I. INTRODUCTION

Personal Protective Equipment (PPE) is an important component of the department's safety plan, which is aimed at protecting personnel from work associated exposures. However, PPE must never be relied on as the sole means of safeguarding the health and safety of laboratory personnel. To be most effective, PPE must be used in conjunction with appropriate engineering controls, standardized procedures, and best practices aimed at mitigating hazards posed by the work.

II. SCOPE

This document describes the PPE policy for the Cornell University Department of Chemistry and Chemical Biology and covers instructional and research laboratories.

III. MINIMUM PPE REQUIREMENT

1. Eye Protection

Eye protection is required for all persons at all times in all department laboratories, chemical storage areas, and shop areas. It is the user's responsibility to wear the proper eye protection. Enforcement of this policy is the responsibility of the laboratory supervisor and department safety manager.

i. Research Laboratories

The minimum acceptable level of eye protection in research laboratories is properly fitted prescription or non-prescription safety glasses with integral plastic side shields, which offer protection from moderate impact and particles associated with grinding, sawing, scaling, broken glass, and minor chemical splashes.

Safety glasses do not provide adequate protection for processes that involve stirring, pouring, or mixing large volumes of material. For these processes, it is recommended that personnel wear chemical safety goggles.

ii. Undergraduate Teaching Laboratories

The minimum level of eye protection for undergraduate teaching laboratories is safety goggles. Safety goggles completely cover the eyes, providing protection from chemical splashes, impact and dust.

When information on materials being used is insufficient to define the degree of hazard or when there is a possibility of explosion, a face shield, bench safety shield, or hood sash in the lowest possible position must be used in conjunction with safety glasses.

Face shields offer additional protection of the eyes, face, head, and neck regions and must always be used in conjunction with safety glasses or goggles.

All safety eyewear MUST comply with the ANSI Z87.1-2010 Standard, "Practice for Occupational and Educational Eye and Face Protection".

iii. Purchasing Prescription Safety glasses

The Department of Chemistry and Chemical Biology has made arrangements to provide prescription safety glasses to research assistants, employees, and faculty members who require prescription eye protection at work. To obtain prescription safety glasses contact the Business Office (120 Baker Laboratory) for procedures and current approved vendors.

2. **Body Protection**

i. Research Laboratory

Inherently flame-retardant lab coats must be worn for procedures involving hazardous chemical, biological or unsealed radiological materials. Laboratory coats must be appropriately sized for the individual and be buttoned to their full length. Laboratory coat sleeves must be of a sufficient length to prevent skin exposure while wearing gloves.

ii. Undergraduate Teaching Laboratories

Tyvek aprons are required for undergraduate students.

Inherently flame-retardant lab coats must be worn by laboratory teaching assistants.

3. **Hand Protection**

Hand protection must be used whenever there is a high probability for dermal exposure to chemical, biological, or radiological substances or physical hazards. Personnel should select gloves that are of appropriate material and thickness. Gauntlet-type gloves should be used when working with extremely toxic or corrosive chemicals, or when splattering may occur.

Protective gloves are made from a wide variety of materials and in general fall into four groups:

i. Gloves made of leather, canvas or metal mesh.

Leather gloves protect against sparks, moderate heat, blows, chips and rough objects.

ii. Fabric and coated fabric gloves.

Fabric gloves protect against dirt, slivers, chafing, and abrasions.

iii. Chemical and liquid-resistant gloves.

Nitrile gloves are made of a copolymer and provide protection from chlorinated solvents such as trichloroethylene and perchloroethylene.

Nitrile gloves also offer protection against acids, caustics, greases, and alcohols but are generally not recommended for use with strong oxidizing agents, aromatic solvents, ketones and acetates.

iv. Insulating rubber gloves

1. Butyl gloves protect against a wide variety of chemicals, such as peroxide, highly corrosive acids (nitric, sulfuric and hydrofluoric acids), strong bases, alcohols, aldehydes, ketones, esters, and nitro-compounds. Butyl rubber does not perform well with aliphatic and aromatic hydrocarbons and halogenated solvents.
2. Latex (natural rubber) gloves feature outstanding tensile strength, elasticity and temperature resistance. Latex gloves resist abrasions and protect the hands from most water solutions of acids, alkalis, salts and ketones. Latex gloves can cause allergic reactions in some individuals.
3. Neoprene gloves offer good pliability, finger dexterity, high-density, and tear resistance. They protect against alcohols, organic acids, alkalis, and gasoline. Neoprene gloves generally are chemical and wear resistant.
4. Rubber gloves are designed to protect against electrical hazards. They can also be used for protection against certain chemicals.

5. Aluminized gloves provide reflective and insulating protection against heat and require an insert made of a synthetic material to protect against heat and cold.

Appendix F of the Cornell University LSMCHP provides additional guidance on glove selection for specific chemicals.

