centrifuge or biological safety cabinet, and how effectively the area can be controlled, for example if a sample is spilled outside a building during transportation.
* **Disposal and decontamination**: necessary disinfection procedure for equipment and the laboratory, fumigation procedures for BSCs and facilities as required by risk assessment, disposal of any waste generated and the appropriate procedure for decontaminating affected workers.
* **Treatment**: how affected workers can access available treatment or prophylaxis for biological agents they have been exposed to, notification to the Occupational Health Service, and first aid arrangements.

Common emergency procedures include:

* Sharps or needlestick injuries,
* Spillages inside equipment, for example inside the BSC or a centrifuge, and
* Spillages in the laboratory or during transportation between laboratories.

# 17. Reporting accidents or incidents

Accidents, incidents and near-misses must be reported using the University’s incident reporting system, Evotix. The reports should include as much detail as practicable and should be submitted as soon as possible.

Biological incidents include:

* Spillages of biological agents:
	+ Inside equipment, such as a BSC or a centrifuge,
	+ In the laboratory or during transportation between laboratories.
* Sharp injuries occurring during work involving biological agents.
* Any worker contracting a disease because of their work.

Dangerous occurrences that are reportable to the HSE include but are not limited to:

* Incidents that have resulted (or could have resulted) in the release or escape of a biological agent likely to cause severe human illness or infection, or
* A sharps injury involving known blood/bodily fluids infected with a Blood- Borne Virus.

it is the duty of the UHSS to report dangerous occurrences to the HSE. Refer to the Reporting of Accident, Dangerous Occurrences and Occupational Ill Health Policy for more information on the reporting and investigation of incidents.

# 18. Occupational Health

The Occupational Health Service carry out health surveillance where it is required by risk assessment, or in accordance with schedule 6 of the COSHH regulations.

Occupational Health supply advice on health surveillance requirements and provide appropriate vaccination to individuals working with biological agents in line with biological and GMO risk assessments.

Line managers are responsible for informing Occupation Health if their direct reportees require health surveillance or vaccinations.

# 19. Vulnerable workers

There are individuals who are more susceptible to ill health than others and so are more vulnerable than the general population. Vulnerable groups include immunocompromised individuals, such as those who have recently undergone chemotherapy or other cancer treatments, disabled workers, those with underlying health conditions, and young workers/students. Any additional considerations for vulnerable workers must be documented as part of the risk assessment.

## 19.1. New and expectant mothers

New and expectant mothers are at an additional risk when working with biological material as certain infections can be transmitted from the mother to the developing foetus/newborn infant. During pregnancy, the infection can be transmitted across the placenta. Infections can be transmitted from the mother to the newborn infant when breast feeding or having close physical contact.

 Biological agents that can affect the developing foetus include but are not limited to:

* Chlamydia abortus,
* Listeria monocytogenes,
* Parvovirus,
* Cytomegalovirus,
* Rubella virus,
* Blood borne viruses such as HIV, Hepatitis B, C, A, and E,
* Toxoplasma gondii, and
* Varicella-zoster virus.

It is the responsibility of line managers/supervisors to review work activities with the individual once they are informed of the pregnancy to ensure a new and expectant mothers risk assessment is carried out, and any additional control measures are identified and implemented.

# 20. Further information

## 20.1. Internal resources

* Biological Safety Policy,
* Risk Assessment and Safe Working Methods Policy
* Chemical Storage Safety Guidance,
* Respiratory Sensitisers and Health Surveillance Guidance,
* 8.1.71 Hazardous Waste,
* 8.1.68 Clinical Waste Disposal

## 20.2 External resources

* HSE’s Management and operation of microbiological containment laboratories,
* HSE’ Approved List of biological agents,
* HSE’s Compendium of guidance on genetic modification,
* HSE’s Working with sewage.
* HSE’s Guidance on Regulations L29 – The Genetically Modified Organisms (Contained Use) Regulations 2014

Appendix 1 – Training record

# Training Record – Biological Laboratories

## Guidance

All staff should receive sufficient information, instruction and training to conduct their work safely. The manager/supervisor should ensure all staff they are responsible for are suitably trained prior to commencing work.

