



Primary Barriers

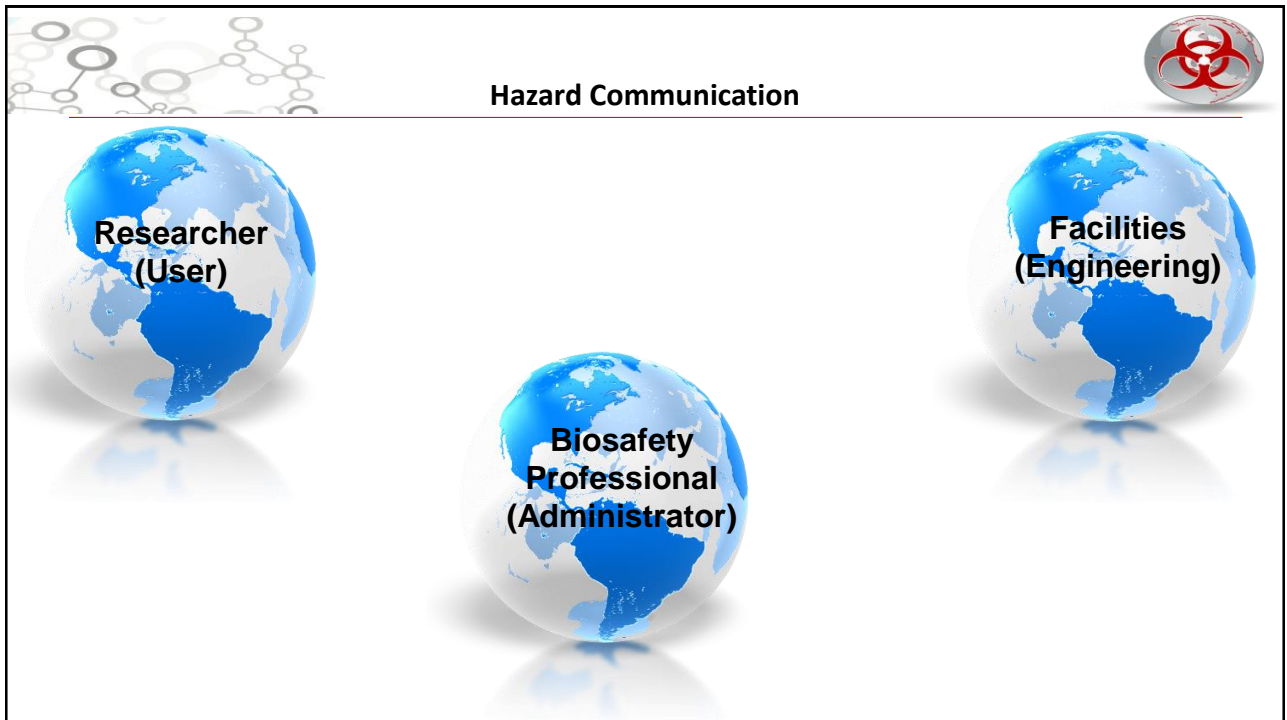
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Topics



- Different Worlds
- Safety Net
- Facility Engineering Perspective
- Equipment Barrier Perspective
- Compliance created by labeling
- Affects on Safety Culture – Safety First or Safety Third



Safety Net

¹The types of measures that may be used to protect laboratory workers, prioritized from the most effective to least effective, are:

- Engineering controls;
- Administrative controls;
- Work practices; and
- Personal protective equipment (PPE).



¹Laboratory Safety Guidance (osha.gov) <https://www.osha.gov/Publications/laboratory/OSHA3404laboratory-safety-guidance.pdf>

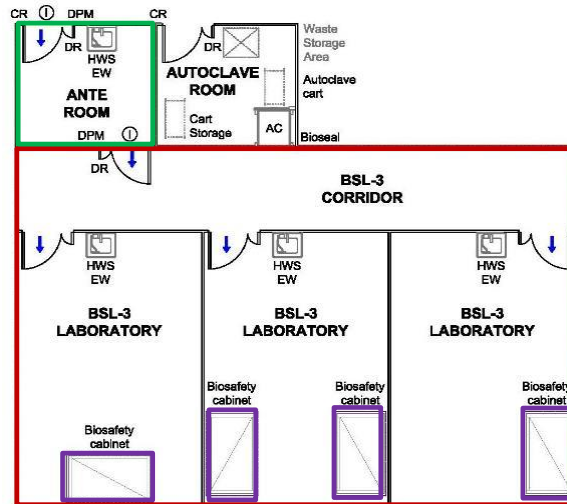
Facility Engineering Perspective



Primary Barrier: Primary barrier refers to all lab equipment such as biological safety cabinet, fume hood, glove box, animal housing, centrifuge, fermenter.

Secondary Barrier: Secondary Barrier refers to the structure surrounding the primary barrier such as rooms, building, basic laboratory, containment laboratory.

