



## Second Revision No. 51-NFPA 1500-2019 [ Global Comment ]

[Delete existing Annex E “Hazardous Materials PPE Information” and add in new Annex E “Selection of Hazardous Materials and CBRN Protective Ensembles” that is below:]

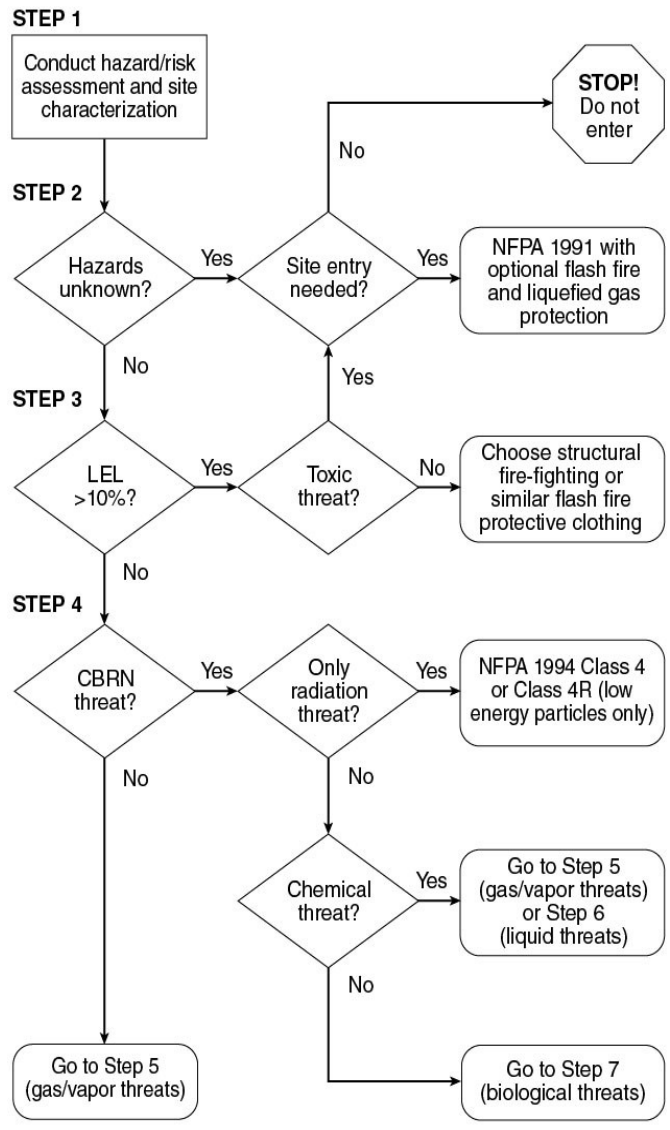
### **Annex E Selection of Hazardous Materials and CBRN Protective Ensembles**

