



March 2007

VIRGINIA POLYTECHNIC INSTITUTE  
AND STATE UNIVERSITY

# Personal Protective Equipment Program

## **Environmental Health and Safety Services**

Environmental Health and Safety Services

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## Revision Status

Contact(s)	Implementation Date	Revision Number	Comments
EHSS	1986	N/A	Program was entitled "Safety Rules for Jobs, Tools and Equipment"
Z. Adams, PE CSP R. Robinson K. Warwick	June 1999	1.0	Major revision to comply with new regulatory requirements.
Z. Adams, PE, CSP	April 2000	1.1	Revised to add Appendix I: Who Pays for PPE?
R. Miller, CSP	March 2007	2.0	Revised to consolidate programs.

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# Table of Contents

Introduction .....	7
Responsibilities .....	8
Training.....	11
Hazard Assessment.....	13
Hazard Controls.....	14
Hazard Assessment Form .....	17
PPE Selection .....	19
Definitions .....	20
References .....	21
On-line Information .....	21
Regulations.....	21
Appendix A: Eye and Face Protection.....	23
Appendix B: Head Protection.....	29
Appendix C: Foot and Leg Protection.....	33
Appendix D: Hand and Arm Protection .....	37
Appendix E: Protective Clothing/Body wear .....	41
Appendix F – Fall Protection.....	43
Appendix G – Hearing Protection .....	45
Appendix H – Respiratory Protection .....	47

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# Introduction

## Purpose

Environmental, Health and Safety Services (EHSS) developed this program to help departments protect employees from exposure to workplace hazards and to facilitate university compliance with state and federal safety-related regulatory requirements. This program complies with the requirements of the Occupational Safety and Health Administration (OSHA) regulations, 29 CFR 1910 (General Industry), Subpart I and 29 CFR 1926 (Construction), Subpart E.

Personal protective equipment (PPE) protects employees from the risks of injury by creating a barrier against workplace hazards. PPE must be used when the eyes, face, hands, extremities, or other parts of the body are exposed to workplace hazards that cannot be controlled by other means. **PPE is not a substitute for good engineering controls, administrative controls, or good work practices, but should be used in conjunction with those controls to ensure the safety and health of employees.** The use of PPE does not eliminate the hazard, and if the PPE fails, or is used improperly, exposure to the hazard may occur.

## Application

The main components of the Personal Protective Equipment Program are:

- Designation of responsible persons (e.g. PPE Coordinators) by departments to coordinate the requirements of this program at their worksites.
- Performing a hazard assessment of worksites and/or employee job duties by the designated PPE Coordinator.
- Assigning PPE to employees based upon the results of the hazard assessment.
- Training PPE Coordinators on this program by EHSS.
- Training of employees on assigned PPE by the PPE Coordinator.
- EHSS evaluation of the effectiveness of the PPE Program on a periodic basis and by EHSS modifying training or the written program as needed to address identified deficiencies.

## Scope

This program applies to all Virginia Tech properties and to all work performed by Virginia Tech employees regardless of jobsite location.

# Responsibilities

## Departmental Responsibilities

Departments are expected to maintain safe and healthy living, learning, and working environments for faculty, staff, students, and visitors to our campus. Departments must require faculty, staff, students, and visitors to use, where necessary, personal protective equipment and protective work clothing suitable to protect them from contact with, or exposure to, hazardous conditions or substances within departmental facilities. Departments must ensure that protective equipment is provided, used, and maintained in a sanitary and reliable condition.

Responsibility for this program lies with the highest supervisory level of each departmental unit unless otherwise specified. It is recommended that each department designate this responsibility to supervisory personnel; however, other appropriate persons may be designated. Supervisors or PPE Coordinators will conduct or coordinate inspections of all workplaces or work tasks to determine the need for PPE and help in selecting the proper PPE for each person or task performed.

Departments must provide most types of PPE at no cost to the employee. There are two exceptions, where PPE is very personal in nature and is typically worn on and off the jobsite – specifically prescription safety eyewear and some types of safety footwear.

- Reimbursement for **prescription safety eyewear**, such as prescription safety glasses, is at the discretion of the department. Whether the department elects to reimburse none, a portion of, or the entire cost of the eyewear, the department is still obligated to assure the adequacy of this PPE for the hazards to which employees are exposed. Prescription lenses that are fitted to full-face respirators, laser protective eyewear, welding helmets, and face shields, however, must be provided at no cost to the employee.
- Reimbursement for **safety footwear**, such as steel-toed shoes/boots, slip-resistant shoes, general work boots, is at the discretion of the department. Whether the department elects to reimburse none, a portion of, or the entire cost of the footwear, the department is still obligated to assure the adequacy of this PPE for the hazards to which employees are exposed. Specialized safety footwear, however, such as electrical protective, conductive, chemical resistant, foundry/heat-resistant, or footwear with metatarsal protection, must be provided at no cost to the employee.

It is recommended that each department maintain a uniform policy for reimbursement of safety eyewear and footwear. Departments are encouraged to fully reimburse employees for such costs. This will assure that adequate and appropriate PPE is provided to, and will be used by, the employee. If the department elects to reimburse only a portion or none of the cost, it is recommended that the requirement for the employee to provide this PPE be included in the position description and that this requirement be fully explained during the interview process.

## PPE Coordinator Responsibilities

PPE Coordinators designated by the department will perform the following tasks once they have received training from EHSS:

- Conduct hazard assessments in accordance with the requirements outlined in this program.
- Evaluate the hazards identified to determine if engineering or administrative controls can be implemented to eliminate or reduce the hazard to a safe level. Guidance on hazard control is provided in this program. EHSS should be consulted for certain controls, such as respiratory or hearing protection, ventilation systems, etc.
- Select and have each affected employee use appropriate protective equipment if hazards cannot be properly controlled. The department must assure that all PPE meets regulatory requirements as defined in this program, and is of a safe design and construction for the work to be performed.
- Assure that employee-owned equipment, where provided by the employee, is approved and adequate for the hazardous condition, and that this equipment is properly maintained and inspected as required by this program or the manufacturer.
- Assure that damaged or defective PPE is removed from service and not used.
- Assure that employees assigned and required to use PPE are properly trained and informed regarding the hazards and proper use, storage, care, inspection, and maintenance of such equipment. New employees should receive training from the Supervisor/PPE Coordinator prior to being assigned tasks requiring the use of PPE.
- Maintain documentation for hazard assessments and PPE training. Documents must be made available to EHSS or other regulatory authorities upon request.
- Review existing Hazard Assessments on a periodic basis to ensure PPE assignments remain valid and personnel are trained and informed.
- Reassess the workplace when new hazards are introduced, or when processes are changed or added.

## Employees

Employees are responsible for following the requirements of this program. Employees are expected to:

- Attend required training sessions on assigned PPE provided by the Supervisor or PPE Coordinator.
- Wear assigned PPE as required.
- Properly clean, inspect, maintain, and care for PPE as required.
- Inform the PPE Coordinator of the need for repair or replacement of PPE.

## EHSS

EHSS will provide technical support, coordinator-level training, and oversight for the PPE Program. EHSS will, upon request, provide training for non-supervisory personnel. Involvement by EHSS does not relieve the departments, supervisors, or contractors of their individual responsibilities. EHSS responsibilities for this program include:

- Developing, implementing, and administering the program.

- Training PPE Coordinators on all aspects of the program requirements.
- Serving as a technical resource to departments and PPE Coordinators, including for hazard evaluations and control reviews.
- Providing guidance on the selection, care, inspection, and use of PPE.
- Maintaining centralized records of PPE Coordinator training and related inspections.
- Evaluating the overall effectiveness of the program on a periodic basis and making appropriate changes as needed to assure the safety of personnel.
- Maintaining the university Respiratory Protection and Hearing Conservation programs, and evaluating workplace exposures to hazards that would require the use of respirators, hearing protection, or laser eyewear.
- Maintaining the university Chemical Hygiene Plan for laboratory operations.

### Contractors

Contractors must comply with all local, state, and federal safety requirements, and must assure that all of their employees performing work on Virginia Tech property have been suitably trained and are provided appropriate personal protective equipment.

### Visitors

Visitors to Virginia Tech property, which may be exposed to certain hazards, must wear appropriate PPE. It is the responsibility of the person(s) hosting the visitors to enforce this aspect. PPE used by visitors, whether provided by the visitor or the host department, must meet at a minimum the requirements established for Virginia Tech employees.

# Training

## Employees

Each employee required to wear PPE must be aware that PPE does not eliminate the hazard. If the equipment fails, or is not worn or used properly, the employee will be exposed to the hazard and may suffer injury or illness. Employees must receive training from the PPE Coordinator, or other appropriate designated personnel, prior to being assigned tasks requiring the use of PPE, and demonstrate an understanding of its use and limitations. (Note: Training on personal fall arrest systems, electrical protective equipment, respiratory protection, and hearing protection is provided by EHSS. Proper documentation will be maintained at EHSS for these trainings. ) Training must include answers and information regarding the following issues:

- What hazards have been identified during the hazard assessment?
- What are the controls in place for minimizing/eliminating these hazards?
- If engineering and/or administrative controls are not implemented, which specific PPE is to be worn for protection?
- How PPE is properly fitted, donned, doffed, adjusted, and worn. (Refer to manufacturers recommendations).
- What limitations does the PPE have? (Refer to manufacturers recommendations).
- How to properly care for, maintain, inspect, replace, and dispose of the PPE. (Refer to manufacturer's recommendations and information provided in the appropriate appendices of this program).

