Safety measures to the department and individual labs

Department of Biosciences and Bioengineering

Bio safety

Chemical safety

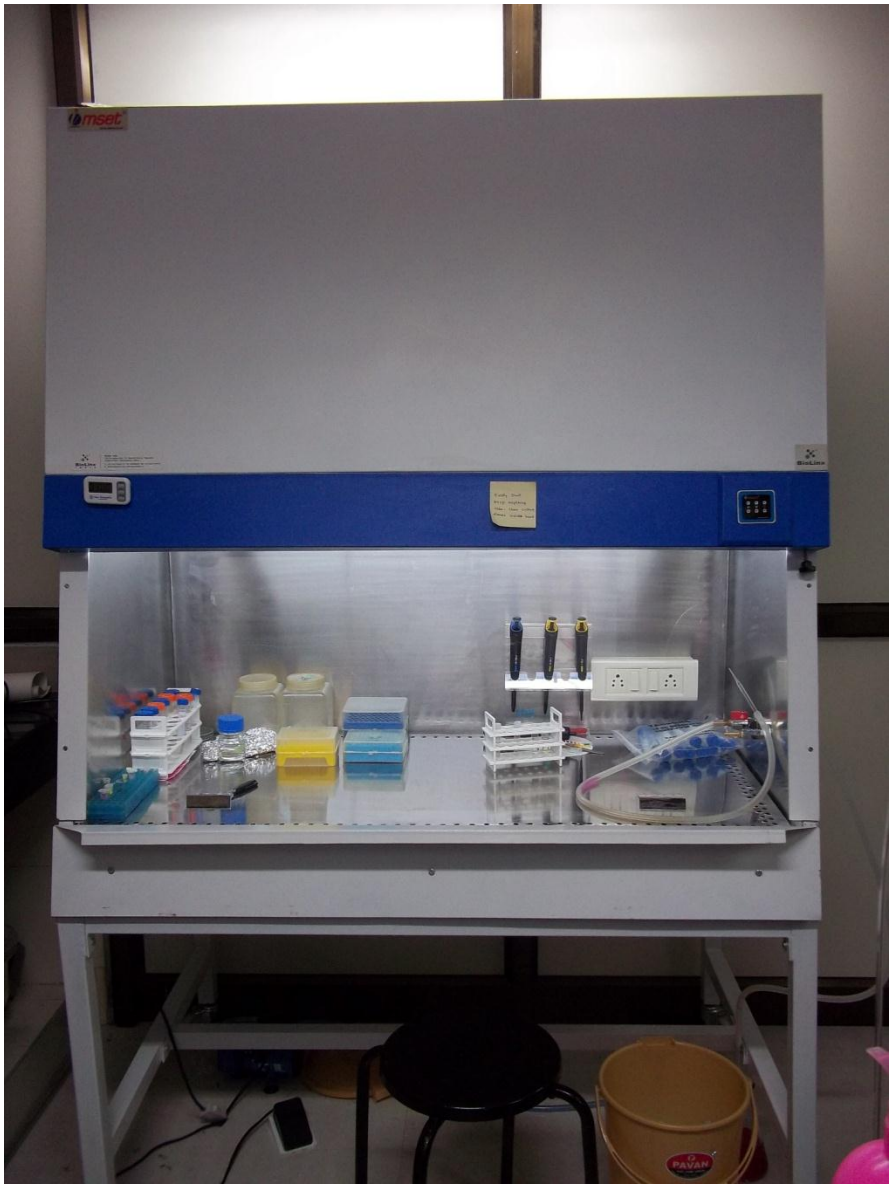
Fire safety

Radiation safety

Bio safety

Biosafety cabinet

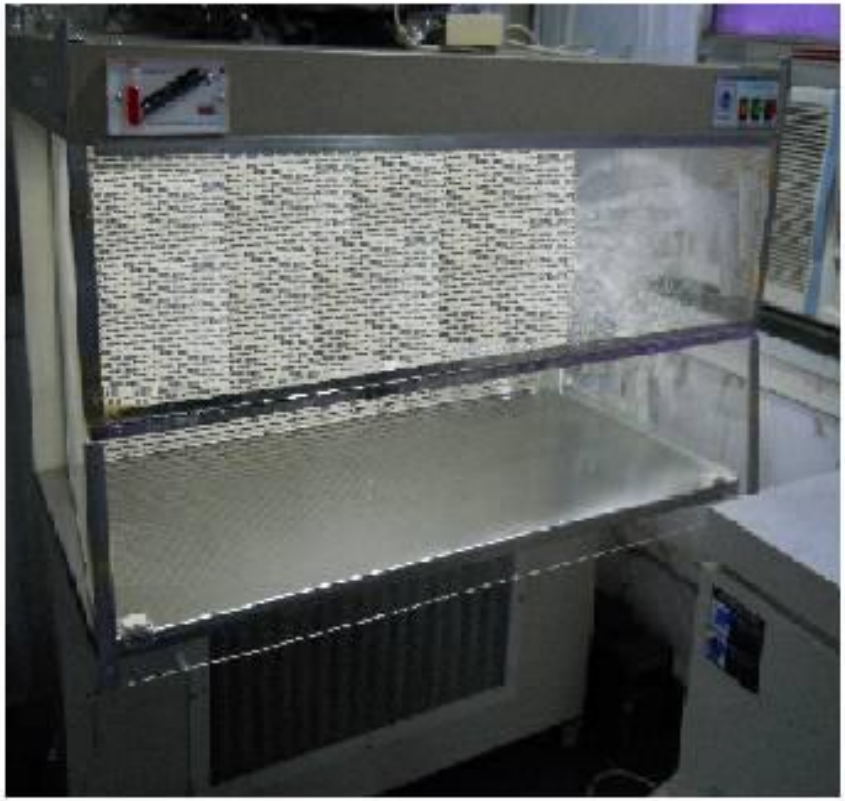
- Should be used for biomaterials that need containment
- Should not be used as fume hood
- Should be used for biomaterials protected from contamination



Safety aspects of biological contaminants

- Reading/computer table should be separated from the working table

- Non-pathogenic microorganisms should be handled only in the laminar hood or on the working table



Safety aspects of biological contaminants

- No eating is permitted in the laboratory working with microbes

- Drinking water should be kept with only at a designated place away from the working bench or laminar hood.

Safety aspects of biological contaminants

- The disposal of the microorganisms should be done only after proper decontamination using autoclave, alkali, acid, alcohol etc.

- We are in the process of buying 2 X 120 L autoclaves for 1st and 4th floor autoclave rooms

- Each room will have one tub for storing autoclaved material which can be disposed off within a day

Safety aspects of biological contaminants

- Clean your work bench on regular interval using liquid disinfectants

- Make sure any biological wastes should be disposed on a regular basis

Disposal of bio-hazard waste

PHO has supplied these bins for bio-waste storage

PHO is co-ordinating the disposal of the bio waste. They are collecting the waste from the individual labs at a frequency of 3 days a week

Location of the bins at BSBE

The laboratories of

1. Prof. D. Panda 2. Prof. R. Banerjee 3. Prof. S. Patankar (kept at tissue culture facility?) 4. Prof. S. Srivastava 5. Prof. S. Sen

- **A similar bin will be kept in one of the autoclave rooms for storing of EtBr gels.**

Liquid bio-waste : No pick up by PHO. Please decontaminate by yourselves using reagents (acid etc.) or autoclaving and discard

Disposal of bio-hazard waste

- **Separate container should be used for disposal of broken glass and sharp objects**

- **The accumulated waste (over several months) can be taken in a plastic container and given for disposal along with bio-waste**

