



Central Washington University

Personal Protective Equipment Plan

Plan prepared by:
Central Washington University
Office of Environmental Health & Safety
400 East University Way
Ellensburg, WA 98926
P: 509-963-2252

2018

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1.0 Introduction

1.1 Central Washington University shall furnish to each of its employees a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to our employees. Each Central Washington University employee shall comply with occupational safety and health standards and all rules, regulations, and orders. Therefore, Central Washington University shall ensure that personal protective equipment (PPE) for eyes, face, head, and extremities are provided, used, and maintained in a sanitary and reliable condition whenever it is necessary by reason of workplace hazard, which may cause injury or impairment of body function through absorption, inhalation or physical contact. This program defines the safety requirements as they pertain to personal protective equipment. Central Washington University's PPE program is written to comply with the WISHA Personal Protective Equipment Standard (WAC 206-800-160) and OSHA (29 CFR § 1910.132-139 Subpart I).

2.0 Scope

2.1 This PPE program applies to all University personnel and visitors in applicable University facilities and/or University operations. PPE is designed to protect the employee from health and safety hazards that cannot practically be removed from the work environment. It is the last means of defense. It should be used only when the hazards cannot be eliminated through engineering and/or administrative controls.

3.0 Definition

3.1 Eyewear / Facewear

- 3.1.1 **Absorptive Lens:** A filter whose physical properties are designed to attenuate the effects of glare, reflective, and stray light. In this program, it referred to shades 1.7 through 3.9 in **Appendix B**.
- 3.1.2 **Face Shield:** A device worn in front of the eyes and a portion of, or all of, the face. Its main function is to protect the eyes and face.
- 3.1.3 **Filter Lens:** A removable disc in the eyecup of a goggle that absorbs varying proportions of ultraviolet, visible, and infrared rays according to the composition and density of the lens.
- 3.1.4 **Filter Plate:** A removable pane in the window of a helmet, hood, or goggle that absorbs varying proportions of ultraviolet, visible, and infrared rays according to the composition and density of the plate.
- 3.1.5 **Goggle:** A device, with contour-shaped eyecups or facial contact with glass or plastic lenses, worn over the eyes for the protection of the eyes and eye sockets.
- 3.1.6 **Hood:** A device that completely covers the head, neck, and portions of the shoulders.
- 3.1.7 **Radiant Energy or Radiation:** The energy of electromagnetic waves produced by the movement of molecules excited by the heat of an electric

arc, or gas flame, or the passage of an electric current. Three kinds of radiant energy are pertinent to this program: (1) ultraviolet (2) visible light, and (3) infrared.

- 3.1.8 **Shield:** A device to be held in the hand, or supported without the aid of the operator, whose predominant function is protection of the eyes and face.
- 3.1.9 **Side Shield:** A device of metal, plastic, or other material hinged or fixed firmly to the frame of the safety glasses to protect the eye from side exposure.

3.2 Hardhats / Helmets

- 3.2.1 **Helmet:** A rigid device that is worn to provide protection for the head, or portions thereof, against impact, flying particles, or electric shock, or any combination thereof, and which is held in place by a suitable suspension.
- 3.2.2 **Suspension:** The internal cradle of the helmet which holds it in place on the head and is made up of the headband and crown straps.

3.3 Gloves

- 3.3.1 **Abrasion Resistance:** The ability of the glove material to withstand the scuffing action on the substrate to which it is exposed.
- 3.3.2 **Breakthrough Time:** The elapsed time between initial contact of the chemical on the glove surface and the analytical detections of the chemical on the inside of the glove.
- 3.3.3 **Degradation Characteristics:** When the material of the glove itself begins to break down.
- 3.3.4 **Laceration Resistance:** The ability of the glove material to resist cuts from sharp objects.
- 3.3.5 **Penetration Resistance:** The ability of the glove material to resist puncture due to sharp objects.
- 3.3.6 **Permeation:** The process by which a chemical moves through a protective clothing material on a molecular level. It involves (1) absorption of molecules of the chemical into the outside surface of the material; (2) diffusion of the sorbed molecules in the material; and (3) desorption of the molecule from the inside surface of the material into the collecting medium.
- 3.3.7 **Tactile Dexterity:** The property of the glove material which enables its user to feel and allow freedom of movement.

3.4 General

- 3.4.1 **Employee:** An employee for the purpose of the PPE program is any person who receives compensation for work performed at Central Washington University.

