ST. LAWRENCE UNIVERSITY

Environmental Health and Safety Office

Personal Protective Equipment (PPE) Policy

This policy defines the process of hazard assessment for the need for Personal protective equipment (PPE), the equipment required for the defined hazards and training required in use of such equipment by SLU employees.

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Updated:

Based on policy from Purdue University

POLICY

I. SCOPE

This policy implements the personal protective equipment (PPE) requirements of the Occupational Safety and Health Administration (OSHA) regulations, 29 CFR 1910.132 - 29 CFR 1910.140. This policy applies to the use of personal protective equipment for employees at St. Lawrence University Facilities Operations.

II. APPLICATION

Personal protective equipment such as protective clothing, respiratory devices (respirators), shields, and barriers shall be used to protect against chemical, radiological, biological, or mechanical hazards and irritants capable of causing injury or impairment through absorption, inhalation, or physical contact. St. Lawrence University policy is that personal protective equipment be provided, used, and maintained in a sanitary and reliable condition.

III. HAZARD ASSESSMENT AND CERTIFICATION

A. *"Hazard Assessment"*

The hazard assessment is a process (required by law) of identifying the hazards associated with a defined task or job prescribing personal protective equipment which must be employed to reduce the risk from the hazards. The supervisor shall assess each work assignment to determine if hazards are present or likely to be present and require the use of personal protective equipment.

B. *"Certification of Hazard Assessment"*

The certification of hazard assessment is a written document detailing the hazard assessment for particular tasks. The supervisor is responsible for ensuring that hazard assessments are performed and the certification(s) written, signed, dated, and readily available or posted in each location. This certification of hazard assessment should be reviewed at least annually and updated anytime a new task which presents a hazard is introduced into the workplace. The supervisor may delegate or contract the labor involved in this process, but cannot reassign or disclaim the responsibility.

C. Performing and Certifying Hazard Assessment(s)

Appendices A1, A2, and A3 suggest formats for the written Hazard Assessment Certification. Supervisors may choose to use any of the following formats, a combination of the formats, or devise their own format as is best suited to their needs.

1. **APPENDIX A1** is designed for a single task evaluation.
   - **a.** Describe the task.
   - **b.** List hazards associated with each body part.
   - **c.** Determine PPE requirements for each hazard.
   - **d.** List other control measures required.

2. **APPENDIX A2** is designed for position or job title evaluations.
   - **a.** Identify hazards the position title may encounter while performing normal duties.
   - **b.** List each task where hazard is present.
   - **c.** Determine PPE requirements for each task.
   - **d.** List other control measures required.

3. APPENDIX A3 is designed for evaluation of a location and is best suited to laboratory environments.
   a. Identify the hazards.
   b. List each task where hazard is present.
   c. Determine PPE requirements for each task.
   d. List other control measures required.

IV. EQUIPMENT SELECTION, USE AND MAINTENANCE

A. Supervisor Responsibilities

After performing a hazard assessment and determining that hazards are present, or likely to be present, the supervisor shall do the following:

1. Select the types of PPE that the affected employee will use for the hazards identified in the hazard assessment.
2. Assure the adequacy of the PPE; proper fit, protection, maintenance, and sanitation.
3. Communicate selection decisions to each affected employee.
4. Ensure every affected employee knows how to use their PPE correctly.
5. Ensure every affected employee uses the required PPE when performing tasks identified in the hazard assessment that require the use PPE.
6. Prevent the use of PPE that is defective or damaged. Defective or damaged PPE must be replaced.
7. Never assign a task for which PPE is required but not available.

B. Employee Responsibilities

After a hazard assessment has been performed and hazards identified that require PPE, the employee shall do the following:

1. Never perform a task for which PPE is required but not available.
2. Always wear and use required PPE correctly.
3. Never use PPE that is defective or damaged.
4. Be subject to disciplinary action in accordance with University policy for failure to abide by St. Lawrence University's Personal Protective Equipment policy.

C. Environmental Health and Safety Office

The EHS Office will assist with selection of PPE and performance of Job Hazard Assessment.

V. TRAINING REQUIREMENTS AND CERTIFICATION

A. The supervisor shall provide adequate training to each employee who is required to use PPE. Each employee shall be trained to know at least the following:

1. When PPE is necessary

2. What PPE is necessary

3. How to properly don, doff, adjust, and wear PPE

4. The limitations of the PPE

5. The proper care, maintenance, useful life, and disposal of the PPE

B. Each affected employee must demonstrate an understanding of the training provided, and the ability to use the PPE properly, before performing any work requiring the use of PPE. Show-and-tell competence demonstrations are appropriate for most situations.

C. When the supervisor has reason to believe that an affected employee who has already been trained does not have the understanding and skill required the supervisor shall retrain the employee.

Circumstances that render previous training obsolete or inadequate and therefore require new training or retraining include, but are not limited to:

1. Changes in the workplace.

2. Changes in the types of PPE to be used.

3. Inadequacies in the affected employee's knowledge or use of assigned PPE.

D. The supervisor must verify that each affected employee has received and understood the required training through a written certification that must contain the name of each employee trained, the date(s) of training, and identify the subject of certification (e.g. **APPENDIX B)**.

