

	<p align="center">OFFICE OF STATE FIRE MARSHAL</p> <p align="center"><i>REGIONAL HAZARDOUS MATERIAL EMERGENCY RESPONSE TEAMS</i></p> <p align="center">STANDARD OPERATING GUIDELINES</p>	<p>Number: T-008</p> <p>Adoption Date: October 27, 1993</p> <p>Review/Revision Date: October 12, 2005</p>
		<p>OSFM Approved: Signature on file at OSFM _____ Date _____ Nancy J. Orr, State Fire Marshal</p>
<p>SUBJECT: Personal Protective Equipment (PPE)</p> <p>OBJECTIVE: Provide Guidance for Determining Appropriate Level of Personal Protective Equipment for use at a Hazardous</p>		

I. SCOPE

These guidelines are intended to assist in the determination of the appropriate level of personal protective equipment for use during the course of a hazardous materials incident.

II. DEFINITIONS - GENERAL

Chemical Resistance - The ability of the material, from which the protective garment is made, to prevent or reduce degradation and permeation of the fabric by the attack chemical.

Chemical Degradation - A chemical action involving the molecular breakdown of the material due to contact with a chemical. The action may cause the fabric to swell, shrink, blister, discolor, become brittle, sticky, soft or to deteriorate. These changes permit chemicals to get through the suit more rapidly or to increase the probability of permeation.

Chemical Permeation - A chemical action involving the movement of chemicals, on a molecular level, through intact material. There is usually no obvious indication that this process is occurring.

Chemical Penetration - The movement of material through a suit's closures, such as zippers, buttonholes, seams, flaps, or other design features. Abraded, torn, or ripped suits will also allow penetration.

III. GENERAL

Personal protective equipment selection shall be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, the task-specific conditions and duration, and the hazards and potential hazards identified at the site.

It is essential that personal protective equipment meeting NFPA standards and CFR1910.132-1910.138 (See Attachment 1) be provided, maintained, and used. Protection against physical, chemical and thermal hazards must be considered when selecting personal protective equipment.

Each regional response team shall have a written personal protective equipment program which is an OSHA requirement. The PPE program shall address the elements listed below. When elements, such as donning and doffing procedures, are provided by the manufacturer of a piece of equipment and are attached to the plan, they need not be rewritten into the plan as long as they adequately address the procedure or element.

1. PPE selection based upon site hazards
2. PPE use and limitations of equipment
3. Work mission duration
4. PPE maintenance and storage
5. PPE decontamination and disposal
6. PPE training and proper fitting
7. PPE donning and doffing procedures
8. PPE inspection procedures prior to, during, and after use
9. Evaluation of effectiveness of the PPE program, and
10. Limitations during temperature extremes, heat stress, and other appropriate medical considerations

ADDENDUM

I. RESPIRATORY PROTECTIVE EQUIPMENT

Self-contained breathing apparatus (SCBA) must be approved by the National Institute of Occupational Safety and Health (NIOSH) and meet the requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Firefighters*.

Personal alert safety systems should meet the requirements of NFPA 1982 *Standard on Personal Alert Safety Systems (PASS) for Firefighters*.

II. THERMAL PROTECTION

Proximity Suits - These suits provide short duration and close proximity protection at radiant heat temperatures as high as 2000⁰ F and may withstand some exposure to water and steam. Respiratory protection must also be provided with proximity suits.

Fire Entry Suits - This type of suit provides protection for brief entry into total flame environment at temperatures as high as 2000⁰ F. This suit is not effective or meant to be used for rescue operations. Respiratory protection must be provided with fire entry suits.

Overprotection Garments - These garments are worn in conjunction with chemical-protective encapsulating suits.

Flash Cover Protective Suit - Flash cover suits are neither proximity nor fire entry suits. They provide limited overprotection against flash-back only. They are worn outside of other protective suits and are used only when the risks require them.

Low Temperature Suits: Low temperature suits provide some degree of protection of the encapsulating chemical-protective clothing from contact with low temperature gases and liquids. They are worn outside of the encapsulating chemical protective clothing and are used only when the risk requires.

III. CHEMICAL PROTECTIVE CLOTHING

Chemical protective clothing is made from special materials and is designed to prevent the contact of chemicals with the body. There are two types of chemical protective clothing: totally encapsulating, and non-encapsulating.

Performance requirements must be considered in selecting the appropriate chemical protective material. These would include chemical resistance, permeation, penetration, flexibility, abrasion resistance, temperature resistance, shelf-life and sizing criteria.

IV. LEVELS OF PROTECTION

Level A - To be selected when the greatest level of skin, respiratory, and eye protection is required. This protection must be in accordance with NFPA 1991, at the time of purchase.

Level A protection should be used when:

- A. The hazardous substance has been identified and requires the highest level of protection for skin, eyes and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases, or particulate; or the site operations and work functions involve a high potential for splash, immersion or exposure to unexpected or unknown vapors, gases, particulate or materials that are harmful to skin for capable of being absorbed through the skin.
- B. Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible, or
- C. Operations are being conducted in confined, poorly ventilated areas, and the absence of conditions requiring Level A has not yet been determined.

The following constitute Level A equipment; it should be used as appropriate:

- A. Positive-pressure, full facepiece, self contained breathing apparatus (SCBA), or positive-pressure supplied air respirator with escape SCBA, approved by the National Institute of Occupation Safety and Health (NIOSH).
- B. Totally encapsulating chemical protective suit.
- C. Fire retardant coveralls.
- D. Long underwear. *
- E. Gloves, outer, chemical resistant.
- F. Gloves, inner, chemical resistant.
- G. Boots, chemical resistant, steel toe and shank.
- H. Hard hat (under suit).
- I. Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally encapsulating suit).*
- J. Two-way Radio (worn inside of encapsulated suit)
- K. Outer flash fire protection for flammable atmospheres.