- 3.4.2 **Job Hazard Analysis (JHA):** A job hazard analysis is a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment.
- 3.4.3 **Personal Protective Equipment (PPE):** Equipment designed to protect individuals from workplace hazards, which may cause injury or impairment of body function through absorption, inhalation, or physical contact (e.g., gloves, eye protection, respirators, safety shoes, head protection).
- 3.4.4 **Personal Protective Equipment Plan:** A written program developed and implemented which set forth procedures to provide, use, and maintain PPE in a sanitary and reliable condition whenever it is necessary by reason of workplace hazard.

4.0 Responsibilities

4.1 Supervisors

- 4.1.1 Where feasible, Supervisors should work to develop engineering and/or administrative controls to reduce the dependence on Personal protective Equipment (PPE).
- 4.1.2 Supervisors and the employee who performs the job shall evaluate anticipated work conditions, via a job hazard analysis (JHA) in their respective areas to determine what, if any, PPE is required to protect the worker while performing his/her job duties.
- 4.1.3 The JHA should be a common sense approach based on observation of existing work practices, hazards, and knowledge of PPE requirements. EH&S staff is available to provide technical assistance.
- 4.1.4 Identification of hazards includes consideration of the following basic hazard categories:
- Impact
 - Penetration
 - Compression (pinch points)
 - Chemical
 - Heat
 - Harmful dusts
 - Radiant energy
 - Infectious Agents/Blood
- 4.1.5 Once work place hazards have been identified and consideration given to the nature of the hazards and potential for exposure to multiple hazards, the Supervisor shall make a decision concerning the type to be selected and purchase PPE accordingly.
- Central Washington University will not pay for PPE which is personal in nature, such as safety shoes and non-specialty safety glasses.
- 4.1.6 Jobs where exposure conditions have changed shall be re-evaluated by the Supervisor and the employee performing the job to determine PPE needs.

- 4.1.7 Supervisors must train employees in the proper use of PPE. *See Section 6.0 for specific training requirements.*
- 4.1.8 Supervisors must ensure that appropriate PPE is worn. The employee must be wearing the PPE and using it properly.
- 4.1.9 Supervisors must review how the PPE is issued and keep records to control equipment misuse, and any equipment deficiencies. Once PPE is found to be deficient, it must be taken out of service. Before the employee can resume work, he/she must be issued working PPE of equipment that is able to provide the minimum safety protection for the employee.
- 4.1.10 Supervisors will replace, at no charge to the employee, provided PPE which is defective or damaged in use.
- 4.1.11 Supervisors must administer the program and approve temporary deviations. These deviations must be approved in writing by the Supervisor and the Safety Coordinator or other competent person.

4.2 Employee

- 4.2.1 Employees will be required to understand and properly wear the provided PPE when work assignment or operations present the risk of exposure to observed or potential hazards.
- 4.2.2 Employees are responsible to inspect the provided PPE each day before the start of their shift. Employees shall notify their Supervisor if, upon inspection, the provided PPE is found to be defective or damaged. Employees shall not perform any work duty that requires PPE until the defective or damaged PPE is replaced with properly working PPE.
- 4.2.3 Employees are responsible for the safekeeping and maintenance of the personal protective equipment.
- 4.2.4 Employees shall inform their supervisor whenever a need arises to use PPE for which the employee has not received training, or when a condition exists, where adequate PPE is not available.

4.3 Department of Environmental health & Safety (EH&S)

- 4.3.1 EH&S is responsible for insuring that all job categories at Central Washington University have been evaluated for PPE requirements.
- 4.3.2 EH&S will provide technical consultation and assistance with choosing the proper PPE for work tasks.
- 4.3.3 EH&S will manage the PPE program and other campus-wide EH&S programs.
- 4.3.4 EH&S will oversee JHA and PPE effort.

5.0 PPE Selection

- 5.1 Selection of PPE shall be based upon provision of a level of protection greater than the minimum required to protect the exposed employee from the potential or observed hazards. See **Appendix F**.

5.2 Eye and Face Protection

- 5.2.1 Where eye and face protection are required the selected protection shall be adequate to protect against machines or operations, which create the risk of eye or face injuries due to physical, chemical and/or radiation agents.
- 5.2.2 Hazards associated with the potential for flying objects shall utilize eye protection with side shields.
- Detachable side shields are permissible, but must meet ANSI Z87.1-2010 or latest revision.
- 5.2.3 Personnel who are required to wear safety eyewear and need prescription lenses to conduct their work shall be provided with protective eyewear that can be worn over the employee's prescription lenses.
- 5.2.4 Where radiant energy is a hazard, properly shaded lenses shall be selected for use. Such hazards may include but are not limited to:
- Welding (gas or electric)
 - Ultraviolet light, and
 - Heat treat furnaces
- *See Section 9.0 – **Appendix B** for help determining proper filter lenses for protection against radiant energy.*
- 5.2.5 Employees desiring eye and face protection and who are not normally assigned to activities that necessitate eye protection, will be provided with suitable eye protection where hazards are present.