VI. IMPLEMENTATION STEPS

A. Conduct and document PPE assessment for each work task or assignment.

B. Select PPE.

C. Communicate selection decisions to employee.

D. Provide PPE (obtain, purchase, rent, etc.).

E. Train each affected employee.

F. Test employee understanding.*

G. Document training and employee testing results.

H. Retrain as necessary.

I. Enforce the requirements.

*Essential functions for all tasks/assignments where PPE is required.

VII. SPECIFIC PROTECTION GUIDELINES

PPE shall comply with appropriate ANSI standards, when standards exist.

A. Electrical Protection

Refer to **Appendix C** for eye and electrical protection selection specifics.

B. Eye and Face Protection

Each affected employee shall…

1. Use appropriate eye and face protection equipment when exposed to hazards from flying objects or particles, molten metal, fumes, chemical liquids, gases, vapors, dusts, acids, caustics, and other potentially injurious chemical or physical hazards.

2. Use appropriate eye protection equipment with filter lenses that have a shade number appropriate for the work being performed when exposed to an eye hazard from potentially harmful light radiation.

3. Standard prescription glasses and contact lenses do not offer protection against most eye hazards. When wearing prescription lenses while engaged in operations that involve eye hazards, wear eye protection that can be worn over the prescription lenses.

Refer to **APPENDIX D** for eye and face protection selection specifics.

C. Foot Protection

Each affected employee shall wear protective footwear when working in areas where there is danger of objects falling on or rolling across the foot, piercing the sole, and where the feet are exposed to electrical or chemical hazards. Foot protection shall comply with appropriate ANSI standards.

D. Hand and Body Protection

Supervisors shall select and require employees to use appropriate hand protection when the hands are exposed to hazards from severe cuts, lacerations, abrasions or punctures, chemical or thermal burns, harmful temperature extremes, and skin absorption of harmful substances.

Supervisors shall base the selection of hand protection on an evaluation of the performance characteristics relative to hazards potential hazards of the task(s) to be performed, conditions present, duration of use.

Refer to **APPENDIX E** for hand and body protection selection specifics.

E. Head Protection

Each affected employee shall wear protective helmets when working in areas where there is a potential for injury to the head from falling objects or “bump” hazards.

F. Hearing Protection

Each employee shall wear appropriate hearing protection in environments where noise levels equal or exceed the OSHA Occupational Noise Exposure Standard (29 CFR 1910.95) 8-hour time weighted average (TWA) of 85 DBA.

G. Respiratory Protection

The use of respiratory protective equipment (respirators) shall be in compliance with the St. Lawrence University Respiratory Protection Program.

H. Hazard Assessment and Personal Protective Equipment Selection

Refer to **APPENDIX F** for compliance assistance for supervisors and employees in implementing requirements for a hazard assessment and the selection of personal protective equipment.

VIII. ADDITIONAL INFORMATION

For additional information concerning this policy, contact the Environmental Health and Safety Office (229-5913).

APPENDICES

Appendix A1 CERTIFICATION OF HAZARD ASSESSMENT

(Single Task)

ASSESSMENT DATE(s): _____

DEPARTMENT: _____

BUILDING: _____

TASK OR ASSIGNMENT DESCRIPTION: _____

_____

HAZARDS IDENTIFIED:

Eye and Face: _____ Respiratory: _____

Head: _____ Foot: _____

Electrical: _____ Hand: _____

Whole Body: _____ Other: _____

PPE REQUIREMENTS:

Eye and Face: _____ Respiratory: _____

Head: _____ Foot: _____

Electrical: _____ Hand: _____

Whole Body: _____ Other: _____

OTHER CONTROL MEASURES: _____

_____

CERTIFICATION: I certify this hazard assessment was conducted in accordance with the provisions of the St. Lawrence University Personal Protective Equipment Policy.

Name: _____ **Date:** _____

DISTRIBUTION: Department PPE Assessment File
EHS
POST: Work Area

Appendix A2 CERTIFICATION OF HAZARD ASSESSMENT

(Position/Title)

DEPARTMENT: _____ **BUILDING:** _____ **ROOM:** _____

POSITION/TITLE: _____

Eye and Face Hazard	Task	PPE Required

Head Hazard	Task	PPE Required

Electrical Hazard	Task	PPE Required

Whole Body	Task	PPE Required

Respiratory	Task	PPE Required

Foot	Task	PPE Required

Hand	Task	PPE Required

Other	Task	PPE Required

OTHER CONTROL MEASURES: _____

CERTIFICATION: I certify this hazard assessment was conducted in accordance with the provisions of the St. Lawrence University Personal Protective Equipment Policy.

