New College of Florida
THE HONORS COLLEGE

Personal Protective Equipment Program

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Purpose

Environmental Health and Safety (EHS) developed this program to help departments protect employees from exposure to workplace hazards and to facilitate NCF compliance with state and federal safety-related regulatory requirements.

This program complies with the requirements of the Occupational Safety and Health Administration regulations 29 CFR 1910 Subpart I and 29 CFR 1926 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. Employees must be trained on the limitations of PPE, and on its proper use and maintenance. Employees must also be aware that PPE does not eliminate the hazard. If the equipment fails or is used improperly, they will be exposed to the hazard and may suffer injury.

Definitions

Administrative Controls involve changing the methods or procedures used to perform specific tasks to reduce employee exposure to a hazard. An example of an administrative control would be employee rotation to reduce the time that an employee is exposed to a hazard.

Engineering Controls reduce or eliminate employee exposure to a hazard on a relatively permanent basis, and are the most desirable type of hazard control. Examples of engineering controls include installing barricades and shields, or changing the work area layout, tools, lighting, or ventilation.

Metatarsal: The middle part of the foot that forms the instep.

Material Safety Data Sheet (MSDS) is 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.

Qualified Person is 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.

Scope

This program applies to all NCF properties, to all work performed on the NCF campus, and to all work performed by NCF employees regardless of jobsite location.

This program specifically addresses eye, face, foot, hand, and torso protection.

This program does not fully address the details of PPE required for respiratory, noise, or non¬ionizing radiation (such as laser) hazards, though the need for such PPE may be identified during the hazard assessment process. If such potential hazards are identified during the assessment process, contact EHS for guidance.

This program does not fully address the details of PPE required for fall or electrical hazards, though the need for such PPE may be identified during the hazard assessment process. If such potential hazards are identified during the assessment process, contact EHS.

This program does not fully address the details of PPE required for work involving ionizing radiation. Information on work practices and PPE required for such hazards may be obtained by contacting EHS.

Supplemental information on PPE required for laboratory operations may be found in the NCF's Chemical Hygiene Plan (CHP). A copy of the CHP may be obtained by contacting EHS.

This program requires:

- Designation of responsible persons - by departments - to coordinate the requirements of this program at their worksites.
- Training of designated departmental personnel by EHS.
- Performing a hazard assessment of worksites and/or employee job duties by designated departmental personnel,
- Assigning PPE to employees based upon the results of the hazard assessment performed.
- Training of employees by designated departmental personnel.
- EHS evaluating the effectiveness of the PPE Program on a periodic basis and by EHS modifying training or the written program as needed to address identified deficiencies.

Responsibilities

Environmental Health and Safety

The Personal Protective Equipment Program will be implemented by using “Train-The-Trainer” methods. EHS will assist departments by providing technical support, supervisory-level training, and oversight for the program upon request. EHS will assist the departments, upon request, by providing training for non-supervisory personnel. EHS involvement does not relieve NCF departments, supervisors, or contractors of their individual responsibilities. EHS is responsible for developing, implementing, and administering the PPE Program. This involves:

- Assisting in training supervisors or other departmental representative(s) to conduct workplace hazard assessments.
- Assisting with the hazard assessment surveys by serving as a technical resource.
- Providing guidance on the selection, care, and use of PPE.
- Maintaining centralized records of hazard assessments, training, and inspections.
- Providing training and technical assistance to the designated departmental personnel.
- Developing and maintaining the PPE train-the-trainer manual, videos, and other training resources.
- Evaluating the overall effectiveness of the PPE Program on a periodic basis, and revising the program as needed to assure the safety of NCF employees.

- Maintaining the NCF Respiratory Protection and Hearing Conservation programs, as needed, and evaluating workplace exposure to hazards that would require the use of respirators or hearing protection.
- Maintaining the NCF Chemical Hygiene Plan. This plan covers the use of protective devices in laboratory operations.

Departmental Responsibilities

Individual NCF Departments are expected to maintain safe and healthy 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. It is recommended that each department designate one person to coordinate and implement this program (e.g., the PPE Coordinator(s)), though any equally effective method may be used if compliance with the requirements of this program is assured. This individual will conduct or coordinate inspections of all workplaces to determine the need for PPE and help in selecting the proper PPE for each task performed. This responsibility will fall to the highest supervisory level of each departmental unit unless otherwise specified. The name(s) of designated departmental personnel must be provided to EHS.

This PPE Coordinator, or other person(s) designated by the department, will perform the following operations once they are trained by EHS:

Job Specific Hazards Assessments

Each department is required to assess the hazards in their workplace(s) to determine which operations require personal protective equipment. In some situations it may be more appropriate for the hazard assessment to involve a review of an employee's job duties or duties for a class of employee to determine if work is performed that that will require the use of PPE. This hazard assessment must be performed in accordance with the requirements outlined in this program.

Equipment selection

If the work site hazard assessment or the review of employee job duties, indicate that there is exposure to a hazard(s) that requires the use of PPE, the departmental designee(s) will:

- Select, and have each affected employee use, the type(s) of PPE that will protect the employee from the hazards identified in the hazard assessment.
- Inform the employee of the reasons for selecting the specific PPE.
- Select PPE that properly fits each affected employee.
- Verify that the hazard assessment has been performed through a written certification. This certification must identify the workplace or job duties evaluated, the name of the person performing the assessment, and the date of the assessment.

Employee-owned equipment

Where employees provide their own protective equipment, the department is responsible for assuring that it is adequate for the hazardous condition, and that this equipment is properly maintained as required by this program.

Design

The department must assure that all PPE is of a safe design and construction for the work to be performed.

Defective and damaged equipment

The department must assure that defective or damaged personal protective equipment is not used.

Training

The person(s) designated above, or other assigned departmental representative, must train each employee who is required to use PPE.

Recordkeeping

Maintain records of hazard assessments, PPE assignments and training, and provide a copy of all records to EHS.

Assessment

Seek assistance from EHS as needed to evaluate hazards. Reassess the worksite when new hazards are introduced or when processes are changed or added in the work place.

Employees

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

- Attend required training sessions on PPE.
- Wear PPE as required.
- Clean, maintain, and care for PPE as required.
- Inform the departmental PPE Coordinator of the need to repair or replace PPE

Contractors

Contractors must comply with all local, state, and federal safety requirements, and must assure that all of their employees performing work on NCF property have been suitably trained and supplied with the appropriate PPE.

Visitors

Visitors to NCF property must abide by the requirements of this program. It is the responsibility of the person(s) hosting the visitors to enforce this program. PPE used by visitors, whether provided by the visitor or the host department, must meet the minimum requirements established for NCF employees.

Training

Each employee required to wear PPE must receive training in the proper use and care of their PPE. It is expected that either the supervisor or other person(s) designated by the department will provide this training. This training must include the following:

- When PPE is to be worn;
- What PPE is necessary;
- How to properly don, doff, adjust, and wear PPE;
- The limitations of PPE;
- The proper care, maintenance, useful life, and disposal of PPE.

The employee must demonstrate an understanding of the training and ability to use PPE properly before being allowed to perform work requiring the use of PPE. The PPE Coordinator(s) must maintain a written certification that each affected employee has received and understood the required training. This certification must include the name of each employee trained, the dates(s) of training, and the subject of the training. A blank training certificate may be found at the end of Appendix H. When the PPE Coordinator(s) or EHS has reason to believe that an employee using PPE does not have the understanding and skill required to use this equipment safely, 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 render previous training obsolete. When assistance is required, the PPE Coordinator for the department may be provided training by EHS.