4. **Foot Protection**

Closed toed shoes must be worn by all individuals working in laboratory areas. Shoes must cover the entire foot. Sandals and other open-toed shoes are not suitable for laboratory occupants. Other types of protective footwear such as steel-toed boots, plastic shoe covers, or insulated soles may be required based on a risk assessment.

IV. PPE Best Practices

a. Laboratory coats must not be worn outside of a laboratory unless the individual is transporting hazardous materials or traveling directly to a nearby laboratory work area.

b. For shared facilities, laboratory coats will be required only if hazardous materials are being handled.

c. Individuals transporting materials between laboratories should use secondary containment such as plastic tubs or lab carts. The secondary container is decontaminated or wiped- down as necessary prior to leaving the lab. Thus, a clean and uncontaminated container is transported to the next use area. This method allows both hands to be free from exposure to any hazardous material and eliminates the need to wear gloves when transporting materials.

d. In cases where secondary containment cannot be used, individuals must keep one hand un-gloved for the purposes of opening doors, entering and exiting elevators, etc. The other hand can be gloved for the purpose of carrying any potentially hazardous material.

   i. A pair of protective gloves should not be worn in any public area outside of the laboratory (i.e., hallways, elevators, offices).

   ii. If you are transporting materials requiring the use of both hands, it is best to use a clean, uncontaminated lab cart.

e. Gloves must be removed and hands washed prior to handling any equipment to avoid cross-contamination (e.g., telephones, computer work stations, etc.).

V. USE OF ADDITIONAL PPE & HAZARD ASSESSMENT

Certain procedures conducted in the laboratory may require the use of PPE that is different from the minimum requirement. In such cases, a hazard assessment must

be conducted, reviewed, and approved by the Safety Committee. Hazard assessment is the process used to identify hazards in the workplace and to select appropriate PPE to guard against potential hazards. Laboratory supervisors must conduct hazard assessments for operations occurring in their laboratories to determine the PPE necessary for carrying out operations safely.

PPE Assessments should include the following:

a) A review of the process or procedure that identifies probable physical, biological, chemical and/ or radiological hazards.

b) A review of the space or specific work area where the procedure is to be conducted and any available engineering controls.

c) Identify and cite an existing procedure or document procedure to be followed.

d) A review of any history of occupational illnesses or injuries associated with the proposed work.

e) Identify the appropriate required PPE for the task.

The PPE Assessment process must be documented using the PPE Assessment form located in Appendix A.

Information on the PPE specific to an operation or process must be included in the Standard Operating Procedure (SOP) for that process.

VI. TRAINING REQUIREMENTS AND CERTIFICATION

Individuals who are required to use PPE must be trained in its use. PPE training must cover at a minimum:

a) When PPE is necessary

b) What type of PPE is necessary

c) How to properly put on, take off, adjust, and wear the PPE

d) The limitations of PPE

e) Inspection and maintenance of PPE

Initial PPE training is provided by EH&S. Additional PPE training may be needed if there are changes in the workplace or in the type of required PPE. All PPE training must be documented and must include information covered during the training session as well as a sign-in sheet.

Retraining will be required if an employee fails to demonstrate proper understanding in the selection and/ or use of PPE.

VII. VISITORS & NON-LABORATORY PERSONNEL

Visitors to teaching and research spaces must wear an equivalent level of eye protection to that of laboratory personnel. PPE to be worn by non-laboratory personnel such as custodial staff or facilities personnel will be based on a risk assessment.

VIII. DISCIPLINARY ACTIONS FOR FAILURE TO COMPLY WITH PPE POLICY

Disciplinary actions for failure to comply with the department PPE policy will be governed by the department's disciplinary policy.

IX. REFERENCES

1. Cornell University Laboratory Safety Manual and Chemical Hygiene Plan (LSMCHP)
2. Cornell University Personal Protective Equipment Program
3. EHS PPE Hazard Assessment Form

X. SPECIFIC PROTECTION GUIDELINES

1. 29 CFR OSHA 1910.132 General Requirements
2. 29 CFR OSHA 1910.133 Eye & Face Protection
3. 29 CFR OSHA 1910.134 Respiratory protection
4. 29 CFR OSHA 1910.135 Head protection
5. 29 CFR OSHA 1910.136 Foot Protection
6. 29 CFR OSHA 1910.138 Hand Protection

