

## STANDARD OPERATING PROCEDURE

<b>Procedure:</b>	<b>Autoclaving</b>
<b>School/Department:</b>	<b>School of Molecular Bioscience</b>
<b>SOP prepared by:</b>	<b>Ben Monaghan and Nick Coleman</b>

### Section 1 - Personal Protective Equipment

1. Heat-resistant gloves
2. Eye protection (safety glasses/goggles)
3. Lab coat
4. Enclosed shoes
5. Hair tied back if long

### Section 2 – Potential Hazards + Safety precautions

1. **Steam in the autoclave can cause burns.** Open the autoclave door slowly and carefully – stand well clear, and beware of initial rush of steam
2. **Just-autoclaved items will be VERY HOT** and can cause burns. Handle these items only with heat-resistant gloves, and minimise handling as much as possible until they have cooled
3. **Containers must not be autoclaved when tightly closed**, this poses a risk of explosion (as steam expands) or implosion (when the item cools). The risk of explosion or implosion or other heat-induced breakage may be aggravated by handling the items.
4. **Solvents, corrosives, bleach, radioactive materials MUST NOT BE AUTOCLAVED.**
5. Full bins containing autoclave bags can be heavy, and pose a potential injury risk if not lifted carefully and appropriately – lift from the knees (don't bend your back), and get help from another person if the item is too heavy. Minimise the distance you have to carry heavy items, use a trolley as much as possible.
6. If the wrong materials (eg. plastics) are put in the autoclave, these can melt, making a mess and posing a hazard. Generally, polypropylene and polycarbonate are OK, but polyethylene may not be autoclavable. If in doubt, test a small sample first inside a container that you know is safe to autoclave.
7. Materials being autoclaved may pose a serious BIOHAZARD threat. Ensure you are familiar with the MSDS and/or properties of these materials, eg. what risk group microbes and what species of microbes are involved. Consult risk assessment and SOP "Working with risk group 2 microorganisms" if appropriate.

### Section 3A – Procedure for Regular Users (sending goods to autoclave)

1. Select appropriate containers/bags for autoclaving. Use a dedicated plastic biohazard bag for disposable wastes (most plasticware), a steel bucket or bin for wastes that are in recyclable containers (eg. glassware), and a wire rack for glassware, media etc ready for sterilisation.
2. If using a plastic autoclave bag for disposing wastes, ensure this is inside some kind of strong secondary container, both when in use in the lab, and when being transported. A metal garbage bin with a lockable lid is ideal.
3. Don't overfill containers, especially autoclave bags. About 2/3 full is appropriate, Overfull bags pose a greater risk of breakage, and also pose manual handling risks due to their weight.
4. Don't overfill individual bottles of media, solutions or wastes. These should be no more than ¾-full otherwise they will spill over when they boil in the autoclave.

8. Attached a strip of autoclave indicator tape to your items
9. Ensure any non-waste items are labelled with your name or initials, and your lab's room number
10. Any biohazard materials that are NOT autoclaved (eg. clinical samples killed with bleach) must be placed in the Contaminated Material Container located in room 225 (large yellow Sulo bin).
11. All sharps containers which contain biohazards must be autoclaved.

### **Section 3B – Procedure for Trained Operators (Loading, starting, unloading autoclave)**

1. **Only trained operators are to operate the autoclaves**
2. Check steam levels, water levels and gauges before use to ensure no faults or unusual readings
3. Select the correct autoclave cycle for your materials – eg. liquids cycle (slow exhaust), dry goods cycle (fast exhaust), or waste destruction cycle (extra high temp, slow exhaust)
4. Instructions specific to Large Autoclaves:
  - Switch on steam generators at start of day if required
  - A warm up cycle will help with the running of the sterilizer
  - Due to the length of run cycles, cycles are timetabled
  - Select the applicable cycle and check that the temperature, times and items to be sterilised are appropriate. Review the manufacturers operating manual if required.
  - Check to see if there is any indicator tape attached (if not, attach some)
  - Load items for the cycle selected. Note that a liquids cycle needs addition of a bottle with a similar level of water present to the items to be sterilised – put the temperature probe into this bottle of water. Ensure the probe cable cannot be caught in the door
  - Only run the cycle once the steam pressure is at acceptable levels
  - Once the cycle has finished, switch off the alarm (Getinge autoclaves only) and then unload items, taking care to use heat-resistant gloves
  - Place sterilised items on the “has been sterilised” shelves
  - Discard sterilised disposable wastes (autoclave bags) into skip bins in car park, after placing autoclave bags inside an opaque regular plastic garbage bag.
  - Transfer sterilised wastes in glassware to washing-up zone.
  - Remind users about items sterilised that remain uncollected for more than a few days.
  - Switch off steam generators at end of day if required
5. Instructions specific to Small Autoclaves:
  - New users should be shown how to use the steam sterilizer by the custodian or trained user
  - Water level should be checked (different for each autoclave) and topped up if required
  - Add water to the chamber to the level specified in the instruction manual
  - Close and secure locking mechanism of the autoclave door
  - Select appropriate settings, and start the autoclave.
  - Set a timer for the required cycle time after the temperature has reached 121°C. Once the timer has counted down, change autoclave controls to the applicable settings

- Do not open door until the temperature is at a safe level (below 80°C).
- If any agar spills are apparent, flush out the autoclave by pouring hot water through the base and drain system.
- Turn the autoclave off at the powerpoint, especially if there will be an extended period of non-usage (ie, holiday breaks, weekends)

#### **Section 4 – Disposal / Spills / Incidents**

1. Any biohazard spills must be cleaned up immediately using bleach. See SOP for “Working with risk group 2 microorganisms”.
2. Report any injuries such as burns or lifting injuries as soon as possible to your supervisor, and using the online incident reporting system. Near misses (hazardous situations not leading to an incident) should also be reported
3. Dispose of autoclaved wastes correctly, as described above

#### **Section 5 – Repairs / Certification / Validation**

1. There are three types of certification:
  - A. Validation is performed annually (external contractors)
  - B. Calibration is performed annually (external contractors)
  - C. Spore Testing is preformed monthly (SMB workers)

#### **Section 6 – Relevant Material safety data sheets**

Ensure you are familiar with the types of biohazards present in the School, and have read the risk assessment and SOP for Working with risk group 2 microorganisms, and the risk assessment and SOP for Biohazard Spills

#### **Section 7 - References**

Not applicable

**SOP Training Confirmation**

By signing below, these individuals confirm that they have read and understood the SOP, and agree to always follow the instructions in this SOP when performing this procedure.

Position	Name	Signature	Date
Supervisor			
employee / student			
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