| COLUMBIA UNIVERSITY<br>Environmental Health and Safety |                 |                     |
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| Policy for Personal Protective Equipment               | Procedure: 5.03 | Created: 10/22/2012 |
| (PPE) in Research Laboratories                         | Version 3.0     | Revised: Jan. 2025  |

#### a. Purpose

Personal protective equipment (PPE) such as lab coats, gloves, and safety glasses/goggles are important for protecting researchers from hazardous materials, as well as physical hazards, in the laboratory. PPE cannot, however, be used as a substitute for more effective controls measures such as engineering controls or procedural controls and best practices (aka administrative controls).

PPE is the last line of defense and acts as a complement to the other, more effective, control measures. If hazard elimination, substitution or engineering controls are not feasible, a consultation with EH&S is required, to help identify the most effective alternatives to controlling potential exposure.

This Policy provides guidance on the provision, selection, use and care of PPE in research laboratories at Columbia University (the "University"). This Policy is consistent with U.S. Occupational Safety and Health Administration (OSHA) regulations, as well as the content and recommendations of the Centers for Disease Control and Prevention and National Institute of Health's *Biosafety in Microbiological and Biomedical Laboratories* and the National Research Council's *Prudent Practices in the Laboratory*, and standards for the use of PPE established by the Nuclear Regulatory Commission.

This Policy applies to all personnel, including faculty, staff, students, and visitors, in the University's research laboratories and associated research support spaces such as equipment rooms where hazardous materials are stored or handled. PPE should *always* be removed prior to exiting research spaces.

#### b. Applicability/Responsibility

In accordance with OSHA regulations, affected personnel are required to be provided with appropriate PPE at no cost, and to wear appropriate PPE whenever the potential for exposure to occupational hazards exists that are not effectively controlled by other measures. Safety is a shared responsibility of all people utilizing a laboratory space. The employee supervising a laboratory - typically the Principal Investigator ("PI") and/or the laboratory manager - the "PPE Responsible Party" is responsible for conducting a PPE hazard assessment and ensuring the availability of PPE in their laboratory personnel are responsible for receiving, understanding, and complying with this Policy and all other relevant University-, departmental- and laboratory- specific policies, procedures, and guidance, as well as attending training for determining when PPE is necessary and how to select, use and maintain PPE (*See Section g*). Environmental Health & Safety (EH&S) is responsible for assisting laboratories in completing PPE hazard assessments and training laboratory personnel. EH&S is responsible for the maintenance of this Policy.

PPE requirements will vary based on the hazardous materials used and the specific work practices involved, and the PPE provided must be adequate for the research conducted in the laboratory. Laboratories should use the Laboratory Assessment Tool and Chemical Hygiene Plan (LATCH) to perform a PPE hazard assessment. Available through the <u>Laboratory Information Online Network</u> (LION), The LATCH must be renewed annually, or upon the introduction of new hazards/procedures

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in your laboratory. See Section j –LATCH Start Guide for further information on how to complete your laboratory's LATCH. EH&S can assist laboratories in assessing work process hazards and identifying appropriate PPE. Please note: the hazard assessment should include an evaluation of ancillary laboratory activities, including requirements to protect other laboratory personnel whose work is proximal to the use of hazardous materials. Laboratories should establish a risk-based standard for the use of PPE by personnel participating in these activities.

#### c. **Definitions**

<u>Administrative Controls</u> – *A category of methods used to control workplace hazards. They involve changing policies, rules, and the way work is performed with the goal of reducing the duration, frequency, and severity of exposure to hazards.* 

<u>Ancillary Laboratory Activities</u> - Supporting activity conducted within a laboratory, such as desk- or computer-based work.

<u>Engineering Controls</u> – A type of strategy designed to protect workers by implementing equipment/placing barriers between the worker and the hazard. These controls are typically independent of worker interactions, involving a physical change to the workplace itself, rather than relying on the action of laboratory personnel. Some examples of this may include fume hoods, glove boxes, process enclosures, etc.

<u>Hazardous Material</u> – *Any biological, chemical, or radiological material that is dangerous to human health or the environment.* 

Laboratory Assessment Tool and Chemical Hygiene Plan (LATCH) – An online module within Columbia's LION system made to assist in each laboratory's **Risk Assessment** and selection of **Personal Protective Equipment**.

<u>Laboratory Information Online Network (LION)</u> – An EH&S data system used for inspection tracking, correspondence, and platform for the **LATCH** module.

<u>Occupational Hazards</u> - A hazard present in the workplace. This encompasses many types of hazards, including chemical hazards, biological hazards (biohazards), and physical hazards.

