

2021 Chemical Safety Checklist Change Summary

Added a General Biosafety section (G), page 14 to reflect the changes in the Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Several questions have been moved to this new section.

Reference were modified to reflect the new Biosafety in Microbiological and Biomedical Laboratories, 6th Edition.

2021 Chemical Safety Inspection

A. Documents

1. There is a written Chemical Hygiene Plan (CHP) for the laboratory. Lab staff can locate the CHP upon request and is accessible to lab personnel.

Recommendations: Your Chemical Hygiene Plan (CHP) must be lab specific and is typically found in a designated area of your laboratory. To develop your laboratory's CHP using the University CHP template, visit <https://ehsapps.osu.edu/secure/apps/>

Reference: 29CFR 1910.1450(e)(1-2), (f) and OSU Chemical Hygiene Plan

Risk Ranking 3

2. The Chemical Hygiene Plan has been reviewed and updated by laboratory staff within a calendar year of the last revision.

Recommendations: The employer shall review and evaluate the effectiveness of the Chemical Hygiene Plan at least annually and update it as necessary.

Reference: 29CFR 1910.1450(e)(4)

Risk Ranking 2

3. A chemical inventory is in EHS Assist and has been updated (appendix A) and electronically verified by the PI or his/her designee within the past 12 months.

Recommendations: As per the Definition of Hazardous Chemical in section 3.0 of the Chemical Hygiene Plan the inventory must include chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system and agents which damage the lungs, skin, eyes or mucous membranes. The use of EHS Assist is required to allow the university to provide critical information for emergency response and Department of Homeland Security reporting. All principal investigators are provided access to the system. The Principal Investigator or his/her designee must verify that the chemical inventory in the EHS Assist database is true and accurate at least annually.

Reference: 29CFR 1910.1450(e)(4) and 29CFR 1910.1450(f)(1); Department of Homeland Security Chemical Facility Anti-Terrorism Standards; Ohio Fire Code 1301:7-7-27 and OSU Chemical Hygiene Plan.

Risk Ranking 3

4. PI is aware that changes to inventories of Department of Homeland Security Chemicals of Interest need to be updated in EHS Assistant within 30 days.

Recommendations: To comply with Department of Homeland Security (DHS) reporting requirements set forth in DHS Chemical Facility Anti-terrorism Standards, changes to inventories of Department of Homeland Security Chemicals of Interest need to be updated in EHS Assistant within 30 days. PIs must review and verify chemical inventories in the EHS Assistant on at least an annual basis. Chemical inventories in EHS Assistant are a critical resource for emergency responders. EHS Assistant can be accessed at <https://ehsa.osu.edu/ehsa/>.

Reference: 6 CFR 27.210; OSU Chemical Hygiene Plan; 29 CFR 1910.154 and (f) (1); Ohio Fire Code 1301:7-7-27

Risk Ranking 3

5. All training for personnel is provided and documented in the Chemical Hygiene Plan.

Recommendations: Employee training must be documented and filed with the Chemical Hygiene Plan. Training includes, but is not limited to the Lab Standard, Building Emergency, laboratory-specific SOP's, competency based hands-on training, and relevant EHS online training modules at www.ehs.osu.edu.

Reference: 29CFR 1910.1450(f) and OSU Chemical Hygiene Plan

Risk Ranking 5

6. SOP's are written for lab specific activities.

Recommendations: SOP's, i.e., Standard Operating Procedures are required by OSHA's Laboratory Standard (1910.1450). The Standard states that the Chemical Hygiene Plan must contain "Standard Operating Procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals." Lab Specific SOPs are to be included in your Chemical Hygiene Plan (CHP). SOPs must address appropriate personal protective equipment, containment devices, decontamination procedures and waste disposal procedures. See section 12.0 Standard Operating Procedures and Appendix E of your Chemical Hygiene Plan and the EHS website at: <https://ehsapps.osu.edu/secure/apps/> for an interactive SOP template. SOPs from other laboratories, departments or institutions may be used as a guide ONLY; however, they must be reviewed and edited to be specific to your laboratory procedures / OSU regulations.

Reference: Ohio Fire Code 1301:7-7-27 (A)(3)(xii) 2701.3.3.1229; CFR 1910.1450(f)(4)(i)(c) and OSU Chemical Hygiene Plan

Risk Ranking 4

7. SOP's are written for general laboratory hazards.

Recommendations: SOP's, i.e., Standard Operating Procedures are required by OSHA's Laboratory Standard (1910.1450). The Standard states that the Chemical Hygiene Plan must contain "Standard Operating Procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals." SOPs for general laboratory hazards such as cryogenic liquids, flammable liquids, compressed gasses, etc. are to be included in your Chemical Hygiene Plan (CHP) under the Hazardous Operations Section. SOPs must address appropriate personal protective equipment, containment devices, decontamination procedures and waste disposal procedures. See section 12.0 Standard Operating Procedures and Appendix E of your Chemical Hygiene Plan and the EHS website at: <https://ehsapps.osu.edu/secure/apps/> for an interactive SOP template. SOPs from other laboratories, departments or institutions may be used as a guide ONLY; however, they must be reviewed and edited to be specific to your laboratory procedures / OSU regulations.