5.3 Respiratory Protection

- 5.3.1 Refer to the Central Washington University Respiratory Protection Program.

5.4 Head Protection

- 5.4.1 Employees working in areas where there is the possible danger of head injury from the impact of falling or flying objects, striking against objects, electrical shock and/or burns, or any combinations of these hazards will be protected by protective hard hats.
- 5.4.2 All head protection shall comply with the specifications contained in ANSI Z89.1-2009 or latest version.
- 5.4.3 ANSI Z89-2009 (or latest version) breaks protective headwear into the following classes:
- Class A helmets provide impact, penetration resistance and electrical protection up to 2,200 Volts.
 - Class B helmets provide impact, penetration resistance and electrical protection up to 20,000 Volts.
 - Class C helmets provide only impact and penetration resistance.

5.4.4 Bump caps are not recognized by ANSI or Central Washington University for general exposure and are not a valid form of head protection under this program.

5.4.5 Hard hats may not be altered in a way that will reduce their efficiency. Typical prohibited alterations include:

- Painting
- Drilling holes in the shell
- Application of metal jewelry
- Other such applications as above

Hats with these alterations or excessive scratches will be replaced.

5.5 Foot Protection

5.5.1 Employees who are exposed to hazards that may cause foot injuries due to falling or rolling objects, objects piercing the sole, extreme cold, wetness, slipping, electrical shock, or any hazard identified by the JHA, shall be required to use safety footwear.

5.5.2 All protective footwear shall comply with ANSI Z41-1999 or latest version.

5.6 Hand Protection

5.6.1 Hand protection must be selected, provided and worn when employees are exposed to hazards such as skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns, harmful temperature extremes, or any other hazard identified by the JHA.

5.6.2 Glove selection shall include consideration of the following factors:

- Whether or not the glove will be reused.
- Length of time that the glove may be worn.
- The specific chemical or chemicals to which the glove will be exposed.
- The ability of the chemical to be skin absorbed.
- Permeation characteristics of the glove fabric.
- Degradation characteristics of the glove fabric.
- Chemical breakthrough times of the glove fabric.
- Abrasion resistance.
- Penetration resistance.
- Laceration resistance.
- Tactile dexterity.
- Glove fit and ergonomic issues.
- Heat resistance.
- Vibration damping.

- Electrical shock resistance.
 - Whether or not the gloves need to be sterile or sanitary.
 - Applicability to work with infectious agents.
 - Protection during extreme weather/temperatures.
- 5.6.3 In certain cases it may be necessary to provide two pair of gloves to provide the protective traits, which neither pair possesses by itself.
- 5.6.4 A properly fitted glove is important to the wearer's comfort. Tight-fitting gloves can cause fatigue while loose fitting gloves can be hazardous. *See Section 9.0 – **Appendix C** for help determining proper glove size.*
- 5.6.5 Supervisors and employees must be cautious of allergic reactions to natural rubber latex in the workplace. Whenever necessary, supervisors should provide employees with non-latex gloves. If latex gloves are chosen, supervisors should provide reduced protein, powder-free latex gloves to reduce exposure to allergy-causing proteins.

5.7 Hearing Protection

- 5.7.1 Refer to Central Washington University's Noise Control and Hearing Conservation Program.

5.8 PPE Not Described Elsewhere in this Document

- 5.8.1 PPE not specifically mentioned elsewhere in this document, the general requirements section covers. Other sources of information on personal protective equipment include WISHA/OSHA regulations, NIOSH recommendations, ANSI recommendations, and the staff of Environmental Health & Safety.

6.0 Training

- 6.1** The Supervisor shall provide training/retraining to each employee who is required to use PPE for his/her job function.

- 6.1.1 Each employee shall be trained to know and understand the following:

- When is PPE necessary?
- What PPE is necessary?
- How to don or put on the PPE.
- How to doff or remove the PPE.
- Limitations of the PPE.
- Proper care and maintenance of PPE.
- Useful life of PPE.
- Proper disposal of PPE.

- 6.2** Each employee required to wear PPE shall demonstrate his/her understanding of the training elements listed above, before being allowed to perform work requiring the use of PPE.

