

Getting Your BSL2 Laboratory Ready for BSL2+ Work

Physical Space:

- 1 .Laboratory doors should be self-closing and have locks with an entry code.
- 2 .Laboratories must have a sink for washing. The sink should be automatically operated. It should be located near the exit door.
- 3 .The laboratory should be designed so that it can be easily cleaned and decontaminated. Carpets and rugs in laboratories are not permitted.
- 4 .Laboratory furniture must be capable of supporting anticipated loads and uses. Spaces between benches, cabinets, and equipment should be accessible for cleaning.
 - a. Bench tops must be impervious to water and resistant to heat, organic solvents, acids, alkalis, and other chemicals.
 - b. Chairs used in laboratory work must be covered with a non-porous material that can be easily cleaned and decontaminated with appropriate disinfectant.
- 5 .Laboratory windows that open to the exterior are not recommended. However, if a laboratory does have windows that open to the exterior, they must be fitted with screens.
- 6 .BSCs must be installed so that fluctuations of the room air supply and exhaust do not interfere with proper operations. BSCs should be located away from doors, windows that can be opened, heavily traveled laboratory areas, and other possible airflow disruptions.
- 7 .Vacuum lines should be protected with liquid disinfectant traps and filter HEPA at the exhaust air pipe.
- 8 .An eyewash station must be readily available.
- 9 .There is requirements for ventilation systems. There must be at least 6 ventilation System exchanges of air, that provide an inward flow of fresh air and recirculation through HEPA filter to the spaces outside of the laboratory.
- 10 .HEPA filtered exhaust air from a Class II BSC can be safely recirculation back into the laboratory environment if the cabinet is tested and

certified at least annually and operated according to manufacturer's recommendations. BSCs can also be connected to the laboratory exhaust system by either a thimble (canopy) connection or directly exhausted to the outside through a hard connection. Provisions to assure proper safety cabinet performance and air system operation must be verified.

- 11 .A method for decontaminating all laboratory wastes should be available in the facility (e.g., autoclave, chemical disinfection, incineration, or other validated decontamination method).

Safety Equipment (Primary Barriers and Personal Protective Equipment)

- 1 .All procedures involving the manipulation of infectious materials must be conducted within a BSC (preferably Class II or Class III), or other physical containment devices.
- 2 .Workers in the laboratory where protective laboratory clothing with a solid-front, such as tie-back or wrap-around gowns, scrub suits, or coveralls. Protective clothing is not worn outside of the laboratory.
Reusable clothing is decontaminated before being laundered. Clothing is changed when contaminated.
- 3 .Eye and face protection (goggles, mask, face shield or other splash guard) is used for anticipated splashes or sprays of infectious or other hazardous materials. Eye and face protection must be disposed of with other contaminated laboratory waste or decontaminated before reuse. Persons who wear contact lenses in laboratories must also wear eye protection.
- 4 .Gloves must be worn to protect hands from exposure to hazardous materials. Glove selection should be based on an appropriate risk assessment. Alternatives two latex gloves should be available. Gloves must not be worn outside the laboratory.
In addition, BSL-3 laboratory workers:

- a. Changes gloves when contaminated, glove integrity is compromised, or when otherwise necessary. **Wear two pairs of gloves when appropriate.**
 - b. Remove gloves and wash hands when work with hazardous materials has been completed and before leaving the laboratory.
 - c. Do not wash or reuse disposable gloves. Dispose of used gloves with other contaminated laboratory waste. Hand washing protocols must be rigorously followed.
- 5 .Eye, face, and respiratory protection must be used in rooms containing infected animals.

Special Practices

- 1 .All persons entering the laboratory must be advised of the potential hazards and meet specific entry/exit requirements.
- 2 .Laboratory personnel must be provided medical surveillance and offered appropriate immunizations for agents handled or potentially present in the laboratory.
- 3 .Each PI/ laboratory supervisor, should consider the need for collection and storage of serum samples from at-risk personnel.
- 4 .A laboratory-specific biosafety manual must be prepared and adopted as policy. The biosafety manual must be available and accessible.
- 5 .The laboratory supervisor must ensure that laboratory personnel demonstrate proficiency in standard and special microbiological practices before working with BSL-3/BSL-2+ agents.
- 6 .Potentially infectious materials must be placed in a durable, leak proof container during collection, handling, processing, storage, or transport within a facility.
- 7 .Laboratory equipment should be routinely decontaminated, as well as, after spills, splashes, or other potential contamination.
 - a. Spills involving infectious materials must be contained, decontaminated, and cleaned up by staff properly trained and

equipped to work with infectious material.

b. Equipment must be decontaminated before repair, maintenance, or removal from the laboratory.