Reference: CFR 1910.1450(f)(4)(i)(c) and OSU Chemical Hygiene Plan

Risk Ranking 3

8. Personnel are enrolled in the Occupational Risk Assessment Tool (ORAT).

Recommendations: Personnel must complete a risk assessment using the Occupational Risk Assessment Tool (ORAT), so that medical evaluation, surveillance, and treatment, including immunizations are provided as appropriate for agents handled or potentially present in the laboratory. To enroll, personnel need to complete an online questionnaire, which is accessible at <http://go.osu.edu/riskassessment>

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 A.3; BSL2 A.3, B.3: Section VII

Risk Ranking 3

9. Acceptable responses to all items outlined during the previous year's inspection are documented in EHSA and no repeat deficiencies were noted.

Recommendations: All corrective action plans have been received for deficiencies found during the previous year's inspection. Corrective action plans should be submitted using the EHS Assist (EHSA) system within 15 calendar days. The EHSA system is necessary for documenting and providing a means of communicating to the status of pending action items. Items considered to be a significant risk are required to be reviewed by the designated inspector. Once all action items have been completed the P.I. will receive an email indicating the inspection is considered closed.

Reference: OSU Chemical Hygiene Plan

Risk Ranking 3

B. Chemical Hygiene

1. Chemicals are secured against unauthorized access. Access to laboratory is limited or restricted at the discretion of the Principal Investigator when experiments are in progress.

Recommendations: Unoccupied labs containing hazardous materials shall be secured (locked) at all times. This includes labs beyond hallway access doors controlled by key cards/ touch pads/ pin number access. Alternately, locked storage cabinets for all hazardous materials in the lab are acceptable. If storage equipment (storage cabinet, refrigerator, etc.) is in common areas or hallways, lock them when unattended.

Reference: Ohio Fire Code 1301:7-7-27, section 2703.9.2; Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 A.1; BSL2 A.1

Risk Ranking 3

2. Chemical containers are in good condition, closed securely, labeled properly and not stored on the floor.

Recommendations: All chemical containers must be properly labeled and closed securely. The storage of chemicals on the laboratory floor, especially in aisles, shall be avoided. For example, metal drums can be easily punctured resulting in chemicals spilling on the floor and potentially draining to a lower laboratory. In addition, anything in an aisle presents a tripping hazard particularly if an emergency evacuation of the laboratory is needed. Proper disposal through the Office of Environmental Health and Safety (EHS) shall be considered for any unknown or unwanted chemicals or containers in poor condition. Contact 292-1284 for additional details.

Reference: 29CFR 1910.1450(h)(1) and OSU Chemical Hygiene Plan

Risk Ranking 3

3. Chemical waste is identified, labeled, segregated, stored, and disposed of properly.

- Chemical waste is capped/closed (Caps or paraffin) at all times.
- Chemical waste containers are no more than 2/3 full.
- SOP's address proper handling of waste materials.

Recommendations: Chemical waste shall be handled in accordance to EPA regulations and disposed of through Environmental, Health and Safety (EHS). Laboratory processes generating waste shall be identified and an evaluation of those identified materials made as to whether recycling, reuse or disposal is appropriate. A list of waste generated within the lab should be maintained and the management methods for each waste stream listed. This information can be incorporated into lab SOPs. Contact 292-1284 for additional details.

Reference: OSU Chemical Hygiene Plan, Resource Conservation and Recovery Act, Chapters 3734 and 3745 Ohio Administrative Code

Risk Ranking 3

4. Evidence of safe handling of sharps. No evidence of needles being recapped prior to disposal in appropriate sharps disposal container.

Recommendations: Policies must be followed for the safe handling of sharps. Whenever possible, lab supervisors shall adopt improved engineering devices and work practice controls to reduce the risk of sharps injuries, including, needles must not be bent, sheared, broken, recapped, removed from disposable syringes, or otherwise manipulated by hand prior to disposal. Used disposable needles and syringes must immediately be placed in a puncture resistant sharps disposal container. Use of needles and syringes shall be limited to only when necessary. Non-disposable sharps must be placed in a hard walled container for transport to processing area for decontamination. Broken glass should not be handled directly, and glass Pasteur pipettes must be placed in an appropriate sharps' container prior to disposal.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 A.12 a-d; BSL2 A.12 a-d and Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Edition (2011). Page 58 and 111.