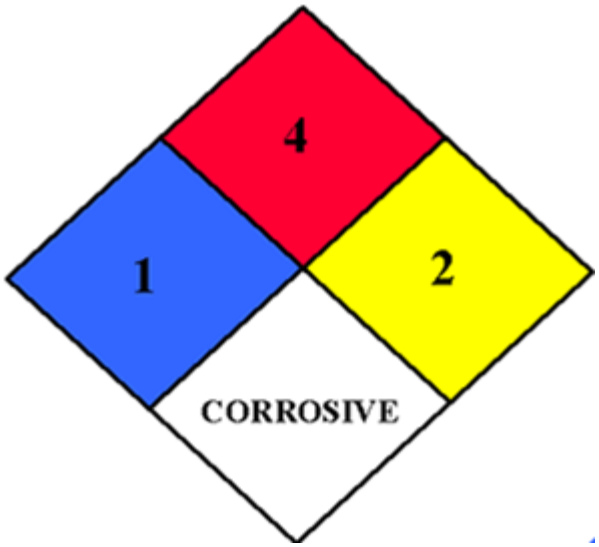
BSL-2 facility

At second floor

Chemical safety

Inventory and MSDS

- **Label** all your reagent bottles.
- Maintain an **inventory** of all the chemicals in your lab. **Display** the list on the storage cupboard.
- **Before** a new chemical arrives in the lab, read its **MSDS** and figure out how to store, use and dispose.



Material Safety Data Sheet

Storage of chemicals: flammables

- Store flammable organic solvents away from acids.
- Keep them away from open flames and sparks (i.e. electrical outlets).

X

Storage of chemicals: Acids

- Do not store acids next to flammable solvents.
- Use secondary containers (e.g. a tray) for strong acids to contain spills.

Pre-disposal storage of waste chemicals

- **Store wastes in the lab** until other arrangements are made.
- **No dumping** of bottles in the stairs/terrace/common areas.
- **Label** all waste bottles properly (full names, should not wash off)

- **Phenol**: Use a dedicated closed glass container.
- **Flammables**: Never pour solvents down the drain. Segregate waste solvents into "**halogenated**" and "**non-halogenated**" and keep in separate bottles.

Disposal of waste chemicals: EtBr waste

All ethidium bromide wastes should be so labeled for disposal.

- **EtBr gels**: Store in a separate closed bag and dispose with other biological waste every week. This is to prevent fungal growth in the gels. Separate bin (biohazard bin from PHO will be kept in the autoclave room for EtBr gels).

- **EtBr-contaminated pipette tips:** Store in a separate container in your lab. To be disposed as chemical waste.

- **EtBr-buffers**: Store in separate container and dispose as chemical waste. Do not mix with other chemical waste.

Disposal of chemical waste: flammables

- Material Management Division will dispose of waste chemicals and empty containers every 3 months.
- Store all waste chemical bottles inside your labs until other arrangements are in place.

Flameproof cabinet to be kept on the 6th floor terrace landing (near elevator room) for interim storage of waste solvents before pick-up.

Disposal of chemical waste: Empty bottles

- Before disposing, make sure that containers are empty.
- Ground floor area under the stairs (lift side) will be provided with suitable storage cupboards for empty bottles.
- Until this is ready, store empty bottles inside your lab.

Fire safety

Safety aspects of fire

- Locate , identify and know the positions of fire extinguishers and sand buckets kept at your floor nearest to your lab.