Name: _____ **Date:** _____

Appendix A3 CERTIFICATION OF HAZARD ASSESSMENT

(Location)

Assessment Date(s):	**Department:**
Building:	**Room:**
Supervisor (print):	**Signature:**

Hazards	**Task:** hands-on work or being within reach[(a)] of potential hazards of described activity/items:	Minimum Requirements

OTHER CONTROL MEASURES: _____

_____

NOTES

Being within reach of potential hazards: "within reach" varies widely depending on scale and conditions of work and will be judged by affected staff in each room

DISTRIBUTION: Department PPE Assessment File
REM, CIVL
POST: Work Area

Appendix B

St. Lawrence University Training Given By: _____

Personal Protective Equipment Training

Summary of Training: _____

TASK OR ASSIGNMENT DESCRIPTION: _____

_____

PPE REQUIREMENTS:_____

_____

Training Held: (Date) _____ (Time) _____

Name (Print)	Name (Signature)	Department

CERTIFICATION: I certify training was conducted in accordance with the provisions of the St. Lawrence University Personal Protective Equipment Policy and that each affected employee has received and understood the training provided

Trainer Name: _____ Date:_____

Original: Environmental Health & Safety
cc: Colleen Manley, Human Resources

APPENDIX C

ELECTRICAL PROTECTIVE EQUIPMENT REQUIREMENTS

TABLE C1: AC Proof-Test Requirements

Class of Equipment	Proof Test Voltage ms V	Maximum Proof Test Current, mA (Gloves Only)			
		267 mm (10.5-in.) Glove	356 mm (14-in.) Glove	406 mm (16-in.) Glove	457 mm (18-in.) Glove
0	20,000	8	12	12	16
1	40,000	--	14	16	18
2	50,000	--	16	18	20
3	60,000	--	18	20	22
4	70,000	--	--	22	24

TABLE C2: DC Proof-Test Requirements

Class of Equipment	Proof Test Voltage ms V
0	5,000
1	10,000
2	20,000
3	30,000
4	40,000

Note for TABLE C2:
The d-c voltages listed in this table are not appropriate for proof testing rubber insulating line hose or covers. For this equipment, k-c proof tests shall use a voltage high enough to indicate that the equipment can be used at the voltages listed in Table I-4. See ASTM D 1050-90 and ASTM D 1049-88 for further information on proof tests for rubber insulating line hose and covers.

TABLE C3: Glove Tests - Water Level [1, 2]

Class of Glove	AC Proof Test		DC Proof Test	
	mm	In.	Mm	In.
0	38	1.5	38	1.5
1	38	1.5	51	2.0
2	64	2.5	76	3.0
3	89	3.5	102	4.0
4	127	5.0	153	6.0

Notes for TABLE C3:
1.The water level is given as the clearance from the cuff of the GLOVE to the water line, with a tolerance of ± 13 mm. (± 0.5).
2.If atmospheric conditions make the specified clearances impractical, the clearances may be increased by a maximum of 25 mm (1 in).

ELECTRICAL PROTECTIVE EQUIPMENT REQUIREMENTS

TABLE C4: Rubber Insulating Equipment Voltage Requirements

Class of Equipment	Maximum use Voltage [1] AC (rms)	Retest Voltage [2] AC (rms)	Retest Voltage [2] DC (avg.)
0	1,000	5,000	20,000
1	7,500	10,000	40,000
2	17,000	20,000	50,000
3	26,500	30,000	60,000
4	36,000	40,000	70,000

Notes for TABLE C4:
1.The maximum use voltage is the a-c voltage (rms) classification of the protective equipment that designates the maximum nominal design voltage of the energized system that may be safely worked. The nominal design voltage is equal to the phase-to-phase voltage on multiphase circuits. However, the phase-to-ground potential is considered to be the nominal design voltage:

a. If there is no multiphase exposure in a system area and if the voltage exposure is limited to the phase-to-ground potential, or
b. If the electrical equipment and devices are insulated or insolate or both so that the multiphase exposure on a grounded wye circuit is removed.

2.The proof-test voltage shall be applied continuously for at least 1 minute, but no more than 3 minutes.

TABLE C5: Rubber Insulating Equipment Test Intervals

Type of Equipment	Maximum use Voltage [1] AC (rms)
Rubber insulating line hose	Upon indication that insulating value is suspect
Rubber insulating covers	Upon indication that insulating value is suspect
Rubber insulating blankets	Before first issue and every 12 months thereafter[1]
Rubber insulating gloves	Before first issue and every 6 months thereafter[1]
Rubber insulating sleeves	Before first issue and every 12 moths thereafter[1]

Notes for TABLE C5:
1.If the insulating equipment has been electrically tested but not issued for service, it may not be placed into service unless it has been electrically tested within the previous 12 months.

Contact _Dan Seaman? _, for specific requirements and recommendations.

APPENDIX D

EYE AND FACE PROTECTION

TABLE D1: Eye and Face Protection Selection

Source	Assessment of Hazard	Protection
IMPACT: Chipping, grinding, machining, masonry work, wood working, sawing, drilling, chiseling, powered fastening, riveting and sanding.	Flying fragments, objects, large chips, particles, sand, dirt, etc	Spectacles with side protection, goggles, face shield. See notes (1), (3), (5), (6), and (10). For severe exposure, use face shields.
HEAT: Furnace operations, pouring, casting, hot dipping, and welding.	Hot sparks	Faceshields,goggles, spectacles with side protection. For severe exposure use faceshield. See notes (1), (2), (3)
	Splash from molten metals	Faceshields worn over goggles. See notes (1),(2),(3).
	High temperature exposure	Screen face shields, reflective face shields. See notes (1), (2), (3).
CHEMICALS: Acid and chemicals handling, degreasing plating	**Splash**	Splash Goggles, eyecup, and cover types. For severe exposure use face shield. See notes (3), (11).
	Irritating mists	Special-purpose goggles.
DUSTS: Woodworking, buffing, and general dusty conditions	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), (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), (9).
GLARE	Poor vision	Spectacles with shaded or special purpose lenses, as suitable. See notes (9), (10).

