



Chemical Safety and Security Workshop

Kuching, Malaysia

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Chemical Lab Safety: Administrative, Operational, and Engineering Controls

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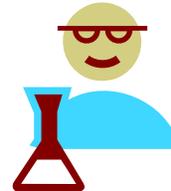
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Evaluation & Control

- Administrative practices
organizational policies
- Operational practices
work practices
- Engineering controls
Hardware (ventilation,
barriers)



Administrative Practices: Lab Safety Policies

- ❖ Have organizational safety practices
 - Apply to everybody
 - Don't work alone after hours
 - Specify when eye protection & PPE is required
 - Specify operations that require hood use
 - No eating in labs
 - No mouth pipetting
 - No loose long hair or dangling attire
 - Label all chemical containers
- ❖ Have a Safety Manual





Administrative Practices: Lab Safety Policies

- Schedule routine, periodic maintenance and inspection of fume hoods
- Schedule routine, periodic maintenance of safety showers and eye wash stations
- Schedule routine, periodic maintenance of fire suppression/fighting equipment
- Post restricted areas with proper signs
 - radiation, biosafety, carcinogen, high voltage, lasers, authorized personnel only, etc.



Operational Practices: Safe Laboratory Procedures



- Use hoods properly
 - 6” in from sash
 - in center of hood
 - work with hood sash at 12-18”
 - close sash when not in use
 - don’t use for storage



Operational Practices: Safe Laboratory Procedures



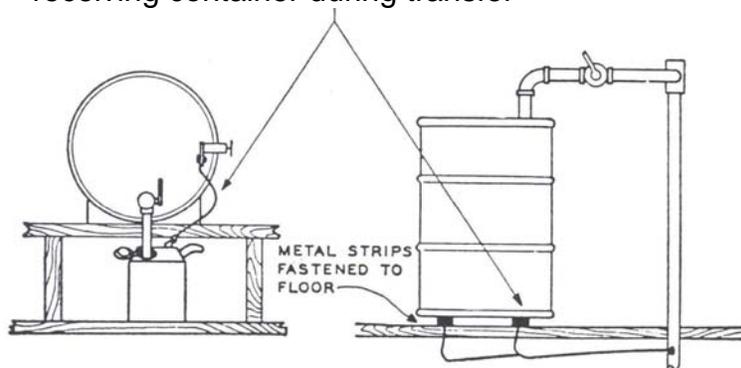
❖ Safely transport chemicals

- use container in a container concept
 - label all containers
 - inform driver of hazards
- provide contact names, phone numbers
 - provide MSDS



Operational Practices: Control of Static

Wire needed unless containers are already bonded together, or fill stem is always in metallic contact with receiving container during transfer





Operational Practices: Safe Laboratory Procedures



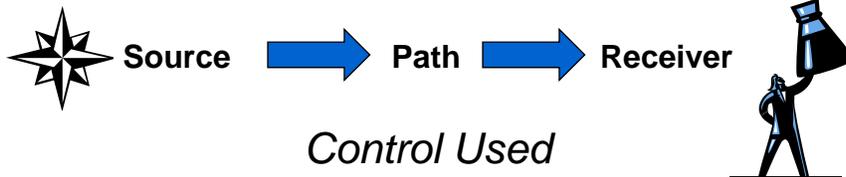
❖ Housekeeping

- label all containers
- clean-up spills
- eliminate trip hazards
- proper storage



Engineering Controls: Laboratory Containment Principles

Concept



Control Used



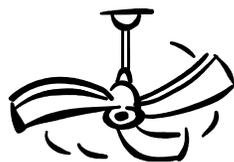


Engineering Controls

1. **Change the process**
eliminate the hazard
2. **Substitution**
use non-hazardous substance instead of hazardous, such as toluene for benzene
3. **Isolate or enclose the process or worker**
use a barrier
4. **Ventilation**
dilution (general ventilation) - not good
local exhaust ventilation (LEV) - Preferred



Engineering Controls



Local exhaust ventilation
Preferred

Dilution / general ventilation
not good





Engineering Controls

Laboratory hoods and ventilation are the basis of engineering controls.