Risk Ranking 2

5. All chemicals are stored safely and segregated.

Recommendations: The Ohio Fire Codes require that incompatible materials be segregated/separated by hazard class. Examples include, Oxidizers, Flammables, Corrosives, Water Reactive chemicals. Secondary containment is also recommended for chemical storage.

Reference: 29CFR 1910.1450 and OSU Chemical Hygiene Plan; Ohio Fire Code

Risk Ranking 3

6. All gas cylinders are secured.

Recommendations: Compressed gas cylinders shall be secured at all times. Use cylinder clamps or chains attached to stationary objects. Cylinder stands are also acceptable. Compressed gas cylinders not in use must be capped.

Reference: 29CFR 1910.1450 and OSU Chemical Hygiene Plan: Ohio Fire Code

Risk Ranking 3

7. Flammable and oxidizing gas cylinders gases are stored separately.

Recommendations: Incompatible gases must be stored by hazard class in separate areas, even when the cylinders are empty. Separate the incompatible cylinders by a distance of at least 20 feet, or a non-combustible partition extending not less than 18 inches above and to the sides of the stored materials.

Reference: 29CFR 1910.1450 and OSU Chemical Hygiene Plan: Ohio Fire Code

Risk Ranking 3

8. Mechanical pipetting devices are used. All procedures are performed carefully to minimize the creation of aerosols.

Recommendations: Provide and use mechanical pipetting devices. Pipetting by mouth is strictly prohibited. Procedures must be performed carefully and correctly to reduce aerosols. When performing procedures where aerosols are created, if possible, consider the use of a biosafety cabinet to help prevent contamination. Serological pipettes must be bundled prior to disposal.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 A.11; BSL2 A.11; Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Edition (2011). Page 110; OSHA Laboratory Standard

Risk Ranking 2

C. Lab Facilities & Engineering Controls

1. Engineering controls (i.e., fume hoods, localized ventilation, local alarms, etc.) are available and are appropriate for the hazards found in the laboratory.

Recommendations: Engineering controls should be used to prevent and mitigate hazards whenever feasible. The type of controls installed should be appropriate for the laboratory application or process. Hazards can change with time, so it is important that engineering control systems be continually reviewed and updated, if necessary.

Reference: Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Edition (2011). Page 14; Fundamentals of Industrial Hygiene, 4th Edition (1996). Page 29-30

Risk Ranking 5

2. Engineering controls within the laboratory are appropriately maintained and functioning properly.

Recommendations: Overall maintenance of laboratory ventilation, including fume hoods, should be performed annually. Whenever a change in local ventilation device is made or repairs to fume hoods are necessary, the ventilation devices should be re-evaluated for proper function. Gas specific sensors or alarms should be tested, calibrated, and replaced per the manufacturer's recommendations. Documentation of maintenance of laboratory engineering controls should be kept within the lab and made available upon request (i.e., fume hood test sticker, alarm calibration reports, etc.).

Reference: Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Edition (2011); Fundamentals of Industrial Hygiene, 4th Edition (1996).

Risk Ranking 5

3. Fume hoods are used correctly.

Recommendations: When operators are away from fume hoods the sash should be closed. Sash operation should be unhindered by cords, tubing, or equipment. Fume hood baffles and slots shall be unobstructed (no more than 25% obstructed). When operators are using a hood the sash should be positioned to shield operator.

Reference: NFPA 45 8.8.3 Fire Protection for Laboratories Using Chemicals, ANSI/AIHA Z9.5 Laboratory Ventilation, OSU Chemical Hygiene Plan

Risk Ranking 4

4. Vacuum lines are protected from contamination. If glass traps are used, they are in appropriate secondary containment.

Recommendations: Vacuum lines must be protected from contamination. If working with biohazards, in-line filters and liquid disinfectant traps are required must be replaced as needed. Glass shall be placed in plastic or metal, secondary containment, large enough to contain the liquid in the trap, if it were to break.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 D.8; Appendix A, Figure 11; Adopted Ohio Public Employment Risk Reduction Program Standard 29 CFR 1910.1030 (OSHA Bloodborne Pathogens Standard); Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Edition (2011). Page 174

Risk Ranking 3

5. Eyewash and safety shower is available, unobstructed and can be reached within 10 seconds from workstations and eyewash stations need to be checked on a weekly basis.

Recommendations: Safety showers and eyewashes shall be within 10 seconds of travel for immediate emergency use. Safety showers should be checked periodically to ensure proper working condition.