Two such cabins at each floor. Key should be there in common key box (will be kept at the ground floor)

Within fire duct cabin

For heavy fire. Should be operated by fire or security persons

For light fire. We can operate

Underground water pumps (Four)

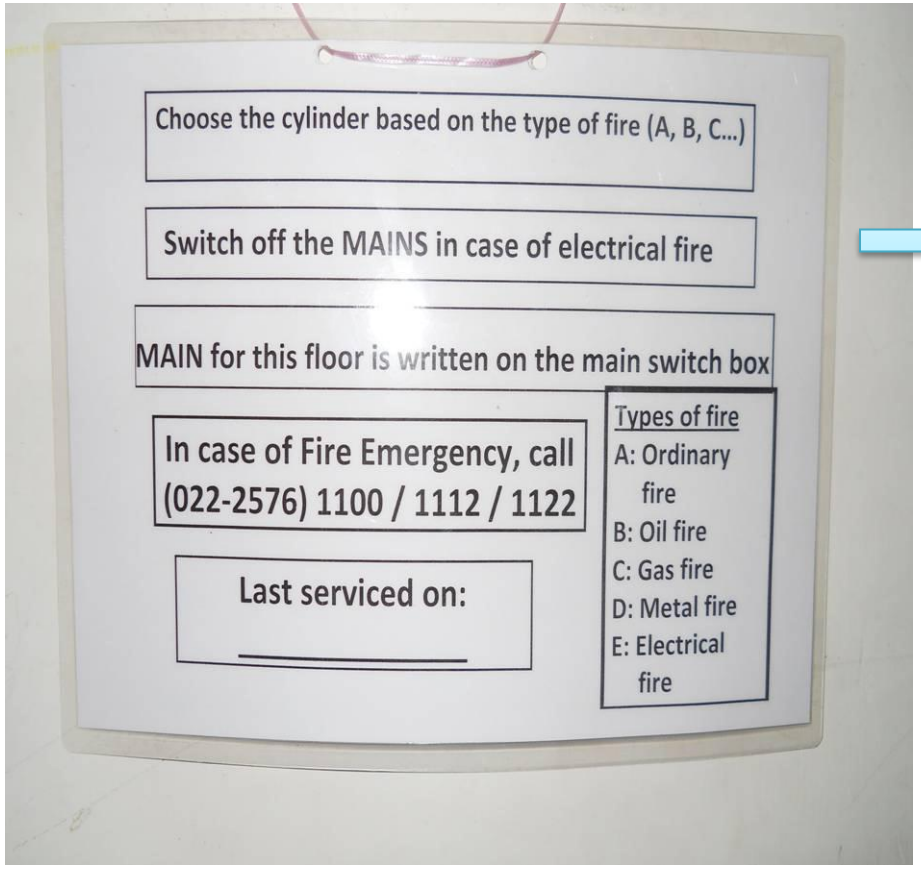
Power panel for the pump

Total 100,000 lt of water is stored

Location of the pumps (Four)

Safety aspects of fire

- Locate and identify the laminated instruction board displaying choice of fire extinguishers, emergency numbers etc.



Safety aspects of fire

- Select the correct type of fire extinguisher depending upon the type of fire.
- Locate , identify and know the positions of MAIN electrical switch of your floor so that you can SWITCH OFF the power line.
- SWITCH OFF power line as FIRST step if there is fire.