<u>Personal Protective Equipment (PPE)</u> – Apparel and equipment designed to limit exposure to a *Hazardous Material.* \* *PPE requirements in the laboratory are based on a Risk Assessment of laboratory experiments and other work.* \*

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<u>Risk Assessment</u> – *The process of recognizing and evaluating the potential for harm resulting from an activity.* 

#### d. Procedures

#### 1. Body Protection

**Clothing:** Long pants, or the equivalent, and closed shoes made of a non-porous material should always be worn; clothing that exposes the legs and feet must not be worn in the laboratory. Good laboratory practices require that a combination of personal clothing and PPE should cover all exposed skin. It is also important to avoid loose, dangling jewelry that may become caught in equipment or make incidental contact with hazardous materials. It is strongly recommended that laboratory personnel have a change of clothes and shoes at work to utilize as needed. In laboratories utilizing open flames, it is recommended that personnel tie back loose hair and avoid wearing synthetic fibers.

**Work Uniforms**: Work uniforms and personal protective equipment (PPE) serve distinct yet often complementary roles in the workplace. While uniforms primarily serve to identify employees, PPE is specifically designed to safeguard individuals from potential hazards. While some items can serve as both uniforms and PPE, it is crucial to ensure that work uniforms are supplemented with appropriate PPE to address specific workplace risks.

Laboratory Coat ("lab coat"): A lab coat is required to be worn by all personnel in a research laboratory whenever there is the potential for exposure to hazardous materials. Assessment of this exposure potential should include personnel involved in ancillary laboratory activities.

#### Potential hazards requiring the use of a lab coat include:

- Chemicals, biological agents, and radioisotopes
- Corrosive substances
- Flammable materials
- Open flames and hot processes
- Pyrophoric materials

A properly fitted lab coat should be knee length, with sleeves hitting just above the wrist and large enough to button or snap up completely. The lab coat selected must be appropriate for the hazards and procedures in the laboratory. For example, flame resistant lab coats that are NFPA 2112 certified should be worn when working with spontaneously igniting materials like pyrophores. *See Section j* - *Columbia University EH&S Personal Protective Equipment website* for additional information on various types of lab coats and selection criteria for each. Liquid resistant aprons (vinyl, rubber) should supplement lab coats for activities with elevated splash potential.

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Non-disposable lab coats must be regularly laundered, or if the lab coat is heavily soiled or contaminated with hazardous materials, disposed of through EH&S. EH&S is available to provide evaluation of lab coat contamination and suitability for continued use. *See Section j - Columbia University EH&S Personal Protective Equipment website* for more information on lab coat laundering.

2. **Hand Protection**: Gloves must be worn by all personnel in a research laboratory whenever there is potential for the hands to be exposed to physical hazards or hazardous materials.

#### Potential hazards requiring the use of hand protection include:

- Skin absorption of substances such as radioisotopes, biological agents, and chemicals
- Cuts and lacerations
- Abrasions
- Punctures
- Chemical or thermal burns
- Temperature extremes

There are many types of gloves available for use by laboratory personnel. The type of glove chosen must reflect the hazards and procedures in the laboratory. *See Section j - Columbia University EH&S Personal Protective Equipment website* for additional information on types of gloves and selection criteria for each.

Because many people are sensitive to latex, and repeated contact with the natural proteins in latex can lead to allergic sensitization, latex gloves should be avoided whenever possible.

Disposable glove material should be matched to the chemical hazard to ensure maximum break through time. Typically, nitrile gloves provide the most chemical resistance. See Section j - EH&S Glove Guide for assistance in identifying the appropriate gloves for the work being conducted.

Gloves should be removed before handling personal items, exiting the laboratory, or touching door handles. The user should wash their hands immediately upon removing gloves. Gloves should be changed as soon as they become compromised (contaminated, torn, or damaged). Disposable gloves are not to be reused, and reusable gloves should be cleaned according to manufacturer's instructions and discarded if contaminated.

Gloves contaminated with radioactive materials must be disposed of in a "dry solid radioactive waste" container, segregated by isotope. Biologically contaminated gloves soiled with blood, bodily fluids, or other infectious materials should be disposed of as Regulated Medical Waste (RMW) in red bags. Gloves used in handling laboratory chemicals can be disposed of in municipal trash, unless significantly soiled or contaminated with acutely toxic chemicals, in which case they should be collected and disposed of as solid hazardous waste via EH&S. *See Section j* – *Glove Disposal FAQ Sheet* for more guidance on the disposal of soiled and unsoiled gloves.

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3. Eye and Face Protection: Appropriate eye and face protection (safety goggles, safety glasses, face shields, etc.) is required to be worn by all personnel in a research laboratory while handling hazardous materials, and whenever there is the potential for the eyes or face to be exposed to physical hazards or hazardous materials.