This is a template produced by the University Health and Safety Service for Schools to use to document staff training and can be modified to suit School’s training requirements.

## Introduction

|  |  |
| --- | --- |
| **School:** |  |
| **Department:** |  |
| **Worker name:** |  |
| **Role:** | Delete as appropriate: Student/PhD/PDRA/Staff/Safety Officer |
| **Manager/Supervisor name:** |  |
| **Start date:**  |  |

## Training Record

|  |  |  |  |
| --- | --- | --- | --- |
| **Training/Instruction** | **Details of training** | **Date** | **Signed by** |
| **Start** | **End** | **Worker** | **Manager/Supervisor** |
| **Mandatory Induction Training** |  |  |  |  |  |
| Introduction and tour of the facility (Fire exits, toilets, desk space, laboratories etc.) |  |  |  |  |  |
| Access requirements (Staff card, keys, door codes) |  |  |  |  |  |
| Fire evacuation procedures |  |  |  |  |  |
| First aid procedures |  |  |  |  |  |
| Local rules  |  |  |  |  |  |
| University Biological Safety Policy  |  |  |  |  |  |
| **Health and Safety training** |  |  |  |  |  |
| Fire Safety Awareness  |  |  |  |  |  |
| Effective Risk Assessment |  |  |  |  |  |
| Manual Handling Safe Lifting Techniques |  |  |  |  |  |
| Accident & Near Miss Reporting |  |  |  |  |  |
| *e.g. Biosafety for laboratory workers, COSHH Awareness, or First aid at work* |  |  |  |  |  |
| **Procedural**  |  |  |  |  |  |
| Working at containment level 2  |  |  |  |  |  |
| Cryostorage and Liquid Nitrogen Handling  |  |  |  |  |  |
| Decontamination |  |  |  |  |  |
| Waste Disposal |  |  |  |  |  |
| Inventory management (chemical, biological etc.) |  |  |  |  |  |
| **Equipment** |  |  |  |  |  |
| Biological Safety Cabinet |  |  |  |  |  |
| Fume Cupboard |  |  |  |  |  |
| Autoclave |  |  |  |  |  |
| Centrifuge |  |  |  |  |  |
| Incubator |  |  |  |  |  |
| Water bath |  |  |  |  |  |
| *e.g. plate reader* |  |  |  |  |  |
| **Optional additional training**  |  |  |  |  |  |
| Cell culture |  |  |  |  |  |
| Aseptic technique |  |  |  |  |  |
| Liquid handling |  |  |  |  |  |
| Manual handling |  |  |  |  |  |
| Basic microscopy |  |  |  |  |  |
| Gas cylinder training |  |  |  |  |  |
| **Mandatory health and safety documents** |  |  |  |  |  |
| *e.g. SOPs, risk assessments and local rules that staff must read, understand and sign* |  |  |  |  |  |

# Appendix 2 – Inspection Checklist

# Biological Laboratory Inspection Checklist

## Guidance

This is a template laboratory inspection checklist provided by the University Health and Safety Service (UHSS) for Schools to use to complete inspections. The template includes general and biological health and safety considerations and can be modified by Schools to include additional hazards.

Schools must conduct inspections at least every six months. The results of the inspections should be reported to the School’s Health and Safety Committee and any other relevant Health and Safety committees such as the Genetic Modification and Biosafety Committee.

## Section 1: Inspection information

Inspections should be conducted by suitably trained and experienced staff. It is recommended that two to three members of staff complete an inspection, with one person acting as the lead inspector.

|  |  |  |  |
| --- | --- | --- | --- |
| Date of inspection: |  | Area(s) inspected: |  |
| Name of lead inspector: |  | Associated Staff: |  |

## Section 2: Actions from previous inspection

|  |
| --- |
| **Actions** |
| Action number | Action to be taken | Action owner | Date of completion |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

