**School of Engineering**
**University of Glasgow**

# Aspects of Bioengineering Research Group

## Levels 1 and 4 Labs

## Advanced Research Centre Building

# CODE OF PRACTICE

***The adoption and practice of good safety procedures is of paramount importance both for the health of fellow workers and for the integrity of the fabric of the laboratories in Biomedical Engineering.***

1) No work may be carried out in the Aspects of Biomedical (AB) Engineering areas of the Advanced Research Centre without the prior permission of Professor Jon Cooper, Dr Andrew Glidle, Professor Huabing Yin, Professor Alasdair Clark, Dr Manlio Tassieri, Dr Julien Reboud or Dr Andriejus Demcenko.

2) No work may be carried out until all necessary safety documentation has been read, and understood, and both Andrew Glidle and your supervisor have been sent a short (1 page), Word document describing some of the information you have learned after reading these documents (see also the AB group PowerPoint presentation on the Safety website).

3) Note: Additional safety information covering the use of the Chemistry and various categories of Biological and Laser rooms is given in other documents either on the Safety Website or e-mailed to you by Andrew Glidle, Julien Reboud, or your supervisor.

4) New staff and students should be shown the positions of safety equipment in the various labs by their supervisor, Julien Reboud, or Andrew Glidle.

The locations of this safety equipment are (see PDF plan at the end of the document):

Fire Extinguishers - Level 4: At either end of main lab, Rm 428, and outside doors leading to goods lift; Level 1: Outside goods lift near Rm 154, outside Rm 151/163

First Aid kit - Level 4: Above lab coat hooks in main lab, Rm 428; Level 1: Rm 171 (wash room) and in cupboard outside Rm 151/163.

Eye baths – At either end of main lab, Rm 428; Level 1: Rms 151 and 163.

Emergency shower – Adjacent to sink, main lab, Rm 428; Outside Rm 173/179, level 1.

Safety goggles – Personalised, but spare ones above coat hooks in main lab, Rm 428.

Emergency Exits – Level 4 at either end and in the middle of main lab, Rm 428, and thence via stairs to atrium; Level 1 at either end of main corridors and via stairs next to goods and passenger lifts leading to exits on level 2, or to outside near the stores area and meeting room at far end of corridor from Rm 151.

The emergency telephone number is **4444**

All new staff and research students needing to use the JWNC will need to fill in the safety documentation which can be found on the James Watt Nanofabrication Centre website before being trained in cleanroom techniques. http://wiki.jwnc.gla.ac.uk/

5) Any work outwith '9 to 5' requires discussion with Dr Andrew Glidle or your supervisor and explicit permission obtained before out of hours running of unattended experiments is undertaken. Working alone is not allowed if doing any of the following procedures; (i) hazardous organic synthesis or chemical manipulations; (ii) using high voltage power supplies. If you are working in the cell culture lab or a dark room be aware that others may not know of your presence. No one is to work alone when using hazardous materials or processes. Additional out of hours regulations are described in the School Safety Manual and ARC safety documents. In general first year PhD students should not undertake any out of hours work by themselves until they have had at least six months experience of laboratory work in the level 1 or level 4 labs.

6) Lab coats or other protective clothing, as required, must be worn at all times in the lab. Where necessary, safety spectacles must also be worn.

7) If anyone wishes to use new or additional procedures (biological or chemical) they MUST inform their supervisor or lab. staff of this BEFORE ordering any chemicals, biochemicals, cell lines etc., or starting the practical work. For any work not covered by the general code of practice, or other AB lab codes of practice, a risk assessment must be completed using the School web based database and approved by their supervisor and the level 1 or level 4 AB group laboratory responsibles (Andrew Glidle or Julien Reboud). For work involving genetically modified material, a GM risk assessment must also be completed (contact Andrew Glidle for details). Also, people should e-mail others in the group if performing a new and particularly hazardous procedure.

8) Any work with solvents, volatile chemicals that are toxic, corrosive chemicals, concentrated and moderate strength acids and alkalis must be carried out in a fume cupboard. The fume cupboard in Rm 151 on level 1 can be used for any materials, but those on level 4 should only be used for organic solvent work. In all cases, safety glasses and disposable gloves should be worn, with heavy duty gloves being used for handling stock bottles of concentrated acids and alkalis (> 2 M). Used gloves and paper towels and non-hazardous chemical waste must be put into the black bag bins in the laboratories.