*This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.*

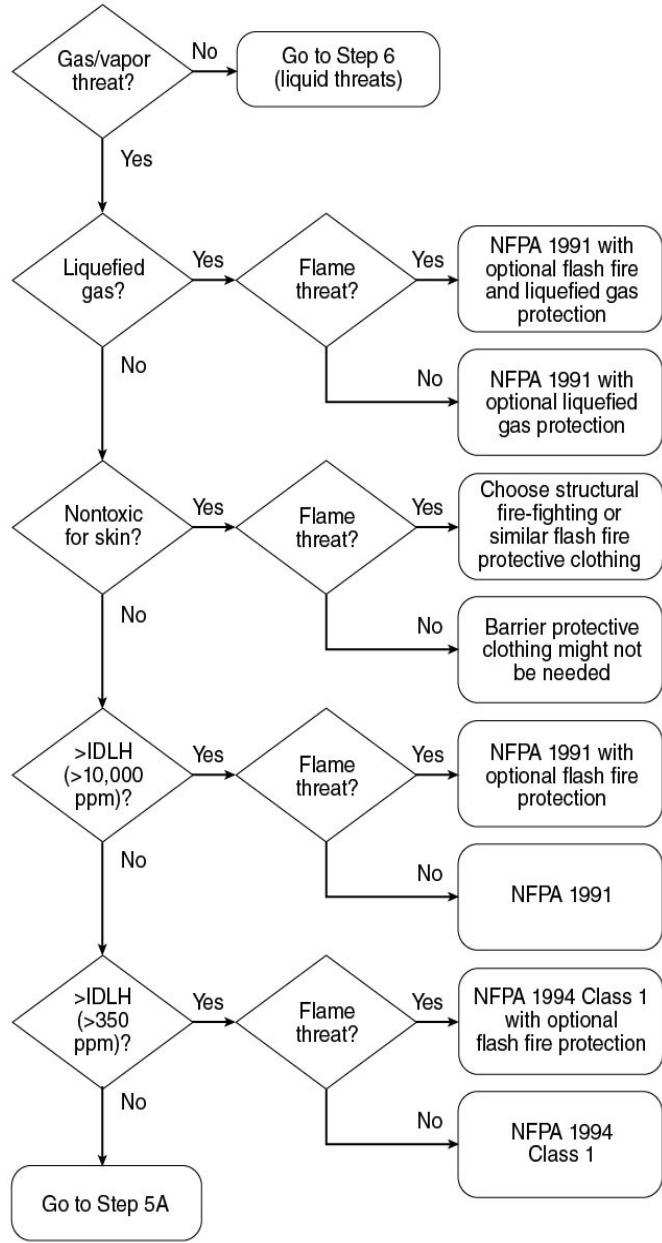
#### **E.1 The Selection Process.**

The selection of PPE for a specific response or operational mission should account for the specific hazard levels as well as an understanding for the specific types of available protective ensembles that can provide appropriate levels of protection. Selection of appropriate hazardous materials or CBRN PPE depends on a thorough hazard and risk assessment that identifies the specific exposure threats and conditions at the response or operations scene. See Figure E.1.

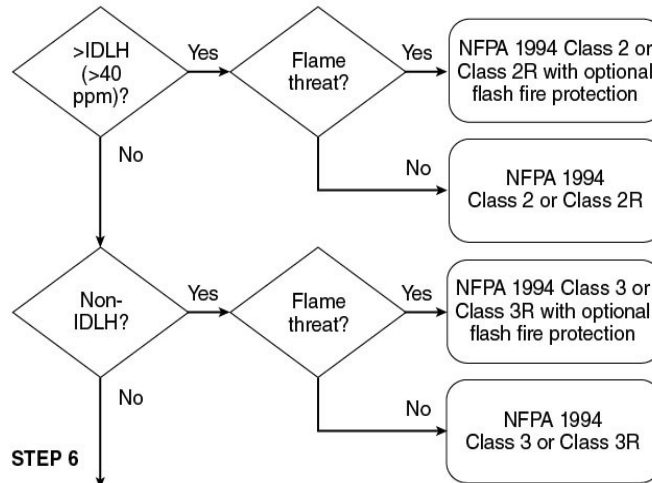
Figure E.1 Decision Logic Threat Assessment Steps.



