AMSEC PPE SELECTION GUIDE

Purpose and Description

The laboratory personal protective equipment (PPE) hazard assessment guide will help the user identify hazards to which laboratory personnel may be exposed and specifies the minimal appropriate PPE to protect against these hazards during work operations. When completed, the document and its associated training will satisfy the Department of Labor and Industries requirements for PPE as required in Washington Administrative Code (WAC) 296-800-160.

This document must be completed by the Principal Investigator (PI), Lab Supervisor, or their designee. This person must conduct a laboratory hazard assessment that is specific to operations in their laboratories. EHS personnel are available to assist with the hazard assessment and can review the form. EHS may be consulted by calling 360-650-3064. The PI's/Lab Supervisors are responsible for ensuring PPE requirements are followed.

Section 1: Instructions and Guidance on PPE Selection

The Lab Supervisor has conducted and certified this hazard assessment.

1. The user shall conduct a hazard assessment of the laboratory operations using the PPE Assessment Guide.
   - This guide will assist in identifying work tasks that require the use of PPE to protect lab personnel from exposures to hazards. If a listed task is performed, ensure that all personel participating in said tasks are utilizing the proper PPE.
   - For each task performed, as necessary, provide additional information by marking the appropriate additional box or marking "Other PPE: Specify" and describing in the space provided the lab specific PPE designated for the work task.

✓ **Indicates a required item of PPE**

☒ **Indicates a recommended item of PPE**

GENERAL GUIDANCE ON PERSONAL PROTECTIVE EQUIPMENT (PPE) SELECTION

1. **Minimum Laboratory PPE.** In general, the minimum PPE that should be worn in the AMSEC laboratory is the following:
    - Safety glasses
    - Disposable nitrile or other appropriate chemical resistant gloves
    - Lab coat* (full length) and long pants, long skirt, or equivalent leg covering (no shorts)
    - Laboratory footwear (as described below)

*lab coats are to be provided by the users unless flame resistant (located in PPE station)

2. **Chemical-Resistant Gloves**. Chemical-resistant gloves must be selected based on the specific chemical(s) used and manufacturer's glove permeation and compatibility charts. Note that no two glove manufacturers produce gloves exactly alike. When determining the appropriateness of gloves for your laboratory you must use data provided the manufacturer of the specific gloves you are using.

3. **Laboratory Footwear.** Laboratory footwear should fully cover the feet to protect against chemical spills. Avoid sandals, flip flops, flats, canvas/breathable fabric tops, and shoes constructed of mesh (such as athletic shoes) unless impervious chemical-resistant booties that protect the entire foot are worn over them (not provided by AMSEC).

4. **Airborne / Inhalation Hazard: Engineering Controls and Respiratory Protection**.
    - **Chemical Fume Hood**. When materials have a potential for becoming airborne, use a chemical fume hood or other engineering control whenever possible. Activities that generate airborne contaminants or odors that are not conducted inside of a chemical fume hood or using some other engineering control (such as a local exhaust at the workbench) should be evaluated to determine if the activity presents an inhalation hazard.
    - **Respiratory Protection**. If a need for respiratory protection is identified during the hazard assessment, a respiratory protection program must be implemented that includes a hazard assessment, medical evaluation to wear a respirator, respirator training, and respirator fit testing. Contact EHS at 650-3064 for assistance in developing the program.

Chemical Hazards		
Task Performed in Lab (Modify wording to fit your needs)	**Potential Hazards**	**PPE Designated For Lab Specific Tasks**
C1. Working with solids of low or moderate toxicity. (Typically Category 4 toxicity ratings on the SDS, or Category 1 health hazards on the NFPA diamond)	• Skin damage • Eye damage • Toxic by skin contact	✓ **Eyes:** Safety glasses ✓ **Hands:** Disposable nitrile or appropriate chemical resistant gloves ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2). ☐ **Face**: Splash or splatter may occur - face shield
C2. Working with small volumes (<100 ml.) of corrosive (acids or caustics) liquids or solids.	• Skin damage • Eye damage • Toxic by skin contact	✓ **Eyes:** Safety goggles ✓ **Hands:** Disposable nitrile or appropriate chemical resistant gloves ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2).
C3. Working with large volumes of corrosive (acids or caustics) or *acutely toxic materials that may splash. (*Typically materials that have category 2 or 3 toxicity ratings on SDS sheets)	• Inhalation • Skin damage • Eye damage • Toxic by skin contact	✓ **Eyes:** Safety goggles ✓ **Face:** If splash or splatter may occur – face shield ✓ **Hands:** Disposable nitrile or appropriate chemical resistant gloves ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2). ☐ **Body:** Chemical resistant apron.
C4. Working with small volumes (<100 ml.) of flammable solvents or materials.	• Skin damage • Eye damage • Toxic by skin contact	✓ **Eyes:** Safety goggles ✓ **Hands:** Disposable nitrile or appropriate chemical resistant gloves ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2).
C5. Working with large volumes (>100 ml.) of flammable solvents.	• Inhalation • Skin damage • Eye damage • Toxic by skin contact • Fire	✓ **Eyes:** Safety goggles ✓ **Face**: If splash or splatter may occur - face shield ✓ **Hands:** Disposable nitrile or appropriate chemical resistant gloves ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2). ☐ **Body:** Flame resistant lab coat