The PPE Coordinator must maintain written certification of training received by each employee. This "Record of Training" must include the name of the trainer, the name of the employee receiving training, the date of training, and the specific types of PPE covered during the training. This record is to be maintained at the departmental level, and must be made available to EHSS, or regulatory authorities, upon request. For training conducted by EHSS, the PPE coordinator can request the list of employees trained and the date of training to maintain with his/her departmental records. When there is a reason to believe that an employee using PPE does not have the understanding and skill required to use the equipment safely or properly, the employee must be retrained immediately. Retraining is also required when changes in the workplace render previous training obsolete, or when changes in the type of PPE to be used are made.



# Hazard Assessment

## Requirement

Employers are required by OSHA to certify in writing that they have assessed the work area to determine if hazards that required the use of personal protective equipment (PPE) are present or likely. A Hazard Assessment Form, **Exhibit 1**, has been developed to help departments meet this requirement.

## Conducting the Assessment

1. Look at how your employees are similar, or different, with respect to their work, their location, and their hazard exposures. If all employees have similar exposures due to the type of work performed or the location of their work area, they may be evaluated as a group. If there are a few employees who have significantly different exposures, they may require a separate assessment. Mark the appropriate box on the Hazard Assessment Form and fill in the required information for locations, position numbers and titles.
2. Perform a walk-through of the employee's work area or observe them performing tasks. Look for existing or potential hazards and enter them on the Hazard Assessment Form by checking "Yes" for an exposure to a body part and describing what the hazard exposure is in general terms in the space provided. Interview employees or review accident data, if necessary, to help identify hazards. Also look for general hazards, such as:
  - a. Moving equipment/parts/processes/personnel that could result in collision, compression, or impact.
  - b. Potential for objects to fall or drop from above onto an employee.
  - c. Exposure to chemicals or potentially harmful dusts, mists, or fumes.
  - d. Rolling or pinching objects or machinery processes that could crush body parts, catch hair, or snag loose clothing.
  - e. Electrical hazards from equipment, wiring, or utilities.
  - f. Presence or use of sharp objects that could cut or pierce the body.
  - g. Hot or cold surfaces that could cause burns or freezing.
  - h. Light (optical) radiation from welding, cutting, brazing, lasers, or other sources.
  - i. Use of tools or equipment that may generate flying debris, harmful dusts, vibration, repetitive motion, or noise.
  - j. Processes involving mixing or pouring of hazardous liquids.
  - k. Work area layout or spacing that may create hazardous conditions, for example, chemical storage near electrical panels or welding/cutting in high-traffic areas.
  - l. Material handling involving pushing, pulling, or lifting on a regular basis.
3. For each hazard identified and entered on the Hazard Assessment Form, indicate whether it will be controlled through engineering or administrative controls, or specify what type of PPE is required. The next section will help you evaluate these options.

## Hazard Controls

PPE Coordinators should consider the feasibility of implementing engineering and administrative controls whenever possible.

**Engineering Controls** remove the hazard from the workplace or use a barrier to virtually eliminate worker exposure to a hazard. The hazard is controlled on a relatively permanent basis. Engineering controls are the most desirable and effective type of hazard control, but may not always be feasible due to time and money constraints.

**Administrative Controls** alter the way a procedure or task is performed and rely on employee actions/behaviors to control the hazard. The hazard and/or employee exposure is reduced to a safer level, but still may require the use of PPE.

The following table, Hazard Controls, will give you some ideas of what engineering or administrative controls may be implemented. Review the options to see if any are feasible for your situation. If any of the controls listed are not an option, or do not reduce the hazard to a safe level, then PPE must be selected.

## Hazard Controls

Engineering Controls (Eliminate)	Administrative Controls (Reduce)
<p><b>Isolation</b></p> <ul style="list-style-type: none"> <li>*Control rooms or restricted access areas</li> <li>*Guarding (ex. machinery guards, fall protection/guardrail systems/parapet walls on roofs)</li> <li>*Barriers/shielding (ex. welding shields, plastic for P-32 radiation sources)</li> <li>*Locking out hazardous energy sources</li> </ul>	<p><b>Housekeeping</b></p> <ul style="list-style-type: none"> <li>*Regular cleaning of work area</li> <li>*Dry, clean floors</li> <li>*Proper storage of tools, materials, chemicals, radioactive substances</li> <li>*Proper spill response</li> <li>*Surplus old machinery/equipment</li> <li>*Vacuum instead of sweeping</li> </ul>
<p><b>Design</b></p> <ul style="list-style-type: none"> <li>*Proper access (ex. stairways, ramps)</li> <li>*Height (ex. hazard located above employee access, typically 8 feet)</li> <li>*Impervious work surfaces</li> <li>*Seamless flooring</li> <li>*Safety interlocks on equipment</li> <li>*Automatic shutoff</li> </ul>	<p><b>Training</b></p> <ul style="list-style-type: none"> <li>*Hazard recognition</li> <li>*Hazard controls</li> <li>*Safe work practices</li> <li>*Safe operating procedures</li> <li>*Emergency procedures</li> <li>*Machinery and equipment</li> </ul>
<p><b>Substitution</b></p> <ul style="list-style-type: none"> <li>*Dipping/brushing instead of spraying</li> <li>*Bolting together instead of welding</li> <li>*Hacksaw use instead of grinding</li> <li>*Wet processes instead of dry processes</li> <li>*Using non-hazardous chemicals</li> <li>*Using less hazardous radioactive substances (ex. P-33 instead of P-32)</li> <li>*Soap and water instead of solvents</li> <li>*Automation instead of manual eqpt.</li> </ul>	<p><b>Reduction</b></p> <ul style="list-style-type: none"> <li>*Perform hazardous tasks less frequently</li> <li>*Rotate employees in hazardous areas (not permitted for respiratory hazards)</li> <li>*Minimize on-hand stock of hazardous materials</li> <li>*Minimize waste products by recycling or redistribution (donate chemicals to university surplus)</li> <li>*Decrease time/increase distance (rad)</li> </ul>
<p><b>Elimination</b></p> <ul style="list-style-type: none"> <li>*On-demand supply instead of on-site storage</li> <li>*Maintenance-free batteries</li> <li>*Purchase premixed products</li> </ul>	<p><b>Preventative Maintenance</b></p> <ul style="list-style-type: none"> <li>*Regular inspections</li> <li>*Regular service and maintenance</li> </ul>
<p><b>Work Area Layout</b></p> <ul style="list-style-type: none"> <li>*Separating non-compatible work tasks</li> <li>*Routing high-traffic paths away from hazardous areas</li> <li>*Minimize size of radioactive work areas</li> <li>*Segregating radioactive work</li> </ul>	<p><b>Exposure Monitoring</b></p> <ul style="list-style-type: none"> <li>*Quarterly review of personal radiation doses</li> <li>*Investigation at 10% and 25% of occupational exposure limits (radiation)</li> <li>*Identify radiation contaminated areas</li> </ul>
<p><b>Ventilation</b></p> <ul style="list-style-type: none"> <li>*Increase air flow</li> <li>*Use fume hoods for mixing</li> <li>*Local exhaust ventilation</li> <li>*Filtration (ex. HEPA-filtered Biosafety cabinets, charcoal filtering for radioactive substances such as I-125)</li> </ul>	<p><b>Safe Work Practices and Procedures</b></p> <ul style="list-style-type: none"> <li>*Identify and develop for hazardous processes</li> <li>*Perform radiological hazard analysis</li> <li>*Label equipment as radioactive</li> <li>*Container labeling (chemical, radioactive, biohazardous)</li> </ul>

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## Hazard Assessment Form

<b>Department:</b>		<b>Date:</b>	<b>Completed by:</b>		
<input type="checkbox"/> A worksite	Specify location:				
<input type="checkbox"/> An employees job description	Name of employee:				
	Working title of position:				
	Position Number:				
<input type="checkbox"/> The job description for a class of employees	Working title of positions:				
	Position Number(s):				
<b>EYE/FACE HAZARDS (Appendix A).</b>					
<i>Check the box for each hazard:</i>		<i>Description of hazard(s):</i>	<i>Controls in place:</i>	<i>Identify required PPE.</i>	
Chemical Exposure	Yes <input type="checkbox"/>		<input type="checkbox"/> Work in fume hoods	<input type="checkbox"/> Safety glasses	
High Heat/Cold	Yes <input type="checkbox"/>		<input type="checkbox"/> Enclosure/guarding	<input type="checkbox"/> Safety goggles	
Dust or Flying Debris	Yes <input type="checkbox"/>		<input type="checkbox"/> Shielding (bystanders)	<input type="checkbox"/> Face shield	
Impact	Yes <input type="checkbox"/>		<input type="checkbox"/> Safe Work Practices	<input type="checkbox"/> Welding helmet	
UV Light	Yes <input type="checkbox"/>		<input type="checkbox"/> Dust collection system	<input type="checkbox"/> Cutting goggles	
Radiation	Yes <input type="checkbox"/>		<input type="checkbox"/> Other:	<input type="checkbox"/> Other:	
<b>HEAD HAZARDS (Appendix B).</b>					
<i>Check the box for each hazard:</i>		<i>Description of hazard(s):</i>	<i>Controls in place:</i>	<i>Identify required PPE.</i>	
Impact	Yes <input type="checkbox"/>		<input type="checkbox"/> Canopy	<input type="checkbox"/> Class G hard hat	
Electrical Shock	Yes <input type="checkbox"/>		<input type="checkbox"/> De-energization	<input type="checkbox"/> Class E hard hat	
Entanglement	Yes <input type="checkbox"/>		<input type="checkbox"/> Hair secured	<input type="checkbox"/> Class C hard hat	
Other:	Yes <input type="checkbox"/>		<input type="checkbox"/> Other:	<input type="checkbox"/> Bump cap/welding cap	
<b>FOOT/LEG HAZARDS (Appendix C)</b>					
<i>Check the box for each hazard:</i>		<i>Description of hazard(s):</i>	<i>Controls in place:</i>	<i>Identify required PPE.</i>	
Chemical Exposure	Yes <input type="checkbox"/>		<input type="checkbox"/> Substitution	<input type="checkbox"/> Work boots	
High Heat/Cold	Yes <input type="checkbox"/>		<input type="checkbox"/> Mechanical device used	<input type="checkbox"/> Steel-toed shoes/boots	
Impact/Compression	Yes <input type="checkbox"/>		<input type="checkbox"/> Housekeeping	<input type="checkbox"/> Slip-resistant shoes	
Puncture	Yes <input type="checkbox"/>		<input type="checkbox"/> Isolation/grounding	<input type="checkbox"/> Puncture-resistant shoes	
Explosive/Flam. atmos.	Yes <input type="checkbox"/>		<input type="checkbox"/> Safe Work Practices	<input type="checkbox"/> Non-conductive	
Slippery/Wet Surfaces	Yes <input type="checkbox"/>		<input type="checkbox"/> Appropriate clothing	<input type="checkbox"/> Metatarsal protection	
Electrical	Yes <input type="checkbox"/>		<input type="checkbox"/> Other:	<input type="checkbox"/> Shin guards	
Other:	Yes <input type="checkbox"/>		<input type="checkbox"/> Other:	<input type="checkbox"/> Other:	