Fire alarm signage

Press this ONLY when there is fire

Do not tamper this without fire

Fire alarm signage

Fire alarm signage

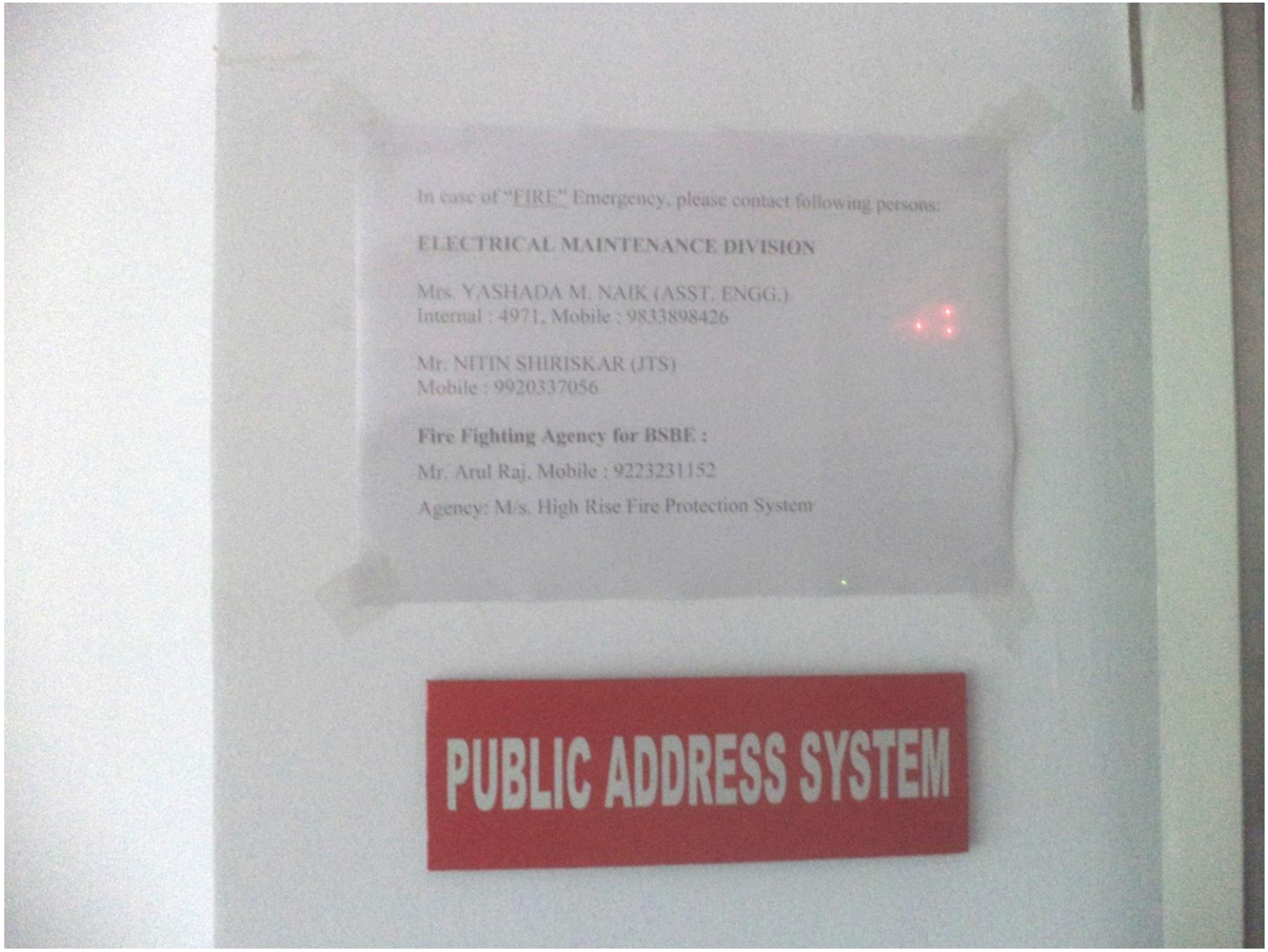
These fire doors should remain closed ALWAYS

Fireman switch

DO NOT use this switch. This is ONLY for the fire fighters

Public address system and fire alarm panel

Important numbers



Location of the fire panel

Power room

This is at the ground floor, remains open 24/7

Power panels in L.T. room 1

Power panels in L.T. room 1

These are the switches for lights of the ground floor foyer, staircase, seminar rooms etc (written inside the DB boxes)

Power panels in L.T. room 2

Power panel at each floor

This is within the instrument room

Within elevator

Do not tamper the receiver and any notice inside the elevator

Radiation safety

Radio isotope handling facility at 6th floor

Safety aspects of ionizing radiations

Make sure the following items in the laboratory where you are working with radioisotopes:

- It should have good ventilation. Switch on the AC for some time prior to your work.
- Do not switch on the ceiling fan while handling radioisotope
- Actual handling room should be separated by another room from the main entry corridor. Never handle the radioisotope material in the first room which is adjacent to the corridor