- 6.2.1 The Supervisor shall provide training during the following situations:

- Upon an employee’s initial assignment to a work area or activity that requires PPE.
- When changes in the workplace render previous PPE training obsolete.
- When there are changes to the selected types of PPE, which render previous training obsolete.
- When employees no longer demonstrate proficiency with their assigned PPE.

7.0 Recordkeeping

7.1 The Supervisor or designee shall verify through written certification that all areas under his/her jurisdiction have been assessed for hazards requiring PPE. This certification shall contain the location of the assessment, the date, and the job title of the job assessed.

7.2 The Supervisor or designee shall verify that each employee, who is required to wear PPE, has received and understood the required training listed in Section 6.0.

7.2.1 Records shall be maintained which indicate that training has been completed and the employee has demonstrated competency in the use of the PPE.

7.2.2 Training Records shall include:

- Date of the training session.
- A brief summary of the session’s subject matter.
- Name, social security number or company I.D. number, and job title of all attendees.
- Name and qualifications of persons conducting training.

7.2.3 Training records shall be maintained for at least three (3) years by the affected department.

8.0 References

8.1 References for this program include:

8.1.1 Washington Industrial Safety & Health Administration (WISHA), Personal Protective Equipment Standard, WAC 296-800-160.

8.1.2 WISHA, General Requirements for Personal Protective Equipment, WAC 296-155-200.

8.1.3 U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Personal Protective Equipment Standard, 29 CFR § 1910.132-139 Subpart I.

8.1.4 WISHA Personal Protective Equipment (PPE) Guide, Volume 1

8.1.5 OSHA, STD 01-06-006 – STD 1-6.6 – Inspection Guidelines for 29 CFR § 1910. Subpart I, the revised Personal Protective Equipment Standards for general Industry.

8.1.6 OSHA, Job Hazard Analysis, OSHA 3071, 2003 (Revised).

- 8.1.7 American National Standard Institute (ANSI) Z41-1999: Personal Protection – Protective Footwear.
- 8.1.8 ANSI Z87.1-2010: Practice for Occupational and Educational Eye and Face Protection.
- 8.1.9 ANSI/ISEA Z89.1-2009: Industrial Head Protection.
- 8.1.10 ANSI Z136.1-2007: Safe Use of Lasers.
- 8.1.11 ANSI/ISEA Z107-2004: High-Visibility Safety Apparel and Headwear.
- 8.1.12 ASTM F2413-05: Standard Specification for Performance Requirements for Foot Protection.
- 8.1.13 ASTM D6978-05: Standard Practice for Assessment of resistance of Medical Gloves to Permeation by Chemotherapy Drugs.
- 8.1.14 ASTM F739-07: Standard Test Method for Permeation of Liquids and Gases through Protective Clothing Materials under Conditions of Continuous Contact.
- 8.1.15 ASTM D120-09: Standard Specifications for Rubber Insulating Gloves.
- 8.1.16 ASTM F1117-03 (2008): Standard Specifications for Dielectric Footwear.
- 8.1.17 ASTM F1116-03 (2008): Standard Test Method for Determining Dielectric Strength of Dielectric Footwear.
- 8.1.18 ASTM F1818-04: Standard Specifications for Foot Protection for Chain Saw users.
- 8.1.19 National Fire Protection Association (NFPA) 70E (2009): Standard for Electrical Safety in the Workplace.
- 8.1.20 Centers for Disease Control and Prevention (CDC) & National Institute of Occupational Safety & Health (NIOSH), Emergency Response Resources – Personal Protective Equipment (PPE).

9.0 Appendices

Appendix A

Personal Protective Equipment Worksheet

Central Washington University in compliance with the WISHA and OSHA's Personal Protective Equipment (PPE) Standard (WAC 296-800-160 and 29 CFR 1910.132) shall provide employees adequate PPE through a completed Job Hazard Analysis or a developed Standard Operating Procedure (SOP). Adequate PPE shall be provided to employees at no cost, including replacement from regular use. Departments shall ensure employees are trained and PPE is worn when hazards are present.

EYE and FACE Protection

(WAC 296-800-16050 & 29 CFR 1910.133)

Appropriate eye and face protection shall be provided to all employees when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors or potential injurious radiation and glare. All eye and face protection must be approved by the American National Standards Institute, ANSI.