Exhibit 2

<b>HAND/ARM HAZARDS (Appendix D)</b>				
Check the box for each hazard:		Description of hazard(s):	Controls in place:	Identify required PPE.
Chemical Exposure	Yes <input type="checkbox"/>		<input type="checkbox"/> Substitution	<input type="checkbox"/> Chemical-resistant gloves
High Heat or Cold	Yes <input type="checkbox"/>		<input type="checkbox"/> De-energization	<input type="checkbox"/> Thermal-protective gloves
Cuts or Abrasion	Yes <input type="checkbox"/>		<input type="checkbox"/> Elimination	<input type="checkbox"/> Cut-resistant gloves
Puncture	Yes <input type="checkbox"/>		<input type="checkbox"/> Avoidance	<input type="checkbox"/> Leather gloves
Electrical Shock	Yes <input type="checkbox"/>		<input type="checkbox"/> Other:	<input type="checkbox"/> Voltage-rated-Class:
Radiation	Yes <input type="checkbox"/>		<input type="checkbox"/> Other:	<input type="checkbox"/> Latex/nylon exam gloves
Vibration/grip	Yes <input type="checkbox"/>		<input type="checkbox"/> Other:	<input type="checkbox"/> Anti-vibration gloves
Bloodborne Pathogens	Yes <input type="checkbox"/>			
<b>BODY/TORSO HAZARDS (Appendix F)</b>				
Check the box for each hazard:		Description of hazard(s):	Controls in place:	Identify required PPE.
Chemical Exposure	Yes <input type="checkbox"/>		<input type="checkbox"/> Reduce time exposed	<input type="checkbox"/> Lab coat
Extreme Heat/Cold	Yes <input type="checkbox"/>		<input type="checkbox"/> Guards/barriers	<input type="checkbox"/> Apron:
Radiation	Yes <input type="checkbox"/>		<input type="checkbox"/> Substitution	<input type="checkbox"/> Flame-retardant
Impact	Yes <input type="checkbox"/>		<input type="checkbox"/> De-energization	<input type="checkbox"/> Coveralls
Cut/Abrasion/Puncture	Yes <input type="checkbox"/>		<input type="checkbox"/> Mechanical devices	<input type="checkbox"/> Vest
Electrical Arc	Yes <input type="checkbox"/>		<input type="checkbox"/> Other:	<input type="checkbox"/> Tyvek suit
Pushing/pulling/lifting	Yes <input type="checkbox"/>		<input type="checkbox"/> Other:	<input type="checkbox"/> Other:
<b>FALL HAZARDS (Appendix G). Work on a surface with an unprotected side or edge that is 4 feet or more above a lower level</b>				
Check the box for each hazard:		Description of hazard(s):	Controls in place:	Identify required PPE.
Fall hazard	Yes <input type="checkbox"/>		<input type="checkbox"/> Guardrail <input type="checkbox"/> Safe ladder practices	<input type="checkbox"/> Full-body harness
<b>NOISE HAZARDS (Appendix G). Noise exceeding 90 dBA during an 8 hour work period</b>				
Check the box for each hazard:		Description of hazard(s):	Controls in place:	Based upon EHSS evaluation, the following PPE is required:
Noise hazard	Yes <input type="checkbox"/>		<input type="checkbox"/> Noise reduction	<input type="checkbox"/> Ear plugs
Ultrasonics	Yes <input type="checkbox"/>		<input type="checkbox"/> Reduced exposure	<input type="checkbox"/> Ear muffs
<b>RESPIRATORY HAZARDS (Appendix G) Harmful dusts, mists, fumes</b>				
Check the box for each hazard:		Description of hazard(s):	Controls in place:	Based upon EHSS evaluation, the following PPE is required:
Chemicals/pesticides	Yes <input type="checkbox"/>		<input type="checkbox"/> Fume hood	<input type="checkbox"/> Half-face
Particulates	Yes <input type="checkbox"/>		<input type="checkbox"/> Local exhaust ventilation	<input type="checkbox"/> Full-face
Confined space work	Yes <input type="checkbox"/>		<input type="checkbox"/> Increase air flow	<input type="checkbox"/> Air-line/SCBA
Welding/cutting fumes	Yes <input type="checkbox"/>		<input type="checkbox"/> Filtration	<input type="checkbox"/> PAPR
Other	Yes <input type="checkbox"/>		<input type="checkbox"/> Work outside	<input type="checkbox"/> Dust mask

I certify that the above inspection was performed to the best of my knowledge and ability, based on the hazards present on this date.  
(PPE Coordinator Signature) \_\_\_\_\_

# PPE Selection

## General Guidelines

Once you have determined the hazard categories for each area of the body by entering the hazards onto the Hazard Assessment Form, use the information provided in the appendices to help select the appropriate type of PPE. For some types of PPE, such as hearing and respiratory protection, you must go through EHSS for proper selection and fit. For others, such as fall protection or the use of voltage-rated equipment, additional training is required by EHSS to adequately address related hazards and/or to meet regulatory requirements.

All personal protective equipment must be of safe design and constructed for the work to be performed, and must be maintained in a sanitary and reliable condition.

Suppliers of PPE are great resources for help in selecting the right PPE for a hazard. The hazard category (i.e. impact, chemical, heat, cold, electrical, light/radiation, cut-resistance, etc.) must be matched with the style and model of PPE.

The PPE must be fitted to the user. PPE that fits poorly will not provide the necessary protection, and the employee is less likely to wear the device if it does not fit comfortably. Protective devices are generally available in a variety of sizes. Care should be taken to ensure the right size is selected for each individual wearer.

Adjustments must be made on an individual basis for a comfortable fit that will maintain the protective device in the proper position. If the PPE is not adjustable by design, you should not make any alterations to it! This voids the manufacturer's warranty and compromises the protective qualities of the equipment.

Employees must be given instructions on the care and use of PPE assigned to them. It is very important that the end users be made aware of all warnings and limitations of their PPE. PPE Coordinators are assigned the task of training employees on the PPE assigned. Guidelines are provided in the appendices, but are not a substitution for the manufacturer's instructions, which are included with the PPE when purchased.

# Definitions

**ANSI:** American National Standards Institute – coordinates the development and use of voluntary consensus standards in the United States, and represents the needs and views of U. S. stakeholders in standardization forums around the globe.

**ASTM:** American Society of Testing Materials – one of the largest voluntary standards developing organizations in the world – a trusted source for technical standards for materials, products, systems, and services.

**Competent person:** a person capable of identifying safety hazards and authorized to take prompt corrective action.

**MSDS:** Material Safety Data Sheet – A summary sheet provided by the manufacturer of a chemical or other potentially hazardous product. The MSDS explains the hazards of the material and the precautions that must be taken to prevent fires, explosions, or harmful health effects.

**NFPA:** National Fire Protection Association – nonprofit organization formed to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training, and education.

**NIOSH:** National Institute for Occupational Safety and Health – the federal agency responsible for conducting research and making recommendations for the prevention of work-related injuries and illnesses. NIOSH is part of the Center for Disease Control and Prevention (CDC) in the Department of Health and Human Services.

**OSHA:** Occupational Safety and Health Administration – formed by the federal government to assure the safety and health of America’s workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health.

**Qualified Person:** One who has received training appropriate for the tasks to be performed, and has demonstrated the necessary skills and techniques to perform his or her work safely.

**TWA:** Time-Weighted Average – (in reference to noise exposure) the sound level which, if constant over an eight-hour exposure, would result in the same noise dose as is measured.