Reference: 29CFR 1910.1450 and OSU Chemical Hygiene Plan: ANSI Z358.1-2004; Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 D.2; BSL2 D.3

Risk Ranking 4

6. Fire equipment/doors are not obstructed, blocked or inoperable.

Recommendations: Access to exits, emergency equipment and utility controls shall never be blocked. **(Fire extinguishers)** The Ohio Fire Code and National Fire Protection Associations (NFPA) require that fire extinguishers shall not be blocked so that they can be accessed quickly. Therefore, nothing shall be either blocking or under your fire extinguishers. If your fire extinguishers must be relocated contact the Facilities

Reference: OSU Chemical Hygiene Plan; NFPA 99; Ohio Fire Code

Risk Ranking 4

7. Electrical connections are appropriate.

Recommendations: Electrical outlets shall not be overloaded. Extension cords shall not be used as permanent wiring. Surge protectors shall not be used with high amperage devices. Remove any outdated electrical equipment or damaged electrical cords from service. Install additional circuits or outlets if necessary. For additional information review the on-line Electrical Safety training available at www.ehs.osu.edu.

Reference: NFPA 70 National Electric Code

Risk Ranking 3

8. Lab electrical panel boxes unobstructed.

Recommendations: Access to exits, emergency equipment and utility controls shall never be blocked.

Reference: NFPA 70 National Electric Code; OSU Chemical Hygiene Plan

Risk Ranking 2

9. Lab has appropriate lighting, and ceiling and floor tiles are in good condition.

Recommendations: The laboratory must have adequate lighting. Floor and ceiling tiles should be in good condition (no cracks, peeling, water stains, etc.).

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 D.7; BSL2 D.7; Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Edition (2011). Page 27.

Risk Ranking 1

D. Housekeeping

1. First aid supplies are available, adequate, and not expired.

Recommendations: First aid kits shall be available and maintained for treatment of minor injuries or for short-term emergency treatment before getting medical assistance. Kits must conform to University's First Aid Kit Policy or be approved by a physician licensed in Occupational Medicine. Kits should have appropriate supplies for the research taking place and should be checked on a regular basis to make sure that the supplies have not expired.

Reference: Section 11.8 and Appendix D, OSU Chemical Hygiene Plan

Risk Ranking 2

2. No-smoking and no eating in lab policies enforced.

Recommendations: Eating, drinking, gum chewing and cosmetic application (i.e., hand cream) are not permitted in the laboratory. Food shall not be eaten in places where chemicals or biological materials are being used or stored. Employee break or lunchrooms shall be located outside of the laboratory.

Reference: Section 5.3, OSU Chemical Hygiene Plan; Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 A.10; BSL2 A.10

Risk Ranking 4

3. Chemical spill supplies are available.

Recommendations: In the event of a chemical spill, supplies shall be available to control a spill of 1 gallon or less. Spill supplies needed are based on chemical hazards present in your laboratory. For additional information review the Chemical Spill Cleanup training found on the EHS training page www.ehs.osu.edu or contact EHS at 2-1284.

Reference: 29CFR 1910.1450 and OSU Chemical Hygiene Plan: Ohio Fire Code 1301:7-7-27 (A)(3)

Risk Ranking 3

4. Benches, floors, and fume hoods are free of spilled chemicals.

Recommendations: Spills are to be cleaned up immediately from work areas and floors. Any spills or accumulations of chemicals on work surfaces shall be removed daily, using techniques that minimize residual surface contamination.

Reference: 29CFR 1910.1450 and OSU Chemical Hygiene Plan: Ohio Fire Code

Risk Ranking 2

5. Bench tops and work surfaces are impervious to water and resistant to chemicals and moderate heat. Laboratory is clean and free of clutter. Spaces between benches, cabinets and equipment are accessible for cleaning.

Recommendations: Bench tops must be impervious to water and resistant to chemicals and moderate heat. Laboratory must be maintained clean and free of clutter. Adequate space must be provided between benches, cabinets, and equipment to facilitate cleaning.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 D.5a; BSL2 D.5a; Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Edition (2011). Page 216.

Risk Ranking 2

6. Laboratory chemical storage shelving is in good condition.

Recommendations: Shelving shall not be overloaded causing the shelves to bow or flex. Shelving brackets shall be in good condition, with no visible corrosion and shall be securely attached to the shelves and wall studs. Shelving shall have a raised lip or guard along the outer edge to prevent containers from falling.

Reference: Ohio Fire Code 1301:7-7-27 A (3)

Risk Ranking 3

E. Personal Protective Equipment & Clothing

1. Personal protective equipment is available and accessible to employees, appropriate for the hazards found in the lab.

Recommendations: The OSHA PPE Standard requires a hazard assessment be completed whenever PPE is necessary. Personnel are responsible for knowing the location and proper use of the PPE they are required to use (i.e., appropriate eye protection must be worn by lab occupants whenever warranted by laboratory conditions or hazards; lab coats should be worn whenever handling liquids or powders that are injurious to the skin or absorbed through the skin, etc.).

Reference: OSHA Personal Protective Equipment Standard; OSU Chemical Hygiene Plan

Risk Ranking 4

2. Only closed toe shoes are worn in lab (no sandals, or exposed toes).

Recommendations: This is an established laboratory rule. When working with chemicals, sharps or falling objects closed toe shoes shall be worn to help prevent serious injury. Exposed skin should be minimized. The appropriate attire should be based on the hazard.