Hazard Assessment and Equipment Selection

Evaluation of Hazards

Two types of hazard assessments may need to be performed by the department.

Workplace hazards should be evaluated when an employee works at one location or performs only one class of work.

Job specific hazards should be evaluated when an employee does not work at a fixed location and is exposed to hazards at a number of work locations.

Workplace Hazards

The PPE Coordinator(s) will be reviewing departmental workplaces to determine if hazards are present or are likely to be present that require the use of PPE. The workplace hazard assessment is conducted using the guidance provided in Appendix A and must be documented in writing using the form provided in Appendix I. A copy of this assessment must be provided to EHS.
The first step of the hazard assessment is to perform a walk-through survey of the worksite to observe and record potential hazards. Hazards are identified as follows:

Electrical hazards	Layout of workplace
Presence of sharp objects or edges	Stacked or stored objects that could fall or roll
Sources of light radiation	Types of chemical exposure
Sources of rolling or pinching objects	Sources of high and low temperature
Exposed moving parts of machinery or equipment	Exposed moving parts of machinery or equipment
Sources of harmful dust	

After the worksite survey is completed, hazards are grouped into the following

categories:	
Impact	Heat
Penetration	Compression (roll-over)
Chemical	Respiratory
Light (optical) radiation	Electrical
Hearing	Harmful dust, mist, or fumes

Finally, the data must be organized by hazard, and assess the hazards as to the type, level of risk, and seriousness of potential injury. This evaluation should include the possibility of exposure to multiple hazards.

Job Specific Hazards

When an employee is exposed to hazards on multiple job sites the employee and/or their supervisor should be interviewed to identify the hazards to which he or she are exposed. The job specific hazard assessment is conducted using the guidance provided in Appendix A. The assessment must be documented in writing using the form provided in Appendix H and a copy of this assessment must be provided to EHS. The hazard assessment is performed in a manner similar to the evaluation of workplace hazards.

PPE Selection

Appropriate PPE is selected based upon the hazard(s) identified and using the guidance provided in:

Appendix A: Hazard Assessment and Personal Protective Equipment Selection
Appendix B: Eye and Face Protection
Appendix C: Head Protection
Appendix D: Foot Protection
Appendix E: Hand Protection
Appendix F: Protective Clothing and Body Protection
Appendix G: Fall Protection, Hearing Protection, Respiratory Protection, and Electrical Protective Devices
Appendix H: Miscellaneous Forms
Appendix I: Who Pays for PPE?

References

Published Sources

Referenced standards are detailed in the Appendices.
A copy of these standards may be obtained from EHS.
Related documents or programs include NCF's:

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

Regulations

Occupational Safety and Health Administration, General Industry Standards:

- 29 CFR 1910.95 Occupational Noise Exposure
- 29 CFR 1910.97 Non-ionizing radiation.
- 29 CFR 1910.133 Eye and Face Protection
- 29 CFR 1910.134 Respiratory Protection
- 29 CFR 1910.135 Head Protection
- 29 CFR 1910.136 Foot Protection
- 29 CFR 1910.137 Electrical Protective Equipment
- 29 CFR 1910.138 Hand Protection
- 29 CFR 1910.1096 Ionizing Radiation

Occupational Safety and Health Administration, Construction Industry Standards:

- 29 CFR 1926. 52 Occupational Noise Exposure
- 29 CFR 1926.53 Ionizing Radiation
- 29 CFR 1926.54 Non-ionizing Radiation
- 29 CFR 1926.95 - Criteria for personal protective equipment.
- 29 CFR 1926.96 - Occupational foot protection.
- 29 CFR 1926.100 - Head protection.
- 29 CFR 1926.101 - Hearing protection.
- 29 CFR 1926.102 - Eye and face protection.
- 29 CFR 1926.103 - Respiratory protection.
- 29 CFR 1926.104 - Safety belts, lifelines, and lanyards.

Appendix A

Hazard Assessment and Personal Protective Equipment Selection

Overview of the Hazard Assessment Process

Hazard Identification

The first step of the hazard assessment is to inspect the worksite and/or review the type of work performed by an employee if he or she conduct work at multiple sites. The purpose of the inspection and/or job review is to identify the hazards to which the employee is exposed. The inspection findings should be documented on the Hazard Assessment Form found in Appendix I. During this inspection/review particular attention should be paid to the following potential hazards:

- Moving equipment, parts of equipment, processes or personnel that could result in collision, compression or impact.
- Potential for objects to fall or drop from above an employee.
- Exposure to chemicals or potentially harmful dusts, mists or fumes.
- Rolling or pinching objects or machinery processes that could crush body parts, catch hair or snag loose clothing.
- Electrical hazards, either from equipment, wiring, or utilities.
- Presence or use of sharp objects that could cut or pierce the body.
- Hot or cold surfaces that could cause burns or freezing.
- Light (optical) radiation from welding, cutting, brazing or other sources.
- Use of tools or equipment that may generate flying debris, harmful dusts or noise.
- The layout of the workplace and the locations of coworkers and the way in which work is staged or performed.

Organize the Data

After completing the walk-through survey and/or employee interview, organize the data using the hazard assessment form found at the end Appendix H.

Analyze The Data

Determine the level of risk and the seriousness and type of potential injury from each of the hazards identified during the assessment. The possibility of exposure to several hazards simultaneously should also be considered.

Control or Eliminate the Hazard(s)

Before selecting and providing PPE to an employee, first determine if exposure to the hazard can be reduced or eliminated through the use of administrative or engineering controls. The following questions should be asked:

- Does the manufacturer supply guards for the machinery or equipment? Do these guards completely contain or control exposure to the hazard if used properly?
- Can a shield, barrier, or guard be manufactured or purchased that will contain or control exposure to the hazard?
- Can older equipment be replaced with newer, safer equipment?
- Can the layout of the worksite be changed to eliminate or reduce exposure to the hazard?
- Can the product or chemical used be replaced with a less hazardous product or chemical?
- Can exposure to an airborne chemical or dust be controlled with exhaust ventilation?

If the answer to any of the above is ‘yes’, or ‘maybe’, it may be possible to use administrative or engineering controls to eliminate or reduce the hazard. Contact EHS for assistance or guidance.

Select PPE Appropriate for the Hazard(s)

Review of the potential hazards, in relation to specific job activities, forms the basis for selecting PPE. The quick reference charts contained in each Appendix list basic hazards. After identifying the basic hazards, the general procedure for selection of protective equipment is to:

Review the types of protective equipment that are available. An overview of the various types of PPE is provided in Appendices B through H.

Compare the specifics of the hazard (i.e., how heavy and/or fast the object is moving, projectile shape, the type of light being emitted, duration of exposure, etc.) against the capabilities of the available protective equipment.

Select protective equipment that provides a level of protection adequate to protect the employee from the hazard.

The PPE must be fit to the individual, and the employee must be given instructions on the care and use of his or her PPE. It is very important that end users be made aware of all warning labels and limitations of their PPE.

Fitting the Device

Give careful consideration to the comfort and fit of PPE. PPE that fits poorly will not provide the necessary protection, and the user 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.

Particular care must be taken in fitting devices for eye protection against dust and chemical splash to ensure that the devices are sealed to the face. In addition, proper fitting of helmets is important to ensure that it will not fall off during work operations. In some cases a chinstrap may be necessary to keep the helmet on an employee's head. (Chinstraps, if provided, should break at a reasonably low force so as to avoid a strangulation hazard). Always review and follow the manufacture's instruction.

Devices with adjustable features

Adjustments must be made on an individual basis for a comfortable fit that will maintain the protective device in the proper position.