# References

## Published Sources

Referenced standards are detailed in the appendices. A copy of these standards may be obtained from Newman Library, or by contacting EHSS directly. Related documents or programs include Virginia Tech's:

- Hearing Conservation Program
- Respiratory Protection Program
- Fall Protection Program
- Electrical Safety Program
- Chemical Hygiene Plan
- Laser Safety Program

“Lab Safety Fall Protection FAQs”

“Taking Care of Your Hard Hat”, Occupational Health & Safety

## On-line Information

EHSS at <http://www.ehss.vt.edu>

MSHA at <http://www.msha.org>

NIOSH at <http://www.cdc.gov/niosh/homepage.html>

OSHA at <http://www.osha.org>

VOSHA at <http://www.dli.state.va.us/>

# Regulations

Occupational Safety and Health Administration (OSHA) regulations are available online at [www.osha.gov](http://www.osha.gov).

- 29 CFR 1910 General Industry Standards
- 29 CFR 1926 Construction Standards

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# Appendix A: Eye and Face Protection

## Compliance with National Standards

Eye and face protection purchased and used after July 5, 1994 must meet ANSI Z87.1-1989, "American National Standard Practice of Occupational and Education Eye and Face Protection".

## General Requirements

Employees must use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, acidic or caustic liquids, liquid chemicals, chemical gases or vapors, or potentially hazardous light radiation. Eye and face PPE must be marked to identify the manufacturer, and must also be marked to indicate that it complies with the ANSI Z87 standard.

Each affected employee who wears prescription lenses, while engaged in operations that involve eye hazards, must either:

- Wear safety eyewear that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the safety eyewear, or
- Wear safety eyewear that incorporates the prescription in its design.
  - The prescription lens will have the laboratory/manufacturer marking embossed on it if it is approved for safety purposes.
  - The frame will bear the Z87 marking if it is approved for safety purposes.

Prescription safety glasses are one piece of safety equipment that may have to be paid for by the wearer due to its personal nature. Departmental policy may indicate whether the department will pay for all, partial, or none of the costs.

Care should be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards should be provided. Protective devices do not provide unlimited protection.

Operations involving heat may also involve light radiation. When necessary, protection from other hazards must be provided.

Wearers of contact lenses must also wear appropriate eye and face protection in a hazardous environment. It should be recognized that dusty environments might represent an additional hazard to contact wearers.

Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleaning may be necessary.

## Types of Eye and Face Protection

### **Safety Glasses-Impact Resistant, Glare**

Standard safety glasses are designed to protect against light to moderate impact and flying particles. Flying particles may include wood or metal debris, light dust, blood, or other body fluids, etc. Safety glasses must have shatter-proof lenses, impact resistant frames and provide side protection. Detachable side protectors (e.g. clip-on or slide-on shields) are acceptable if they meet the ANSI requirements. Prescription safety glasses are available through your optometrist and must also meet these criteria.

Safety glasses are available in a wide variety of styles and (lens) colors. Styles should be chosen that employees like, and will therefore wear. Lens colors do have some functionality. Below is a quick guide to help you select appropriate lens colors.

- Clear – for general indoor applications.
- Gray – for outdoor applications where light and glare can cause eye strain and fatigue. Provides good color recognition.
- Mirror – same purpose as gray lens, yet allows more visible light through the lens for indoor/outdoor use. Reduces glare from artificial light.
- Gold/Blue/Silver Mirror – for outdoor use where sunlight and glare cause eye strain and fatigue. “Mirror” coating reflects light, reducing the amount of light that passes through the lens.
- Dark Green – general-purpose protection from glare and UV radiation.
- Brown – for outdoor applications where sunlight and glare cause eye strain and fatigue. Meets color traffic signal recognition requirements.
- Vermilion (pink) – enhances contrast while reducing all color equally for optimum color recognition. Ideal for indoor inspection.
- Amber – blocks the blue portion of the visible light spectrum, creating maximum contrast enhancement, particularly in low light.
- Filtered shades (green to brown) – protect against ultraviolet and infrared radiation generated when working with molten metal, and in welding, cutting, soldering, and brazing operations.
  - Shades 1.5-3 for torch soldering
  - Shades 3-4 for torch brazing
  - Shades 3-6 for cutting applications
  - Shades 4-8 for gas welding
  - Shades 10-14 for electric arc welding

Caution should be exercised in the use of metal frame safety glasses in electrical hazard areas.

Non-side shield safety glasses are available for frontal protection only, but are not acceptable eye protection for the sources and operations involving “impact”.

### **Lasers Safety Glasses/Goggles**

The energy emitted from lasers is highly concentrated and can cause permanent eye injury. Although engineering controls are preferred to reduce hazards from the laser

beam, it may be necessary to use laser safety eyewear when engineering controls are inadequate. Laser safety eyewear must be worn in areas where unenclosed Class 3b or 4 lasers are operated. Laser eyewear filters or absorbs light of a specific wavelengths, while maintaining adequate light transmission for other wavelengths. The absorption capability of the filtering media is called the optical density (OD). The OD is always expressed as a factor of 10. An OD of 5 means the filter has reduced the power of the beam to 1/100,000 of its original power. The required OD is the minimum OD necessary to reduce the beam to a non-hazardous level. The OD of the eyewear has to be at least equal to, or greater, than the required OD for each wavelength. The eyewear must be labeled with the optical density of the lens and the wavelength that it protects against.

When choosing appropriate laser eyewear, time is also a consideration. The length of time the eyewear will protect your eye before the beam goes through, and how much time you will have to react if you are hit with a direct beam are factors. According to ANSI, protective eyewear shall exhibit a damage threshold for a specified exposure time (typically 10 seconds). The eyewear shall be used in a manner so that the damage threshold is not exceeded in the worst case exposure situation. Main points to consider when selecting eyewear for a specific laser includes:

- Wavelength
- Optical density
- Laser beam intensity
- Luminous transmittance
- Damage threshold
- Comfort
- Lenses

For more information on selecting laser protective eyewear, refer to the laser manufacturer's recommendations and instructions and/or review EHSS's Laser Safety Program.

### **Safety Goggles**

Vinyl-framed goggles of soft pliable body design provide adequate eye protection from many hazards, such as impact, chemical splash, dust, sand, and debris. Goggles are available with perforated, port-vented, or non-vented frames. Single lens goggles provide similar protection to spectacles and may be worn in combination with spectacles or corrective (prescription) lenses to ensure protection along with proper vision. Like safety glasses, goggles are impact resistant and are available with tinted lenses.

**EHSS strongly recommends the use of safety goggles, rather than safety glasses, for all personnel working in laboratories with chemicals or human bodily fluids.**

Welders/chippers goggles provide protection from sparking, scaling, or splashing metals and harmful light rays. Lenses are impact resistant and are available in graduated shades of filtration. Filter lenses must meet the requirements for shade designations as outlines in the OSHA regulations and ANSI standards. Tinted and shaded lenses are not filter lenses.

## **Face Shields**

Face shields provide general protection to the entire face for a variety of hazards, such as flying debris, chemical splash, arc flash, UV radiation, and extreme heat. Face shields must be used in combination with goggles when there is a potentially significant chemical splash hazard, especially where highly toxic chemicals or corrosives are used. Face shields must be worn over primary eye protection (safety glasses or goggles) when there is a potentially severe exposure to flying fragments or objects, hot sparks from furnace operations, potential splash from molten metal, or extreme temperatures.

## **Welding Helmets**

Welding helmets/shields must be provided to protect worker's eyes and face from infrared or radiant light burns, flying sparks, metal splatter, and slag chips encountered during welding, torch brazing, torch soldering, resistance welding, bare or shielded electrical arc welding, and oxy-acetylene work.

The shield assemblies consist of a vulcanized fiber or glass-fiber body, a ratchet or button type adjustable headgear or cap attachment, and a filter and cover plate holder. Newer technology offers auto-darkening lens capabilities. For manual filtered lens selection, start with a shade that is too dark to see the weld zone, then switch to a lighter shade which gives sufficient view of the weld zone without going below the minimum shade allowed. In oxy-fuel gas welding or cutting where the torch produces a high yellow light, use a filter lens that absorbs the yellow (sodium line) in the visual light of the (spectrum) operation. Guidance on appropriate filtered shades for various operations is available from EHSS or the OSHA website.

Welding helmets or filtered face shields should only be used over primary eye protection (i.e. safety glasses or goggles). Follow the manufacturer's instructions.

## **Storage and Care**

Safety glasses and other eye and face protection should be stored carefully to prevent scratching and damage. In general, do not store this equipment where it would be exposed to high heat or direct sunlight.

Eye and face protection should be inspected prior to use. If the equipment is damaged or broken, do not use it because it may not be able to fully resist impact. Pitted lenses, as well as dirty lenses, make it more difficult for an employee to see and should be replaced. Lenses that are pitted or deeply scratched are more prone to break under impact and should be replaced.

Clean eye and face protection according to the manufacturer's instructions. If the manufacturer's instructions are not available, clean with a mild soap and water solution (maintained at 120°) by soaking for 10 minutes. Rinse thoroughly and allow to air dry.

PPE that has been previously used by other personnel should be disinfected before issuing to another person. Completely immerse all parts in solution of germicidal fungicide for 10 minutes. Remove parts and air dry at room temperature.

## Selection of Eye and Face Protection Guide

The following chart provides general guidance for the proper selection of eye and face protection for hazards associated with the listed hazard “source” operations.