8 .Incidents that may result in exposure to infectious materials must be immediately evaluated and treated according to procedures described in the laboratory biosafety manual. All such incidents must be reported to the laboratory supervisor. Medical evaluation, surveillance, and treatment should be provided and appropriate records maintained.

9 .Animals and plants not associated with the work being performed must not be permitted in the laboratory.

10 .All procedures involving the manipulation of infectious materials must be conducted within a BSC, or other physical containment devices. No work with open vessels is conducted on the bench. When a procedure cannot be performed within a BSC, a combination of personal protective equipment and other containment devices, such as a centrifuge safety cup or sealed rotor must be used.

Standard Microbiological Practices

1 .The laboratory supervisor must enforce the institutional policies that control access to the laboratory.

2 .Persons must wash their hands after working with potentially hazardous materials and before leaving the laboratory.

3 .Eating, drinking, smoking, handling contact lenses, applying cosmetics, and storing food for human consumption must not be permitted in laboratory areas. Food must be stored outside the laboratory area in cabinets or refrigerators designated and used for this purpose.

4 .Mouth pipetting is prohibited; mechanical pipetting devices must be used.

5 .Policies for the safe handling of sharps, such as needles, scalpels, pipettes, and broken glassware must be developed and implemented. Whenever

practical, laboratory supervisors should adopt improved engineering and work practice controls that reduce risk of sharps injuries.

Precautions, including those listed below, must always be taken with sharp items. These include:

- a. Careful management of needles and other sharps are of primary importance. Needles must not be bent, sheared, broken, recapped, removed from disposable syringes, or otherwise manipulated by hand before disposal.
 - b. Used disposable needles and syringes must be carefully placed in conveniently located puncture-resistant containers used for sharps disposal.
 - c. Non-disposable sharps must be placed in a hard walled container for transport to a processing area for decontamination, preferably by autoclaving.
 - d. Broken glassware must not be handled directly. Instead, it must be removed using a brush and dustpan, tongs, or forceps. Plastic ware should be substituted for glassware whenever possible.
- 6 .Perform all procedures to minimize the creation of splashes and/or aerosols.
- 7 .Decontaminate work surfaces after completion of work and after any spill or splash of potentially infectious material with appropriate disinfectant.
- 8 .Decontaminate all cultures, stocks, and other potentially infectious materials before disposal using an effective method. A method for decontaminating all laboratory wastes should be available in the facility, preferably within the laboratory (e.g., autoclave, chemical disinfection, incineration, or other validated decontamination method).

Depending on where the decontamination will be performed, the following methods should be used prior to transport:

- a. Materials to be decontaminated outside of the immediate laboratory must be placed in a durable, leak proof container and secured for transport.
- b. Materials to be removed from the facility for decontamination

must be packed in accordance with applicable local, state, and federal regulations.

- 9 .A sign incorporating the universal biohazard symbol must be posted at the entrance to the laboratory when infectious agents are present. Posted information must include the laboratory's biosafety level, the supervisor's name (or other responsible personnel), telephone number, and required procedures for entering and exiting the laboratory. Agent information should be posted in accordance with the institutional policy.
- 10 .An effective integrated pest management program is required.
- 11 .The laboratory supervisor must ensure that laboratory personnel receive appropriate training regarding their duties, the necessary precautions to prevent exposures, and exposure evaluation procedures. Personnel must receive annual updates or additional training when procedural or policy changes occur. Personal health status may impact an individual's susceptibility to infection, ability to receive immunizations or prophylactic interventions. Therefore, **all laboratory personnel and particularly women of childbearing age should be provided with information regarding immune competence and conditions that may predispose them to infection.** Individuals having these conditions should be encouraged to self-identify to the institution's healthcare provider for appropriate counseling and guidance.

Paperwork

Working under BSL2+ operational protocols requires a complete set of SOPs to be written. The SOPs required include but are not limited to:

- (1)Layout of the BSL2+ area when in BSL2+ mode, Laboratory Access, Biosecurity
- (2)PPE Required, Entry and Exit Protocols, Decontamination, Housekeeping
- (3)Emergency Exit Protocols
- (4)Spill Protocols
- (5)Lab Specific protocols (experimental procedures done at BSL2+)
- (6) Use of a Biological Safety Cabinet
- (7) Training documentation for all BSL-2+ workers (on the SOP).

- The supervisor is responsible to create and deliver the training to the workers.
- Prepare a signature form to the workers, the supervisor and the date on which the training took place.