Reassessment

It is the responsibility of the departmental representative to reassess workplace hazards when new equipment, processes, or other hazards are introduced.

Appendix B

Eye and Face Protection

Compliance with National Standards

All personal protective clothing and equipment must be of safe design and construction for the work to be performed and must be maintained in a sanitary and reliable condition. Eye and face protection used by employees must meet NIOSH (National Institute of Occupational Safety and Health) or ANSI (American National Standards Institute) standards as follows:

- Protective eye and face devices purchased after July 5, 1994 must comply with ANSI Z87 .1-1989,"American National Standard Practice of Occupational and Education Eye and Face Protection".
- Eye and face protective device purchased before July 5, 1994 must comply with the ANSI Z87 .1-1968 "USA Standard for Occupational and Educational Eye and Face Protection."
- The referenced standards do not apply to hazards related to X-rays, gamma rays, high-energy particulate radiation, microwaves, radio-frequency radiation, or work with lasers and masers. Information on PPE required for work involving these hazards is available through EHS.

General Requirements

Employees must use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, acids or caustic liquids or other liquid chemicals, chemical gases or vapors, or potentially hazardous light radiation.

Each affected employee must use eye protection that provides side protection when there is a hazard from flying objects. Detachable side protectors (e.g. clip-on or slide-on shields) are acceptable if they meet the ANSI requirements.

Eye and face PPE must be marked to identify the manufacturer.

Face shields must be used in combination with goggles when there is a potentially significant chemical splash hazard.

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.

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

- Wear eye protection that incorporates the prescription in its design, or,

- Wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.

Each affected employee must use equipment with filter lenses that have a shade number appropriate for the work being performed for protection from injurious light radiation. Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.

Types of Eye and Face Protection

Safety Glasses

Protective eyeglasses are made with safety frames, tempered glass or plastic lenses, temples and side shields which provide eye protection from moderate impact and particles encountered in job tasks such as carpentry, woodworking, grinding, scaling, etc. Prescription safety glasses and tinted lenses are also available.

Standard safety glasses are designed to protect against flying particles. Safety glasses have lenses that are impact resistant and frames that are far stronger than regular eyeglasses.

Safety Goggles

Vinyl framed goggles of soft pliable body design provides adequate eyes protection from many hazards. These goggles are available with clear or tinted lenses, 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 lenses to ensure protection along with proper vision.

Like safety glasses, goggles are impact resistant and are available with tinted lenses.
Goggles offer the best all-around impact protection of all eyewear types because they form a positive seal around the eye area.

Welders/Chippers Goggles

Welders and chippers goggles are available in rigid and soft frames to accommodate single or two-eyepiece lenses. Welders' 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.

Chippers/Grinders goggles provide eye protection from flying particles. The dual protective eyecup house impact resistant clear lenses with individuals cover plates.

Face Shields

Face shields normally consist of an adjustable headgear and face shield of either tinted or transparent acetate or polycarbonate materials, or wire screen. Face shields are available in various sizes, tensile strength, impact/heat resistance and light ray filtering capacity.

Face shields are used in operations when the entire face needs protection and to protect the eyes and face against flying particles, metal sparks, and chemical or biological splash hazards.

Welding Helmets and Shields

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. These shields must be provided to protect workers' eyes and face from infrared or radiant light burns, flying sparks, metal spatter and slag chips encountered during welding, brazing, soldering, resistance welding, bare or shielded electrical arc welding and oxyacetylene work.

Storage and care

Safety glasses and other eye and face protection should be stored carefully so they won't be scratched or damaged. In general, do not store this equipment where it would be exposed to high heat or sunlight.

Inspect eye and face protection 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, like 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.

Conduct cleaning of 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 by soaking in the soap solution (maintained at 120°F) for ten minutes. Rinse thoroughly and allow to air dry.

PPE that has been previously used should be disinfected before being issued to another employee. PPE may be disinfected by completely immersing all parts in a solution of germicidal fungicide for 10 minutes. Remove the parts from the solution and allow to air dry at room temperature.

EYE AND FACE PROTECTION CHART

Source	Assessment of Hazard	Protection
IMPACT	Flying fragments, objects, large chips, particles of sand, dirt, etc.	Spectacles with side protection, goggles, face shields. See notes (1), (3), (5), (6) and (10). For severe exposure, use face shield.
HEAT	Hot sparks	Face shields, goggles, spectacles with side protection. For severe exposure use face shield. See notes (1), (2) and (3).
	Splash from molten metals	Face shields worn over goggles. See notes (1), (2) and (3).
	High temperature exposure	Screen face shields, reflective face shields. See notes (1), (2), and (3).
CHEMICALS	Splashing liquids	Goggles, eyecup and cover types. For severe exposure, use face shield. See notes (3) and (11).
	Irritating mists	Special purpose goggles.
DUST	Nuisance dust	Goggles, eyecup and cover types. See note (8).
LIGHT and/or RADIATION- Welding: Electric arc	Optical radiation	Welding helmets or welding shields. Typical shades: 10 -14. See notes (9) and (12).
Welding: Gas	Optical radiation	Welding goggles or welding face shield. Typical shades: gas welding 4-8, cutting 3-6, brazing 3-4. See note (9).
Cutting, Torch brazing, Torch soldering	Optical radiation	Spectacles or welding face shield. Typical shades: 1.5-3. See notes (3) and (9).
Glare	Poor vision	Spectacles with shaded or special-purpose lenses, as suitable. See notes (9), (10).

Notes to Eye and Face Protection Chart:

1. 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 shaded lenses are *not* filter lenses unless they are marked or identified as such protection.

2. Operations involving heat may also involve light radiation. As required by the standard, protection from both hazards must be provided.

3. Face shields should only be worn over primary eye protection (spectacles or goggles).

4. As required by the standard, filter lenses must meet the requirements for shade designations in 1910.133(a)(5). Tinted and shaded lenses are not filter lenses unless they are marked as such.

5. As required by the standard, persons whose vision requires the use of prescription (Rx) lenses must wear either protective devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) eyewear.

6. Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.

7. Caution should be exercised in the use of metal frame protective devices in electrical hazard areas.

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

9. Welding helmets or face shields should be used only over primary eye protection (spectacles or goggles).

10. Non-sideshield spectacles are available for frontal protection only, but are not acceptable protection for the sources and operations listed for "impact".

11. Ventilation should be adequate, but well protected from splash entry. Eye and face protection should be designed and used so that it provides both adequate ventilation and protects the wearer from the splash entry.

12. Protection from light radiation is directly related to filter lens density. See note (4). Select the darkest shade that allows task performance

Head Protection

Compliance with National Standards

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

Only those items of protective clothing and equipment that meet ANSI (American National Standards Institute) standards may be used.

Every hard hat conforming to the requirements of ANSI Z89.1-1986 must be appropriately marked to verify its compliance. The following information must be marked inside the hat: Manufacture's name; legend, "ANSI Z89.1-1986; and, the class designation (A, B, or C).

Protective helmets purchased before July 5, 1994 must comply with the ANSI standard "American National Standard Safety Requirement for Industrial Head Protection," ANSI Z89.1-1969.

Protective helmets purchased after September 1997 must comply with ANSI Z89.1-1997, "American National Standard for Personnel Protection- Protective Headwear for Industrial Workers-Requirements."

In 2003, ANSI published a revision to the Z89.1-1997 standard. The most significant changes from the 1997 version were made to harmonize with other national standards for head protection that test and evaluate equipment performance. In addition, many physical requirements for helmet components that do not provide added user value or that limited design or performance have been removed.