Primary ———
Secondary ———
Tertiary ———



Equipment Primary Barrier View



²Containment

“The term ‘containment’ is used to describe safe methods for managing infectious agents in the laboratory environment where they are being handled or maintained. The purpose of containment is to reduce or eliminate exposure of laboratory workers, other people, and the outside environment to potentially hazardous agents. The four elements of containment are administrative controls, work practices, personal protective equipment, and facility design.”

²Safety Equipment

“Safety equipment includes biological safety equipment, enclosed containers, safety centrifuge cups, and other engineered controls designed to minimize exposure to biological agents. Biological safety cabinets are among the most important safety equipment for protection of personnel and the laboratory environment, and most also provide product protection. Safety equipment is most effective at minimizing exposure when workers are trained on the proper use of such equipment and the equipment is regularly inspected and maintained.”

²<http://www.bu.edu/researchsupport/compliance/ibc/resources/biosafety-manual/chapter-04-biosafety-principles/>

What is a Primary Barrier in Biological Containment Equipment?



- Biological Safety Cabinets (BSC)
- Local Exhaust Ventilation systems (LEVs)*
 - Down draft tables and sinks
 - Slot hoods
 - Canopy hoods
- Vertical and horizontal clean benches
- Cage change stations
- Animal racks
- Animal isolators
- HVAC HEPA
- Plumbing HEPA

Labeling or Classifying Something as a Primary Barrier has Consequences!



Labels shape a person's expectations of compliance:

- Certification requirements?
- Maintenance requirements?
- Inspection requirements?
- OSHA compliance?

Case in Point - Biosafety Cabinets



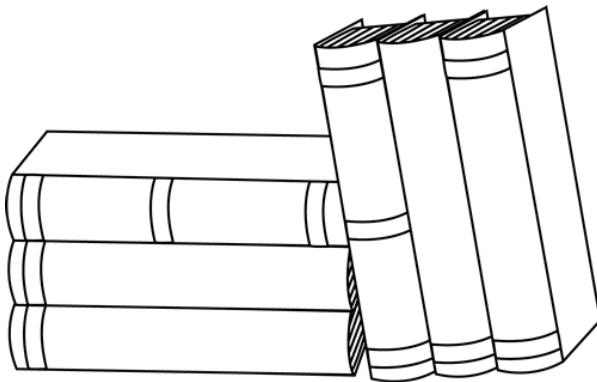
³Laboratory Safety Biosafety Cabinets (BSCs)

“Properly maintained Biosafety Cabinets (BSCs), when used in conjunction with good microbiological techniques, provide an effective containment system for safe manipulation of moderate- and high-risk infectious agents [Biosafety Level 2 (BSL-2) and 3 (BSL-3) agents]. BSCs protect laboratory workers and the immediate lab environment from infectious aerosols generated within the cabinet. BSCs must be certified when installed, whenever they are moved and at least annually [29 CFR 1910.1030(e)(2) (iii)(B)].

Employers should ensure that a risk assessment has been completed and approved for the work to be conducted and to identify the class and type of BSC needed for the operation or procedure.”

³ <https://www.osha.gov/Publications/laboratory/OSHAfactsheet-laboratory-safety-biosafety-cabinets.html>

⁴Employers should train workers to do the following when working inside the BSC:



⁴ <https://www.osha.gov/Publications/laboratory/OSHAfactsheet-laboratory-safety-biosafety-cabinets.html>

Safety Equipment Certification



Biological Safety Cabinets



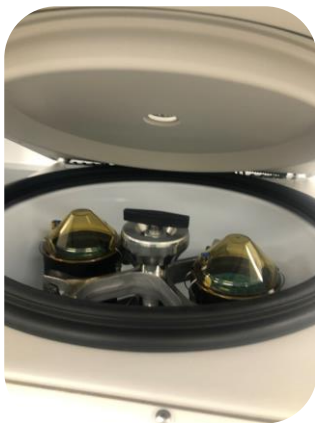
Specialty Containment Devices



Containment Barrier Equipment is Typically Inspected Regularly by Lab Inspections



Centrifugal Safety Canisters



Sharps Containers



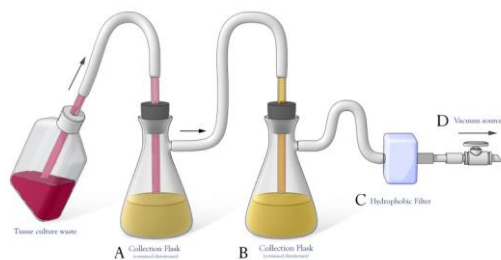
Hidden Primary Barrier Equipment Protecting the Environment