9) Use of plastic solvent dispensing/'squirty' bottles: These are translucent with colour coded spouts and printed labels as follows: White/Black label – DI/RO Water; Orange – Ethanol; Blue – Isopropanol; Red – Acetone; Green – Methanol; soap solutions for washing should only be put in washing up liquid bottles and not in ones used for any of the above solvents or DI/RO water i.e. it is very important that these are only filled with the solvent that corresponds to both the colour code and printed labels on the bottle. They should not be filled with other solvents even if other hand written names are put

on the bottles. The reason for this is that people will often automatically look at the colour of the bottle or the colour of the spout, and use it thinking that the corresponding solvent is in the bottle and it can be extremely hazardous and/or ruin people's samples if someone has filled the bottle with a different type of solvent e.g. if acetone has been put into a water bottle, then someone could dissolve the resist on their sample, when they had only been intending to rinse some salt off it, or if water was put into an acetone bottle, then the water could react and ruin something that was water sensitive – in the worst case this could be a violent reaction. If other types of solvent need to be used in squirty bottles, consult Andrew Glidle for alternatives.

10) Waste solvents must be disposed of into the waste bottles located in the fume cupboard. Acetone, Methanol and Iso-Propyl Alcohol should be poured into the UNCHLORINATED waste bottle. Chlorobenzene and other chlorinated organic solvents poured into the CHLORINATED waste. NEVER add acid or alkalis or corrosive/oxidizing chemicals to these bottles.

11) Flammable organic solvents must never be heated directly on hotplates.

12) Work involving volumes of concentrated acids > 50 ml should be done in the fume cupboards on level 6 of the Rankine Building since the ones in the ARC do not have large sinks to deal with emergencies or disposal.

Small quantities (<50 ml) of concentrated acids or alkali's (>100 mM) should be disposed of in the fume cupboard on level 1 as follows:

Fill a large beaker (e.g. 2 l) with 1.5 l water then slowly add the acid (or alkali) to the water to dilute, and then carefully pour the diluted mixture down the alcove sink and leave the water running for 10 minutes to allow the diluted acid/alkali to drain away.

13) In the event of an acid or alkali spillage on anyone immediately soak the affected area with water using the drench shower or eye wash (if a small area) and use one of the spill mats under the sink to clear up (making sure you wear heavy duty gloves and safety glasses).

In the event of an accident or mishap tell someone - preferably Andrew Glidle, Julien Reboud, Carol-Anne Smith, your supervisor or a more experienced colleague who can pass the information on.

If you find yourself following a possibly unfamiliar procedure or performing an experiment and are unsure of what to do next or if something is going wrong, seek assistance from somebody rather than end up having an accident.

14) ALL containers, beakers, bottles etc. must be correctly labelled with owner's name, date and contents. Unlabelled containers or those not properly labelled will be thrown away.

15) ALL used glassware must be rinsed and either washed up at the sinks in Rms 151 and 428, or placed in soak baths in Rms 151 and 428 for taking to the washroom facility in Rm 171 when full.

16) All non-contaminated broken glassware, slides and coverslips must be disposed of in the underbench waste glass bins. All sharps i.e. scalpel blades, hypodermic needles and blades should be disposed of in the small sharps boxes. Waste syringes (non-

contaminated) should be put in the black bins. All pipette tips should be disposed of in clear autoclave bags or bio-hazard bins, prior to these being taken to the autoclaving facility in Rm 171

17) Disposal of things in different types of waste bins: Waste bins with black bin liners should only be used for non-hazardous, non-contaminated and non-sharp waste i.e. non-recyclable paper/cardboard/plastic/gloves; Glass bins should be used for glass waste; Yellow hard plastic bins for other sharp waste e.g. needles; Yellow hard and soft plastic bins for cell culture and other biologically contaminated waste; solvent drums for waste organic solvents; for hazardous/contaminated waste that is not suitable for disposal via a general landfill waste stream, consult Andrew Glidle to arrange for specialist disposal (prior to generating the waste).

18) Personal belongings such as bags and coats should be stored in owner's office or under a bench, not left on the open floor. Books and paper in the labs should be kept to a minimum.

19) Soldering Irons must not be left on when not in use.

20) If gas flames are needed for particular activities e.g. sterilization, then permission must be sought from Carol-Anne Smith (via Julien Reboud or Andrew Glidle), to use these in designated areas. The equipment to be used (i.e. small camping gaz burners or torches) should be checked for leaks before use, paying particular attention to any parts of the equipment that may have perished e.g. rubber seals. If there is any hint of a smell of gas, then do not use the equipment and replace the seals or discard it. Make sure there is nothing flammable (e.g. solvents, chemicals, plastic, paper) near where you are using the naked flame.