- Safety Glasses: Required when there is a potential of being struck by flying objects such as grinding, chiseling, use of a power saw and tools or any machining. For most situations safety glasses with side shields are adequate.
- Safety Goggles: Required in chemical handling and laboratory operations where there is a potential for chemical fumes, splashes, mists, sprays, or dust exposure to the eyes.
- Face Shields: Required when there is a potential face exposure to projectiles, chemicals or radiant energy; they cannot be used as substitute for eye protection.
- Prescription Lenses: Employees who wear prescription glasses must either wear approved safety glasses over the prescription glasses or wear prescription approved safety glasses.
- Contact Lenses: Contact Lenses do not provide eye protection and therefore must be worn with appropriate protective eyewear.
- Filtered Lenses: For use when there is a potential of being exposed to light radiation.

HAND Protection

(WAC 296-800-16065 & 29 CFR 1910.138)

Appropriate hand protection shall be provided to all employees when exposed to hazards of the hand, such as skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns, and harmful temperature extremes. Selection of appropriate hand protection shall be based on the hazards identified, level of protection needed, duration of use, dexterity required and fit, and the limitations the gloves provide.

HEAD Protection

(WAC 296-800-16055 & 29 CFR 1910.135)

Appropriate head protection shall be provided to all employees when working in areas where head injuries could occur from falling or flying objects or bumping the head against with stationary objects, or electrical shock hazards. All protective helmets must be approved by the American National Standards Institute, ANSI. Each type of head protection is made to guard against certain specific hazardous situations. The following will help you decide the right protection according to the type and class.

- Type 1-helmets with full brim, not less than 1 and ¼ inches wide, and
- Type 2-brimless helmets with a peak extending forward from the crown.

For industrial purposes there are three classes of head protection:

- Class A-general service that are intended again impact hazards, such as construction, mining and manufacturing.
- Class B- utility service, high voltage helmets that protect from impact and penetration of falling objects, they are used extensively by electrical workers.
- Class C-special service helmets with NO voltage protection they are made for lightweight and comfort and usually made with aluminum.

Helmets should be maintained and replaced if worn or cracked.

FOOT Protection

(WAC 296-800-16060 & 29 CFR 1910.136)

Appropriate footwear should be provided to employees when there is danger of injuring the foot from falling or rolling objects, objects piercing the sole of the shoe or where feet will be exposed to electrical or chemical hazards. Protective footwear must meet applicable ANSI standards and performance measurements for protection for the toes, metatarsal area (top of foot), puncture protection and electrical hazards, the use of add-on type of devices (i.e. metatarsal guards) is only suitable for temporary use. The suitability of shoes in any workplace should be determined by supervisory personnel and if it is appropriate to wear sandals, clogs etc.

HEARING Protection

(WAC 296-817 & 29 CFR 1910.95)

Excessive noise exposures to workers may require implementation of a hearing conservation program. Additional information on the CWU Hearing Conservation Program can be found at www.ehs.ohio-state.edu.

RESPIRATORY Protection

(WAC 296-841 & 29 CFR 1910.134)

Inhalation hazards such as harmful dusts, fogs, chemical fume/mist/gas, smoke, spray and/or vapor may require implementation of a respiratory protection program. Additional information on the CWU Respiratory Protection Program can be found on the CWU EH&S website.

Appendix B

Filter Lens Determination

Filter Lenses for Protection Against Radiant Energy

Electrode Size			Minimum* Protective Shade
Operations	1/32 inches	Arc Current	
Shielded metal arc welding	Less than 3	Less than 60.....	7
	3-5	0-160	8
	5-8	60-250	10
	More than 8	250-550	11
Gas metal arc welding and flux cored arc welding		Less than 60	7
		60-160	10
		160-250	10
		250-500	10
Gas Tungsten arc welding		Less than 50	8
		50-150	8
		150-500	10
Air carbon Arc cutting	(Light)	Less than 500	10
	(Heavy)	500-1000	11
Plasma arc welding		Less than 20	6
		20-100	8
		100-400	10
		400-800	11
Operations	Plate thickness - inches	Plate thickness - mm	Minimum* Protective Shade
Plasma arc cutting	(Light)	Less than 300	8
	(Medium)	300-400	9
	(Heavy)	400-800	10
Torch brazing		3
Torch soldering		2
Carbon arc welding		14
Gas Welding:			
Light	Under 1/8	Under 3.2	4
Medium	1/8-1/2	3.2 to 12.7	5
Heavy	Over 1/2	Over 12.7	6
Oxygen Cutting:			
Light	Under 1	Under 25	3
Medium	1 to 6.....	25 to 50	4
Heavy	Over 6	Over 150	5

As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxy-

fuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation. *These values apply where the actual arc is clearly seen. Experience has shown that lighter filters may be used when the arc is hidden by the workpiece.*

Appendix C

Glove Size Determination

To determine glove size, use a tape measure to find the circumference of the hand around the palm area. This measurement in inches is closest to the actual glove size.