*Optional, as applicable.

LEVEL B - To be selected when the highest level of respiratory protection is required but a lesser level of skin protection is needed. This protection must be in accordance with NFPA 1992, at the time of purchase.

Level B protection should be used when:

- A. The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection.
- B. The atmosphere contains less than 19.5 percent oxygen; or
- C. The presence of incompletely identified vapors or gases is indicated by a direct-reading gas detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the skin.

Note: This involves atmospheres with IDLH concentrations of specific substances that present severe inhalation hazards and that do not meet the criteria for use of air-purifying respirators.

The following constitutes Level B equipment: it should be used as appropriate:

- A. Positive-pressure, full facepiece self contained breathing apparatus (SCBA), or positive-pressure supplied air respirator with escape SCBA, approved by NIOSH.
- B. Hooded chemical resistant clothing (overalls and long-sleeved jacket, coveralls, one or two-piece chemical-splash suit, disposable chemical-resistant overalls).
- C. Coveralls*
- D. Gloves, outer, chemical resistant.
- E. Gloves, inner, chemical resistant.
- F. Boots, chemical resistant, steel toe and shank.
- G. Boot covers, outer, chemical-resistant (disposable)* or: rubber boots.
- H. Hard hat or fire helmet.
- I. Two-way radio.
- J. Face Shield.*

*Optional, as applicable.

Level C - The concentration(s) and identity of airborne substance(s) are known and the criteria for using air purifying respirators are met. The equipment must be in accordance with NFPA 1993, at the time of purchase.

Level C protection should be used when:

- A. The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;
- B. The types of air contaminants have been identified, concentrations measured, and an SCBA is worn.
- C. The following constitute Level C equipment; it should be used when appropriate:
 - 1. A. Positive-pressure, full facepiece self contained breathing apparatus (SCBA), or positive-pressure supplied air respirator with escape SCBA, approved by NIOSH.
 - 2. Hooded chemical resistant clothing (overalls, two-piece chemical splash suit, or disposable chemical resistant overalls).

3. Coveralls.*
4. Gloves, outer, chemical resistant.
5. Gloves, inner, chemical resistant.
6. Boots, chemical resistant, steel toe and shank.
7. Boot covers, outer, chemical resistant (disposable)* or; rubber_boots.
8. Hard hat or fire helmet.
9. Escape mask.*
10. Face shield.*
11. Two-way radio.

Level D - A work uniform affording minimal protection, used for protection against nuisance contamination only.

Level D protection should be used when:

- A. The atmosphere contains no known hazard; and
- B. Work functions preclude splashes, immersion or the potential for unexpected inhalation of, or contact with, hazardous levels of any chemicals.
- C. The following constitute Level D equipment; it should be used as appropriate:

1. Coveralls.
2. Gloves.*
3. Boots, chemical resistant, steel toe and shank.
4. Boot covers, outer, chemical resistant (disposable).
5. Safety glasses or chemical splash goggles.
6. Hard hat or fire helmet.
7. Escape mask.*
8. Face shield.*
9. Full turnouts.

*Optional, as applicable.

V. SITE CHARACTERIZATION AND ANALYSIS IN RELATION TO SELECTION OF PPE

Personal protective equipment (PPE) shall be provided and used during initial site entry, in accordance with the following requirements:

- A. Based upon the results of the preliminary site evaluation, an ensemble of PPE will be selected and used during initial site entry which will provide protection to a level of exposure below permissible exposure limits and published exposure levels for known or suspected hazardous substances and health hazards, and which will provide protection against known and suspected hazards identified in the preliminary site evaluation. If there is no permissible exposure limit or published exposure level, the Team may use other published studies and information as a guide of appropriate PPE.

- B. If respiratory protection is warranted by the potential hazards identified during the preliminary site evaluation, SCBA shall be worn.
- C. If the preliminary site evaluation does not produce sufficient information to identify the hazards or suspected hazards of the site, an ensemble providing protection equivalent to Level B PPE shall be provided as minimum protection, and direct reading instruments shall be used as appropriate for identifying IDLH conditions.
- D. Once the hazards of the site have been identified, the appropriate PPE shall be selected in accordance with the guidelines described in Section IX.

VI. PPE SELECTION

- A. Personal protective equipment (PPE) shall be selected and used which will protect Team members from the hazards and potential hazards they are likely to encounter as identified during the site characterization and analysis (Section VIII).
- B. Personal protective equipment selection shall be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, the task-specific conditions and duration, and the hazards and potential hazards at the site.
- C. Positive-pressure self contained breathing apparatus or positive-pressure air-line respirators equipped with an escape air supply shall be used when chemical exposure levels present will create a substantial possibility of immediate death, immediate serious illness or injury, or impair the ability to escape.
- D. Totally encapsulating chemical protective suits (protection equivalent to Level A protection as recommended in Section VIII) shall be used in conditions where skin absorption of a hazardous substance may result in a substantial possibility of immediate death, immediate serious illness or injury, or impair the ability to escape.
- E. The level of protection provided by PPE selection shall be increased when additional information of site conditions indicates that increased protection is necessary to reduce Team exposures below permissible exposure limits and published exposure levels for hazardous substances and health hazards.

ATTACHMENT 1

**CFR1910.132-1910.138 can be found in its entirety at
www.orshea.org/pdf/rules/division_2/div2_i.pdf**