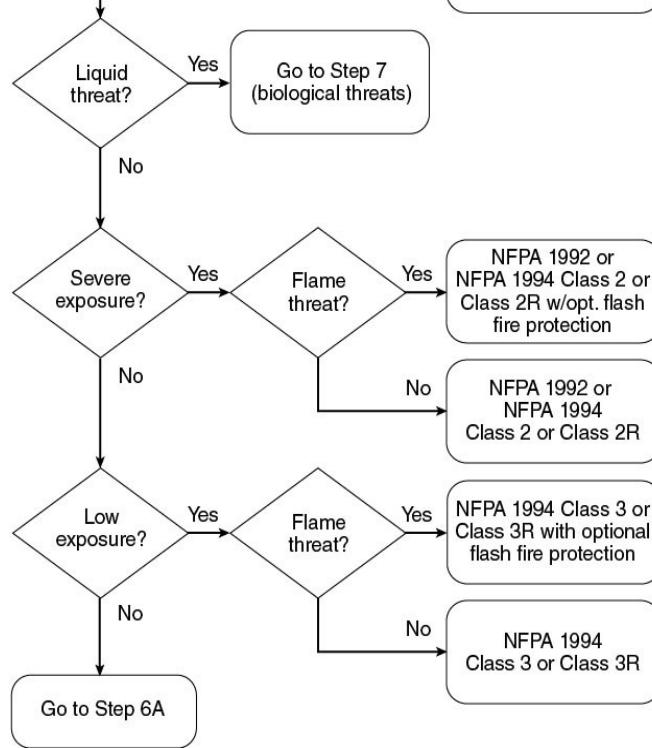
**STEP 5**

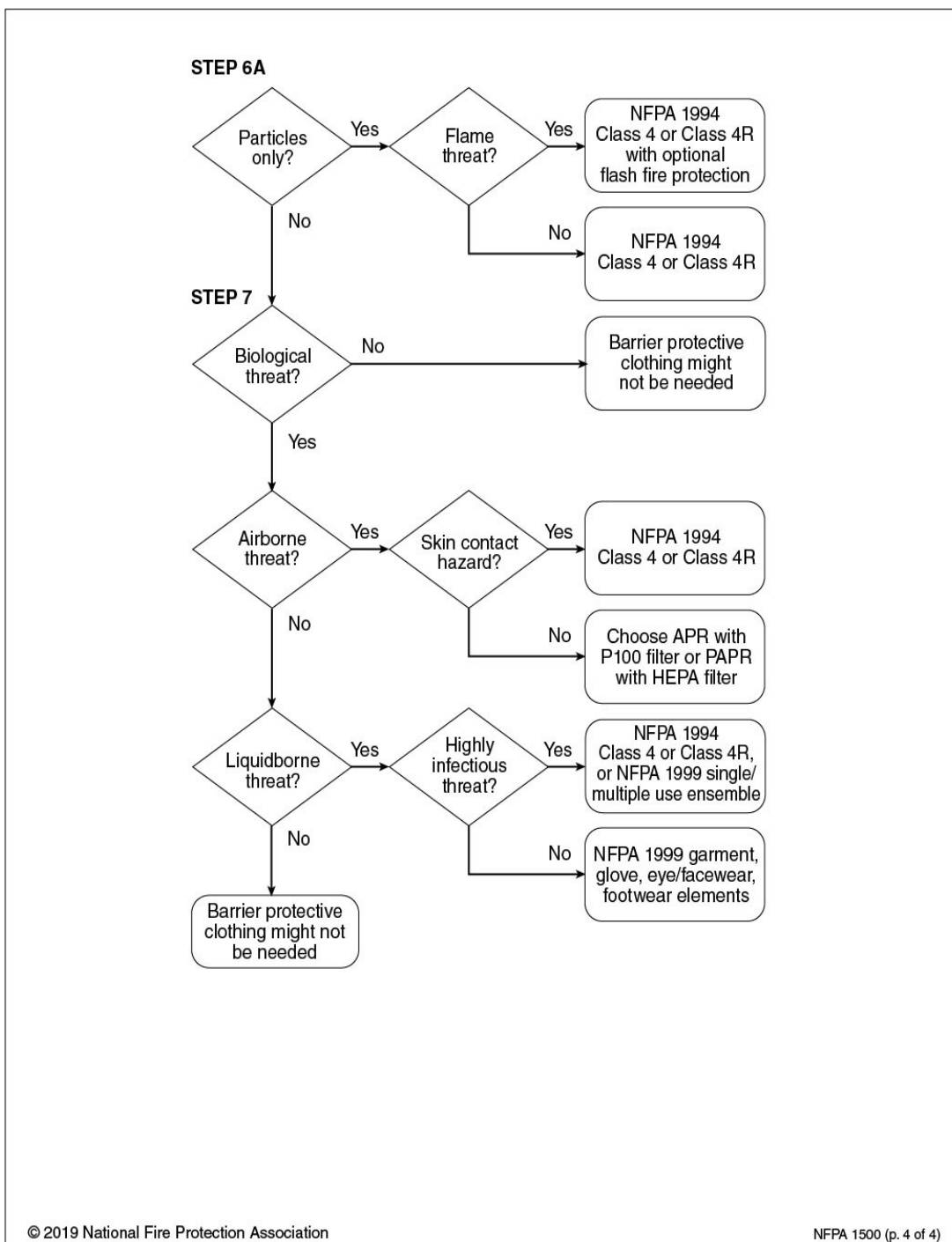


**STEP 5A**



**STEP 6**





The selection process follows with the hazard and risk information through a series of decisions to determine which type of ensemble provides the needed minimum protection.

Decisions are set as part of the logical approach where depending on the answers provided, a certain pathway is taken that ultimately ends in a recommended protective ensemble that meets a specific NFA standard.

### **E.1.1 Primary Assumptions.**

To select appropriate chemical, biological, or CBRN PPE, several assumptions must be made to make the selection process more manageable. The assumptions include the following:

- (1) The selection process is limited to chemical or biological protective clothing for emergency response or other operators and technicians involved in hazardous materials or CBRN operations.

- (2) Individuals involved in the selection process have training in hazardous materials operations at an appropriate level for the selection of PPE.
- (3) Individuals involved in the selection also have knowledge of the types of chemical or biological protective clothing used as part of ensembles.
- (4) At least some forms of clothing and equipment that meet the NFPA standards are available for use.