General Requirements

Each affected employee must wear protective helmets when working in areas where there is a potential for injury to the head from falling objects or impact. Some examples of occupations for which head protection should be routinely considered are: carpenters, electricians, linemen, mechanics and repairers, plumbers and pipe fitters, welders, laborers, freight handlers, timber cutting and logging, warehouse operations, and construction or renovation operations.

Protective helmets designed to reduce electrical shock hazard must be worn by each affected employee when working near exposed electrical conductors which could contact the head.

Employees working at higher elevations must wear protective helmets with chinstraps. The chinstrap should be designed to prevent the hard hat from being bumped off the employees' head, but must not be so strong that it presents a strangulation hazard.

Types of Head Protection

Description of Protective Helmets – 1997 Standard

Type 1 Helmets providing crown impact protection

Type 2 Helmets providing lateral impact protection

Class G General service, limited voltage. Intended for protection against impact hazard. Used in mining, construction, and manufacturing. Provide electrical protection from low-voltage conductors (proof tested to 2,200 volts).

Class E Utility service, high voltage. Used by electrical workers and workers who also need protection from falling objects. Provides electrical protection from high-voltage conductors (proof tested to 20,000 volts).

Class C Conductive – no electrical protection. Designed for lightweight comfort and impact protection. Used in certain construction, manufacturing, refineries, and where there is a possibility of bumping the head against a fixed object. This class of helmet may not be used around electrical hazards.
Bump Caps may be used when head (impact) protection isn't required, but where an employee may be exposed to minor head bumps or laceration hazards. Bump caps are not approved for use where impact protection is required.

Storage and Care

If a helmet needs to be cleaned it should be scrubbed with a mild detergent and rinsed in clear water.

After rinsing, the shell, straps and cradle should be carefully inspected for damage.

The shell, cradle, headbands, sweatbands, and accessories should be visually inspected daily for signs of cracks, dents, damage, or wear that might reduce the protection of the device. Any helmet with worn, damaged, or defective parts should be removed from service until the defective part has been replaced per the manufacturer's instructions.

Tar, paint, oils, and some chemicals can damage the shell and reduce protection.

Helmets should not be painted, and the manufacturer's instructions should be consulted if tars, paints, or similar materials need to be cleaned from the shell of the helmet.

Helmets must be worn properly and must be properly maintained to provide adequate protection.

Do not:

- Drill holes for added ventilation.
- Paint or inscribe the helmet
- Allow the helmet to be exposed to extreme temperatures or direct sunlight for long periods of time. Don't, for example, store your helmet in the back window of your car.
- Wear the hard hat with the shell tilted to one side.
- Wear the hat backward (e.g., with the brim facing your back).
- Stickers can hide signs of deterioration in the hard hat shell and should not be placed on hard hats.

Appendix D

Foot Protection

Compliance with National Standards

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

Only those items of protective clothing and equipment that meet ANSI (American National Standards Institute) standards may be used.

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

Protective footwear purchased before July 5, 1994 must comply with the ANSI Standard "USA Standard for Men's Safety-Toe Footwear," Z41.1-1967

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. Employees must wear toe or foot guards over regular work shoes until a proper safety shoe is purchased or the condition subsides. The guards provided under these conditions must be furnished at no cost to the employee.

Protective guards, such as shoe-caps and metatarsal guards, are designed to slip over street shoes. Protective guards are not recommended if an employee will frequently encounter foot hazards on the job. They are not intended to replace steel-toed safety shoes or boots. There are no approved ANSI standards for protective guards.

All footwear requires routine inspection for cuts, holes, tears, cracks, worn soles, and other damage that could compromise its' protective quality.

Types of Protective Footwear

There are three basic types of protective footwear:

- **General protective footwear** that is worn in place of regular shoes or boots.
- **Overshoe**s, which are worn over regular footwear.
- **Protective guard**s, or safety devices that are worn over regular shoes or boots.

The guidance provided in the Selection Chart for Foot and Leg Protection located at the end of this appendix will assist you in selecting PPE appropriate for the hazards that you identify during the hazard assessment process.

General Protective Footwear

The five main types of general protective footwear are:

1. **Safety Toe Shoe or Boo**t. These shoes are designed to protect feet from common hazards, such as falling or rolling objects, cuts, and punctures.

   The entire toe box and insole are reinforced with steel (or similar), and steel, aluminum, or plastic materials protect the instep.

Safety shoes are also available that insulate against temperature extremes and/or are equipped with special soles to guard against slips, chemicals, and/or electrical hazards (see below).

The shoe or boot may incorporate metatarsal protection, or a shield that protects the upper surface of the foot from impact or compression hazards. This type of footwear would generally be required for work around heavy pipes, activities involving manual material carts, or similar activities where heavy loads could drop on or roll over an employee's feet.

Safety boots offer more protection when splash or spark hazards (chemicals, molten materials) are present.

Chemical protective safety shoes and boots may be required to prevent or minimize chemical penetration when working with corrosives, caustics, cutting oils, or petroleum products.

Safety shoes and boots may need to be used in conjunction with other PPE to provide greater protection against some work site hazards. For example, when exposed to molten metals or welding sparks, protect the lower legs and feet from heat hazards by using leather leggings or similar PPE. Safety snaps allow leggings to be removed quickly.

2. **Conductive footwear** – protects the wearer from static electricity by equalizing the differing electrical potentials.

    - Type 1 conductive footwear controls static electricity generated on the body of the worker, thereby preventing sparks which could ignite nearby flammable gases or liquids.

    - Type 2 conductive footwear is designed for linemen working with high-voltage lines where the electrical potential of the person and the energized equipment must be equalized.

      NOTE: Conductive shoes are not general-purpose shoes and must be removed upon completion of the tasks for which they are required.

      NOTE: Employees exposed to electrical hazards must never wear conductive shoes. Safety shoes and boots may need to be used in conjunction with other PPE to provide greater protection against some work site hazards. Conductive shoes are **not** general-purpose shoes and must be removed upon completion of the tasks for which they are required. Non-conductive footwear must **not** be used in explosive or hazardous locations.

      NOTE: Employees must be instructed not to use foot powder or wear socks made of silk, wool, or nylon with conductive shoes.

3. **Electrical hazard footwear** – shoes or boots designed with non-conductive materials (other than the steel toe, which is properly insulated to protect the wearer, or a toe made from another material). This type of footwear insulates the worker from energized parts. It is intended for secondary protection only, for use on surfaces that are already substantially insulated.

    NOTE: Non-conductive footwear must not be used in explosive or hazardous locations; in such locations, *electrically conductive* shoes are required.

    NOTE: Employees using electrical hazard footwear must be trained to recognize that the insulating protection of electrical hazard, safety-toe shoes may be compromised if:

    - The shoe is wet
    - The rubber sole is worn through
    - Metal particles become embedded in the sole or heel; or
    - Other parts of the employees' body come into contact with conductive grounded items.

4. **Sole puncture resistant footwear** - provide protection from nails, wire, tacks, screws, large staples, or similar objects that, if stepped on, could penetrate the sole of the shoe and result in foot injury.

5. **Static dissipative footwear** – insulates the wearer from electrical hazards that may exist in areas where static dissipative footwear is required.

Overboots

Overboots protect a worker's boots and shoes from contact with acids, solvents, or other chemicals, or a dirty or wet working environment. Overboots do not generally offer impact or compression protection, and may need to be worn in conjunction with safety shoes to provide adequate protection against workplace hazards. If chemical protection is required, assure the overboot is compatible with, and will provide adequate protection against, the expected exposure.