Glove Size	XS	S	M	L	XL
Hand Size (inches)	6-7	7-8	8-9	9-10	10-11

Appendix D

Hazard Control Hierarchy

Information obtained from a job hazard analysis is useless hazard control measures recommended in the analysis are incorporated into the tasks. Supervisors should recognize that not all hazard controls are equal. Some are more effective than others at reducing risk.

The order of precedence and effectiveness of hazard control is the following:

1. Engineering Controls
2. Administrative Controls
3. Personal protective Equipment (PPE)

Engineering Controls include the following:

- Elimination/minimization of the hazard – designing the facility, equipment, or process to remove the hazard, or substituting processes, equipment, materials, or other factors to lessen the hazard.
- Enclosure of the hazard using enclosed cabs, enclosures for noisy equipment or other means.
- Isolation of the hazard with interlocks, machine guards, blast shields, welding curtains, or other means.
- Removal or redirection of the hazard such as with local and exhaust ventilation.

Administrative Controls include the following:

- Written operating procedures, work permits, and safe work practices.
- Exposure time limitations (used most commonly to control temperature extremes and ergonomic hazards).
- Monitoring the use of highly hazardous materials.
- Alarms, signs, and warnings.
- Training.

Personal Protective Equipment – such as respirators, hearing protection, protective clothing, safety glasses, and hardhats – is acceptable as a control method in the following circumstances:

- When engineering controls are not feasible or do not totally eliminate the hazard.
- While engineering controls are being developed.
- When safe work practices do not provide sufficient additional protection.
- During emergencies when engineering controls may not be feasible.

Use of one hazard control method over another higher in the control precedence may be appropriate for providing interim protection until the hazard is abated permanently. In reality, if the hazard cannot be eliminated entirely, the adopted control measures will likely be a combination of all three items instituted simultaneously.

Appendix E

Common Hazards & Descriptions

1. **Chemical (Toxic):** A chemical that exposes a person by absorption through the skin, inhalation, or through the blood stream that causes illness, disease, or death. The amount of chemical exposure is critical in determining hazardous effects. Check Material Safety Data Sheets (MSDS) / Safety Data Sheets (SDS) and/or WISHA (WAC 296-62) & OSHA 1910.1000 for chemical hazard information.
2. **Chemical (Flammable):** A chemical that, when exposed to a heat ignition source, results in combustion. Typically, the lower a chemical's flash point and boiling point, the more flammable the chemical. Check MSDS/SDS for flammability information.
3. **Chemical (Corrosive):** A chemical that, when it comes into contact with skin, metal, or other materials, damages the materials. Acids and bases are examples of corrosives.
4. **Explosion (Over-Pressurization):** Sudden and violent release of a large amount of gas/energy due to a significant pressure difference such as rupture in a boiler or compressed gas cylinder.
5. **Electrical (Shock/Short Circuit):** Contact with exposed conductors or a device that is incorrectly or inadvertently grounded, such as when a metal ladder comes into contact with power lines. 60Hz alternating current (common house current) is very dangerous because it can stop the heart.
6. **Electrical (Fire):** Use of electrical power that result in electrical overheating or arcing to the point of combustion or ignition of flammables, or electrical component damage.
7. **Electrical (Static/ESD):** The moving or rubbing of wool, nylon, or other synthetic fibers, and even flowing liquids can generate static electricity. This creates an excess or deficiency of electrons on the surface of material that discharges (spark) to the ground resulting in the ignition of flammables or damage to electronics or the body's nervous system.
8. **Electrical (Loss of Power):** Safety-critical equipment failure as a result of loss of power.
9. **Ergonomics (Strain):** Damage of tissue due to overexertion (sprains and strains) or repetitive motion.
10. **Ergonomics (Human Error):** A system design, procedure, or equipment that is error-provocative (a switch goes up to turn something off).
11. **Excavation (Collapse):** Soil collapse in a trench or excavation as a result of improper or inadequate shoring. Soil type is critical in determining the hazard likelihood.
12. **Fall (Slips, Trip):** Conditions that result in falls (impacts) from height or traditional walking surfaces (such as slippery floors, poor housekeeping, uneven walking surfaces, exposed ledges, etc.).
13. **Fire/Heat:** Temperatures that can cause burns to the skin or damage to other organs. Fires require a heat source, fuel, and oxygen.
14. **Mechanical/Vibration (Chaffing/Fatigue):** Vibration that can cause damage to nerve endings, or material fatigue that results in a safety-critical failure. (Examples are abraded slings and ropes, weakened hoses and belts).
15. **Mechanical:** Skin, muscle, or body part exposed to crushing, caught-between, cutting, tearing, shearing items or equipment.
16. **Noise:** Noise levels (≥ 85 dBA 8 Hr TWA) that result in hearing damage or inability to communicate safety-critical information.