Safety aspects of ionizing radiations

- Make sure that the contamination monitor is in working condition before you start your work

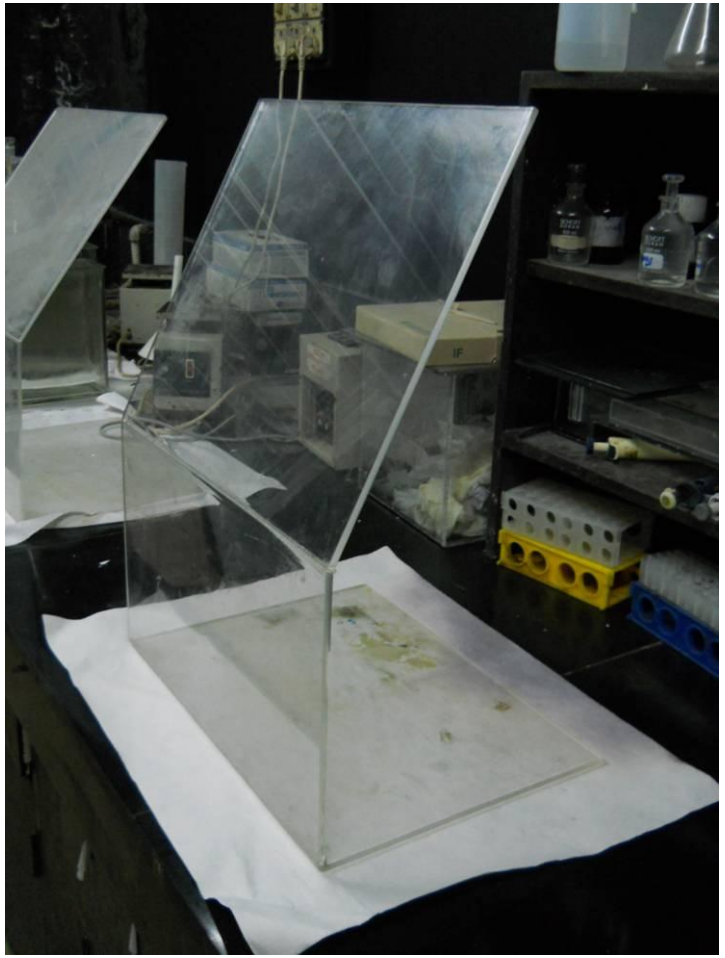
Safety aspects of ionizing radiations

- Always use gloves and lab coat and safety glasses or goggles

- Always wear lab coat in the isotope room even if you enter the room without any isotope work

Safety aspects of ionizing radiations

- Always dispense liquid radioactive materials behind perspex shield. Always use appropriate shielding when working with radioactive materials.



Safety aspects of ionizing radiations

- Use remote handling devices such as forceps, tongs as much as possible.

- Never pipette solutions by mouth

Safety aspects of ionizing radiations

- Keep the sink clear all the time
- Do not eat, drink, smoke and apply cosmetics in the laboratory.
- Do not use refrigerators or freezers designated for storage of radioisotopes for food storage.
- Glassware and other equipment used for radioactive work must not be used for other purposes.

Safety aspects of ionizing radiations

- Store radioactive waste and sources in a safe and secure place depending upon the type of radioisotopes being used.
- ^{32}P solid waste can be stored in the perspex box for seven to five half lives before disposal.
- ^{32}P liquid waste can be stored in glass bottle behind perspex shield for seven to ten half lives. The liquid waste can be discarded in the sink of the radioisotope laboratory upon dilution.
- No radioactive material can be stored in the individual labs. All should be stored in the freezer kept in the radioisotope laboratory

Safety aspects of ionizing radiations

- Make sure the working surface is covered with smooth non-absorbent materials. All surfaces in the radioisotope laboratory should be smooth, non-porous and non-absorbent

- Further, all work tables should be covered with polythene sheets and absorbent paper to take care of accidental spillage while handling liquid radioactive materials.