Protective Guards

Protective guards consist of either shoe-caps or metatarsal guards. Protective guards can provide protection from foot injury, but should not be used to replace steel-toed safety footwear. Protective guards can be used where an employee is only occasionally exposed to foot hazards on the job.

Other Considerations

Other types of special footwear that may be required for an employee to perform their job safely include: shoes with skid resistant soles, waterproof footwear, chemical-resistant footwear, and combinations thereof. Foundry or "Gaiter" style boots, for example, feature quick-release fasteners or elasticized insets to allow quick removal of the footwear if a hazardous substance or material (such molten metal) were to get into the boot itself.

Storage and Care

Inspect safety footwear prior to each use. Defective or damaged personal protective equipment must not be used. Remove the damaged equipment from service and report the condition to your supervisor. Follow the manufacturer's instructions for the care and maintenance of safety footwear.

Selection Chart for Foot and Leg Protection

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

Selection Chart for Foot and Leg Protection

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

Source	Typical Occupations Requiring Protection	Protection
Impact – Heavy tools, equipment, or heavy objects that might fall onto the feet of an employee.	Construction, demolition, or renovation operations; plumbing; building maintenance; trenching; utility work; grass cutting; materials handling	Safety shoes or boots. Toe guards may be used over regular footwear if only if an employee is infrequently exposed to this type of foot hazard.
Puncture – Work where wire, tacks, staples, metal, or mails could be stepped on by employees causing a foot injury.	Construction, demolition and renovatio0n operations; building maintenance.	Safety shoes or boots with puncture protection.
Compression – Handling of unusually heavy objects or using heavy tools or equipment that present a compression hazard to the top of the foot.	Heavy materials handling, such as work activities involving skid trucks around heavy pipes; work using jackhammer; pavement breaking.	Metatarsal footwear. Metatarsal guards may be used over regular footwear only if an employee is infrequently exposed to this type of foot hazard. Shin guards may be required for some operations where the lower leg is exposed to a rolling impact hazard.
Heat – Exposure to molten metal or other super-heated fluids.	Furnace operations; pouring, casting, hot dipping, welding, cutting and brazing.	Foundry or heat resistant shoes or boots as appropriate. Leggings should be used as appropriate to protect the lower legs from molten metal or welding sparks.
Chemicals – Splash hazards or direct contact/work with chemicals	Acid and chemical handling degreasing, plating. Chemical spill response.	Consult the manufacturer's literature for a chemical resistant boot appropriate for the chemical hazard. Footwear may need to incorporate a safety toe if an impact hazard is also present.
Conductive – Work near or in explosive or hazardous atmospheres	Explosive manufacturing, grain milling, spray painting or similar work, with highly flammable materials.	Conductive footwear.
Electrical – Work with or near exposed energized electrical wiring or components.	Building maintenance; utility work; construction wiring work on or near communications; computer or similar equipment; and arc welding or resistance welding.	Electrical hazard footwear.

Appendix E

Hand Protection

Compliance with National Standards

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

Hand protection: There are no ANSI standards for glove selection. Glove selection, therefore, must be based on the performance characteristics of the glove in relation to the tasks to be performed.

General Requirements

The requirements outlined in this program are generally applicable to all College operations. Personnel who are involved in research and laboratory operations or that are exposed to blood or other potentially infectious agents, however, should consult the Chemical Hygiene Plan or Bloodborne Pathogens Programs, as appropriate, for additional requirements. Information on these programs may be obtained by contacting EHS.

Supervisory personnel or the departmental PPE Coordinator must select and require employees to use appropriate hand protection when the employee's hands are exposed to certain hazards. These hazards include, but are not limited to:

- Work with harmful substances that can be absorbed through the skin or that can cause skin irritation, chemical burns, or similar conditions. Examples would include strong acids or bases and organic solvents. Consult the Material Safety Data Sheet (MSDS) for the product or chemical to determine the type of hand protection that may be needed. Note that employees using these types of products outside of research laboratories must be trained to read and interpret MSDS's. This training may be arranged through EHS.

- Work with tools, equipment, or materials that can cause sever 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 temperature extremes.

Selection

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 hazards and potential hazards identified. General guidelines are as follows:

- Most accidents involving hand and arms can be classified under four main hazard categories: chemical, abrasion, cut, and burns.

- When protective hand wear is required for the job to be performed, make sure the gloves fit the employee well, are comfortable to wear, and are rated to guard against the particular hand hazards of the workplace.

- When selecting gloves for protection against chemical hazards, the toxic properties of the chemical(s) and the ability of the chemical to penetrate through the glove must be determined. 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.

- There are no gloves that provide protection against *all* potential hand hazards, and commonly available glove materials 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. Note that as long as the

performance characteristics of the glove are acceptable, in many cases it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types.

- Regardless of material or construction, no glove is completely puncture-proof, nor can any PPE be expected to take the place of proper engineering or work practice controls.

- Before purchasing gloves, the supervisor or designated departmental representative should review the work activities of the employee to determine the degree of dexterity required, the duration, frequency, and degree of exposure of the hazard, and the physical stresses that will be applied.

- Generally, any “chemical resistant” glove can be used for dry powders.

- For mixtures and formulated products (unless specific test data is available), a glove should be selected on the basis of the chemical component with the shortest breakthrough time, since it is possible for solvents to carry active ingredients through some glove materials.

- Employee must be able to remove the gloves in such a manner as to prevent skin contamination.

- Store gloves at room temperature—never in extreme heat or cold.

- Depending upon the material, some manufacturers may specify special storage requirements—check the accompanying literature or contact the supplier for information.

- Train employees to inspect gloves carefully for discoloration, holes, tears, wear, or other imperfections prior to each use, and require them to report any damage immediately to their supervisor or other designated person..

- PPE that is contaminated must be disposed of in a manner that will protect employees from exposure to the hazard. Specific questions on disposal requirements should be addressed to EHS.

Types of Hand Protection

Five general glove types are available: chemical resistant, disposable, cut or abrasion resistant, temperature resistant, or combinations thereof.

Chemical Resistant Gloves

These gloves may be made of rubber, neoprene, polyvinyl alcohol, vinyl, or other materials. The glove protects hands from corrosives, oils, and solvents.

The selection of the proper chemical-resistant glove begins with an evaluation of the type of work to be performed and the chemical(s) that will be contacted by the employee.

Factors that will influence selection are:

- The type of chemical(s) to be handled or used.
- Frequency and duration of chemical contact.
- Whether the contact will involve total immersion or splash hazards.
- Concentration of the chemical(s).
- Temperature of the chemical(s).
- Abrasion or resistance requirements.
- Puncture, snag, tear, and cut-resistance.
- Area to be protected, and whether it involves only the hand, or if it also includes the forearm and/or arm (see section on Other Considerations).
- The amount of finger or hand dexterity that may be required to do the work.
- Grip requirements, or how well the glove needs to perform under dry, wet, or oily conditions.
- Whether the glove needs to show a color change if it has become contaminated.

- Thermal protection that may be required when handling, for example, cryogenic (i.e. very cold) or superheated materials or liquids.
- Size and comfort requirements.
- The price of the glove.

Different chemicals will affect the protective qualities of a glove in different ways. Select an appropriate glove material based upon:

- **Permeation**, or how quickly a chemical will pass through the glove material.

- **Breakthrough tim**e, or the time it takes for the chemical to pass to the inside of the glove.

- **Degradation**, or 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 type of chemical being used is the key factor for choosing the type of material from which the glove should be made. Some of the more common chemical-resistant glove materials are:

- **Buty**l. A synthetic rubber with good resistance to weathering and a wide variety of chemicals.