17. **Radiation (Ionizing):** Alpha, Beta, Gamma, neutral particles, and X-rays that cause injury (tissue damage) by ionization of cellular components.
18. **Radiation (Non-Ionizing):** Ultraviolet, visible light, infrared, and microwaves that cause injury to tissue by thermal or photochemical means.
19. **Struck By (Mass Acceleration):** Accelerated mass that strikes the body causing injury or death. (Examples are falling objects and projectiles).
20. **Struck Against:** Injury to a body part as a result of coming into contact with a surface in which action was initiated by the person. (An example is when a screwdriver slips).
21. **Temperature Extreme (Heat/Cold):** Temperatures that result in heat stress, exhaustion, or metabolic slow down such as hypothermia.
22. **Visibility:** Lack of lighting or obstructed vision that results in an error or other hazard.

Appendix F

Personal Protective Equipment Recommendations

Source of Hazard	Affected Body Part	Recommended PPE
Chemical and Splashing Liquid (e.g., Acid and chemical handling, hazardous drug preparation and administration, biological substances, food processing, painting, cleaning products, pesticide and herbicide use, etc.)	Eyes	Goggles, safety glasses with side shields (not for chemical protection)
	Head, Neck, Face	Chem-resistant Tyvek hood, face shield, chemical/liquid resistant hoods/caps, fluid-resistant surgical masks or surgical mask/face shield combinations (generally not for chemical protection)
	Feet and Toes	Slip-resistant shoes, chemical/liquid resistant overshoes
	Hands	Chosen based upon specific hazard: Nitrile, butyl rubber, neoprene, Silver Shield, or other chemical resistant gloves or mittens, chemotherapy gloves
	Body: Torso, Arms, Legs	Chemical/liquid resistant clothing
High Heat (Dry) (e.g., Burns from hot surfaces, sparks, Bunsen burners, welding, kitchen equipment, furnace operations, etc.)	Eyes	Goggles, safety glasses with side shields, insulated helmets
	Head, Neck, Face	Face shield, flame retardant / insulated helmet, cap or hood
	Feet and Toes	Leather shoes, foundry shoes
	Hands	Hand protection made from insulated or flame resistant materials such as Nomex, Kevlar, leather, terry, cotton, etc.
	Body: Torso, Arms, Legs	Clothing made from flame resistant or insulated material such as Nomex or leather
High Heat (Liquid) (e.g., Burns from hot liquids, molten metal, steam, food preparation, etc.)	Eyes	Goggles, safety glasses with side shields
	Head, Neck, Face	Face shields, protective hoods / helmets
	Feet and Toes	Leather shoes, foundry shoes
	Hands	Insulated gloves with added liquid resistant properties when necessary
	Body: Torso, Arms, Legs	Clothing made from treated wool or cotton, leather or specialty fabrics such as Nomex

Source of Hazard	Affected Body Part	Recommended PPE
Cryogenics / Extreme Cold (e.g., Cryo-burns, frostbite, permanent eye damage from liquid Nitrogen, CO ₂ , non-insulated equipment, etc.)	Eyes	Goggles
	Head, Neck, Face	Face shield
	Feet and Toes	Appropriate safety shoes
	Hands	Cryo-gloves
	Body: Torso, Arms, Legs	Lab coat, long pants, aprons, insulated cotton or synthetic fabrics
Dust / Flying Debris (e.g., Chipping, grinding, sanding, chiseling, woodworking, grounds-keeping, coal handling, buffing, general dusty conditions, etc.)	Eyes	Goggles, safety glasses with side protection
	Head, Neck, Face	Face shield, hard hat, helmet, hood
	Feet and Toes	Safety shoes if appropriate
	Hands	Appropriate protective gloves
	Body: Torso, Arms, Legs	Protective clothing made from synthetic or natural fabrics such as Kevlar or treated cotton/wool, or cotton duck
Impact / Compression (e.g., Crushing on penetration from machinery, materials handling, carpentry, construction, etc.)	Eyes	Safety glasses with side shields
	Head, Neck, Face	Class G, E, or C helmets
	Feet and Toes	Safety toes and metatarsal guards
	Hands	Leather, Kevlar or other specially material
	Body: Torso, Arms, Legs	Leather, Kevlar or cotton duck clothing
UV / IR Radiation (e.g., Optical radiation from welding, cutting, torch brazing or soldering, glare, laser, working outdoors, etc.)	Eyes	Spectacles, welding face shield, goggles, or helmets with appropriate shaded or special purpose lenses
	Head, Neck, Face	Same as above
	Feet and Toes	Closed-toe shoes
	Hands	Sunscreen
	Body: Torso, Arms, Legs	Sunscreen, clothing with SPF rating
Electrical Hazards (e.g., Open circuits, energized electrical equipment or utilities, electrical arc, etc.)	Eyes	Safety glasses
	Head, Neck, Face	Hard hat, Class E
	Feet and Toes	Electrical hazard footwear
	Hands	Rubber gloves and insulating sleeves, Class 00-4 based on maximum voltage exposure
	Body: Torso, Arms, Legs	Garments made from Protera synthetic material, flame retardant clothing