Reference: Section 13.3, OSU Chemical Hygiene Plan

Risk Ranking 3

3. Protective clothing that is contaminated with hazardous chemicals is appropriately discarded or laundered properly.

Recommendations: Protective clothing (PPE) must be worn while working with hazardous materials. Glove selection shall be based on an appropriate risk assessment. Personnel must remove PPE before leaving the laboratory. PPE must be discarded properly after use or laundered by the institution. PPE shall not be taken home by personnel. If sent offsite for laundering, it must be properly bagged, and the laundry facility must be notified of potential contaminants. Procedures for dealing with contaminated, soiled clothing can be found in your Chemical Hygiene Plan by contacting your Environmental Safety representative. Call EHS at 292-1284 for further details.

Reference: OSU Chemical Hygiene Plan

Risk Ranking 1

4. Employees who use respirators or protective masks are registered with the OSU Respiratory Protection program.

Recommendations: Based on OSHA regulations university employees required to use respiratory protective equipment must follow established procedures. In order to use this type of PPE, users must be properly trained, fit tested, and complete a medical evaluation prior to wearing a respirator in the workplace. Call EHS for further details.

Reference: OSU Chemical Hygiene Plan; OSHA 1910.134; Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 C.3

Risk Ranking 4

F. Signage

1. Lab has current EHS universal room sign posted with PI name, after hours contact information and applicable hazard information.

Recommendations: The lab must have a room sign posted containing the Principal Investigator name(s), emergency contact information, laboratory hazard information, required PPE and any special entry or exit instructions. Universal room signs are provided by EHS, free of charge, via the "Room Sign Request", <https://ehsapps.osu.edu/secure/apps/>.

Reference: 29CFR 1910.1450 and OSU Chemical Hygiene Plan

Risk Ranking 1

2. Emergency phone numbers and contacts are posted in the lab.

Recommendations: Post emergency phone numbers and contact information at phones. A list of emergency contacts can be found here: <https://ehs.osu.edu/emergency-contact-list>

Reference: OSU Chemical Hygiene Plan and Building Emergency Action Plan, Appendix F, page 37

Risk Ranking 1

3. Designated Areas are established and posted for carcinogens, reproductive toxins, and highly toxic chemicals.

Recommendations: Designated areas (signs) must be posted when working with select carcinogens, reproductive toxins or substances that have a high degree of acute toxicity. A designated area may be the entire laboratory, an area of a laboratory or a device such as a laboratory hood.

Reference: 29CFR 1910.1450(e)(3)(viii) and OSU Chemical Hygiene Plan

Risk Ranking 2

4. Lab equipment (i.e., refrigerators, microwaves, etc.) is labeled for designated uses. Ice machines must be labeled "Not for Human Consumption"

Recommendations: Laboratory equipment shall be labeled for designated use. Example: "No Food - Chemical Storage Only"

Reference: NFPA 45; OSU Chemical Hygiene Plan

Risk Ranking 2

5. Lab Hazard Signs, including emergency evacuation routes are posted.

Recommendations: Lab Hazard Signs are required by various codes and standards. Signs may be provided by departments or upon request from Environmental Health and Safety. Visit <https://ehs.osu.edu/secure/apps/> to order signage as needed for your laboratory.

Reference: Ohio Fire Codes; Ohio Department of Health; OSU Chemical Hygiene Plan

Risk Ranking 1

G. General Biosafety

1. A risk assessment has been performed by the PI addressing the following six areas:

- Recommendations:**
- Identification of the hazards inherent to the organisms, toxins, etc. being used in the lab (infectiousness, severity of disease, availability of effective treatments, etc.).
 - Identification of the hazards associated with the procedures (aerosol generation, working with animals, etc.).
 - Determination of appropriate Biosafety level and selection of additional precautions as indicated by the risk assessment (an example would be a procedure for exposing animals to experimentally generated infectious aerosols).
 - Before implementation of work, review the risk assessment with EHS, IBC, IBO, etc.
 - Evaluate proficiencies of staff regarding training, safe practices, and the integrity of safety equipment (certification dates, functionality, etc.).
 - Re-evaluate this risk assessment regularly, at least annually or any time changes are made to laboratory procedures, verify strategies are working or if changes are necessary.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section II: Biological Risk Assessment

Risk Ranking 4

2. Lab personnel are aware of how to access the OSU Institutional Biosafety Manual and NIH Guidelines.

Recommendations: Lab personnel must be aware of how to access (hard copy or electronic version) the OSU Institutional Biosafety Manual and the NIH Guidelines (mandatory if working with recombinant DNA).