- **Neoprene**. A synthetic rubber having chemical and wear-resistance properties superior to those of natural rubber.

- **Nitrile**. A copolymer available in a wide range of acrylonitrile (propane nitrile) contents; chemical resistance and stiffness increases with higher acrylonitrile content.

- **Polyethylene**. A fairly chemical-resistant material used as a freestanding film or a fabric coating.

- **Polyurethane**. An abrasion-resistant rubber that is either coated into fabrics or formed into gloves or boots.

- **Polyvinyl alcohol**. A water-soluble polymer that exhibits exceptional existence to many organic solvents that rapidly permeates most rubbers.

- **Polyvinyl chloride**. A stiff polymer that is made softer and more suitable for protective clothing applications by the addition of plasticizers.

- **Rubber**. A highly flexible and conforming material made from a liquid tapped from rubber plants.

General guidelines for selecting chemical-resistant gloves are listed in the Selection Chart for Chemical Resistant Gloves located in Appendix H. Consult the manufacturer's literature or contact EHS for information on the performance of the various classes of gloves versus specific chemicals.

Disposable Gloves

Disposable gloves are typically discarded after a single wearing, and are not designed to provide long term chemical protection. General types of disposable gloves are:

- **Fabric gloves**, usually made of cotton or nylon. These gloves will not generally provide adequate chemical protection, but function well as glove liners.

- **Nitrile gloves** are more chemically resistant than latex or vinyl, and offer good dexterity, elasticity, abrasion resistance, and conform well to the shape of the hand.

- **Latex gloves** offer dexterity and conformity, but should only be used in situations involving minimal chemical handling or contact. Some employees may experience an allergic reaction to latex.

- **Polyethylene gloves** are generally loose fitting and provide a high degree of dexterity.

- **Vinyl gloves** are not as flexible as latex, but offer a looser, less binding fit, and somewhat better chemical resistance than latex.

Cut and Abrasion-Resistant Gloves

General types of cut and abrasion-resistant gloves are:

- **Leather gloves** are used to guard against injuries from abrasions, cuts, extreme temperatures, and sparks (such as occur when welding) or burn hazards. They may be used in combination with an insulated liner when working with electricity.

- **Metal Mesh gloves** are used to protect hands from accidental cuts and scratches from extremely sharp objects such as cutting tools or knives.

- **Kevlar ® gloves** offers exceptional abrasion and burn resistance.

- **Aluminized Gloves**. Gloves made of aluminized fabric are designed to insulate hands from intense heat. Persons working with molten materials most commonly use these gloves.

- **Fabric gloves**, usually made from cotton or nylon, do not offer much protection against sharp-edged objects, and may present a snag hazard.

These gloves are generally used to protect from hands from minimal abrasion hazards, or contact with dirt, grease, or other contaminants.

Temperature-Resistant Gloves

General types of temperature-resistant gloves are:

- **Leather** is a natural insulator, and offers resistance to cuts and abrasion.

- **Kevlar ®** is cut and abrasion-resistant, and will withstand temperatures up to 600 ^{o} F.

- **Cotton terrycloth** will work effectively at temperatures up to 600 ^{o} F, though dexterity may be a factor.

- **Cryogenic** gloves offer protection against extremely low temperatures, but are not suitable for immersion in liquid nitrogen or for use near open flames.

- **Rubber** offers protection against cold temperatures, but will not stand up well to heat.

- Other temperature-resistant gloves, including Nomex®, Zetex®, and Flextra®, are available. The manufacturer's literature should be consulted for specific applications.

Other Considerations

Glove Linings

Glove linings will tend to improve comfort by absorbing perspiration, but may decrease dexterity.

General types of linings consist of:

- **Unlined** gloves offer greater sensitivity and dexterity.

- **Flock** linings, or linings of shredded fibers, improve absorption of perspiration.

- **Knit** linings absorb perspiration, and may improve temperature protection.

- **Jersey** linings are generally more comfortable and provide better cushioning than other linings.

- **Foam** linings may be used to improve temperature protection for hot or cold conditions.

- **Wool** linings are natural insulators used outdoors for warmth in cold temperatures.

Glove length

- **Finger cots** -- worn on the fingers alone when only minimal protection is required, such as when handling small parts that do not present a hazard to the rest of the hand.

- **Wrist length** (9-14") – protects both the hand and wrist from exposure.

- **Elbow length** (14-18") – provide protection if the hand must be immersed in a liquid or extra splash protection, and also shields the forearm from heat hazards, abrasions, or chemicals.

- **Shoulder length** (30-31") – protects the entire arm from exposure.

Cuff style

- **Rolled cuffs** – provide a barrier to keep chemicals on the glove from running onto your skin.

- **Straight cuffs** – provide extra length and a snug fit to protect from chemical run-off.

- **Slip-on or open cuffs** – make it easier to put on and take off the glove.

- **Safety cuffs** – provide additional wrist protection, and improve cut and abrasion resistance.

- **Gauntlet-style cuffs** – support a looser fit, and allow greater movement of the forearm to improve comfort.

- **Knit wrist cuffs** – improve the fit of the glove at the opening to prevent materials from entering the glove.

Appendix F

Protective Clothing and Body Protection

Compliance with National Standards

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

Standards are not currently available for all types of protective clothing or body protection. Where such standards do exist, only those items of protective clothing and equipment that meet *NIOS*H, *ANS*I, *AST*M, 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 EHS.

General Requirements

An overview of protective clothing required to conduct research operations is provided in the NCF Chemical Hygiene Plan. Information on this program may be obtained by contacting EHS.

Information on protective clothing required for work involving infectious materials or bloodborne pathogens may be obtained by contacting EHS.

Protective clothing that is subject to contamination with toxic or hazardous substances may not be removed from the work area, and must be disposed of properly and in a manner that protects employees from exposure to the hazard.

If you expect to use protective clothing in the above manner, contact for guidance prior to beginning work.

Care should be exercised in protective clothing selection, since some protective clothing has very limited resistance to chemicals or fire.

Consult the Material Safety Data Sheet (MSDS) to determine the recommended clothing for a particular chemical or chemical mixture.

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

- Exposure to intense heat or cold. Note that 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 abrasion.
- Exposure to hazardous chemicals.
- Contact with potentially infectious materials like blood.
- Radiation.
- Exposure to electrical arc hazards.

Types of Clothing and Body Protection

As with all protective equipment, protective clothing is available to protect against specific hazards. The department is required to provide personal protective clothing/equipment only for the parts of the body exposed to possible injury.

The protective clothing provided must be constructed of material that will protect against the specific hazards in the workplace. Materials used in protective clothing include the following:

- **Paper-like fibe**r. Disposable suits made of this material provide protection against dust and varying protection against splash hazards. Disposable suits may be coated with a material to increase chemical or water resistance. Uncoated disposable suits are typically only suitable for protection from contamination with particulate hazards (e.g., asbestos or lead).

- **Treated wool and cotton**. Protective clothing made from treated wool and cotton adapts well to changing workplace temperatures and is comfortable as well as fire resistant. Treated cotton and wool clothing protects against dust, abrasions, and rough and irritating surfaces.

- **Duck**. This closely woven cotton fabric protects employees against cuts and bruises while they handle heavy, sharp, or rough materials.

- **Leathe**r. Leather protective clothing is often used to protect against dry heat and flame such as are encountered during grinding and welding operations.

- **Rubber, rubberized fabrics, neoprene, and plastic**s. Protective clothing made from these materials protects against certain acids and chemicals.

- **Specialized protective clothing** may incorporate Kevlar for cut resistance (for example, chainsaw chaps), aluminized coatings for protection from radiant heat, and flame-retardant or resistant coatings or materials.