- Make sure the provision of foot operated waste bin in the laboratory

Safety aspects of ionizing radiations

- Make sure that decontaminating reagents like soap, mild detergents should be there in the laboratory

- When work is complete, clean the area thoroughly. Check the working surface, floor, monitor and other equipments with the monitor. Mark and Isolate contaminated space and equipments. Decontaminate all by using light soap water.

- Carry out wipe testing (see next slide) every week

Safety aspects of ionizing radiations

Contamination checking:

Wipe testing: This is the only effective method for detecting low energy beta particles such as those emitted by ^{3}H, ^{14}C or ^{35}S. Wet a disc of filter paper with ethanol, rub it over the surface to be checked and count in the liquid scintillation counter.

Direct reading : This is done using monitors for detection of high energy beta particles, X-ray and gamma radiation

Safety aspects of ionizing radiations

Disposal of radioactive waste: depends upon types and origin of waste

- Follow the principle of (a) delay and discharge and (b) dilute and discharge

Solid waste: Normally after a period of 7 – 10 half lives (for ^{32}P), the waste can be disposed off into the municipal dump. ^{3}H and ^{14}C should be contained in perspex box so that these can be accumulated and disposed off in lot by AERB.

Liquid waste: The liquid waste stored in the glass bottle after a period of 7-10 (for ^{32}P) half lives can be diluted and discarded in the sink. ^{3}H and ^{14}C should be diluted and discarded in the sink.

- Used liquid scintillation cocktail should NOT be disposed off in the sink. It should be treated as chemical waste.

Safety aspects of ionizing radiations

Decontamination procedures

Personal decontamination:

- Contaminated body area (hands, feet, neck etc.) should be cleaned by gently washing with soap solution and water but avoiding hot water.

- Special care should be taken to avoid spreading contamination to the eyes, nose or lips.

- Washing of the skin must be gentle so that mechanical and chemical irritation of the skin is minimized

Safety aspects of ionizing radiations

Decontamination procedures

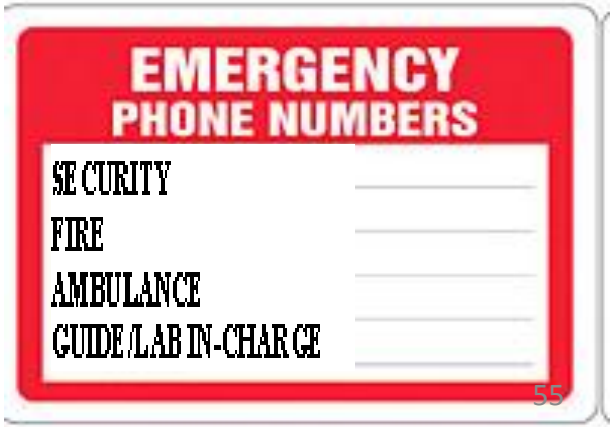
Surface decontamination:

- Decontamination should start on the outer perimeter of a contaminated area and proceed towards the central point
- Clean the surface with moist swab. Use water for this.
- If this is unsuccessful, detergents like soap solution, teepol, EDTA etc. can be tried
- Remove contamination from glass wares use soap solution or chromic acid.
- For the metal surfaces, use mild acids like 0.1N HCL or HNO_3.

General points

- Every lab should have one first-aid box
- Every lab should have at least one battery operated search light
- Display at an open easily noticeable position in the lab the emergency telephone numbers like: fire, security, police, Guide, Lab in-charge in absence of guide and safety officer.
- Phone numbers of Institute Safety Officer (Mr. Sajith. K.V):
  Cell No. 9819744062

All these slides can be viewed from
http://www.bio.iitb.ac.in/Safety_measures.pdf



Thank you