### **E.1.2 Key Information Needed.**

To make specific selection decisions, the following information is needed:

- (1) Type of hazards present in the response area
- (2) Expected form of exposure to the type of hazard
- (3) Expected severity of the hazards or potential consequences of exposure
- (4) Portions of the body that are likely to come in contact with the hazard
- (5) Type of response environment and presence of other hazards (heat, cold, physical, etc.)
- (6) Length of time of the work to be performed while wearing PPE

### **E.1.3 Decision Logic: General Approach for Selection Decisions.**

Information gained primarily from the hazard assessment is used to answer a series of questions that result in specific decisions. Depending on the answer, other questions are asked, and those answers lead to different paths that ultimately end with a specific, recommended PPE. This process is known as a *decision logic*, and it begins with asking the most significant questions first so that better-performing PPE will be selected first to ensure appropriate levels of protection to operators and technicians.

Many types of PPE can be considered. In several cases, more than one form of PPE can be recommended. However, one possible outcome from the decision logic is not to enter the situation because adequate protection cannot be guaranteed.

Many other conditions and circumstances can affect the choice of PPE and must be taken into account. The following attempts to identify the most important factors that go into PPE selection.

### **E.1.4 Step 1: Perform Hazard and Risk Assessment.**

PPE selection starts with a detailed hazard and risk assessment that includes a characterization of the site where the PPE will be used. The hazard assessment is intended to identify all primary hazards that can create potential harm to the responding operators or technicians.

Hazard and risk assessments also take into consideration the likelihood and the consequences of exposure to a specific hazard. Both of these factors combined establish the potential risk. For example, a low risk might exist for a hazard that is infrequently encountered and produces only moderate effects. Conversely, exposure to a highly hazardous substance that can produce immediate acute effects would be charged as a high risk.

Hazards can be characterized in a number of ways. For this document, hazards are identified as specific to the substance, the working environment, and the type of work performed.

#### **E.1.4.1**

*Chemical, Biological, and Radiological Hazards.* The principal hazards during hazardous materials or CBRN responses include hazards posed by specific substances in the response environment. Chemical substances are of varying toxicity and harmful effects where exposure can occur in a variety of forms:

- (1) Gas or vapor
- (2) Liquid or aerosol
- (3) Solid

Biological substances can be presented as either liquids or aerosols, although some forms of solid

biotoxins or spores exist.

Radiological substances can be experienced as electromagnetic radiation or as contaminated gases, liquids, or solids.

Risk escalates with increasing volume and concentration, or strength, of the substance or hazard combined with the length of time exposure occurs.

#### **E.1.4.2**

*Environmental Hazards.* The environment where responders must work can equally affect the hazards present. Environmental factors include the following:

- (1) The size of the space — confined spaces represent special hazards because the environment limits the dilution or release of the substance and creates other hazards such as slips and falls and limited ease of escape.
- (2) The ambient temperature will affect how quickly volatile substances evaporate. High temperatures can lead to heat stress; cold environments can create hypothermic conditions.
- (3) The physical environment can lead to hazards that affect response activity and can compromise the barrier materials or integrity of the ensemble. Some aspects of the physical environment can allow substances to accumulate in certain areas, which creates higher risk.

#### **E.1.4.3**

*Work/Task Hazards.* The type of work can also contribute to hazards at the response scene. Wearing PPE for extended periods of time while undertaking moderate to hard work can create heat stress. In addition, the types of activities required can place strains on the individual operator or technician that lead to mistakes or possible injuries. Work required on elevated platforms can lead to falls or objects dropped on others below.

#### **E.1.5 Step 2: Determine Known Threats.**

After information is obtained from the hazard and risk assessment, the very first decision to make is whether the hazards are identifiable. If the hazards are unknown than a separate decision has to be made whether entry into the site is actually needed.

- (1) If there is no significant consequence for not responding, then no entry should be made.
- (2) Even if there is potential loss of life or significant loss of property, any decision to enter a response area where the hazards are not completely characterized brings significant risk and should be avoided until more information is obtained to ensure the safety of the first responders.
- (3) When entry into the site is determined as necessary, then the highest level of protection should be chosen in the form of an NFPA 1991-certified ensemble with both flash fire escape and liquefied gas protection.

#### **E.1.6 Step 3: Determine Flash Fire Threats.**

The next key decision is to determine if there is a potential flash fire or explosive situation involved for the particular response or operation.