- **Electrical hazard clothin**g. Special clothing may be required for persons exposed to electrical arc hazards and/or extreme temperatures resulting from an electrical arc. This clothing is nonconductive and contains no metal hardware. Extreme exposure may necessitate use of an ultraviolet/infrared flash hood.

- **Cooling vests or jacket**s. Cooling vests or jackets provide protection from heat exhaustion or heat stoke when employees work in very hot environments or conditions.

Be aware that different materials will protect against different chemical and physical hazards. When chemical or physical hazards are present, check with the clothing manufacturer to make sure that the material selected will provide protection from the specific chemical or physical hazards in your workplace or contact EHS for guidance.

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.

Fall Protection, Hearing Protection, Respiratory Protection, and Electrical Protective Devices

Fall Protective Devices

EHS administers the College's Fall Protection Program. Only personnel that have been trained by EHS or other approved sources may perform work requiring the use of fall protective devices. Personnel that perform work on a surface with an unprotected side or edge that is 6 feet or more above a lower level, or 10 feet or more on scaffolds, must be protected from falling by the use of guardrails, safety nets, or personal fall arrest systems. The exact requirements for when fall protective devices are required are outlined in the EHS Fall Protection brochure.

The use of body belts for fall protection and the use of non-locking snaphooks are prohibited as of January 1, 1998.

If it can be determined that an employee is exposed to potential fall hazards during the hazard assessment process, the supervisor must contact EHS for guidance.

Hearing Protective Devices

EHS administers the College's Hearing Conservation Program. A copy of the Hearing Conservation Program may be obtained by contacting EHS or visiting the EHS web site as listed in the "Departments" directory of the College's home page. Noise measurements must be made to determine if employees are being overexposed and to identify the machines or work processes that are contributing to the exposure. If it is discovered that a worker is exposed to an excessive amount of noise, these measurements are needed to determine the proper hearing protection device (HPD) that needs to be used and if engineering and/or administrative controls need to be implemented. Accurate exposure measurements are also needed so that the affected employee(s) can be included in the Hearing Conservation Program if they are exposed to excessive noise levels. If it can be determined that an employee may be exposed to excessive noise levels based upon the hazard assessment that is performed, contact EHS for guidance. Until such time as the evaluation has been performed, the potentially exposed employee must be provided with hearing protective devices to limit his or her exposure.

Respiratory Protective Devices

EHS administers the College's Respiratory Protection Program. NCF employees will be included in the Respiratory Protection when it is suspected that they are exposed to respiratory hazards that cannot be alleviated with engineering controls (e.g. ventilation, process confinement, or material substitutions). Respirators may be used only in cases where alternative controls are not feasible or are in the process of being implemented. Services that pertain specifically to the respiratory protection program include medical evaluation, fit testing, hazard monitoring, training and the placing of orders for equipment. These services are provided only when entry into the respiratory protection program is required due to hazards in the workplace. Respiratory protection will be required if it is determined that airborne contaminants which pose a health hazard are present in the workplace. If it is suspected that an employee may be exposed to a chemical or particulate (e.g., dust) respiratory hazard based upon the hazard assessment performed, contact EHS for guidance.

Electrical Protective Devices

If an employee performs premise wiring or other electrical work on exposed energized electrical conductors, they must abide by the requirements outlined in NCF's Electrical Safety Program. These employees must be trained to the level of *qualified perso*n, use appropriate lockout and tagout procedures, and use appropriate electrical protective devices. Information on the electrical safety program, Lockout/Tagout program, and electrical protective devices may be obtained by contacting EHS.

Glove Selection Chart for Chemical Compatibility

Chemical Name	NFPA Health Rating	Nitrile	Natural Rubber Latex	Recommended Alternate Material
ACETALDEHYDE	3	P	G	
ACETIC ACID (GLACIAL)	3	F	G	
ACETIC ANHYDRIDE	3	F	G	
ACETONE	1	F	G	
ACETONITRILE	2	F	F	Butyl (E)
ACRYLIC ACID	3	G	G	
AMMONIUM ACETATE		E	E	
AMMONIUM CARBONATE		E	E	
AMMONIUM FLUORIDE, 30-70%	3	E	E	
AMMONIUM HYDROXIDE,30-70%		E	E	
AMMONIUM HYDROXIDE, <30%		E	E	
AMYL ALCOHOL	1	E	G	
ANILINE	3	F	G	
AQUA REGIA		P	P	Neoprene (F)
AZT			G	
BENZALDEHYDE	2	P	F	Butyl (E)
BENZENE	2	F	P	Viton (G)
BORIC ACID		E	G	
BROMOPROPIONIC ACID		F	G	
BUTYL ACRYLATE	2	P	P	Teflon (G)
BUTYL CELLUSOLVE		G	G	
CALCIUM HYDROXIDE		E	E	
CARBON DISULFIDE	3	G	P	
CARBON TETRACHLORIDE	3	P	P	Viton (G)
CHLOROBENZENE	2	P	P	Viton (G)
CHLORODIBROMOMETHANE		P	P	Viton (G)
CHLOROFORM	2	P	P	Polyvinyl Alcohol (G)
CHLORONAPTHALENES	1	P	P	Viton (G)
CHROMIC ACID	3	F	P	(G)
CISPLATIN		G	G	
CITRIC ACID, 30-70%		E	E	
CYCLOHEXANE	1	E	P	
CYCLOHEXANOL	1	E	G	
CYCLOHEXANONE	1	P	P	Butyl (G)
CYCLOHEXYLAMINE	3	P	P	
DI-N-AMYLAMINE	3	E	P	
DI-N-BUTYLAMINE	3	E	P	
DI-N-BUTYLPHTHALATE	0	E	F	
DI-N-OCTYLPHTHALATE	0	E	F	
DIACETONE ALCOHOL	1	G	F	
DIALLYLAMINE		P	P	Viton (G)
DICHLOROACETYL CHLORIDE	3	P	P	Viton (G)
DIESEL FUEL	0	E	P	
DIETHANOLAMINE	1	E	E	
DIETHYLAMINE	3	G	F	
DIETHYLENE GLYCOL	1	E	E	
DIETHYLENETRIAMINE	3	P	P	Neoprene (G)
DIISOBUTYL KETONE	1	G	P	
DIISOBUTYLAMINE	3	E	P	
DIMETHYL ETHER		G	P	