## Section 3: Inspection

|  |
| --- |
| **Access/signage** |
| Criteria | Yes | No | Comments | Action number |
| Is the containment level of the laboratory displayed? |   |   |   |   |
| Is a biohazard sign displayed? |   |   |   |   |
| Are all other relevant hazard signs displayed? |   |   |   |   |
| Is the laboratory door locked when not in use? |   |   |   |   |
| Is the door closed? (If the room is under negative pressure) |   |   |   |   |
| Are the correct authorised persons listed by the entrance to the laboratory? |   |   |   |   |
| Is the correct responsible person listed by the entrance to the laboratory? |   |   |   |   |
| Are all contact details correct and up to date? |   |   |   |   |
| **Premise** |
| Criteria | Yes | No | Comments | Action number |
| Is the standard of lighting satisfactory for the work being undertaken? |   |   |   |   |
| Is the level of noise satisfactory for the work being undertaken? |   |   |   |   |
| Is the temperature suitable for the work being undertaken? |   |   |   |   |
| Is the standard of ventilation satisfactory for the work being undertaken? |   |   |   |   |
| **Housekeeping** |
| Criteria | Yes | No | Comments | Action number |
| Are all benches and work surfaces clean, in good condition and uncluttered? |   |   |   |   |
| Is the floor clean and free from slip and trip hazards? |   |   |   |   |
| Is there fresh disinfectant available? |   |   |   |   |
| Is waste being managed effectively? E.g. bins not overflowing |   |   |   |   |
| Are the correct bins present? |   |   |   |   |
| Are waste disposal procedures readily available and visible in the laboratory? |   |   |   |   |
| Are relevant spill kits available? |   |   |   |   |
| Is adequate storage available? |  |  |  |  |
| **Hygiene and PPE** |
| Criteria | Yes | No | Comments | Action number |
| Is there a designated hand washing sink? |   |   |   |   |
| Is there hand soap available? |   |   |   |   |
| Are there paper towels in the dispenser? |   |   |   |   |
| Are there sufficient clean laboratory coats available and fit for use? |   |   |   |   |
| Is there sufficient storage space for outdoor clothing? |   |   |   |   |
| Are gloves and goggles readily available and fit for use? |   |   |   |   |
| If applicable, is all specialist PPE available? E.g. respirators, cryogenic aprons |   |   |   |   |
| **First aid** |
| Criteria | Yes | No | Comments | Action number |
| Is the first aid kit clearly visible? |   |   |   |   |
| Is the first aid kit fully stocked? |   |   |   |   |
| Are the correct first aiders listed by the first aid kit? |  |  |  |  |
| Are eye wash bottles present and in date? |   |   |   |   |
| **Fire safety arrangements** |
| Criteria | Yes | No | Comments | Action number |
| Are all escape routes clear of obstructions and combustible materials? |   |   |   |   |
| Are fire doors in good condition and kept closed? |   |   |   |   |
| Are fire doors and exits clearly marked? |   |   |   |   |
| Are fire extinguishers in the correct location? |   |   |   |   |
| Are fire extinguishers in date? |   |   |   |   |
| Are the correct type of fire extinguishers present? |   |   |   |   |
| **Equipment** |
| Criteria | Yes | No | Comments | Action number |
| Has all equipment passed PAT testing? If equipment has failed, has it been isolated and clearly identified that it should not be used? |   |   |   |   |
| Has all equipment passed its last maintenance inspection? |   |   |   |   |
| Has the autoclave been serviced and maintained? |   |   |   |   |
| Have all biological safety cabinets been tested and serviced? |   |   |   |   |
| Have all centrifuges been tested and serviced?  |   |   |   |   |
| Are there records of all equipment that has undergone testing and maintenance?  |   |   |   |   |
| If there is a list of approved equipment users, is this list correct and up to date? |   |   |   |   |
| **Control of Hazardous substances** |
| Criteria | Yes | No | Comments | Action number |
| Are chemicals stored in appropriate cabinets?  |   |   |   |   |
| Are incompatible chemicals stored separately?  |  |  |  |  |
| Do the cabinets have hazard signs?  |   |   |   |   |
| Are the cabinets located away from heat sources? |  |  |  |  |
| Are all chemical containers labelled with their contents and hazard signs? |   |   |   |   |
| Are all fridge/freezer/incubator samples labelled with their contents?  |   |   |   |   |
| Are all biological samples stored in a safe manner? |   |   |   |   |
| Are there biohazard signs on all fridges, freezers, and incubators? |   |   |   |   |
| Is there an up-to-date chemical inventory? |   |   |   |   |
| Is there an up-to-date inventory of biological material and samples? |   |   |   |   |
| Is there safe storage of compressed gases/cylinders? |  |  |  |  |
| Is there a cylinder trolley available for transport of cylinders? |  |  |  |  |
| Are regulators in date? |  |  |  |  |
| Are all connections to regulators secured? |  |  |  |  |
| Are cryogens used and stored in a safe manner? |  |  |  |  |
| If applicable, are oxygen and/or carbon dioxide monitors present? |  |  |  |  |
| **Documentation** |
| Criteria | Yes | No | Comments | Action number |
| Are suitable and sufficient risk assessments readily available and within their review period? |   |   |   |   |
| Are all SOPs readily available and within their review period? |   |   |   |   |
| Have all workers received a laboratory induction? |   |   |   |   |
| Are all training records up to date? |   |   |   |   |