Source	Type of Hazard	Safety Glasses	Safety Goggles	Welding	Laser	Face Shield
<b>IMPACT</b> -Flying fragments, flying objects, chips, particles, sand, dirt, etc.	Chipping, grinding, machining, masonry work, drilling, chiseling, riveting, powered fastening, and sanding	✓	✓			✓
<b>HEAT</b> -Hot sparks, splash from molten metal, high temperatures	Furnace operations (pouring, casting, hot dipping), gas cutting and welding	✓	✓			✓
<b>CHEMICALS</b> -Splash, fumes, vapors, and irritating mists	Acid and chemical handling, degreasing, plating		✓			✓
<b>DUST</b> -Nuisance	Woodworking, buffing, general dusty conditions		✓			
<b>OPTICAL RADIATION</b> -Radiant energy, glare and intense light	Welding, torch cutting, torch brazing, torch soldering, and laser work			✓	✓	✓

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# Appendix B: Head Protection

## Compliance with National Standards

Protective helmets (i.e. hard hats) reduce the amount of force from impact, but cannot provide complete head protection from severe impact and penetration. They are intended to provide limited protection against small objects.

Hard hats must be marked to indicate the manufacturer, the date of manufacture, the ANSI designation, the applicable type and class designations, and the head size range.

When purchasing hard hats, ensure that they comply with the most recent ANSI standard, which is currently ANSI Z89.1-2003 "American National Standard for Industrial Head Protection". Hard hats already in use must be inspected carefully prior to use for signs of deterioration and defects. Although OSHA does not indicate an expiration date for hard hats, some manufacturer's do. Follow the manufacturer's instructions regarding inspection and replacement recommendations. If an expiration date is not indicated by the manufacturer, and the hard hat is in good condition and has not been previously dropped (more than 8-10 feet), it may be used; however, replacing hard hats every 5 years regardless of outward appearance is a good rule of thumb. Hard hats used in environments which have temperature extremes, sunlight, or chemicals should have a more stringent replacement period, such as every 2 years.

## General Requirements

A visual inspection should be performed prior to use each day. Hard hats should be free from signs of impact (i.e. dents, cracks, or penetration) and rough treatment (i.e. abrasions, gouges, or excessive wear). Any hard hat that fails the visual inspection should be removed from service and replaced. In addition to every day wear and tear, ultra-violet (UV) radiation can pose a problem for hard hats constructed of plastic. Hard hats should be free from UV damage (i.e. loss of glossy finish, chalky appearance, flaking, brittleness, fading, or dullness of color).

Another important part of the inspection process for hard hats is checking the suspension system on a periodic basis. The main purpose of the suspension system is to absorb the shock of a blow. Excessive wear, defects, or damage can invalidate the protection that it should be providing. Look for cracks, tears, frayed or cut straps, and loss of pliability. The attachment points to the shell should fit tightly and securely into their respective key slots. Remove the hard hat from service or replace the suspension system in kind if there are signs of damage.

## Types of Head Protection

Head protection must be worn when working in areas where there is a potential for injury to the head from falling objects or impact, or where close contact to live electrical is possible. Some examples of occupations for which head protection should be routinely considered are: carpenters, electricians, linemen, mechanics and repairers, plumbers and pipe fitters, assemblers, packers, wrappers, sawyers, welders, laborers, freight handlers, timber cutting and logging, stock handling, and warehouse laborers.

Hard hats shall meet either Type I or Type II requirements, and further be classified as Class G, E, or C for electrical protection. The current ANSI classification system for hard hats is described below.

	<b>Class G - General Protection</b>	<b>Class E - Electrical Protection</b>	<b>Class C - Conductive</b>
<b>Type I (crown impact protection)</b>	Crown impact protection. Intended to reduce the danger of contact with low voltage conductors. (Proof-tested at 2,200 volts.)	Crown impact protection. Intended to reduce the danger of contact with higher voltage conductors. (Proof-tested at 20,000 volts phase to ground.)	Crown impact protection. Not intended to provide protection against contact with electrical hazards.
<b>Type II (crown and side impact protection)</b>	Crown and side impact protection. Intended to reduce the danger of contact with low voltage conductors. (Proof-tested at 2,200 volts.)	Crown and side impact protection. Intended to reduce the danger of contact with higher voltage conductors. (Proof-tested at 20,000 volts phase to ground.)	Crown and side impact protection. Not intended to provide protection against contact with electrical hazards.

**Bump caps** (plastic ball caps) – may be used when head impact protection is not required, but where personnel may be exposed to minor bumps to the head or laceration hazards. Bump caps are not approved for use where impact protection is required.

**Cloth caps** are worn during welding operations to protect hair from sparks and slag, or in situations where rotating equipment could entangle hair.

**Ranger hats** have a wide brim all the way around the cap and provide sun protection for ears and neck.

**Reflectorized** ball caps provide high-visibility in situations involving close proximity of workers to traffic.

### Storage and Care

Follow manufacturer’s recommendations for cleaning head protection. Generally, a mild detergent and warm water is sufficient, followed by rinsing in clear water. Wipe shell of hard hat dry and allow suspension system, sweatband, and accessories to air dry thoroughly.

Hard hats should not be altered for any reason. Accessories must be compatible with the hard hat to avoid compromising protection. Alterations may result in a lower level of protection than originally intended and will void the manufacturer’s warranty.

General care for hard hats includes:

- **Do not** expose to extreme temperatures for long periods of time.
- **Do not** drill holes in the shell for added ventilation.
- **Do not** paint or inscribe on the shell without consulting the manufacturer.
- **Do not** store in direct sunlight.
- **Do not** wear backwards (unless welding apparatus is attached and welding is being performed).
- **Do not** wear with the shell tilted to one side.
- **Do not** place stickers on the shell which can hide signs of deterioration.

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# Appendix C: Foot and Leg Protection

## Compliance with National Standards

Protective footwear purchased after July 5, 1994 must comply with ANSI Z41.1-1991 "American National Standard for Personal Protection – Protective Footwear".

## General Requirements

Each affected employee must wear protective footwear when working in areas where there is a danger of foot injury due to falling or rolling objects, chemical hazards, objects piercing the sole, or electrical hazards. Employees who cannot wear safety shoes for medical reasons must furnish a letter to their supervisor from their physician stating the reason and the anticipated duration of the condition.

Footwear may be worn routinely, or donned in certain locations for identified hazards on a temporary basis. Disposable shoe covers are available and recommended for some hazards, such as biohazards.

General protective footwear, such as steel-toed or slip-resistant shoes may have to be paid for by the wearer due to its personal nature. Departmental policy may indicate that the department will pay for this type of footwear in full, partially, or not at all (wearer is responsible for paying for it). It is the employer's responsibility to ensure that footwear purchased by the employee or the department is in good condition and is suitable for use in certain situations. Damaged or defective footwear will not provide the level of protection required, and should be replaced immediately.

## Types of Protective Footwear

There are many types of footwear available for work situations. Some are designed with a specific craft or industry in mind, such as fire-fighting, electricians, or welders; others provide a specific type of protection as listed below. Many footwear options offer dual protection, such as steel-toed, chemical-resistant boots.

- **Steel/Composite Safety Toe** – Provides protection to the toes where personnel are exposed to injury as a result of heavy (greater than 40 pounds) falling or rolling objects on a regular basis, such as tools, equipment, and materials handling. Slip on toe caps are available when steel-toe protection is needed for a short, temporary instance.
- **Metatarsal Guard** – Provides protection to the top of the foot (metatarsal bone) as well as the toes. Guards are available built into the boot or as a temporary accessory where protection is only needed for a short period of time.
- **Static Dissipative** – Regulates the build up of electrical charge in a person's body. Commonly used in manufacturing of computer components, solvent-based paints, explosives, and plastics.
- **Conductive** – Protects against the hazards of static electricity build up in a person's body where the accumulation of static electricity on a body is a hazard. They should be worn by persons working in potentially flammable or explosive atmospheres.

- **Electrical** – The soles of these shoes provide a barrier to protect personnel from open electrical currents up to 600 volts.
- **Insulated** – Provides insulation against the cold and are intended for tough outdoor environments. Check the specific weight of insulation to help guide you in selection.
- **High Heat** – Constructed to resist high heat situations.
- **Waterproof** – Constructed to keep the feet dry and comfortable in wet conditions.
- **Chemical-Resistant** – Constructed of various materials to provide protection against certain categories of chemical hazards, such as animal fats, acids, most chemicals, oils, etc. Compare potential exposures to the manufacturer’s recommendations to select the right type.
- **Puncture-Resistant** – Designed to protect the mid-sole of the foot where sharp objects can pierce or penetrate the sole.
- **Slip-Resistant** – Provides slip-resistant tread for wet, oily, and/or greasy floors. Shoe chains and spikes are available to fit over existing boots to prevent falls on ice, snow, or other slick surfaces.

### Selection of Foot and Leg Protection

The following chart provides general guidance for the proper selection of foot protection for hazards associated with the listed hazard “source” operations.

Protection	Source(s)	Typical Occupations
Steel-toed safety shoes/boots/caps	Impact, compression, cuts, abrasions	Construction, demolition, renovation, plumbing, building maintenance, trenching, utility work, grass cutting, materials handling
Metatarsal footwear	Severe impact or compression to the top of the foot	Jack-hammering, pavement breaking, heavy pipes, steel or iron work, skid trucks
Heat-resistant boots and/or leggings/chaps	Molten metal, super-heated fluids	Foundry work, welding operations
Chemical-resistant footwear/leg wear	Splash hazard or direct contact/work with certain chemicals	Acid and chemical handling, degreasing, plating, spill response
Static Dissipative	Should be used in conjunction with static dissipative flooring.	Work on electronics, computer components, solvent-based paints, explosives, and plastics
Conductive footwear	Work near or in explosive or hazardous atmospheres. DO NOT use when exposed to electrical hazards.	Explosives manufacturing, grain milling, spray painting, or similar work with highly flammable materials

Electrical footwear	Work on or near exposed energized electrical wiring or components. DO NOT use in areas that have potential flammable or explosive atmospheres.	Building maintenance, utility work, construction, wiring, work on or near communications, computer or similar equipment, and arc or resistance welding
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### Types of Protective Leg Wear

- **Leg Guards** - Designed to cover the knee, shin, and top of the foot from impact or abrasions.
- **Waders** - Provide water-proof protection for the feet, legs, and/or lower torso.
- **Chaps** - Provides protection to upper and lower legs. Usually hazard/task specific.
  - **Chain saw chaps** are made of multiple layers of cut-resistant fabric, which is designed to jam the chain saw chain and stop the cutting action before it reaches your skin.
  - **Welding chaps** are typically made of leather and provide heat/burn protection from sparks and slag.