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 A.5; BSL2 A.5; NIH Guidelines for Research Involving Recombinant DNA Molecules (April 2002), Appendix G-II-B-2-m

Risk Ranking 1

3. If BSC(s) is available for use in the laboratory, it has been tested and certified within the last 12 months by a qualified field certifier.

Recommendations: Biosafety cabinets must be certified annually by a qualified field certifier. Upon completion of certification, email a copy of the certification report to your EHS safety representative.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 10.c Appendix A, Part 7

Risk Ranking 4

4. BSCs are installed so that air fluctuations do not interfere with proper operations.

Recommendations: Biosafety cabinets must be installed so that fluctuations of the room air supply and exhaust do not interfere with proper operations. BSCs shall be located away from doors, heavily traveled areas of the laboratory, windows that can be opened and other possible airflow disruptions.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 D.10, Appendix A

Risk Ranking 3

5. Continuous flame producing devices are not used in the BSC.

Recommendations: Continuous flame producing devices shall not be used in BSCs. Flaming of items inside the BSC is unnecessary if good microbial technique is utilized. If a flame must be used, then one with a pilot light (e.g., Touch-o-Matic) should be chosen. Continuous flame models can produce turbulence, disrupting the BSC's airflow and the heat produced can damage the HEPA filter.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Appendix A, Part 5

Risk Ranking 3

6. Biosafety cabinets are used correctly.

Recommendations: Biosafety cabinets are designed for a single operator. Never work with two or more people at a time in **any** BSC, regardless of manufacturer, model, or size. Multiple users will cause air disruptions and potentially destroy the containment capabilities of the BSC, possibly creating personnel, product, or environmental protection issues. Do not block air grilles in the BSC. Materials placed on or in front of air grilles cause disruption to the airflow, resulting in turbulence, possible cross-contamination and/or breach of containment. BSCs shall not be overcrowded with equipment or used for storage. Load only the materials necessary for the experiment into the BSC. Surface decontaminate and remove materials from the BSC when work session is completed.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Appendix A, Part 5 Institutional Biosafety Manual

Risk Ranking 3

7. Lab supervisor ensures that personnel receive appropriate training and maintain written documentation of all training. All personnel and visitors with access to BSL1 areas shall take general biosafety training.

Recommendations: Lab supervisor must provide lab personnel with adequate training regarding their duties, the necessary precautions to prevent exposures and exposure evaluation procedures. Personnel should receive updates annually, as well as when procedural or policy changes occur. All lab personnel, including females of childbearing age, shall be provided with information regarding immune competence and conditions that may predispose them to infection.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 A.2

Risk Ranking 5

8. A biohazard sign is posted at the entrance to the lab and must include the biosafety level, contact numbers and procedures for entering/exiting the lab.

Recommendations: A universal biohazard sign must be posted at the entrance of the laboratory when infectious agents are present. Posted information must include lab's biosafety level, PI's name, after hours telephone number of PI or other emergency contact(s), and any special procedures required for entering and exiting the laboratory. Universal room sign available from EHS is posted and contains all required information.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 A.5; BSL2 A.5

Risk Ranking 1

9. Doors have locks and PI limits access to lab. Doors are closed during experiments.

Recommendations: Limit/restrict access to the laboratory, per discretion of the PI while research is in progress. Only individuals who meet specific entry requirements are allowed to enter the laboratory. Unattended laboratories are secured.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 D.1 : BSL2 B.1, D.1; OSU Institutional Biosafety Manual

Risk Ranking 2

10. Only plants and animals used in research are in the lab.

Recommendations: Only plants and animals associated with the research project are permitted in the laboratory.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 A.17, BSL2 A.17

Risk Ranking 1

11. PPE (lab coats, gloves, etc.) is worn when working with hazardous materials. Eye protection, appropriate for the anticipated hazard, shall be worn in the lab. Long hair is restrained so that it cannot contact hands, specimens, containers, or equipment. PPE is removed before leaving the lab and is properly discarded/laundered. Laboratories have a sink for handwashing.

Recommendations: Protective clothing (PPE) must be worn while working with hazardous materials. Glove selection shall be based on an appropriate risk assessment. Eye protection, appropriate for the anticipated hazard, shall be worn in the lab. Personnel must remove PPE before leaving the laboratory. PPE must be discarded properly after use or is laundered by the institution. PPE shall not be taken home by personnel. If sent offsite for laundering, it is properly bagged, and the laundry facility is notified of potential contaminants.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL1 A.6, A.7a-d, A.8, A.9, C.2, C.3, D.2; BSL2 A.6, A.7a-d, A.8, A.9, C.1, C.2, D.2

Risk Ranking 2

12. Chairs are covered with non-porous material in areas where biological work is conducted.

Recommendations: Chairs used in laboratory work must be covered with a non-porous material that can be easily cleaned and decontaminated with an appropriate disinfectant.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL 1 D.5b; BSL2 D.5b

Risk Ranking 2

H. Biosafety Level 2 (BSL2) Inspection

- Laboratory currently not doing BSL2 work

I. Documents

1. PI has currently approved IBC protocols for all biohazard work. Personnel are aware of and can access approved protocols (IBC, IRB, IACUC) & SOPs describing procedures using biohazards and necessary precautions.