Chemical Hazards		
Task Performed in Lab (Modify wording to fit your needs)	**Potential Hazards**	**PPE Designated For Lab Specific Tasks**
C6. Working with chemicals of high acute toxicity (e.g. hydrogen fluoride, hydrogen cyanide). (Typically chemicals with a category 1 acute toxicity rating on SDS sheets. These substances often have unique spill cleanup, first aid, and/or handling measures. **In addition to PPE, these substances require lab specific SOP's and training for their safe use**)	• Inhalation • Skin damage • Eye damage • Toxic by skin contact	✓ **Eyes:** Safety goggles ✓ **Face**: If splash or splatter may occur - face shield ✓ **Hands:** Appropriate chemical resistant gloves with disposable nitrile liners ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2). ☐ **Body:** Chemical resistant apron.
C7. Working with particularly hazardous agent such as: • Human carcinogen. • Mutagen. • Reproductive toxin.	• Inhalation • Skin damage • Eye damage • Toxic by skin contact	✓ **Eyes:** Safety goggles ✓ **Hands:** Disposable nitrile or appropriate chemical resistant gloves. Double glove. ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2) ☐ **Face**: Splash or splatter may occur - face shield
C8. Working with an apparatus with contents under pressure or vacuum above 25 psi or below 1 torr.	• Skin damage • Eye damage	✓ **Eyes:** Safety glasses ✓ **Hands:** If chemicals used - disposable nitrile or appropriate chemical resistant gloves ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2) ☐ **Face**: Face shield ☐ **Eyes and/or Face**: For high risk activities - Safety goggles and face shield ☐ **Body:** For chemical use, chemical-resistant apron
C9. Working with air or water reactive chemicals (These substances often have unique spill cleanup, first aid, and/or handling measures. **In addition to PPE, these substances require lab specific SOP's and training for their safe use**)	• Exposure to toxic gases, heat, and/or energy • Inhalation • Skin damage • Eye damage • Fire	✓ **Eyes:** Safety goggles ✓ **Hands:** Disposable nitrile or appropriate chemical resistant gloves ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2). ☐ **Face**: Splash or splatter may occur - Face shield ☐ **Hands**: Heat resistant or chemical resistant gloves. Specify under other PPE. ☐ **Body:** If fire hazard, flame-resistant lab coat

Chemical Hazards		
Task Performed in Lab (Modify wording to fit your needs)	**Potential Hazards**	**PPE Designated For Lab Specific Tasks**
C10. Working with pyrophoric materials. (These substances often have unique spill cleanup, first aid, and/or handling measures. **In addition to PPE, these substances require lab specific SOP's and training for their safe use**)	• Fire • Severe burns • Inhalation • Skin damage • Eye damage	✓ **Eyes**: Safety goggles ✓ **Hands**: Inner disposable nitrile or appropriate chemical resistant gloves ✓ **Hands:** Outer flame-resistant gloves ✓ **Body:** Flame resistant lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2) ✓ **Body:** Synthetic clothing must not be worn when working with pyrophoric materials ☐ **Face**: Splash or splatter may occur – Face shield
C11. Working with potentially explosive chemicals. (These substances often have unique spill cleanup, first aid, and/or handling measures. **In addition to PPE, these substances require lab specific SOP's and training for their safe use**)	• Detonation • Flying debris • Skin damage • Eye damage • Fire	✓ **Eyes**: Safety goggles ✓ **Hands**: Inner disposable nitrile or appropriate chemical resistant gloves ✓ **Hands:** Outer flame-resistant gloves ✓ **Body:** Flame resistant lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2) ✓ **Body:** Synthetic clothing must not be worn when working with explosive materials ☐ **Face**: Splash or splatter may occur – Face shield ☐ **Eyes, Face, or Body**: For high risk activities - Blast shield
C12. Working with high temperature equipment or objects.	• Burns • Fire	✓ **Eyes**: Safety goggles ✓ **Hands**: Inner disposable nitrile or appropriate chemical resistant gloves ✓ **Hands:** High temperature thermal insulated gloves ✓ **Body:** Flame resistant lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2) ✓ **Body:** Synthetic clothing must not be worn when working with high temperature equipment or objects ☐ **Face**: Splash or splatter may occur – Face shield
C13. Working with cryogenic material.	• Burns • Frostbite • Eye damage	✓ **Eyes**: Safety glasses ✓ **Eyes:** For large volumes (>100 mL) - Safety goggles ✓ **Face**: If splash or splatter may occur - Face shield ✓ **Hands**: Inner gloves - Disposable nitrile or appropriate chemical resistant gloves ✓ **Hands**: Outer gloves: Cryogenic low temperature insulated gloves ✓ **Body:** Lab coat; Long pants, skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2)