### Storage and Care

All safety footwear requires routine inspection for cuts, holes, tears, cracks, worn soles, and other damage that could compromise its protective qualities. Footwear required for certain hazards, such as electrical, hazardous materials, or chemical-resistance should be inspected prior to each use. Follow manufacturer's instructions on inspection and care. Damaged or defective footwear must not be used.

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# Appendix D: Hand and Arm Protection

## Compliance with National Standards

There currently are no ANSI standards for glove selection; therefore, selection must be based on the performance characteristics of the glove in relation to the tasks to be performed. Suppliers and manufacturers may provide compliance guidelines or references for food and pharmaceutical applications.

## General Requirements

Hand and arm protection must be selected and used when personnel may be exposed to certain hazards, such as:

- Work with harmful substances, dry or liquid, that can be absorbed through the skin, or that can cause skin irritation, chemical burns, or similar conditions. Examples would include strong acids/bases, toxic or corrosive materials, organic solvents, and radioactive materials.
- Work with tools, equipment, or materials that can cause cuts, lacerations, punctures, fractures, amputations, or abrasions.
- Work where the employee is exposed to materials or agents that can cause thermal burns or that expose the employee to harmful temperatures.
- Work that may expose employees to blood or other potentially infectious agents.
- Work on live electrical systems or components. Additional training is required for the use of electrical protective equipment.

The best place to start when selecting gloves for a task is to compare the exposure hazards to the protective qualities of the gloves available from your supplier. Many tasks will involve multiple hazards, and the glove selected should either protect against all of the hazards, or more than one type of glove may have to be worn. A common example of this is when leather gloves (cut/puncture/abrasion resistant) are worn over voltage-rated rubber gloves. Certain chemical and/or radiation hazards may require double gloving (of the same type).

## Types of Hand/Arm Protection

There are several categories of gloves.

- **Disposable gloves** – Perfect for one-time use situations. Thin for improved sensitivity and dexterity. Provides wearer protection against materials, or protects the material from the handler. Available in a variety of materials and for a variety of tasks.
- **Critical-environment gloves** – Used in applications that require extreme cleanliness, such as in the electronic, nuclear, and pharmaceutical industries.
- **Chemical-resistant gloves** – Protects against **specified** chemicals and liquids, also protects against abrasion, cuts, punctures, and snags. Generally, any “chemical-resistant” glove can be used for dry powders. (See additional information provided later in this section.)
- **General-purpose gloves** – Intended to help reduce hand injuries from snags, punctures, abrasions, and cuts.

- **Coated gloves** – Nitrile and natural rubber coated gloves are often used as substitutes for leather gloves. They offer superior hand protection in wet environments where dexterity is important.
- **Cut-resistant gloves** – Available in a wide variety of materials, including metal-mesh, Kevlar®, aluminized, etc. Protects against cuts and scrapes in the food industry, as well as general warehousing.
- **Puncture-resistant gloves** – Available in a wide variety of materials. Puncture-resistant gloves protect against most sharp objects, including glass, metal, and needle sticks. No glove is completely puncture-proof, nor can gloves be expected to take the place of proper engineering or work practice controls.
- **Anti-vibration/impact gloves** – Protection from vibration or impact from tools and equipment. Helps prevent hand, finger, and arm fatigue.
- **Leather gloves** – Qualities of leather include comfort, durability, dexterity, mild heat resistance, and abrasion resistance. Good all-purpose glove.
- **Temperature-resistance gloves** – Provides protection from high temperatures as well as cold. Leather, Kevlar®, cotton terrycloth, cryogenic gloves, rubber, Nomex®, Zetex®, and Flextra® are some common materials used in this type of glove. Includes welding gloves.
- **Lineman’s gloves** – Protection for utility workers. To assure adequate electrical protection, choose the properly rated lineman’s gloves and protectors for your application. Additional training from EHSS is required.

Class	Max. Use Voltage AC	Max. Use Voltage DC
00	500	750
0	1,000	1,500
1	7,500	11,250
2	17,000	25,500
3	26,500	39,750

## Selection

Before purchasing gloves, the PPE Coordinator should review the work activities to determine the degree of dexterity required, the duration, frequency, and degree of exposure to the hazard, and the physical stresses that will be applied. Hand protection must be selected based upon a review of the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use, and the existing and potential hazards identified.

There are several factors to consider when selecting a glove, such as size, the type of cuff, lining, and length.

- Sizing
  - Gloves come in sizes ranging from small to XX-large. It is important to provide a selection of sizes to employees so that a proper fit is obtained. Gloves that are too small will cause fatigue and gloves that are too large may create dexterity issues, entanglement hazards, or may affect protective qualities.
- Cuff Type

- Pinked cuff – A zigzag finished appearance commonly found on knit-lined rubber gloves.
- Rolled cuff – Gives additional cuff strength and a finished appearance. Acts as a barrier to keep chemicals from running off glove onto skin.
- Straight cuff – Provides a snug fit to protect from chemical runoff and skin contact.
- Gauntlet cuff – Extended length protects wrist area. Slides on and off easily. Allows for maximum movement of forearm.
- Lining Type
  - Unlined – Gives better sensitivity and dexterity than lined gloves. Required where particle contamination is a concern. Powdered unlined gloves make on/off easier and increase comfort, but may be an irritant to some individual users.
  - Flock-lined – Shredded fiber, usually cotton, applied to the inside surface of the glove material. Absorbs perspiration. Easy on/off.
  - Knit-lined – Cotton or synthetic material bonded to the inside surface of a glove. Absorbs perspiration, adds some temperature protection.
  - Jersey-lined – Softest, most comfortable lining. Gives additional temperature protection and greater cushioning effect.
- Length
  - Finger cots – worn on the fingers alone when minimal or no protection is required.
  - 9 – 12 inches provides complete hand protection.
  - 12 – 18 inches provides hand, forearm to elbow protection for immersion or extra splash protection.
  - 24 – 31 inches provides full arm immersion protection.

**Chemical-resistant glove** selection begins with an evaluation of the type of work to be performed and the chemical(s) that personnel will be contacting. No glove provides protection against all potential hand hazards, and available gloves may provide only limited protection against many chemicals. It is important, therefore, to select the most appropriate glove for a particular application and to determine how long it can be worn and whether it can be reused. It is often advantageous to select two different types of gloves and wear one pair over the other, thus increasing the range of protection. Chemical-resistant gloves should be inspected prior to use for discoloration, punctures, or tears. Consider the following issues:

- The type of chemical(s) to be handled or used.
- The frequency and duration of the task for chemical contact. Different chemicals will affect the protective qualities of a glove in different ways.
  - Breakthrough time: the time it takes for the chemical to pass to the inside of the glove. Some gloves are not recommended for certain chemicals. Some specified a time limit before chemical breakthrough of the glove material was detected. Some did not detect a breakthrough (under laboratory test conditions). Follow manufacturer guidelines or supplier “Chemical Compatibility Guides” for additional information.
  - Permeation: if a chemical will pass through a glove material.

- Degradation: how the chemical will affect the physical properties of the glove material upon contact. Degradation can lead to softening, drying, swelling, shrinkage, or other undesirable side effects that could expose the employee to the chemical.
- The ability of the chemical to penetrate through the glove must be determined.
  - **Latex/natural rubber** does not hold up well to organic solvents, oils, greases, or fuels such as kerosene or gasoline.
  - **Nitrile** is ideal for stripping and degreasing, chemical washing, and is resistant to animal fats and vegetable oils. Nitrile does not contain latex that causes skin allergies.
  - **Polyvinyl chloride (PVC)** provides excellent resistance to most acids, fats, and petroleum hydrocarbons.
  - **Neoprene** is strong and durable and provides excellent chemical resistance. Note: Check “Chemical Compatibility Guides” for specific chemical and glove materials recommended.
  - **Polyvinyl alcohol (PVA)** has an extremely high resistance to aliphatics, aromatics, chlorinated solvents, esters, and ketones. PVA quickly breaks down when exposed to water and light alcohols.
  - **Butyl** provides excellent chemical resistance to gases and ketones. It is ideal for handling hazardous materials. Butyl is severely affected by fuels and aliphatic and aromatic hydrocarbon solvents.
  - **Viton** is the most resistant of all, and provides high-temperature, fuel-resistance. Recommended for working with extremely hazardous chemicals, such as carcinogenic or highly toxic chemicals.
  - **Silver-shield** provides excellent chemical resistance and is commonly used for hazardous materials work, or work involving multiple chemical hazards.
- The toxic properties of the chemical(s) - in particular, chemicals that can cause local effects on the skin and/or pass through the skin and cause systemic effects warrant a higher level of protection.
- Mixtures and formulated products (unless specific test data is available) require that gloves should be selected based on the chemical component with the shortest breakthrough time since it's possible for solvents to carry active ingredients through some glove materials.
- Personnel must be able to remove the gloves in such a manner as to prevent skin contamination.
- Determine if the task will involve splash hazards, and ensure that adequate protection is used.
- Consider the concentration of the chemical(s).
- Consider the temperature of the chemical(s).
- Consider abrasion, cut, puncture, tear-resistance, and grip requirements.
- For work involving chemicals where there is a skin absorption hazard, double gloving of the appropriate type may be necessary.