This decision is best supported by having portable monitoring equipment to measure the lower explosive limit (LEL). If monitoring equipment or circumstances indicate a LEL that is 10 percent or greater, then the environment should be considered a flash fire or explosive risk. It is possible that certain chemicals and the conditions of their storage for release will make this determination evident automatically.

As part of this decision, it is necessary to determine whether there is also a toxic threat posed by the substances at the response scene.

- (1) If toxic threats do not exist and there is no threat of an explosion, wear appropriate flame-resistant protective clothing (compliant to either NFPA 1971 or NFPA 2112).

- (2) If toxic threats do exist, then choose an NFPA 1991 ensemble that also meets the optional flash fire escape requirements.

#### **E.1.7 Step 4: Determine CBRN Threats.**

If there is the potential for exposure to a CBRN agent, then a series of determinations are needed to present the correct path for choosing appropriate PPE.

The first determination as part of this decision process is to identify whether the agent is chemical, biological, or radiological/nuclear.

- (1) If the agent is radiological/nuclear in nature and limited to contaminated particles that are of relatively low radiation levels, then choose an NFPA 1994 Class 4 or Class 4R ensemble.
- (2) If the agent is chemical, then follow Step 5 or Step 6 to make decisions for vapor/gas or liquid threats.
- (3) If the agent is biological, then follow Step 7 to make decisions for biological threats.

#### **E.1.8 Step 5: Determine Gas/Vapor Chemical Threats.**

If the hazard/risk assessment identifies chemical agents or substances where exposure can occur either as a gas or a vapor, then the following decision logic takes one of four paths, depending on the chemical gas or vapor concentration:

- (1) The first path is for environments that present an immediately dangerous to life and health (IDLH) concentration or conditions that warrant the wearing of self-contained breathing apparatus (SCBA). IDLH conditions include environments that involve potentially flammable vapor, liquefied gases, and oxygen deficiencies. This path is based on gas/vapor concentrations that are over 10,000 ppm or 1 percent.
- (2) The second path is also IDLH but exists for substances at lower concentrations (gas/vapor concentrations that are over 350 ppm but equal to or below 10,000 ppm).
- (3) The third path is also IDLH but exists for substances at even lower concentrations (gas/vapor concentrations that are over 40 ppm but equal to or below 350 ppm).
- (4) The fourth path is for environments that are not determined to be IDLH and where either air-purifying respirators (APR) or powered air purifying respirators (PAPR) are considered acceptable. For this path, gas/vapor concentrations are at 40 ppm or below.
- (5) IDLH, Higher Concentrations. The following choices are made along the IDLH pathway.
  - (a) If the substance is a liquefied gas and is flammable, then choose an NFPA 1991 ensemble with the optional liquefied gas protection and flash fire protection.
  - (b) If the substance is a liquefied gas but is not flammable, then choose an NFPA 1991 ensemble with the optional liquefied gas protection.
  - (c) If the gas or vapor is not skin toxic, then choose structural firefighting clothing or other flash fire protective clothing that conforms to NFPA 1971 or NFPA 2112, respectively
  - (d) If the substance is flammable vapor at a concentration over 10,000 ppm or 1 percent, then choose an NFPA 1991 ensemble that also meets the optional flash fire protection requirements.
  - (e) If the substance is vapor at a concentration over 10,000 ppm or 1 percent that is not flammable, then choose an NFPA 1991 ensemble.
  - (f) If the substance is flammable vapor at a concentration over 350 ppm but at or less than 10,000 ppm or 1 percent, then choose either an NFPA 1994 Class 1 ensemble that also meets the optional flash fire protection requirements.
  - (g) If the substance is vapor at a concentration over 350 ppm but at or less than 10,000 ppm or 1 percent that is not flammable, then choose an NFPA 1994 Class 1

ensemble.

(6) IDLH, Lower Concentrations. Some circumstances exist where the principal threat is a gas or vapor but the concentration is deemed relatively low. In these cases, apply the following choices:

- (a) If the substance is flammable vapor at a concentration over 40 ppm but at or less than 350 ppm, then choose an NFPA 1994 Class 2 or Class 2R ensemble that also meets the optional flash fire protection.
- (b) If the substance is vapor at a concentration over 40 ppm but at or less than 350 ppm that is not flammable, then choose an NFPA 1994 Class 2 ensemble.
- (c) If heavy work is expected or the ensemble might be reused, then choose an NFPA 1994 Class 2R "ruggedized" ensemble.