Notes for TABLE D1:

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 hazard should be provided. Protective devices do not provide unlimited 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 or identified as such.
5.As required by the standard, persons whose vision requires the use of prescriptions (Rx) lenses must wear either protective devices fitted with prescription (R_x) 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 condition are 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-side shield spectacles are available for frontal protection only, but are not acceptable eye 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 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.

Source: 29 CFR 1910 Subpart I App B

APPENDIX D
(Continued)

EYE AND FACE PROTECTION

The following is a guide for the selection of the proper shade numbers. These recommendations may be varied to suit the individual's needs.

Welding operation	Shade No.
Shielded metal-arc welding - 1/16-, 3/32-, 1/8-, 5/32-inch electrodes	10
Gas-shielded arc welding (nonferrous) - 1/16-, 3/32-, 1/8-, 5/32-inch electrodes	11
Gas-shielded arc welding (ferrous) - 1/16-, 3/32-, 1/8-, 5/32-inch electrodes	12
Shielded metal-arc welding:	
3/16-, 7/32-, 1/4-inch electrodes	12
5/16 -, 3/8-inch electrodes	14
Atomic hydrogen welding	10-14
Carbon arc welding	14
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 inch	3 or 4
Medium cutting, 1 inch to 6 inches	4 or 5
Heavy cutting, 6 inches and over	5 or 6
Gas welding (light) up to 1/8 inch	4 or 5
Gas welding (medium) 1/8 inch to 1/2 inch	5 or 6
Gas welding (heavy) 1/2 inch and over	6 or 8

Note for TABLE D2:

* 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 oxyfuel 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.

Source:)(H) 29CFR 1910.252(b)(2)(ii

Appendix E

Glove Chemical Resistance Guide (1)(*)

	Silver Shield (2) (4 Mil)			**Viton** (9 Mil)			**Butyl** (17 Mil)			**Nitrile** (11 Mil)			**Neoprene** (22 Mil)			**PVC** (20 MIL)		
Chemical	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR
Acetaldehyde	E	>6h	ND	P	0m	281.9	E	9.6	0.07	F	4m	161	E	21m	18	ID	ID	ID
Acetone	E	>6h	ND	P	ID	ID	E	>17h	ND	P	ID	ID	E	12m	35	P	>1m	>>
Acetonitrile	E	>8h	ND	ID	ID	ID	E	>8h	ND	ID	ID	ID	E	40m	7	ID	ID	ID
Acrylic Acid	ID	ID	ID	G	5.9h	0.23	E	>8h	ND	F	ID	ID	ID	ID	ID	ID	ID	ID
Acrylonitrile	E	ID	ID	F	1m	176	G	3.1h	<0.01	P	3m	176	ID	ID	ID	ID	ID	ID
Aldehyde	E	>6h	ND	P	0m	281.9	E	9.5h	0.07	P	4	161	ID	ID	ID	ID	ID	ID
Aniline	E	>8h	ID	G	10m	18.7	F	>8h	ND	P	1.1h	45	E	>8h	ND	G	>8h	ND
Benzaldehyde	ID	ID	ID	F	9.9h	4	E	9h	ND	P	ID	ID	ID	ID	ID	ID	ID	ID
Benzene	E	>8h	ND	G	6h	0.012	P	31m	32.3	P	ID	ID	ID	16m	133	ID	2m	250
Benzoyl Chloride	ID	ID	ID	E	>8h	ND	F	6.2h	16.6	P	ID	ID	ID	ID	ID	ID	ID	ID
Bromobenzene	E	ID	ID	E	8h	ND	P	32m	39.8	P	13m	9.1	ID	ID	ID	ID	ID	ID
Butyl Acetate	E	>6h	ND	P	ID	ID	G	1.9h	7.61	P	29m	54.4	ID	52m	53	ID	ID	ID
p-t Butyltoluene	E	>8h	ND	E	>8h	ND	G	1.7h	8	P	ID	ID	ID	ID	ID	ID	ID	ID
Butyraldehyde	E	ID	ID	P	54m	9	E	>15h	ND	P	ID	ID	ID	ID	ID	ID	ID	ID
Carbon Disulfide	G	>8h	ND	E	>8h	ND	P	7m	98	P	1m	51	ID	ID	ID	ID	ID	ID
Carbon Tetrachloride	E	>6h	ND	E	>13h	ND	P	ID	ID	G	3.4h	5	F	31m	252	ID	ID	ID
Cellosolve	G	>6h	ND	F	ID	ID	G	ID	ID	P	ID	ID	E	5.9h	3	ID	ID	ID