■ Filtration Devices

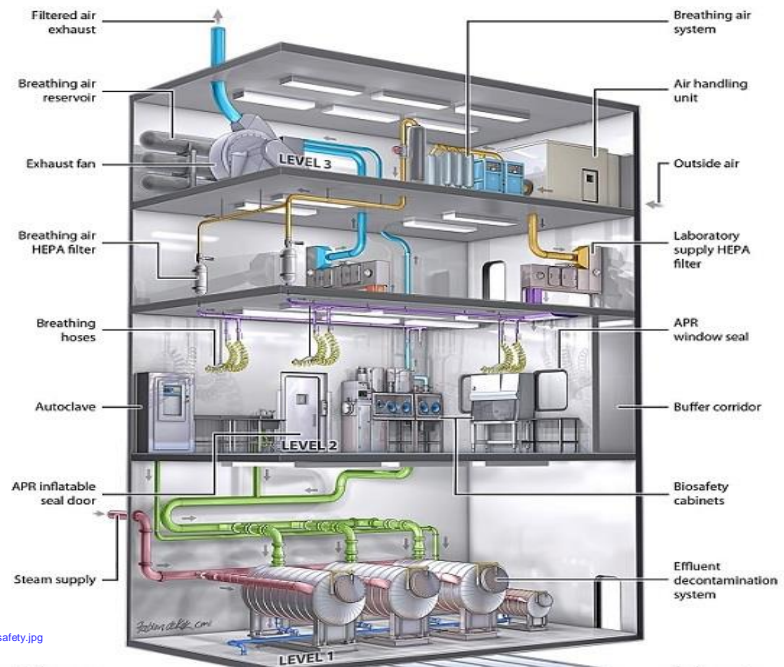


The Truly Hidden and Forgotten!

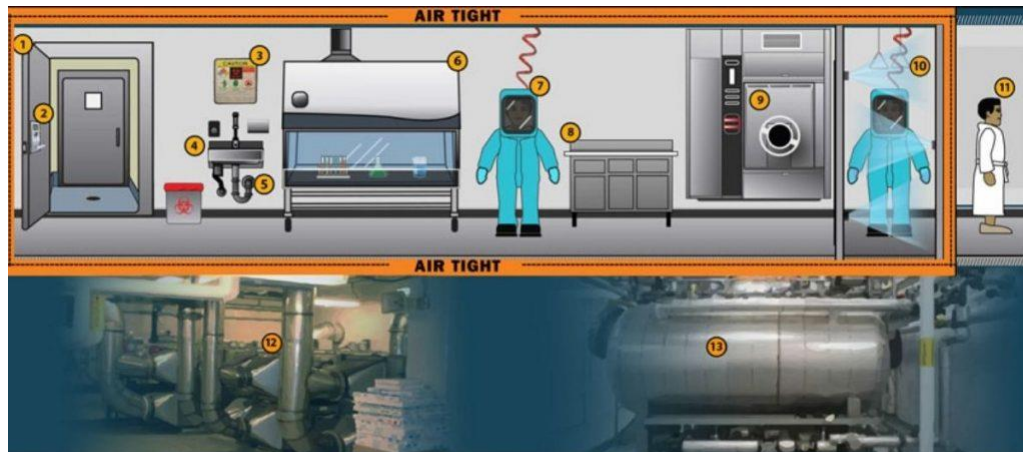


BSC Collection Flask
Setup For Vacuum System
Protection

5 BSL-4 Laboratory Primary Containment Barrier Engineering Controls



⁵ Source: https://www.cdc.gov/cpr/infographics/00_images/infographic-biosafety.jpg



(1) Air tight, (2) Self-closing, double-door access, (3) Controlled access, (4) Sharp hazards warning policy, (5) Hand washing sink, (6) Sealed penetrations, (7) Physical containment device, (8) Positive pressure protective suit, (9) Laboratory bench, (10) Autoclave, (11) Chemical shower out, (12) Personal shower out, (13) Supply and exhaust HEPA filter, (14) Effluent decontamination system

⁶ Source: https://www.cdc.gov/cpr/infographics/00_images/infographic-biosafety.jpg

Commonality of all Things Mentioned are:



- Inspection – Identifies deficiencies
- Maintenance – Prevents or extends equipment
- Compliance – Certification
- Repair – Corrective action to attain compliance



How Can You Manage All of These Requirements?



- | | |
|--|---|
| <ul style="list-style-type: none"> ▪ Low Technology Approach could be an Excel Worksheet <ul style="list-style-type: none"> • List each primary containment devices' <ul style="list-style-type: none"> • Unique Identifier (Bar Code, QR Code, Property #) • Location • Serial Number • Manufacturer • Model • Next Certification or Service Date • Repair History • Risk Assessment Reference • Inspection Date & Surveyor | <ul style="list-style-type: none"> ▪ High Technology Approach could be an Asset Management Software <ul style="list-style-type: none"> • Integration into your current maintenance software generating alerts on certification and servicing. • A Laboratory Asset Management software package which tracks laboratory assets. |
|--|---|



**The Conundrum:
Does Safety First Become
Safety Third Because of
Complacency?**



SAFETY FIRST

Practice Safe Science