|  |
| --- |
| **Any other comments:**  |

## Part 4: Actions

|  |
| --- |
| **Actions** |
| Action number | Action to be taken | Action owner | Action to be completed by: | Date of completion  |
|  |  |  |  |  |

# Appendix 3 – Audit Checklist

# Biological Laboratories Audit Checklist

## Section 1: Audit information

|  |  |  |  |
| --- | --- | --- | --- |
| Date of audit: |  | School: |  |
| Building: |  | Laboratory: |  |
| Name of lead inspector: |  | Associated Staff: |  |

## Section 2: Actions from previous audit

|  |
| --- |
| **Actions** |
| Action number | Action to be taken | Action owner | Date of completion |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

## Section 3: Audit

|  |
| --- |
| **Access/signage** |
| Criteria | Yes | No | Comments | Action number |
| Is the containment level of the laboratory displayed? |   |   |   |   |
| Is a biohazard sign displayed? |   |   |   |   |
| Is the laboratory door locked when not in use? |   |   |   |   |
| Is the door closed? (If the room is under negative pressure) |   |   |   |   |
| Are the correct authorised persons listed by the entrance to the laboratory? |   |   |   |   |
| Is the correct responsible person listed by the entrance to the laboratory? |   |   |   |   |
| Are all contact details correct and up to date? |   |   |   |   |
| Comments: |
| **Premise** |
| Criteria | Yes | No | Comments | Action number |
| Is the standard of lighting satisfactory for the work being undertaken? |   |   |   |   |
| Is the level of noise satisfactory for the work being undertaken? |   |   |   |   |
| Is the temperature suitable for the work being undertaken? |   |   |   |   |
| Is the standard of ventilation satisfactory for the work being undertaken? |   |   |   |   |
| Is the laboratory under negative pressure? If so, is this tested? |  |  |  |  |
| Comments: |
| **Housekeeping** |
| Criteria | Yes | No | Comments | Action number |
| Are aisles and walkways uncluttered? |  |  |  |  |
| Are all benches and work surfaces clean, in good condition and uncluttered? |   |   |   |   |
| Is the floor clean and free from slip and trip hazards? |   |   |   |   |
| Are the laboratory sinks clean? |  |  |  |  |
| Is a disinfection regime in place? |  |  |  |  |
| Is there fresh disinfectant available? |   |   |   |   |
| Is waste being managed effectively? E.g. bins not overflowing |   |   |   |   |
| Are the correct bins present? |   |   |   |   |
| Are waste disposal procedures readily available and visible in the laboratory? |   |   |   |   |
| Are relevant spill kits available? |   |   |   |   |
| Is adequate storage available? |  |  |  |  |
| Comments: |
| **Hygiene and PPE** |
| Criteria | Yes | No | Comments | Action number |
| Is there a designated hand washing sink? |   |   |   |   |
| Is there hand soap available? |   |   |   |   |
| Are there paper towels in the dispenser? |   |   |   |   |
| Are laboratory coats being worn? |  |  |  |  |
| Are there sufficient clean laboratory coats available and fit for use? |   |   |   |   |
| Is there sufficient storage space for outdoor clothing? |   |   |   |   |
| Are gloves and goggles readily available and fit for use? |   |   |   |   |
| If applicable, is all specialist PPE available? E.g. respirators, cryogenic aprons |   |   |   |   |
| Comments: |
| **First aid** |
| Criteria | Yes | No | Comments | Action number |
| Is the first aid kit clearly visible and fully stocked? |   |   |   |   |
| Are the correct first aiders listed by the first aid kit? |  |  |  |  |