Appendix A: PPE Selection Guide
Appendix B: PPE Assessment Form

PPE Selection Guide

Applicable PPE	Example	Type/Characteristics	Applications
Light latex, vinyl or nitrile gloves		**Disposable latex** Powdered or un-powdered	Working with biological hazards (human blood, body fluids, tissues, blood borne pathogens, specimens), BSL1, BSL2, BSL2+, BSL3
		**Disposable nitrile** Puncture, abrasion resistant, protection from splash hazards	Working with biological hazards and incidental chemical splash hazards
		**Disposable vinyl** Economical, durable, similar to latex	Working with biological hazards, BSL1, BSL2, BSL2+, BSL3
Light chemical resistant gloves		**Natural rubber latex** Chemical resistant, liquid-proof	Working with small volumes of corrosive liquids, organic solvents, flammable compounds
Light to heavy chemical resistant gloves		**Nitrile** Chemical resistant, good puncture, cut, and abrasion resistance	Using apparatus under pressure, air or water reactive chemicals
Heavy chemical resistant gloves		**Butyl** High permeation resistance to most chemicals	Working with large volumes of organic solvents; small to large volumes of dangerous solvents, acutely toxic or hazardous materials
		**Viton® II** High permeation resistance to most chemicals	Same as butyl gloves, plus hazardous material spills
		**Silver shield** Extra chemical and mechanical protection	Same as butyl and Viton II gloves, added mechanical protection, hazardous material spills
Insulated gloves		**Terrycloth autoclave** Heat resistant	Working with hot liquids and equipment, open flames, water bath, oil bath
		**Cryogen** Water resistant or water proof, protection against ultra-cold temperatures	Handling cryogenic liquids

Adapted from UCLA PPE Selection Guide, 9/2013

Applicable PPE	Example	Type/Characteristics	Applications
Wire mesh gloves		**Wire mesh** Cut resistant	Working with live animals and exposed to potential cuts
Chemical resistant aprons		**Rubber-coated wash** Chemical splash protection, good abrasion resistance	Working with apparatus under pressure, air or water reactive chemicals, large volumes of corrosive liquids
		**Neoprene w/ sleeves** Chemical resistant, tear resistant	Working with water or air reactive chemicals, large volumes of corrosive liquids, small to large volumes of acutely toxic corrosives
		**Butyl/Silver shield w/ sleeves** Extra chemical and mechanical protection	Working with large volumes of organic solvents; small to large volumes of dangerous solvents, acutely toxic or hazardous materials. Added mechanical protection, hazardous material spills
Lab coats		**Knee length-**White Cotton Protects skin and clothing from dirt, inks, non-hazardous chemicals	General use; Chemical, Biological, Radiation, and Physical Hazards
		**Flame resistant** Flame resistant (e.g. Nomex or flame- resistant cotton)	Working with water or air reactive chemicals, large volumes of organic solvents, potentially explosive chemicals
Gowns		**Disposable** Protects skin and clothing from dirt, dyes, debris, or non-hazardous chemicals	General use; Chemical, Biological, Radiation, and Physical Hazards. Working with live animals
		**Flame resistant disposable** Flame resistant. Protects skin and clothing from dirt, dyes, debris, or non-hazardous chemicals	Working with water or air reactive chemicals, large volumes of organic solvents, potentially explosive chemicals. Working with live animals
		**Tyvek** High tear resistance, protection from particulates	Working with biohazards with potential for exposure to airborne transmissible disease

Adapted from UCLA PPE Selection Guide, 9/2013

Applicable PPE	Example	Type/Characteristics	Applications
Cap		**Bouffant** Protection for hygienic work environments; protection from dirt, dust	Working with biohazards, especially in animal facilities
Footwear		**Disposable shoe covers** Protection for hygienic work environments; protection from dirt, dust. Adjustable fit, non- skid	Working with biohazards, especially in animal facilities
		**Slip resistant** Slip resistant sole	Working in areas where liquids, slippery conditions are present
		**Slip resistant boot** Slip resistant sole. High permeation resistance to wet conditions	Working in environments where large amounts of water are present (e.g., cage washing)
Safety glasses		**Glasses** Polycarbonate lens, side shields for eye protection. Meets ANSI and OSHA specifications	Working with chemical, biological, or physical hazards
Safety goggles		**General** Tight fitting, protects eyes from impact, spray, paint, chemicals, flying chips, dust particles, polycarbonate lens, indirect ventilation, meets ANSI and OSHA specifications	Working with large volumes of corrosive liquids, small to large volumes of acutely toxic corrosives. Working with large volumes of organic solvents, acutely toxic or hazardous chemicals, apparatus under pressure, air or water reactive chemicals
		**Laser / Radiological** Shaded goggles; optical density based on beam and/or UV parameters	Working with Class 3 or Class 4 lasers; UV radiation
Shields		**Face shield** Chemical and/or UV resistant face shield	Working with mild acids, caustics, aromatic hydrocarbons, methylene chloride; splash hazard; air or water reactive or potentially explosive chemicals; UV radiological hazards
		**Safety shield** Acrylic, weighted shield, three sided, bench top shield, frosted edges	Working with chemical splash, beta radiation, exposure to Blood borne pathogens