	Silver Shield			Viton			Butyl			Nitrile			Neoprene			PVC		
Chemical	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR
Chlorobenzene	E	ID	ID	E	>8h	ND	P	35m	308	P	ID	ID	ID	ID	ID	ID	ID	ID
Chloroform	P	10m	O.OO9	E	9.5h	0.46	P	ID	ID	P	4m	352	P	12m	220	ID	ID	ID
Chloronaphthalene	E	>8h	ND	E	>16h	ND	P	ID	ID	P	2.9h	>1.3	ID	ID	ID	ID	ID	ID
Chloroprene	ID	ID	ID	ID	>8h	ND	P	28m	18	ID	ID	ID	ID	ID	ID	ID	ID	ID
Cyclohexane	E	>6h	ND	E	>7h	ND	P	1.1h	20.3	P	ID	ID	E	2.7h	7	ID	16m	17
Cyclohexanol	E	>6h	ND	E	>8h	ND	E	>11h	ND	E	>16h	ND	ID	ID	ID	ID	ID	ID
Cyclohexanone	E	>6h	ND	P	29m	86.3	E	>16h	ND	P	ID	ID	ID	ID	ID	ID	ID	ID
Dibutylphthalate	E	>6h	ND	E	>8h	ND	E	>16h	ND	E	>16h	ND	ID	ID	ID	ID	ID	ID
1,1,Dichloroethane	ID	2.4h	6	G	1.5h	31	ID	ID	ID	P	ID	ID	ID	ID	ID	ID	ID	ID
1,2,Dichlorothane	E	>6h	ND	E	6.9	0.81	P	2h	53	P	8m	311	P	33m	247	ID	ID	ID
Diethylamine	E	>8h	ND	P	35m	852	P	47m	46	F	ID	ID	ID	ID	ID	ID	ID	ID
Diethylaminoethanol	E	ID	ID	E	>8h	ND	E	>8h	ND	E	>8h	ND	ID	ID	ID	ID	ID	ID
1,4-Diethylene Dioxide	ID	>8h	ND	P	23m	26.8	E	>20h	ND	P	28m	77.1	ID	28m	62	ID	8m	250
Diethyleneltriamine	ID	ID	ID	E	>8h	ND	E	>8h	ND	P	ID	ID	ID	ID	ID	ID	ID	ID
Diisobutyl Ketone 80%	E	>6h	ND	F	1.2h	90.6	G	3.3h	41.2	F	3h	48.9	ID	ID	ID	ID	ID	ID
Dimethyl Acetamide	ID	1.5h	0.728	P	25m	3	ID	>8h	ND	ID	ID	ID	ID	ID	ID	ID	ID	ID
Dimethyl Formamide	E	>8h	ND	P	8m	6.5	E	>8h	ND	F	1m	>15	ID	ID	ID	ID	ID	ID
Dimethylsulfoxide	G	ID	ID	F	1.5h	5	E	>8h	ND	F	ID	ID	ID	ID	ID	ID	ID	ID
Dioxane	E	>8h	ND	F	23m	26.8	E	>20h	ND	P	28m	77.1	ID	28m	62	ID	8m	250
Divinyl Benzene	E	>8h	ND	E	>17h	ND	F	2.2h	238	P	ID	ID	ID	ID	ID	ID	ID	ID

	Silver Shield			Viton			Butyl			Nitrile			Neoprene			PVC		
Chemical	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR
Epichlorohydrin	ID	ID	ID	P	2h	4	G	>8h	ND	P	ID	ID	ID	ID	ID	ID	ID	ID
Ether	ID	>6h	ND	P	12m	21.5	P	8m	92.2	P	14m	21.8	ID	ID	ID	ID	ID	ID
Ethyl Acetate	E	>6h	ND	P	ID	ID	G	7.6h	3.4	P	8m	145	G	34m	178	ID	ID	ID
Ethyl Ether	ID	>6h	ND	P	12m	21.5	P	8m	92.2	P	14m	21.8	E	18m	51	ID	ID	ID
Ethylamine 70%	E	47m	7.64	P	ID	ID	E	>12h	ND	F	1.1h	30.1	ID	ID	ID	ID	ID	ID
Ethylene dibromide	E	ID	ID	E	>8h	ND	F	3.3h	6	P	ID	ID	ID	ID	ID	ID	ID	ID
Formaldehyde 37%	E	>6h	ND	E	>16h	ND	E	16h	ND	E	>21h	ND	E	>8h	ND	G	8h	ND
Furan	ID	ID	ID	P	20m	23	P	1.3h	10	P	ID	ID	ID	ID	ID	ID	ID	ID
Furfural	E	>8h	ND	F	3.6h	14.8	E	>16h	ND	P	28m	265	ID	ID	ID	ID	ID	ID
Glutaraldehyde	E	ID	ID	E	>8h	ND	E	>8h	ND	P	ID	ID	ID	ID	ID	ID	ID	ID
n-Hexane	E	>6h	ND	ID	>11h	ND	P	ID	ID	E	ID	ID	E	39m	5	ID	ID	ID
Hydrazine 70%	G	>6h	ND	P	ID	ID	E	>8h	ND	G	>8h	ND	E	>8h	ND	E	8h	ND
Hydrochloric Acid 37%	E	>6h	ND	E	ID	ID	E	ID	ID	P	ID	ID	E	>8h	ND	E	>8h	ND
Hydrofluoric Acid 50%	G	>6h	ND	G	ID	ID	F	ID	ID	P	ID	ID	E	>8h	ND	E	1.8h	0
Isobutyl Alcohol	E	ID	ID	E	>8h	ND	E	>8h	ND	G	>8h	ND	ID	ID	ID	ID	ID	ID
Isobutyraldehyde	E	ID	ID	P	4m	11.5	E	>8h	ND	P	ID	ID	ID	ID	ID	ID	ID	ID
Methacrylic Acid	ID	ID	ID	F	>8h	ND	G	>8h	ND	P	1.7h	23	ID	ID	ID	ID	ID	ID
Methacrylonitrile	E	ID	ID	F	4m	462	G	6.8h	0.001	P	7m	560	ID	ID	ID	ID	ID	ID
Methyl Chloroform	ID	>6h	ND	E	>15h	ND	P	ID	ID	P	41m	76.4	P	27m	197	ID	ID	ID
Methyl Cyanide	ID	>8h	ND	ID	ID	ID	E	>8h	ND	ID	ID	ID	E	40m	7	ID	ID	ID