But they must be properly: **functioning, maintained and used!**



Engineering Controls: Local exhaust

Local exhaust ventilation options include:

Snorkels

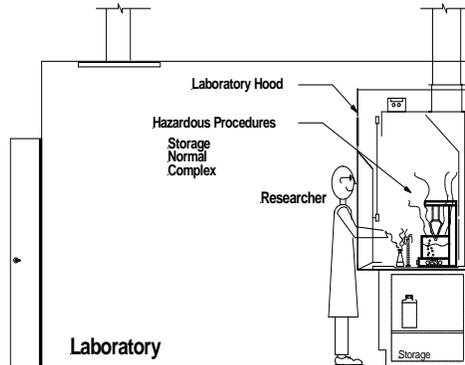
Vented enclosures





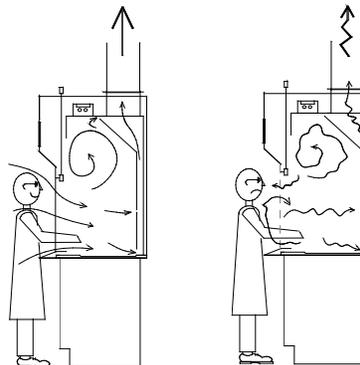
Proper Hood Use

- Locate hood away from potential cross drafts
 - Diffusers, doors, windows, traffic
- Check hood is working properly before starting
- Check for containment
- Avoid clutter
- Do not use for storage
- Sash height at 12-18 “
- Work 6” in from sash
 - and in center



Hood Containment

- Smoke candles and tubes can evaluate hoods





Engineering Controls: Exhaust vents

Hood exhaust should not be blocked or deflected downward, but should exhaust straight up



Engineering Controls: Exhaust vents

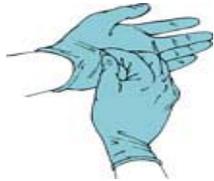


**Avoid exhaust
re-entrainment**

**Disperse
emissions
straight upward
and downwind!**



Engineering Controls: Personal Protective Equipment (PPE)

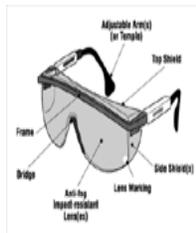


**PPE includes:
eye protection,
gloves,
laboratory coats. etc.,
respirators,
appropriate foot protection**



Engineering Controls: Personal Protective Equipment

**Eye protection
specific to the hazard**





Engineering Controls: Personal Protective Equipment



Gloves
must be chemical specific



Engineering Controls: Foot Protection

Safety shoes with steel toes are not necessary for laboratory work unless there is a serious risk from transporting or handling heavy objects.



however,
open toe shoes
should NOT be worn in labs



Emergency Planning and Response

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Emergency planning and response is based on safety principles of

- Anticipation
- Recognition
- Evaluation
- Control



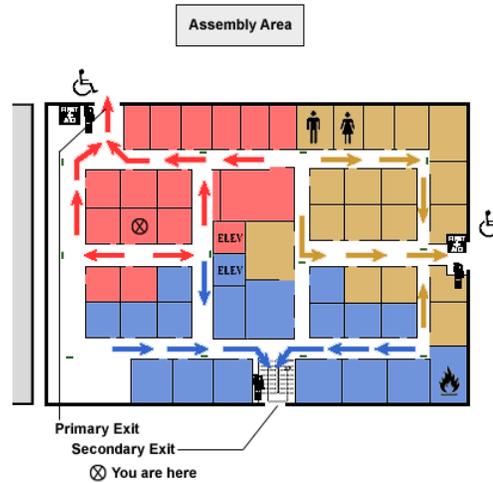
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Emergency Planning & Response

Have an
evacuation
plan
and
POST IT



Emergency Planning & Response

Don't use hallways
for storage

Dangerous!!

Blocks passage and
emergency exit
path





Emergency Planning & Response

- Have routine, unannounced evacuation drills
- Test and maintain alarms
- Designate person for each area to ensure bathrooms, etc. are evacuated



- Locate outside staging areas sufficient distance from building
- Designate person to meet/direct emergency vehicles



Emergency Planning & Response

Alarm systems need to be properly located, maintained, and serviced regularly





Emergency Planning & Response

Centrally locate and maintain fire extinguishers and alarms



Emergency Planning & Response

If people are expected to use extinguishers
they must be trained





Emergency Planning & Response

Post each room with:

- Emergency phone numbers
- After hour phone numbers
- Person(s) to be contacted
- Alternate person(s)
- Unique procedures to be followed

Location	
Hazards Within:	
Primary Contact:	
Second Contact:	
Building Monitor/Safety:	
Department Head:	
Fire/Police/Ambulance:	911
Environ. Health & Safety (or RSO, if needed):	646-3327



Emergency Planning & Response

Label and keep all exits clear,
unlocked or equipped with panic bars





Chemical Exposures to Eyes or Skin

Centrally locate safety showers and eyewashes

- Remove contaminated clothing
- Thoroughly flush with water
- Follow chemical specific procedures (i.e., HF)
- Seek medical assistance



Chemical Spills

Centrally locate spill clean-up kits

Clean up spill only if you know the chemical hazards, have appropriate equipment and are trained to do so!

- alert colleagues and secure area
- assess ability to clean-up spill
- find spill kit
- use appropriate PPE and sorbent material
- protect sinks and floor drains
- clean-up spill, collect/label waste for disposal
- report all spills





Lunch