Recommendations: PI must make sure that all personnel are aware of and can access approved protocols (IBC, IRB, IACUC) & SOPs describing procedures using biohazards and necessary precautions. All biohazard work and recombinant DNA work must be submitted to the Institutional Biosafety Committee for review using the online eProtocol system available at eprotocol.osu.edu.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 A.4a-b; OSU Institutional Biosafety Manual

Risk Ranking 4

2. Written procedures for decontamination, biohazard spill cleanup and potential biohazard exposure, are posted in the laboratory. Necessary spill cleanup supplies are available in the laboratory.

Recommendations: Written procedures for decontamination, spill cleanup and potential biohazard exposures are posted in the laboratory. All necessary supplies for cleaning up a biohazard spill must be available in the laboratory.

Reference: Ohio EPA Guidance Document for Large Generators of Infectious Waste (11/98)

Risk Ranking 3

3. Lab supervisor ensures that personnel receive appropriate training and maintain written documentation of all training. All personnel with access to BSL2 areas shall take BSL2 training.

Recommendations: Lab supervisor must provide lab personnel with adequate training regarding their duties, the necessary precautions to prevent exposures and exposure evaluation procedures. Personnel shall receive updates annually, as well as when procedural or policy changes occur. All lab personnel including females of childbearing age, shall be provided with information regarding immune competence and conditions that may predispose them to infection.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 A.2 B.2

Risk Ranking 5

4. Personnel are aware that incidents, which result in exposure to infectious materials/rDNA are reported to PI, IBO and Employee Health Services.

Recommendations: Make laboratory personnel aware that spills and accidents, which result in overt exposures to biohazardous materials, must immediately be reported to the Principal Investigator, the Institutional Biosafety Officer and Employee Health Services. Personnel must also complete an OSU Accident Report. The Biohazard Incident Report form can be found here: <http://orrrp.osu.edu/files/2013/05/rDNAbiohazardincidentreportform.doc>

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 B.7

Risk Ranking 3

5. If applicable, personnel have completed Bloodborne Pathogen Training within the last year.

Recommendations: Document that personnel working with human blood or other potential bloodborne pathogens (including human cell lines, tissues and animal materials intentionally infected with human pathogens) receive bloodborne pathogen training on an annual basis.

Reference: Adopted Ohio Public Employment Risk Reduction Program Standard 29 CFR 1910.1030 (OSHA Bloodborne Pathogens Standard); Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Appendix H

Risk Ranking 4

6. If applicable, an Exposure Control Plan is available and is updated /reviewed by laboratory staff annually.

Recommendations: If personnel are working with bloodborne pathogens, download the University Exposure Control Plan (ECP) that specifies the practices and procedures which will be implemented to eliminate or reduce employee exposure to blood and other potentially infectious materials. The ECP can be found at <http://www.ehs.osu.edu/manuals.aspx> Complete Appendix A to be specific to your laboratory. All personnel must review, sign and date the ECP (including the completed Appendix A) annually.

Reference: Adopted Ohio Public Employment Risk Reduction Program Standard 29 CFR 1910.1030 (OSHA Bloodborne Pathogens Standard); Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Appendix H

Risk Ranking 2

J. Procedures

1. Procedures involving infectious materials that may generate an aerosol are conducted in a BSC or other approved containment device (or centrifuge safety cups are opened in BSC).

Recommendations: Biosafety cabinets and/or other appropriate containment/protective devices must be used to contain aerosol producing activities (e.g., opening containers with non-ambient pressures, intranasal inoculation of animals, pipetting, shaking or harvesting of infected tissues), aerosol producing equipment (centrifuges/safety cups, blenders, shakers) and when using high concentrations or volumes of organisms.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 B.4a

Risk Ranking 4

2. Approved disinfectant & appropriate decontamination procedures are followed. Disinfectant bottles are labeled and dated. 70% Ethanol in conjunction with UV light is NOT an acceptable method of decontamination.

Recommendations: Personnel are using the disinfectant and decontamination procedures approved in the relevant protocol. Label and date disinfectant bottles when preparing solutions. If UV lights are used in BSCs, they must be turned off prior to anyone working in the room. UV light exposure can cause significant damage to the human eye.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 A.4a, A.14, Appendix B; America Biological Safety Association (ABSA), Position Paper on the Use of Ultraviolet Lights in Biological Safety Cabinets

Risk Ranking 2

3. All lab wastes are appropriately containerized and labeled. Contaminated waste/liquid/sharps are disposed of in accordance with OEPA regulations/OSU policies.