	Silver Shield			Viton			Butyl			Nitrile			Neoprene			PVC		
Chemical	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR
Methyl Ethyl Ketone	E	>24h	ND	P	ID	ID	E	>8h	ND	P	ID	ID	G	22m	155	ID	1m	>>
Methyl Isocyanate	ID	ID	ID	P	4m	121	P	1.1h	9	P	ID	ID	ID	ID	ID	ID	ID	ID
Methylamine 40%	F	1.9h	2	E	>16h	ND	E	>15h	ND	G	>8h	ND	ID	ID	ID	ID	ID	ID
Methylene Chloride	G	>8h	ND	F	1h	7.32	P	24m	133	P	4m	766	F	6m	239	ID	ID	ID
Methylene Dianiline	E	>24h	ND	E	>8h	ND	E	>24h	ND	F	ID	ID	ID	ID	ID	ID	ID	ID
Methylene Dichloride	ID	1.9h	0.002	G	1.9h	7.32	P	ID	ID	P	4m	766	ID	ID	ID	ID	ID	ID
Morpholine	E	>8h	ND	G	ID	97	E	>16h	ND	P	48m	206	ID	ID	ID	ID	ID	ID
Nitric Acid, 3 Molar	E	>6h	ND	G	>8h	ID	F	ID	ID	P	ID	ID	E	>8h	ND	E	1.9h	0
Nitrobenzene	E	>8h	ND	E	21m	ND	E	>23	ND	F	33m	1.7	G	1h	20	ID	ID	ID
Nitropropane	E	>8h	ND	P	>8h	26.1	E	>8h	ND	P	16m	29.5	ID	ID	ID	ID	ID	ID
Oxalic Acid	E	>8h	ND	E	>8h	ND	E	>8h	ND	G	ID	ID	ID	ID	ID	ID	ID	ID
PCB, Aroclor 1254 50%	E	>8h	ND	E	>13h	ND	P	ID	ID	F	ID	ID	ID	ID	ID	ID	ID	ID
Pentachlorophenol 1% (in kerosene)	E	>8h	ND	ID	>8h	ND	P	ID	ID	E	>13h	ND	ID	8h	ND	ID	ID	ID
n-Pentane	E	>6h	ND	E	>17h	ND	P	ID	ID	E	ID	ID	ID	38m	3	ID	9m	17
Perchlorethylene	E	>6h	ND	E	>15h	ND	P	ID	ID	F	>1.3h	5.5	ID	28m	75.5	ID	ID	ID
Phenol 85%, water sat	G	>6h	ND	E	ID	ND	E	>20h	ND	P	39m	>1500	E	>8h	ND	ID	32m	13
Propyl Acetate	E	>6h	ND	P	ID	ID	G	2.7h	2.86	P	17m	72.5	ID	ID	ID	ID	ID	ID
Propyelenediamine	ID	ID	ID	E	38m	ND	E	>8h	ND	F	ID	ID	ID	ID	ID	ID	ID	ID
Pyridine	ID	ID	ID	P	ID	74	G	>8h	ND	P	ID	ID	ID	28m	117	ID	1m	>>
Red Fuming Nitric Acid	P	35m	ID	P	ID	ID	P	ID	ID	P	ID	ID	ID	ID	ID	ID	ID	ID

	Silver Shield			Viton			Butyl			Nitrile			Neoprene			PVC		
Chemical	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR	D	BT	PR
Sodium Hydroxide 50%	E	>6h	ND	G	ID	ID	E	ID	ID	G	ID	ID	E	>6.7h	ND	E	8h	ND
Styrene	G	>4h	ND	G	ID	ID	P	ID	ID	P	ID	ID	ID	ID	40	ID	27m	40
Sulfuric Acid, 3 Molar	E	>6h	ND	E	ID	ID	G	ID	ID	P	ID	ID	E	>6.7h	ND	E	>8h	ND
Tetrachloroethylene	E	>6h	ND	E	>17h	ND	P	ID	ID	F	1.3h	5.5	ID	28m	75.5	ID	ID	ID
Tetraethylenepentamine	ID	ID	ND	E	>8h	ND	E	>8h	ND	F	ID	ID	ID	ID	ID	ID	ID	ID
Tetrafluoroethylene	E	ID	ID	E	>8h	ND	E	>8h	ND	ID	ID	ID	ID	ID	ID	ID	ID	ID
Tetrahydrofuran	E	>8h	ND	P	4m	327	F	31m	112	P	4m	167	P	11m	671	ID	1m	>>
Thiophene	ID	>6h	ND	E	>8h	ND	P	1.8h	17	P	ID	ID	ID	ID	ID	ID	ID	ID
Toluene	E	>6h	ND	E	>16h	ND	F	21m	22.1	P	11m	68.1	ID	14m	576	ID	3m	350
Toluene Diisocyanate	E	>8h	ND	E	>16h	ND	E	>8h	ND	G	3.7h	1.8	ID	ID	ID	G	>6.7	ND
Trichloroethane	E	>6h	ND	G	7.4h	0.24	P	18m	550	P	8m	283	ID	11m	881	ID	ID	ID
1,1,1 Trichloroethane	E	>6h	ND	E	>15h	ND	P	ID	ID	F	41m	76.4	P	27m	197	ID	ID	ID
1,1,2 Trichloroethane	ID	ID	ID	E	>8h	ND	P	5.7h	7	P	ID	ID	ID	ID	ID	ID	ID	ID
Triethylamine	ID	ID	ID	E	>8h	ND	P	ID	ID	E	>8h	ND	ID	ID	ID	ID	ID	ID
Vinyl Chloride	E	>8h	ND	G	4.4h	0.098	P	ID	ID	G	5.7h	0.14	ID	ID	ID	ID	ID	ID
Xylene	E	>24h	ND	E	>8h	ND	P	ID	ID	P	ID	ID	ID	23m	135	ID	4m	383