Adapted from UCLA PPE Selection Guide, 9/2013

Applicable PPE	Example	Type/Characteristics	Applications
Respirators (Use in non-voluntary applications requires participation in Respiratory Protection Program. Contact EHS)		**Surgical masks** Protects against large droplets and splashes	Working with live animals; working with infectious material in BSL-2+ level lab
		**N-95** Protects against dusts, fumes, mists, microorganisms	Working with live animals or infectious materials with known airborne transmissible disease (e.g. Tuberculosis); dusty environments
		**Half face** Purifies air: protects against variety of particulates, vapors, dust, mists, fumes; depends on filter cartridge used	Working with live animals or infectious materials with known airborne transmissible disease; dusty environments; chemical vapors; particulates
		**Full face** Same as half face, with greater protection factor; eye protection, mucous membranes, and face; depends on filter cartridge used	Working with live animals or infectious materials with known airborne transmissible disease; dusty environments; chemical vapors; particulates
		**PAPR** Air supplying respirator; delivers steady supply of filtered air with loose fitting hoods	Working in BSL3 or dusty environments; chemical vapors, particulates; used when full-face or half–face respirator doesn't fit individual, or presence of facial hair
Earplugs		**Disposable** Polyvinyl Chloride (PVC) or Polyurethane foam, one time use design (no cleaning), one size fits all, light weight, low cost, blocks all sound	Working in areas where sound levels average over 85 dBa Contact EHS for assistance with assessment.
		**Reusable** Silicone, tapered fit, reusable (needs cleaning), corded or uncorded, light weight, more durable than disposable	Working in areas where sound levels average over 85 dBa. Contact EHS for assistance with assessment.
		**Hearing Band** Ear plugs connected to a flexible band that can be worn around the neck when not needed	Working in areas where sound levels average over 85 dBa. Contact EHS for assistance with assessment.

Adapted from UCLA PPE Selection Guide, 9/2013

Personal Protective Equipment (PPE) Assessment Form

Instructions *: 1. For each job title, determine physical, biological, chemical, and radioactive hazards. 2. Identify & assign the appropriate PPE for each hazard. 3. Complete a new assessment form if there are changes in workplace conditions, procedures, or equipment that affect occupational hazards.*

Job Title:	Department/Unit:	Location:
Date Conducted:		

Job Task _____	Job Task _____	Job Task _____
Hazards — **Description**	**Hazards** — **Description**	**Hazards** — **Description**
☐ Respiratory Hazards _____	☐ Respiratory Hazards _____	☐ Respiratory Hazards _____
☐ Skin Hazards _____	☐ Skin Hazards _____	☐ Skin Hazards _____
☐ Eye/Face Hazards _____	☐ Eye/Face Hazards _____	☐ Eye/Face Hazards _____
☐ Head/Hand/Food Hazards _____	☐ Head/Hand/Food Hazards _____	☐ Head/Hand/Food Hazards _____
☐ Physical Hazards _____	☐ Physical Hazards _____	☐ Physical Hazards _____
☐ Electrical Hazards _____	☐ Electrical Hazards _____	☐ Electrical Hazards _____
☐ Fall Hazards _____	☐ Fall Hazards _____	☐ Fall Hazards _____
☐ Chemical Hazards _____	☐ Chemical Hazards _____	☐ Chemical Hazards _____
PPE Required — **Type**	**PPE Required** — **Type**	**PPE Required** — **Type**
☐ Safety Glasses _____	☐ Safety Glasses _____	☐ Safety Glasses _____
☐ Goggles _____	☐ Goggles _____	☐ Goggles _____
☐ Face Shield _____	☐ Face Shield _____	☐ Face Shield _____
☐ Hand Protection _____	☐ Hand Protection _____	☐ Hand Protection _____
☐ Respirator _____	☐ Respirator _____	☐ Respirator _____
☐ Hearing Protection _____	☐ Hearing Protection _____	☐ Hearing Protection _____
☐ Welding Shield _____	☐ Welding Shield _____	☐ Welding Shield _____
☐ Protective Clothing _____	☐ Protective Clothing _____	☐ Protective Clothing _____
☐ Fall Protection _____	☐ Fall Protection _____	☐ Fall Protection _____
☐ Other _____	☐ Other _____	☐ Other _____
Comments _____	Comments _____	Comments _____

All Affected Employees Notified: Yes ☐ No ☐

AUTHORIZATION

☐ Approved

I certify that I have conducted the Job Hazard Assessment of the job taks listed above and have detailed the findings of the Job Hazard Assessment on this form.

Supervisor Name:	Supervisor Signature:	Supervisor NetID:	Date:

* Completed forms must be mailed to EH&S at 395 Pine Tree Rd., Suite 210. Departments must also keep a copy of the completed form for their records.

☐ EHS Reviewed