# Appendix E: Protective Clothing/Body wear

## Compliance with National Standards

Standards are not currently available for all types of protective clothing or body protection. Where such standards exist, only those items of protective clothing and equipment that meet NIOSH, ANSI, ASTM, or NFPA standards, as appropriate, may be used. Questions regarding the suitability of a specific item for a given hazard should be referred either to the manufacturer or EHSS.

## General Requirements

The department must provide body protection for employees if they are threatened with bodily injury or illness while performing their jobs, and if engineering or administrative controls have failed to eliminate these hazards. Workplace hazards that could cause bodily injury include the following:

- Exposure to highly toxic chemicals or carcinogens.
- Exposure to intense heat or cold. Note: Cold weather clothing is generally considered to be normal-wear clothing and is not covered by this program.
- Splashes of very cold or very hot metals or liquids.
- Impacts from tools, machinery, or materials.
- Cuts and/or abrasions.
- Exposure to hazardous chemicals.
- Contact with potentially infectious materials, like blood.
- Radiation.
- Exposure to electrical hazards.
- Exposure to some fall hazard situations.

Many types of protective clothing restrict airflow and impede perspiration. The risk of heat exhaustion or heat stroke, therefore, may be greatly increased with some types of protective clothing. Employee training on the symptoms of heat stress and the use of engineering controls (e.g. increasing ventilation), administrative controls (e.g. employee rotation), and personal protective equipment (e.g. cooling vests) may be essential to assuring employee safety in hot work environments.

## Types of Clothing and Body Protection

The protective clothing provided must be constructed of material that will protect against the specific hazards in the workplace. The degree of body protection should be carefully considered since this category covers aprons to gastight suits. Materials used in protective clothing include paper-like fiber, treated wool and cotton, duck, leather, rubber/plastics, etc.

- Coveralls are designed to protect personal clothing while on the job.
- Lab coats protect clothing and skin from dirt, inks, and chemicals. The effects of skin contact can range from relatively minor diseases such as dermatitis, to systemic poisoning, to risk of cancer, and death.
- Barrier gowns provide protection from bloodborne pathogen splashes.
- Disposable suits, such as Tyvek® or PVC-coated, protect against harmful particulates, some liquids and chemicals, and bloodborne pathogens.

- Aprons come in a variety of materials to protect against a variety of hazards, such as chemicals, heat, sparks/slag, etc.
- Chemical suits, used in hazardous material spills for example, are categorized by levels.
  - Level A suits provide protection against vapors and include a gastight zipper.
  - Level B splash suits, such as Tychem®, provide chemical and biological protection.
- Flame-resistant (FR) clothing is treated to self-extinguish when removed from flame or ignition sources. Clothing includes undergarments, coveralls, lab coats, overalls, shirts, and pants. NFPA 70E requires personnel working within a flash protection boundary to wear flame-resistant protective clothing. Employers must perform a flash hazard analysis (before allowing personnel to approach exposed electrical parts) to determine the protection boundary distance and the appropriate level of FR clothing to be used. Detailed information is available from EHSS. The Arc Thermal Protective Value (ATPV) must be calculated to determine the incident energy in calories per centimeter squared (cal/cm<sup>2</sup>). The ATPV signifies the amount of incident energy that would just cause the onset of second-degree burns. It also signifies the amount of protection the clothing affords when an electrical arc comes in contact with the fabric. Each FR garment is assigned an ATPV rating by the manufacturer. This rating must be noted on the garment label, along with other pertinent information.
  - Electrical-arc hazard protection consists of jackets, overalls, coats, leggings, and hoods with arc-protective face shields for full body protection. ATPV rating is typically 20, 32, or 40 cal/cm<sup>2</sup>.
- Welding clothing is available in aprons or suits, and is typically made of leather to resist cuts, sparks, and slag.
- Heat-reflective clothing includes aluminized coats, pants, leggings, aprons, sleeves, gloves, and hoods. This type of clothing is designed to repel molten metal splash and reflect 90% of radiant heat.
- Cooling vests have bladder inserts for ice packs, or are water-soak activated. They are beneficial in heat stress situations.
- High-visibility clothing comes in neon colors with reflective strips for work around traffic or other situations where the worker needs to be seen. Available in vests, jackets, bib overalls, insulated, waterproof, or lightweight.
- Steel mesh aprons provide protection against cuts, slashes, and lacerations to the torso. They are typically worn in the meat-cutting industry.
- Floatation vests are worn when working around water.

## Storage and Care

Always follow the manufacturer's instructions regarding special care, cleaning, storage, and care.

# Appendix F – Fall Protection

## Compliance with National Standards

Personal fall arrest systems consist of an anchorage connector, body wear, and a connecting device. When these components are used properly, and in conjunction with each other, they form a system that is vitally important in fall hazard situations. Body wear and connecting devices (e.g. lanyards, fall-limiters/self-retracting life lines) must meet all OSHA, ANSI Z359-1992 “Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components”, and ANSI A10.14-1991 “Fall Protection Systems – American National Standard for Construction and Demolition Operations” requirements.

## General Requirements

Users must attend EHSS training on personal fall arrest systems prior to being assigned work requiring such equipment. Training includes the components of the system, OSHA requirements, proper donning and fit of the harness, and inspection criteria.

Personal fall arrest harnesses and connecting devices must be inspected prior to use by the wearer, and at least annually by a “competent person” other than the user. General inspection criteria are available during EHSS training. This inspection should be documented on the harness/device tag or on a form/log (available from EHSS).

General guidelines from OSHA, ANSI, and most manufacturers do not specify a shelf-life or expiration. If the equipment passes the inspection process specified by the manufacturer or other recognized criteria, it is acceptable for use. *Never* use a harness that does not pass visual inspection. Some manufacturers do specify a service life, such as five years. If a service life is specified by the manufacturer, the date that the harness is put into service (i.e. first used) must be noted on the tag or inspection log. Follow the manufacturer’s guidelines on inspection and removal from service once the service life has been reached.

Wearers should report any incident of falling in the harness to their supervisor. Harnesses that have received a fall force must not be reused *unless* it has been recertified by the manufacturer in writing. Harnesses that have received a fall force should be removed from service and tagged “Do Not Use”. If it will **not** be sent to the manufacturer for recertification, render it unusable (i.e. cut a strap) and throw it in the trash. Harnesses should not be purchased second-hand because the history of the harness is unknown.

Connecting devices must be shock-absorbing in order to reduce fall forces below OSHA’s maximum allowable fall force of 1,800 pounds.

## Types of Fall Protection

There are two types of fall protection:

- **Type I** fall protection can be used for fall protection as well as positioning. Most harnesses are designed to ANSI’s maximum working weight of 310 pounds. If

the working weight (man and tools) exceeds 310 pounds, a heavy-duty harness and connecting device must be used. Type I harnesses are available with various D-ring configurations. All harnesses must have a back D-ring for attaching the connecting device for fall arrest.

- Shoulder D-rings are optional for confined space (vertical) retrieval.
- Hip D-rings are optional for positioning where hands must be free to perform work.
- Chest D-ring is optional for ladder climbing device connection.
- **Type II** fall protection (ex. body belt) is for positioning only. Body belts are not permitted for fall arrest per OSHA as of January 1, 1998. **EHSS recommends that body belts *not* be purchased or kept on-site to avoid misuse and confusion.**

## Selection

Harnesses may be sized for small to X-large body frames, or offer a universal fit, which can be adjusted for medium to X-large frames. Also consider the work environment where the harness will be worn in order to select a harness that will provide the level of protection and service life desired. There are several models available to address work environment issues and/or industry hazards.

- Concrete construction harness
- Arc-flash utility harness
- Heat- and abrasion-resistant harness
- Grease/oil/dirt/grime-resistant harness
- High-visibility harness
- Lightweight harness (made of lightweight polyester for comfort)
- Abrasion-resistant harness
- Welding harness

## Storage and Care

Follow the manufacturers' recommendations for cleaning, inspection, and storage.

# Appendix G – Hearing Protection

## Compliance with National Standards

EHSS has developed a Hearing Conservation Program to comply with OSHA regulations, and to coordinate efforts to reduce occupational noise exposures and prevent occupational hearing loss. All employees with an 85 dBA Time Weighted Average (TWA) or higher must attend hearing conservation training annually at EHSS. Hearing protection devices must comply with ANSI standards.

## General Requirements

EHSS must conduct noise measurements to determine if employees are being overexposed to noise, and to identify the machine(s) or work process(s) that are contributing to the exposure. If a worker is exposed to an excessive amount of noise, measurements are needed to determine the proper hearing protection device (HPD) that should be used. Accurate exposure measurements are also needed so that affected employees can be included in the Hearing Conservation Program if they are exposed to excessive noise levels.

**Note:** Engineering and administrative controls are the most effective and preferred method to prevent noise-induced hearing loss.

The employee's department shall pay for, and continue to provide, any required HPD to the employee at no cost to the employee.