(*) Consult the Chemical Hygiene Officer at 5105 for further assistance with selection of chemical resistant gloves.

(1)The data for Silver ShieldTM, VitonTM, Butyl and Nitrile gloves were provided by Siebe North Inc, Charleston, SC; information on Neoprene and Polyvinyl Chloride (PVC) gloves were supplied by Pioneer Industrial Products, Williard, OH.
(2) Silver Shield gloves may be worn as liners under other glove types to enhance protection.

E=Excellent; **G**=Good; **F**=Fair; **P**=Poor; **ND**=None detected; **ID**=Insufficient Data; **D**=Degradation; **BT**=Breakthrough, amount of elapsed time after initial exposure before the chemical can be analytically detected on the inside surface of the glove; **PR**=Permeation Rate is expressed in mg/m2/sec. PR can be used for estimating glove thickness required; for a given material, thicker is more resistant.

APPENDIX F

GUIDELINES FOR HAZARD ASSESSMENT AND PERSONAL PROTECTIVE EQUIPMENT SELECTION

I. Controlling Hazards

PPE devices alone should not be relied on to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound work practices.

II. Assessment and Selection

It is necessary to consider certain general guidelines, as outlined in the following sections of this appendix, when assessing a task and selecting means of hazard control. It is the responsibility of the supervisor to exercise common sense and appropriate expertise to accomplish assessment and selection requirements.

III. Assessment Guidelines

A. Survey

Conduct a walk-through survey of the areas in question. The purpose of the survey is to identify sources of hazards to workers and co-workers. Consideration should be given to the basic hazard categories:

1. Impact
2. Penetration
3. Compression (Roll-Over)
4. Chemical
5. Heat
6. Harmful dust
7. Light (Optical) Radiation

B. Hazard Sources

During the walk-through survey, the safety officer should observe:

1. Sources of motion; i.e. machinery or process where any movement where any movement of tools, machine elements or particles could exist, or movement or personnel that could result in collision with stationary objects;
2. Sources of high temperatures that could result in burns, eye injury of ignition of Protective equipment, etc.;
3. Types of chemical exposures;
4. Sources of harmful dust;
5. Sources of light radiation, i.e. welding, brazing, cutting, furnaces, heat treating, high-Intensity lights, etc.;
6. Sources of falling objects or potential for dropping objects;
7. Sources of sharp objects which might pierce the feet or cut the hands;
8. Sources of rolling or pinching objects which could crush the feet;
9. Layout of workplace and location of co-workers; and
10. Any electrical hazards; in addition; injury/accident data should be reviewed to help Identify problem areas.

C. Organize Data

Following the walk-through survey, it is necessary to organize the data and information for use in the assessment of hazards. The objective is to prepare for an analysis of the hazards in the environment to enable proper selection of protective equipment.

D. Analyze Data

Having gathered and organized data on a workplace, an estimate of the potential for injuries should be made. Each of the basic hazards (paragraph 3.a) should be reviewed and a determination made as to type, level of risk, and seriousness of potential injury from each of the hazards found in the area. The possibility of exposure to several hazards simultaneously should be considered.

Material Safety Data Sheet (MSDS), container label, loss history and industtial hygiene issues should be reviewed annually

IV. Selection Guidelines

After Completion of the procedures in paragraph 3 the general procedure for selection of protective equipment is to:

A. Become familiar with the potential hazards and the type of protective equipment that is available, and what it can do, etc. i.e. splash protection, impact protection, etc.;

B. Compare the hazards associated with the environment; i.e. impact velocities, masses projectile shape, radiation intensities, with the capabilities of the available protective equipment;

C. Select the protective equipment which ensures a level of protection greater than the minimum required to protect the employee from the hazards;

D. Fit the user with the protective device and give instructions on care and use of the PPE.

E. Ensure that end users be made aware of all warning labels for and limitations of their PPE.

V. Fitting the Device

Careful consideration must be given to comfort and fit. PPE that fits poorly may not afford the necessary protection. Continued wearing of the device is more likely if it fits the wearer comfortably. Protective devices are generally available in a variety of sizes. Care should be taken to ensure that the right size is selected.