Source of Hazard	Affected Body Part	Recommended PPE
Puncture / Cuts / Abrasions (e.g., Sharp edges from tools and machines, food preparation, surgical equipment, syringes, etc.)	Eyes	Safety glasses with side shields
	Head, Neck, Face	Face shield
	Feet and Toes	Safety toed and puncture resistant soles
	Hands	Material depends upon specific hazard and severity, but can include leather, rubber, cotton, Kevlar, metal mesh, etc.
	Body: Torso, Arms, Legs	Clothing made from Kevlar, treated wool or cotton, duck or leather
Slippery / Wet Surfaces (e.g., Oil, water, soaps, wax, chemicals, food handling areas, etc.)	Feet and Toes	Slip resistant safety shoes
Fall Hazards (e.g., Unprotected elevated working surfaces)	Body	Personal fall arrest system
Noise (e.g., Mechanical rooms, machining, grinding, sanding, cage washing, dish washing, pneumatic equipment, grounds equipment, generators, chillers, motors, saws, jackhammers, etc.)	Head, Neck, Face	Ear plugs, ear muffs, or canal caps
Respiratory (e.g., Emergency response, hazardous chemicals, powders, mists, vapor, smoke or gases, painting, welding, cutting, brazing, disturbing asbestos, lead, silica, or other particulate hazards, working with animals, grounds equipment, etc.)	Respiratory	Appropriate respirator can be a filtering face piece (such as an N-95), PAPR, half-face air-purifying, or supplied are (including SCBA) depending on the hazard; must be approved by EH&S

Appendix G

Certification of Hazard Assessment and Personal Protective Evaluation

Building/Room: _____ Process/Operation: _____ Date: _____

Department: _____ Department Head/Chair Signature: _____

A hazard assessment has been performed for the workplace identified above. The hazard assessment was conducted according to the guidelines in Appendix H.

Person completing this form: _____ Date: _____

Signature of the person completing this form: _____

Hazard Classification	Present		Code	Likelihood of Injury	Seriousness of Injury	Controls Hoods/Guards	PPE Required			
	Y	N					Hands	Face	Foot	Head
				H M L	H M L					
Impact										
Penetration										
Compression										
Chemical airborne, liquid, gas										
Hot or Cold										
Light or Radiation										
Electrical										
Dust										
Biological										

Hazard Codes: Carrying (Cr), Corrosive (COR), Cutting (CT), Grinding (GR), Hot Surfaces (Hs), Infrared (IR), Irritant (I), Lasers (LA), Rolling (R), Sanding (SA), Sawing (SW), Sensitizers (S), Sharps (SH), Solvents (SV), Sparks (SP), Striking (ST), Toxic Gases (G), Ultraviolet (UV), Welding (W)

HIGH (H) MODERATE (M) LOW (L)

Appendix H

Personal Protective Equipment Selection Guidelines

(Example)

(Check Appropriate Lines)

Hand Protection

- Neoprene
- Latex rubber
- Nitrile
- Natural rubber
- PVC
- PVA
- Cotton work gloves
- Leather, suede work gloves
- Welder's gloves
- Cryogenic protection
- Heat, flame, spark protection
- Cut, abrasion protection
- Other: _____

Eye Wear

- Chemical goggles
- Safety glasses with side shields
- Face shield
- Laser glasses
- Welding, cutting glasses
- Other: _____

Head Protection

- Hard hat
- Bump cap
- Other: _____

Foot Protection

- Safety steel toe shank
- Chemical resistant
- Other: _____