| Are eye wash bottles present and in date? |   |   |   |   |
| Is there an emergency shower? Is this clean and routinely flushed? |  |  |  |  |
| Comments: |
| **Fire safety arrangements** |
| Criteria | Yes | No | Comments | Action number |
| Are fire action notices displayed? |   |   |   |   |
| Are fire doors and exits clearly marked? |   |   |   |   |
| Are appropriate fire extinguishers available and within inspection date? in the correct location? |   |   |   |   |
| Comments: |
| **Working arrangements** |
| Criteria | Yes | No | Comments | Action number |
| Is there Number of people in the facility at one time? |  |  |  |  |
| Is there adequate space and facilities? |  |  |  |  |
| If there is more than one research group in the laboratory, is the work compatible?  |  |  |  |  |
| Comments: |
| **Equipment** |
| Criteria | Yes | No | Comments | Action number |
| Has all equipment passed PAT testing? If equipment has failed, has it been isolated and clearly identified that it should not be used? |   |   |   |   |
| Is there an absence of overloaded sockets? |  |  |  |  |
| Has all equipment passed its last maintenance inspection? |   |   |   |   |
| Has the autoclave been serviced and maintained? |   |   |   |   |
| Is an autoclave log kept? |  |  |  |  |
| Are all autoclave operators trained? |  |  |  |  |
| Have all biological safety cabinets been tested and serviced? |   |   |   |   |
| Are there testing records for biological safety cabinets?  |  |  |  |  |
| Have all centrifuges been tested and serviced?  |   |   |   |   |
| Is all other equipment maintained and serviced?  |   |   |   |   |
| If there is a list of approved equipment users, is this list correct and up to date? |   |   |   |   |
| Comments: |
| **Control of Hazardous substances** |
| Criteria | Yes | No | Comments | Action number |
| Are chemicals stored in appropriate cabinets?  |   |   |   |   |
| Are incompatible chemicals stored separately?  |  |  |  |  |
| Do the cabinets have hazard signs?  |   |   |   |   |
| Are all chemical containers labelled with their contents and hazard signs? |   |   |   |   |
| Are all fridge/freezer/incubator samples labelled with their contents?  |   |   |   |   |
| Are fridge/freezer/incubator inventories in place? |  |  |  |  |
| Are all biological samples stored in a safe manner? |   |   |   |   |
| Are there biohazard signs on all fridges, freezers, and incubators? |   |   |   |   |
| Is there an up-to-date chemical inventory? |   |   |   |   |
| Is there an up-to-date inventory of biological material and samples? |   |   |   |   |
| Comments: |
| **Documentation** |
| Criteria | Yes | No | Comments | Action number |
| Are suitable and sufficient risk assessments readily available and within their review period? |   |   |   |   |
| Are all SOPs readily available and within their review period? |   |   |   |   |
| Have all workers received a laboratory induction? |   |   |   |   |
| Are all training records up to date? |   |   |   |   |
| Are local procedures and policies in place? |  |  |  |  |
| Is there a procedure for supervising untrained staff/visitors? |  |  |  |  |
| Is there an out of hours working procedure |  |  |  |  |
| Are there lone working arrangements? |  |  |  |  |
| Comments: |

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| **Interviews with laboratory users:**  |

## Part 4: Actions

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| **Actions** |
| Action number | Action to be taken | Action owner | Action to be completed by: | Date of completion  |
|  |  |  |  |  |