VI. Devices with Adjustable Features

Adjustments should be made on an individual basis for a comfortable fit that will maintain the protective device in the proper position. Particular care should 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 chin strap may be necessary to keep the helmet on an employee's head. (Chin straps should break at a reasonably low force, however, so as to prevent a strangulation hazard.) Where manufacturer's instructions are available, they should be followed carefully.

VII. Reassessment of Hazards

It is the responsibility of the supervisor to reassess the workplace hazard situation as necessary, by identifying and evaluating new equipment and processes, reviewing accident records, and reevaluating the suitability of previously selected PPE.

VIII. Selection Guidelines for Eye and Face Protection

Some occupations for which eye protection should be routinely considered are: carpenters, electricians, machinists, mechanics and repairers, millwrights, plumbers and pipe fitters, sheet metal workers and tinsmiths, assemblers, sanders, grinding machine operators, lathe and milling machine operators, sawyers, welders, laborers, chemical process operators and handlers, and timber cutting and logging workers. The appended chart provides general guidance for the proper selection of eye and face protection to protect against hazards associated with the listed hazard "source" operations.

IX. Selection Guidelines For Head Protection

All head protection is designed to provide protection from impact and penetration hazards caused by falling objects. Head protection is also available that provides protection from electric shock and burn. When selecting head protection, knowledge of potential electrical hazards is important. Class A helmets, in addition to impact and penetration resistance; provide electrical protection from low-voltage conductors (they are proof-tested to 2,200 volts). Class B helmets, in addition to impact and penetration resistance; provide electrical protection from high-voltage conductors (they are proof-tested to 20,000 volts). Class C helmets provide impact and penetration resistance (they are usually made of aluminum which conducts electricity), and should not be used around electrical hazards.

Where falling object hazards are present, helmets must be worn. Some examples include: working around or under conveyor belts which are carrying parts or materials; working below machinery or

processes which might cause material or object to fall; and working on exposed energized conductors.

Some examples of occupations for which head protection should be routinely considered are: carpenters, electricians, linemen, mechanics and repairers, plumbers and pipe fitters, assemblers, packers, wrappers, sawyers, welders, laborers, freight handlers, timber cutting and logging workers, stock handlers, and warehouse laborers.

X. Selection Guidelines for Foot Protection

Safety shoes and boots which meet the ANSI Z41-1991 Standard provide both impact and compression protection. Where necessary, safety shoes can be obtained which provide puncture protection. In some work situations, metatarsal protection should be provided, and in other special situations, electrical conductive or insulating safety shoes would be appropriate.

Safety shoes or boots with impact protection would be required for carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped; and for other activities where objects might fall onto the feet. Safety shoes or boots with compression protection would be required for work activities involving skid trucks (manual material handling carts) around bulk rolls (such as paper rolls) and around heavy pipes, all of which could potentially roll over an employee's feet. Safety shoes or boots with puncture protection would be required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal, etc., could be stepped on by employees causing a foot injury.

Some occupations (not a complete list) for which foot protection should be routinely considered are: shipping and receiving clerks, stock clerks, carpenters, electricians, machinists, mechanics and repairers, plumbers and pipe fitters, structural metal workers, assemblers, drywall installers and lathers, packers, wrappers, craters, punch and stamping press operators, sawyers, welders, laborers, freight handlers, gardeners and groundskeepers, timber cutting and logging workers, stock handlers and warehouse laborers.

XI. Selection Guidelines for Hand Protection

Gloves are often relied upon to prevent cuts, abrasions, burns, and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure. OSHA is unaware of any gloves that provide protection against all potential hand hazards, and commonly available glove materials provide only limited protection against may chemicals. Therefore, it is important to select the most appropriate glove for a particular location and to determine how long it can be worn, and whether it can be reused.

It is also important to know the performance characteristics of gloves relative to the specific hazard anticipated (e.g. chemical hazards, cut hazards like flame hazards, etc.) Their performance characteristics should be assessed by using standard test procedures. Before purchasing gloves, the employer should request documentation from the manufacturer that the gloves meet the appropriate test standard(s) for hazard(s) anticipated.

A. Other factors to be considered for glove selection in general include:
- **1.** As long as the performance characteristics are acceptable in certain circumstances, it may be more cost-effective to regularly change cheaper gloves than to reuse more expensive types, and;
- **2.** The work activities of the employee should be studied to determine the degree of dexterity required, the duration, frequency, and degree of exposure of the hazard, and the physical stress that will be required.

B. With respect to selection of gloves for protection against chemical hazards:
- **1.** The toxic properties of the chemical(s) must be determined; in particular, the ability of the chemical to cause local effects on the skin and/or pass through the skin and cause systemic effects;
- **2.** Generally, any "chemical resistant" glove can be used for dry powders;

3. For mixtures and formulated products (unless specified test data are 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 polymeric materials; and,
4. Employees must be able to remove the gloves in such a manner as to prevent skin contamination.

XII. Cleaning and Maintenance

It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision.

For compliance with 29 CFR 1910.132(a) and (b), PPE should be inspected, cleaned, and maintained at regular intervals so that the PPE provides the requisite protection.

It is also important to ensure that contaminated PPE which cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.