## Types of Hearing Protection

To prevent noise-induced hearing loss, hearing protection devices must reduce noise exposure to time-weighted average (TWA) levels of 90 dBA or below, or to 85 dBA or below for those workers who have suffered a standard threshold shift (STS). HPDs reduce the amount of noise; however, they cannot eliminate all of the noise reaching the ear since noise can take many routes into the ear. The two most commonly used types of HPDs at Virginia Tech are:

- **Ear plugs**, which are inserted into the ear canal to reduce the amount of noise that reaches the ear via that route. There are two types – disposable and reusable.
- **Ear muffs**, which are worn over the ear to reduce the amount of noise.

## Selection

EHSS will make recommendations for appropriate hearing protection devices (HPD) for individuals based on noise attenuation requirements and HPD fittings. If you are not already enrolled in the Hearing Conservation Program, contact EHSS at 231-3080 for more information. Those already enrolled in the program will be notified by EHSS to attend annual training and testing.

## Storage and Care

Follow manufacturer's recommendations for storage, use, and care.

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# Appendix H – Respiratory Protection

## Compliance with National Standards

EHSS has developed a Respiratory Protection Program to comply with state and federal regulations and to coordinate efforts to reduce occupational respiratory exposures and prevent occupational illness. Respiratory protection is necessary whenever a hazardous concentration cannot be reduced below the Permissible Exposure Limits (PEL) established by OSHA. All respiratory protection devices used at Virginia Tech must be certified by NIOSH and shall only be used in accordance with the terms of that certification and their assigned protection factors. All mandatory respiratory protection users must be enrolled in the Occupational Health Assurance Program administered by EHSS.

## General Requirements

Departments and the organizational units are responsible for identifying respiratory hazards to employees and students. A Respiratory Hazard Evaluation (RHE) form is available from EHSS to assist with this process. Once completed, it should be submitted to EHSS for review. Departments must notify EHSS of new employees who are required to wear respiratory protection as part of specific job duties as outlined in the pertaining standard operating procedures and must consult with EHSS prior to instituting such a requirement.

All employees with a consistent occupational exposure to any of the following general hazards should have their supervisors submit the RHE form to EHSS.

- Particulate contaminants (ex. stone dust, asbestos, lead dust, coal dust, fly ash, organic dust, etc.)
- Gas and vapor contaminants (ex. solvents, lacquers, acids, epoxy resins, etc.)

**Note:** Any employee required to perform work in oxygen-deficient atmospheres (ex. oxygen less than 19.5% by volume) must contact EHSS for additional training.

Once a respiratory hazard has been identified, the department must determine appropriate engineering or administrative controls for this hazard. Engineering control is most often achieved by the use of fume hoods, local exhaust ventilation, or substitution of the chemical of concern. An example of an administrative control is changing work practices to decrease potential exposure. EHSS will assist with identifying appropriate controls upon request and perform follow-up evaluations as needed. If personal monitoring is deemed necessary, EHSS will perform it free of charge to the departments. Supervisors and employees will be informed of the findings in a timely manner.

The need for use of respiratory protection is determined based on the RHE, personal sampling results (if available), anticipated contaminant levels during any given task/job duty, and medical provider recommendations, when available.

When respiratory protection use is **mandatory**, respirator users must be enrolled in the Occupational Health Assurance Program (OHAP) administered by EHSS. Enrolling in this program is necessary to determine if a person is physically fit to wear certain types of respiratory protection. EHSS will identify the respirator that has an appropriate fit for each user during the fit testing process. The respirators and associated supplies are provided free of charge to the employee and paid for by their respective departments.

When an employee chooses to wear respiratory protection for his/her personal comfort, even when not exposed to levels of respiratory hazards above any permissible limits, the use of such respirators is considered **voluntary**. Their departments may or may not choose to pay for voluntary-use respirators.

When an employee is enrolled in the Respiratory Protection Program or OHAP, s/he receives the following services:

- Annual medical evaluation (pulmonary function test if deemed appropriate by EHSS, and Respirator Questionnaire),
- Annual respiratory protection training,
- Initial respirator selection and fit-testing (annual fit-testing thereafter).

## Types of Respiratory Protection

There are two primary types of respiratory protective devices that may be used when engineering or administrative controls are not feasible, effective, or are in the process of being implemented.

- **Air-purifying respirators:**
  - Remove particles and certain vapor and gas contaminants from the air prior to inhalation by a cartridge or canister, which is affixed to the respirator face piece.
  - Must not be used in oxygen-deficient atmospheres, or in atmospheres that are “immediately dangerous to life and health” (IDLH).
  - May be powered (PAPR) or non-powered (i.e. tight-fitting half and full face units).
- **Air-supplying respirators:**
  - Supply breathing air to the face piece from a separate air source, such as a cylinder.
  - May be used in oxygen-deficient and/or in highly toxic atmospheres,
  - Include self-contained breathing apparatus (SCBA) and supplied-air respirators (SAR). Specialized training is required prior to use.

## Selection

EHSS makes recommendations for appropriate respiratory protection based on hazard evaluation, monitoring, anticipated levels of exposure and medical provider requests, if available. One or more types of respirators are usually acceptable for any given situation. Priority will be given to respirators that have a high user acceptance factor and accommodate proper use of any additional PPE that is required by a particular work environment.

Special considerations in respiratory selection include:

- Respirators for use in areas where **biohazardous agents** are used or stored must be selected based on a review of the biohazardous agent, workstation design, standard operating procedures, and protocols. The EHSS Biosafety Officer will determine appropriate biosafety levels for laboratories, and will work with EHSS industrial hygienists to determine corresponding required personal protective equipment.
- Although exposure to airborne **animal dusts** is not currently regulated to protect workers from developing allergic problems, there is a large body of evidence indicating that animal handling can induce respiratory health problems, such as asthma, allergic reactions, or sensitizations. Enrollment in the Respiratory Protection Program is available for any employee who chooses to wear a tight-fitting respirator in order to perform animal care related job duties.
- No Virginia Tech employee is permitted to enter a space that might present a situation that is “**immediately dangerous to life and health**” (IDLH) without thorough evaluation and implementing appropriate precautions. EHSS must be notified immediately to determine appropriate controls, precautions, training, and equipment necessary for safe entry. If the space is a confined space, additional training is required from EHSS.
- **Emergency escape** respirators may be kept in work areas identified as having the potential for dangerous leaks or spills. EHSS must be notified so that appropriate standard operating procedures, respirator inspection schedules, and emergency management planning can be developed in conjunction with the department.

### Storage and Care

Respirators must be used, maintained, and stored according to the manufacturer’s recommendations and/or the Respiratory Protection Program requirements.



# Respiratory Hazards Assessment form

I am reviewing (check one box)	<input type="checkbox"/> A worksite	Specify location:	
	<input type="checkbox"/> A single employee's job description	Name of employee:	
	<input type="checkbox"/> A job description for a class of employees	Working title of position/position number:	
		Working title of positions:	
		Position numbers:	
Your name:		Department:	Date:
<b>Exposure to chemicals</b>			
<input type="checkbox"/> Organic Vapors (benzene, toluene, MEK, acetone, xylene, paint thinners, etc)		<input type="checkbox"/> Methylene Chloride	
<input type="checkbox"/> Acid gas (hydrogen chloride, hydrogen sulphide, etc.)		<input type="checkbox"/> Mercury vapors	
<input type="checkbox"/> Ammonia		<input type="checkbox"/> Pesticides	
<input type="checkbox"/> Formaldehyde/Formalin		<input type="checkbox"/> Other _____	
<b>Exposure to dust, mist and fumes</b>			
<input type="checkbox"/> Cotton dust	<input type="checkbox"/> Welding fumes	<input type="checkbox"/> Pesticide application	<input type="checkbox"/> Lead
<input type="checkbox"/> Grain dust	<input type="checkbox"/> Asphalt fumes	<input type="checkbox"/> Paint spraying	<input type="checkbox"/> Asbestos
<input type="checkbox"/> Animal dust	<input type="checkbox"/> Other fumes _____		
<input type="checkbox"/> Wood dust			
<input type="checkbox"/> Other _____		<input type="checkbox"/> Biological hazards	
<b>Work involving any of the above mentioned hazards is performed:</b>			
<input type="checkbox"/> Outside	<input type="checkbox"/> In the shop	<input type="checkbox"/> In confined space*	
<input type="checkbox"/> Under chemical hood	<input type="checkbox"/> In the paint booth	<input type="checkbox"/> In oxygen deficient atmosphere*	
<input type="checkbox"/> In the lab (bench top)	<input type="checkbox"/> Mechanical room	<input type="checkbox"/> Other: _____	
<b>Respiratory protection use</b>		<b>Hazard concentration</b>	
<input type="checkbox"/> Half face respirator	<input type="checkbox"/> chemical cartridge (white, black, yellow, green or olive label)	<input type="checkbox"/> Unknown	
<input type="checkbox"/> Full face respirator	<input type="checkbox"/> HEPA filter (purple label)	<input type="checkbox"/> Known (please provide sampling data)	
<input type="checkbox"/> Air line respirator	<input type="checkbox"/> combination		
<input type="checkbox"/> PAPR			
<input type="checkbox"/> Disposable dust mask			

\* if you need to perform work in these environments please contact EHSS/OSD (231-5985) for approval  
 For a comprehensive Job Hazard Analysis for see <http://www.ehss.vt.edu/Programs/OSD/PPE/Appendices/appendix1.pdf>

**RETURN THIS FORM TO EHSS/OHIIH (campus mail 0423, fax 540 231 3944)**