DIMETHYL SULFOXIDE (DMSO)	1	G	E	
DIMETHYLACETAMIDE	2	F	G	
DIMETHYLFORMAMIDE (DMF)	1	P	P	Butyl (G)
1, 3-DIOXANE		P	F	Butyl (G)
1, 4-DIOXANE	2	P	P	Butyl (G)
EPICHLOROHYDRIN	3	P	F	Butyl (G)
ETHANOL	0	G	G	
ETHYL ACETATE	1	P	F	Butyl (G)
ETHYL ETHER	1	G	P	
ETHYLENE GLYCOL DIMETHYL ETHER	2	F	F	Butyl (G)
ETHYLENE DICHLORIDE	2	P	P	Polyvinyl Alcohol (E)
ETHYLENE GLYCOL	1	E	E	
FORMALDEHYDE, 30-70%	3	E	G	
FORMIC ACID	3	G	E	
FREON 113 OR TF		E	P	
FREON TMC		F	F	Polyvinyl Alcohol (E)
FURFURAL	3	P	P	Butyl (G)
GASOLINE, 40-50% AROMATICS	1	E	P	
GASOLINE, UNLEADED	1	G	P	
GLUTARALDEHYDE, <5%		G	G	
GLYCEROL		E	E	
HEPTANES	1	E	P	
HEXANE	1	E	P	
HYDRAZINE	3	E	F	
HYDROCHLORIC ACID, <30%	3	G	E	
HYDROCHLORIC ACID, 30-70%		G	G	
HYDROFLUORIC ACID,<10%	4	G	G	
ISOBUTYL ALCOHOL	1	E	P	
ISOOCTANE	0	E	P	
ISOPROPYL ALCOHOL	1	E	E	
ISOPROPYLAMINE	3	P	P	Teflon (G)
JET FUEL <30% AROMATICS 73-248C	1	G	P	
KEROSENE		E	P	
LACTIC ACID		E	E	
LAURIC ACID		E	E	
MALATHION,30-70%		G		
MALEIC ACID		G	G	
METHANOL	1	F	F	Neoprene (G)
METHYL ACETATE	1	P	P	Butyl (G)
METHYL ETHYL KETONE	1	P	P	Butyl (E)
METHYL ISOBUTYL KETONE	2	P	P	Butyl (G)
METHYL METHACRYLATE	2	P	P	Polyvinyl Alcohol (E)
METHYLENE CHLORIDE	2	P	P	Polyvinyl Alcohol (G)
AMYL ACETATE	1	F	P	Butyl (G)
BUTYL ACETATE	1	F	P	Butyl (G)
BUTYL ALCOHOL	1	E	E	
N-METHYL-2-PYRROLIDONE	2	P	E	
N-NITROSODIETHYLAMINE		P		Butyl (G)
PROPYL ALCOHOL		E	E	
NAPHTHA, 15-20% AROMATICS		E	P	
NAPHTHA , <3% AROMATICS	1	E	P	
NITRIC ACID, <30%	3	G	G	
NITRIC ACID, 30-70%	3	P	P	Neoprene (G)
NITROBENZENE	3	F	F	Butyl (G)
NITROETHANE	1	P	G	
1-NITROPROPANE	1	P	F	Butyl (G)
2-NITROPROPANE	1	P	P	Butyl (G)
OCTANE	0	G	P	
OCTYL ALCOHOL	1	E	E	
OLEIC ACID	0	E	G	
OXALIC ACID	3	E	E	
PALMITIC ACID		G	F	
PCB (POLYCHLORINATED BIPHENYLS)	2	G	P	
PENTACHLOROPHENOL	3	G	P	
PENTANE	1	E	P	

PERCHLORIC ACID, 30-70%	3	F	F	Neoprene (F)
PERCHLOROETHYLENE	2	G	P	
PEROXYACETIC ACID		P	P	Butyl (G)
PETROLEUM ETHERS, 80-110C	1	G	P	
PHENOL	4	F	F	(F)
PHOSPHORIC ACID	3	G	F	
PICRIC ACID	3	E	G	
POTASSIUM HYDROXIDE	3	E	G	
POTASSIUM IODIDE		G	G	
PROPYL ACETATE	1	F	P	Butyl (F)
PYRIDINE	3	P	P	Butyl (G)
SODIUM CARBONATE		E	E	
SODIUM CHLORIDE		E	E	
SODIUM FLUORIDE	3	G	G	
SODIUM HYDROXIDE,30-70%	3	G	E	
SODIUM HYPOCHLORITE		E	E	
SODIUM THIOSULFATE		G	G	
STYRENE	2	P	P	Polyvinyl Alcohol (G)
SULFURIC ACID, <70%	3	F	G	
SULFURIC ACID, >70%	3	P	P	Butyl (G)
TANNIC ACID	0	G	G	
1,1,1,2-TETRACHLOROETHANE		F	P	Viton (G)
TETRAHYDROFURAN	2	F	P	Teflon (G)
TOLUENE	2	F	P	Viton (G)
TOLUENE-2,4-DIISOCYANATE (TDI)	3	P	P	Butyl (G)
1,2,4-TRICHLOROBENZENE	2	F	P	Teflon (G)
1,1,1-TRICHLOROETHANE	2	P	P	Viton (G)
1,1,2-TRICHLOROETHANE	2	P	P	Viton (G)
TRICHLOROETHYLENE	2	P	P	Viton (G)
TRICRESYL PHOSPHATE	2	G	G	
TRIETHANOLAMINE	2	E	E	
TURPENTINE	1	E	P	
XYLENES	2	F	P	Viton (G)

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The National Fire Protection Association (NFPA) has developed a system for indicating the health hazards of chemicals:

4	Danger, may be fatal on short exposure. Specialized protective equipment required.
3	Warning, corrosive or toxic.
2	Warning, may be harmful if inhaled or absorbed.
1	Caution, may be irritating.
0	No unusual hazard.
	No information available. Avoid skin contact or inhalation..

The compatibility of the glove films with each chemical is color coded as follows:

P	POOR chemical resistance
F	FAIR chemical resistance
G - E	GOOD to EXCELLENT chemical resistance

Who Pays for PPE?

Protective equipment, including personal protective equipment for eyes, face, head and extremities, protective clothing, respiratory devices, and protective shields and barriers, must be provided, used, and maintained in a sanitary and reliable condition.

The supervising department must provide most types of PPE at no cost to the employee.

PPE that is very personal in nature and that can be worn off the jobsite— specifically some types of safety footwear and safety eyewear—may be partially or fully funded at the discretion the department.

It is recommended that each department maintain a uniform policy for reimbursement of safety footwear and eyewear.

Departments are encouraged to fully reimburse the cost of safety footwear and eyewear. 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 of safety footwear or eyewear, it is recommended that the requirement that the employee provide this PPE be included in the position description and that this requirement be fully explained during the interview process.

Safety Footwear

Specialized safety footwear, such as electrical protective, conductive, chemical resistant, foundry/heat resistant footwear or footwear with metatarsal protection must be provided at no cost to the employee. Reimbursement for the purchase of all other types of safety footwear is at the discretion of the department.

If the department elects to reimburse none or only a portion of the cost of safety footwear, remember that the department PPE Coordinator is still obligated to assure the adequacy of this PPE for the hazards to which the wearer is exposed.

Safety Eyewear

Specialized safety eyewear, such as prescription lenses that are fitted to full-face respirators, laser protective eyewear, welding helmets, and face shields, must be provided at no cost to the employee. Reimbursement for impact resistant prescription safety eyewear is at the discretion of the department. If the department elects to reimburse none or only a portion of the cost of safety eyewear, remember that the department PPE Coordinator is still obligated to assure the adequacy of this PPE for the hazards to which the wearer is exposed.

PPE Certification of Hazard Assessment

Dept:	**Area:**	**Job Classification/Task:**
HAZARDS (Circle Hazards)	**Describe Specific Hazards**	**Identify Type of PPE Required for the Hazards**
Eye Hazard Impact Penetration Dust Chemical Radiation Heat Bioaerosols Projectiles		
Head Hazard Burn Electric Shock Impact Penetration Chemical Overhead loads Overhead beams	**Describe Specific Hazards**	**PPE Required**
Foot Hazard Chemical Impact Electrical Sharp Objects (puncture risk) Wet Conditions Construction	**Describe Specific Hazards**	**PPE Required**
Hand Hazard Burn Electric Shock Impact Penetration Chemical Sharp Edges Biological Agents	**Describe Specific Hazards**	**PPE Required**
Other Safety/Health Hazards	**Describe Specific Hazards**	
Falls Guarding Heat Electrical Storage Lockout Noise Respiratory Clothing		

I, _____, conducted the above evaluation of the identified work area
print name

date

_____(Signature)