Chemical Hazards		
Task Performed in Lab (Modify wording to fit your needs)	**Potential Hazards**	**PPE Designated For Lab Specific Tasks**
C14. Minor (or small) spill cleanup (<4 L). Spill can be cleaned up with standard spill kit.	• Inhalation • Skin damage • Eye damage	✓ **Eyes**: Safety goggles ✓ **Face**: Splash or splatter may occur - Face shield ✓ **Hands**: Chemical-resistant gloves for spill cleanup ✓ **Body:** Lab coat; Long pants, skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2) ✓ **Body:** Chemical resistant apron ✓ As needed, contact EHS for assistance ✓ Contact Lab Manager always x4280 ☐ **Foot:** Shoe covers
C15. Large spill cleanup. Spill is too large or complex to clean up with standard spill kit.	• Inhalation • Skin damage • Eye damage	✓ **Mandatory: Follow Required Procedure** • If possible, stop or contain the release • Evacuate and secure the area • Assist injured or contaminated persons • Call 911 for assistance: Report injuries, fires, or request cleanup assistance • Call Lab Manager for assistance x4280 • Call EHS for assistance x3064
C16. Working with bound or wet nanomaterials	• Inhalation • Skin damage • Eye damage • Chemical exposure	✓ **Eyes:** Safety glasses ✓ **Face**: Splash or splatter may occur – Face shield ✓ **Hands**: Disposable nitrile or other appropriate chemical resistant gloves ✓ **Hands**: Routinely replace gloves to minimize exposure and hand contamination ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2) ☐ **Face:** Safety goggles

Chemical Hazards		
Task Performed in Lab (Modify wording to fit your needs)	**Potential Hazards**	**PPE Designated For Lab Specific Tasks**
C17. Working with unbound or dry engineered nanomaterials. **(Currently not permitted in AMSEC labs. Please talk to the Lab Manager for more information.)**	• Inhalation • Skin damage • Eye damage • Chemical exposure	For unbound or dry material: ✓ **Eyes:** Safety glasses ✓ **Face**: Splash or splatter may occur – Face shield ✓ **Hands**: Disposable nitrile or other appropriate chemical resistant gloves ✓ **Hands**: Routinely replace gloves to minimize exposure and hand contamination ✓ **Body:** Lab coat made of non-woven fabric and elastic at the wrists; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2) ✓ **Inhalation:** Half face respirator with P100 cartridge if working with aerosolizing nanomaterials outside of a vented work enclosure. *Contact EHS for respiratory protection program assistance.* ✓ **Removal of PPE:** Give special attention to technique used to remove and dispose of contaminated PPE to avoid skin contact
C18. Any other particularly hazardous lab task involving chemicals. - Make sure to notify the lab manager if something isn't on here or there is no SOP for it anywhere and it will be remedied.	Conduct risk assessment: Hazard depends on task and chemical properties • Inhalation • Skin damage • Eye damage	✓ **Eyes:** Safety glasses ✓ **Hands:** Disposable nitrile or other appropriate chemical resistant gloves ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2). ☐ **Eyes:** If liquids are present – safety goggles ☐ **Face**: Splash or splatter may occur – Face shield ☐ **Body**: Chemical resistant apron ☐ **Inhalation:** Respiratory protection. *Contact EHS for respiratory protection program assistance.*