21) The small workshop room on level 8 of the Rankine Building where light drilling, sawing, filing, toolwork etc can be done should not be used by people without first reading the code of practice for that room and discussing the activity with Andrew Glidle together with being shown how to use the tools if necessary.

22) No food or drink may be consumed in the laboratories.

**Biological Culture Labs**

23) All cell culture work must be carried out in the laminar flow cabinet.

24) All waste products from cell culture work i.e. plastic petri dishes, pipettes and glassware must be placed in the Biological Waste containers which are uplifted by Industrial Waste Contractors.

25) Any spillage of cell or bacterial culture must be treated with Virkon (or similar), mopped up with paper towel and treated with alcohol. Waste paper must be put into the Biological Hazardous Waste containers.

26) NEVER mouth pipette, use the pi-pumps or automatic pipettors provided.

27) Only essential material should be stored in the fridges as space is limited.

28) Anyone using Blood products must inform the Andrew Glidle or Julien Reboud before proceeding. All work with blood must be carried out in a contained environment

(e.g. a laminar flow hood) in one of the designated rooms, and waste products disposed of safely.

29) Anyone working with BSL 2 viruses and other microorganisms must follow the guidelines set out in their approved risk assessment form. Only those working with these materials are allowed in the BSL 2 rooms during such work. Disposal of virus, microorganisms (e.g. bacteria and cell cultures) and associated waste products should be soaked in Virkon.

30) When using the tissue culture rooms on level 4, make sure you adhere to any additional guidelines associate with those rooms.

Final points for all labs.

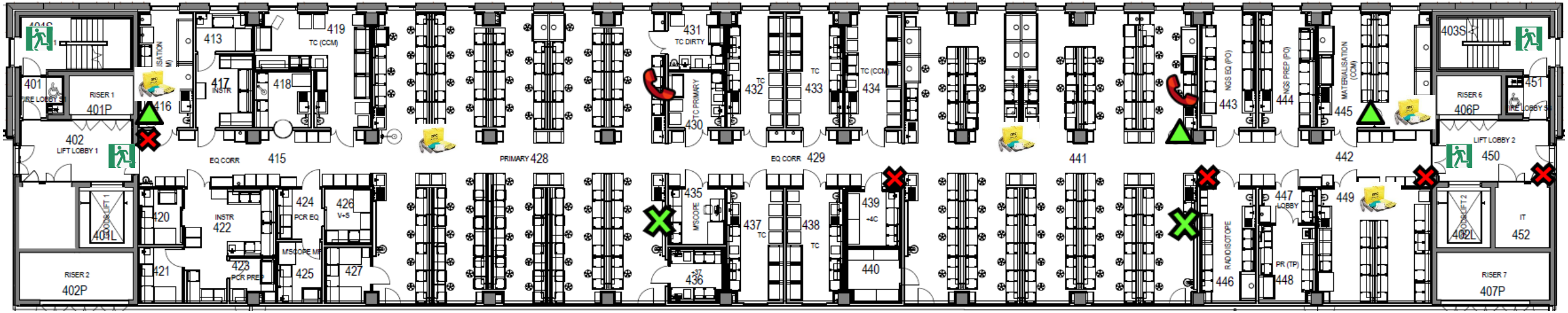
Anyone storing material in fridge/freezers should try to keep this to a minimum; there is limited scope for long term storage.

To minimise dust etc. on benches bench tops should be cleared and cleaned monthly; it is your responsibility to clear the bench both before and after using it – you should not rely on ‘someone’ returning to clear up things that have been left behind. Keeping a minimum amount of paper in the lab reduces dust.

If any equipment breaks or is not working tell the level 1 or 4 laboratory responsibles (Andrew Glidle or Julien Reboud) immediately.

In addition, as indicated in the general School Safety manual and on the safety website, new and expectant mothers must inform their supervisor and Andrew Glidle or Julien Reboud at the earliest opportunity so that appropriate risk assessments can be made (for example, see the University SEPS website) – aside from specific risks, these will in general include avoiding the use of the small chemistry lab where a large number of organic solvents are used/stored.

# Level 4




Telephone

Fire extinguisher

First aid kit

Emergency shower

Emergency exit

Chemical spill kit

Emergency eye wash stations are located at every hand-washing sink in the labs.

# Level 1


Telephone

Fire extinguisher

First aid kit

Emergency shower

Emergency exit

Chemical spill kit

Emergency eye wash stations are located at every hand-washing sink in the labs.