Recommendations: Laboratory waste must be labeled and contained appropriately. Bio box lids must be closed when not in use. Infectious/biohazardous waste must be handled, packaged, and disposed of in accordance with Ohio Environmental Protection Agency Infectious Waste Regulations and OSU policies. Provide appropriate materials (e.g., biohazard bags, biohazard boxes, sharps disposal containers) and ensure that personnel are adequately trained on proper disposal of infectious wastes. Liquid infectious waste must be collected in plastic, leak-proof containers, labeled as biohazard waste and disposed of in a biohazard burn box. Liquid waste from vacuum traps, if generated while working with infectious material, which includes human cell lines, is considered infectious waste per the OEPA. **OSU does not maintain a permit with OEPA to treat liquid biohazard waste with bleach and dispose of in the sanitary sewer.**

Reference: Ohio EPA Guidance Document for Large Generators of Infectious Waste (11/98)

Risk Ranking 2

4. Contaminated or infectious materials are safely transported outside of the laboratory.

Recommendations: Contaminated and/or infectious materials must be placed in durable, leak-proof containers that are closed prior to removal from the laboratory.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 A.15-a-b

Risk Ranking 2

5. If experiments are assigned different biosafety levels, lab areas must be clearly designated.

Recommendations: When experiments are being conducted at different biosafety levels within the same laboratory, lab areas must be clearly designated as to where BSL1 and/or BSL2 work is being conducted.

Reference: NIH Guidelines for Research Involving Recombinant DNA Molecules (April 2002) Appendix G-II-B-1-h

Risk Ranking 1

6. Infectious agents are secured.

Recommendations: The PI is aware that certain biohazardous materials and toxins may be of interest to persons or groups interested in terrorist or other illegal activities. Those agents that might pose a threat to humans, animals, agriculture, or the livestock industry must be kept in a secure place within the laboratory. Prior to shipping materials, the PI is responsible for assuring that the recipient is a recognized researcher from a well-known and reputable institution.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section VI

Risk Ranking 3

K. Equipment

1. Centrifuge has aerosol proof safety cups or rotors.

Recommendations: When centrifuging infectious materials use aerosol proof safety cups or rotors, to prevent leakage during spinning. Safety cups and rotors shall then be opened in a BSC. **Note:** If established human cell lines are the ONLY biohazard being centrifuged, the use of a low-speed centrifuge or open buckets is acceptable, however safety cups/rotors are still recommended. If any other biohazard agent (RG2) will be centrifuged, aerosol proof safety cups or rotors are REQUIRED

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 A.13, B.4a-c

Risk Ranking 3

2. Lab equipment is decontaminated before repair, maintenance, or removal from the lab.

Recommendations: Lab equipment is routinely decontaminated, as well as after spills, splashes, or other potential contamination. Equipment must be decontaminated prior to repair, routine maintenance, or removal from the lab.

Reference: Biosafety in Microbiological and Biomedical Laboratories, 6th Edition. Section IV: BSL2 B.5

Risk Ranking 2

3. Equipment for use or storage of biohazards is labeled with a biohazard symbol.

Recommendations: Label equipment where human pathogens are used or stored with the universal biohazard symbol.

Reference: Adopted Ohio Public Employment Risk Reduction Program Standard 29 CFR 1910.1030 (OSHA Bloodborne Pathogens Standard)

Risk Ranking 2

Survey Questions

1. Do you have any of the following select toxins in the lab? **Y/N?**

Abrin	Saxitoxin
Botulinum neurotoxins	Staphylococcal enterotoxins (Subtypes A, B, C, D or E)
Short, paralytic alpha conotoxins	T-2 toxin
Diacetoxyscirpenol (DAS)	Tetrodotoxin
Ricin	

2. Does the lab have a hazardous gas alarm? **Y/N?**

- If yes, what is being monitored.
- Is the alarm monitored by Public Safety or other OSU departments? (who is notified upon alarm)
- What are the alarm limits?
- Is the sensor in a regular calibration schedule?

3. Do you have Class 3b or 4 lasers? **Y/N?**

- If Yes, are they registered with Environmental Health and Safety?

4. Do you have any non-medical x-ray units? **Y/N?**

5. Does the lab have any Hoists, Lifts or Cranes? **Y/N?**

6. Do you use nanoparticles in your research? **Y/N?**

- Have you completed the Nanoparticle Registry form?
- Do you have a nanoparticle SOP for your lab?

7. Do you use naturally occurring radioactive materials (e.g., uranyl acetate, thorium compounds)? **Y/N?**

- Do you segregate the waste generated?

8. Do you (or anyone in your laboratory) currently use DEA controlled substances as part of your research? **Y/N?**

9. Are you currently receiving the EHS Newsletter via email? **Y/N?**