Physical Hazards		
Task Performed in Lab (Modify wording to fit your needs)	**Potential Hazards**	**PPE For Lab Specific Tasks**
P1. Working with hot liquids. Heating equipment. Open flames (autoclave, Bunsen burner, water bath, oil bath).	• Burns resulting in skin or eye damage	✓ **Eyes:** Safety glasses ✓ **Hands:** Inner disposable nitrile or appropriate chemical resistant gloves ✓ **Hands:** Outer thermal insulated gloves ✓ **Body:** Lab coat; Long pants, long skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2) ✓ **Eyes:** Safety goggles for work with hot liquids ✓ **Face**: Splash or splatter may occur - Face shield ✓ **Hands:** Autoclave gloves, impermeable insulated gloves for liquids and steam
P2. Glassware washing.	• If glass breaks: Lacerations • Splash from cleaning agents	✓ **Eyes**: Safety glasses ✓ **Hands**: Nitrile or appropriate chemical-resistant gloves ✓ **Body:** Lab coat; Long pants, skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2) ☐ **Face**: Face shield ☐ **Hands:** If glass breaks, cut resistant gloves (highly recommended to wear always)
P3. Working with loud equipment, noises, sounds, alarms, etc.	• Potential ear damage and hearing loss	✓ **Hearing:** Earplugs or ear muffs, as necessary: Located in ES 128A by the glass waste box.
P4. Working with sharps or broken glass	• Cuts	✓ **For Cuts**: Use tongs for broken glass and designated sharps container for contaminated wastes ✓ **For Cuts**: Cut resistant outer glove (Kevlar) with nitrile inner gloves

Physical Hazards		
Task Performed in Lab (Modify wording to fit your needs)	**Potential Hazards**	**PPE For Lab Specific Tasks**
P5. Working with compressed gases **Users may only interact with compressed gases if they have completed the required compressed gas and cryogenic liquid training.**	• Asphyxiation • Toxic gas exposure • Significant energy release	✓ **Eyes**: Safety glasses ✓ **Hands**: If chemicals used, nitrile or other appropriate chemical-resistant glove ✓ **Body:** Long pants, skirt, or equivalent leg covering (no shorts); lab footwear (Refer to Page 2) ☐ **Face**: Face shield ☐ **Eyes and/or Face**: For high risk activities - Safety goggles and face shield ☐ **Body:** If chemicals used, chemical-resistant apron
P6. Welding/Hot Work **(This only applies to the torch utilized for the TGA. If you are not trained on the TGA, you may not use the torch located in the lab. No other hot work is permitted in the AMSEC labs at any time.)**	Eye damage Skin burns Flash burns Electric shock	✓ **Eyes**: Safety glasses ✓ **Body:** Long sleeves with tight fitting cuffs, long pants or equivalent leg covering. Lab footwear ☒ **Hands:** Flame resistant gloves **Note:** Welding and hot work may only be conducted with a pre-authorization permit from EHS or in pre-approved areas. If you are uncertain if your area has been approved for hot work contact EHS for more information.

Section 3: Certify the Hazard Assessment

Please certify that the hazard assessment for the laboratory has been completed by filling out and signing this page.

CERTIFICATION OF THE LABORATORY HAZARD ASSESSMENT AND PPE SELECTION **

Principal Investigator's (PI) Name (Print Name): **Kyle Mikkelsen**	Department/Unit: **AMSEC**	
Building(s): **Environmental Studies, Communications Facility**	Room(s): **ES 128, 128A, 128B, 129 CF 011, 014**	
Lab Supervisor's Name: **Kyle Mikkelsen**	Lab Supervisor's Phone: **X4280**	
Completed by (Print Name): **Kyle Mikkelsen**	Signature: **Copy-Original on file with EH&S and AMSEC**	Date: **03/08/2017**
Signature of PI: **Copy-Original on file with EH&S and AMSEC**		Date: **03/08/2017**

Section 4: PPE Training Documentation

Laboratory safety training must be conducted by the Principal Investigator, Lab Supervisor, or their designee. Training will identify and discuss potentially hazardous tasks performed in the lab as well as selection and use of lab specific PPE to protect the laboratory worker or researcher. The training content, instructor, and student attendees must be documented. To provide adequate training, the PI, Lab Supervisor or their designee will provide the following:

1. Identify all applicable safety training topics needed for lab personnel and assure that these trainings are completed.
2. The PI, lab Supervisor, or their designee will review the completed Lab PPE Hazard Assessment Guide with lab personnel. It describes the operations in the lab where personnel need PPE for protection against exposure to hazards. In this step, the hazard assessment is used as a training tool. While discussing lab operations and the associated hazards with lab personnel, the Supervisor will address the following:
    - How the lab obtains PPE
    - What types of PPE are used in the lab and for which tasks
    - Where and how the PPE is stored and maintained
    - How to inspect and what to look for to confirm PPE is in good condition before putting it on. If not, replace the PPE.
    - How to put on, wear, adjust for proper fit, and remove PPE
    - How to properly use the PPE
    - How to properly decontaminate and clean reusable PPE, and how to properly dispose of single-use PPE
    - Discuss any limitations of the PPE
    - General PPE safety practices, including not wearing PPE outside of lab hazard areas (e.g. hallways and eating areas).

3. Trained lab personnel will complete the AMSEC lab safety verification esign form to acknowledge that they have reviewed and been trained on the Laboratory PPE Assessment Guide.
4. Conduct refresher training whenever the hazard assessment and/or PPE selected for use is updated.