#### Potential hazards requiring the use of eye and face protection include:

- Flying particles or droplets
- Extremely hot or cold material, including boiling and cryogenic liquids
- Corrosive liquids, including acids or caustic materials
- Biological or radioactive materials
- Chemical gases or vapors
- Light radiation from lasers or welding

Although there are numerous options, all eye and face protection must meet the ANSI Z87. 1 standard. The type of protection chosen must reflect the hazards and procedures in the laboratory. **Eveglasses alone do not offer the appropriate level of protection\***. Eye/face protection must be properly fitting and worn as intended. If damaged, they should be replaced immediately. *See Section j* - *Columbia University EH&S Personal Protective Equipment website* for additional information on various types of eye/face protection and selection criteria for each.

#### \*EH&S does not recommend wearing of contact lenses in the lab

4. **Foot Protection**: In general, research laboratory work processes do not require specialized protective footwear beyond wearing nonporous, closed shoes; shoes worn in the laboratory should cover the entire foot. However, there may be instances where laboratory personnel are required to wear disposable shoe covers, such as when working with blood or other potentially infectious materials.

To determine if other forms of foot protection, such as steel-toed boots, are required please consult EH&S for guidance.

5. **Respiratory Protection**: Work with hazardous materials should be performed under the protection of properly functioning engineering controls. These controls protect laboratory personnel from airborne exposure to hazardous substances, thus eliminating the need for a respirator.

If laboratory personnel believe there is a need to wear respirators (N95s, half face, full face, etc.), EH&S <u>must</u> be consulted for an evaluation. If a respirator is deemed necessary, affected employees will be required to enroll in the University's Respiratory Protection Program, which includes obtaining medical clearance from a healthcare professional to wear a respirator, as well as annual respirator fit testing and use training.

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If a respirator is not deemed necessary after an evaluation from EH&S, additional guidance will be provided, up to and including enrolling in the University's Voluntary Respiratory Protection Program. See Section j - Respiratory Protection Policy for further information.

6. **Hearing Protection**: The most effective way to control noise is to implement engineering controls that prevent or attenuate noise at its source. Relocation of the noise source or the work location should also be considered. If these engineering or administrative controls are not possible due to the task being performed, hearing protection devices can be used following consultation with the EH&S Occupational Safety program. Hearing protection devices are designed to reduce exposure to noise by limiting transmission to the inner ear, thus preventing hearing loss from occurring.

If laboratory personnel believe there is a need to utilize hearing protection, EH&S <u>must</u> be consulted for an evaluation. If hearing protection is deemed necessary after a noise assessment, affected employees will be required to enroll in the University's Hearing Conservation program. Entrants into the program will undergo regular assessments, typically conducted annually, to assess if the need for hearing protection persists.

7. **Proper Storage and Maintenance of Personal Protective Equipment**: PPE should always be stored in a clean, dry place away from potential contamination. Before use, examine PPE for cleanliness and defects, replacing it if it is not suitable for use. Clean or launder PPE when soiled or dirty. Lab coats and other PPE should not be taken home for personal laundering. *See Section j* - *Columbia University EH&S Personal Protective Equipment website* for further information on PPE laundering, including information on approved laundry practices and vendors.

# e. Emergency contacts

N/A

#### f. Medical Surveillance

For personnel in the University's Respiratory Protection Program, annual medical clearance by Workforce Health and Safety is required. If the individual is cleared to wear an N95 respirator, Workforce Health and Safety will perform the respirator fit test during the medical clearance process. If the individual is cleared to wear any respirator other than an N95, EH&S must be contacted following medical clearance to schedule a quantitative respirator fit test. Students requiring respirator fit testing should contact EH&S directly to schedule an appointment.

#### g. Recordkeeping/Training

All personnel working in university research laboratories must complete Laboratory Safety/Chemical Hygiene Training. This training includes relevant information for determining when PPE is necessary and how to select, use and maintain PPE, and is available via RASCAL. RASCAL maintains records of all laboratory personnel who complete EH&S training. *See Section j - RASCAL Training Finder* for assistance in identifying the required training courses for your lab activities.

#### h. Appendices

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N/A

## i. Forms

N/A

#### j. References

Centers for Disease Control's Biosafety in Microbiological and Biomedical Laboratories

Columbia University EH&S Personal Protective Equipment website

EH&S Glove Guide

Glove Disposal FAQ Sheet

LATCH Start Guide

National Research Council, et al. <u>"Prudent practices in the laboratory: handling and management of chemical hazards, updated version."</u> (2011).

Occupational Safety and Health Administration (29 CFR 1910.132)

**RASCAL Training Finder** 

**Respiratory Protection Policy** 

#### k. Acknowledgements

N/A