(7) Non-IDLH. Where relatively low vapor and/or liquid exposures are expected, such as might occur during decontamination, then a lower level of protective ensemble can be used. Where it is acceptable to wear either APR or PAPR, apply the following choices:

- (a) If the substance is below IDLH conditions and flame hazard exists, then choose an NFPA 1994 Class 3 or Class 3R ensemble that also meets the optional flash fire protection.
- (b) If the substance is below IDLH conditions and there is no flame hazard, then choose an NFPA 1994 Class 3 or Class 3R ensemble.
- (c) If the above conditions exist and heavy work is expected or the ensemble might be reused, then choose an NFPA 1994 Class 3R "ruggedized" ensemble.

#### **E.1.9 Step 6: Determine Liquid/Particulate Chemical Threats.**

Some assessments will show that gas or vapor hazards do not exist, and the principal hazards are from either liquid or particulate exposure. Liquid exposures might be at various levels depending on the volume, frequency, applied pressure, and length of liquid contact. Severe liquid splash or exposure conditions include high volumes of liquid, frequent splashes, liquid spraying under pressure, or an expected extended exposure to liquid. In contrast, liquid exposure might involve relatively low volumes or, less likely, infrequent contact. In these situations, apply the following choices:

- (1) If severe liquid splash or repeated/extended exposure liquid hazards exist, then choose an NFPA 1992 or NFPA 1994 Class 2 or Class 2R ensemble.
- (2) If low volume or infrequent liquid exposure hazards exist, then choose an NFPA 1994 Class 3 or Class 3R "ruggedized" ensemble.
- (3) If exposure is only expected from solid particles, then choose an NFPA 1994 Class 4 or Class 4R ensemble.
- (4) If the above conditions exist and heavy work is expected or the ensemble might be reused, then choose Type R "ruggedized" ensembles.

#### **E.1.10 Step 7: Determine Biological Threats.**

Biological threat might include bloodborne pathogens in the form of infected blood, body fluids, or other liquids; types of aerosols; or contaminated solid particles or spores. Where biological-only hazards are encountered, apply the following choices:

- (1) If the primary hazard is from airborne or aerosolized biological substances that are considered dangerous for skin contact, then choose an NFPA 1994 Class 4 or Class 4R ensemble.
- (2) If the primary hazard is from airborne or aerosolized biological substances that are not transmissible through skin contact, then choose an appropriate respirator such as an air-purifying respirator (APR) with P100 filters or a powered air-purifying respirator (PAPR)

with HEPA filter.

- (3) If the primary hazard is from highly hazardous liquidborne biological substances, then choose either an NFPA 1994 Class 4 or Class 4R or a single-use or multiple-use NFPA 1999 ensemble.
- (4) If the primary hazard is from potentially infectious blood or body fluids, then choose protective NFPA 1999 garments, gloves, footwear, and face/eyewear to protect the portions of the wearer's body where exposure is expected.
- (5) If the above conditions exist and heavy work is expected or the ensemble might be reused, then choose NFPA 1994 Type R "ruggedized" or NFPA 1999 multiple-use ensembles.

#### **E.1.11 Other Considerations for PPE Selection.**

The preceding steps in the decision logic cover general selection of PPE for hazardous materials and CBRN incidents. The results of the branched decision making are one or more ensembles certified to a given NFPA standard or class in that standard. In many cases, an organization might not have all types of ensembles available. When this occurs, a higher-performing ensemble can be selected. Table E.1.11 provides a hierarchy for each of the major categories of protection.

Table E.1.11 Major Categories of Protection

<b><u>Level</u></b>	<b><u>Chemical Vapors</u></b>	<b><u>Chemical Liquids</u></b>	<b><u>Biological Liquids</u></b>	<b><u>Biological Aerosols</u></b>	<b><u>Radiological Particles</u></b>
Highest	<u>NFPA 1991</u>	<u>NFPA 1991</u>	<u>NFPA 1991</u>	<u>NFPA 1991</u>	<u>NFPA 1991</u>
↑	<u>NFPA 1994 C1</u>	<u>NFPA 1994 C1</u>	<u>NFPA 1994 C1</u>	<u>NFPA 1994 C1</u>	<u>NFPA 1994 C1</u>
	<u>NFPA 1994 C2</u>	<u>NFPA 1994 C2</u>	<u>NFPA 1994 C2</u>	<u>NFPA 1994 C2</u>	<u>NFPA 1994 C2</u>
Lowest	<u>NFPA 1994 C3</u>	<u>NFPA 1992</u>	<u>NFPA 1992</u>	<u>NFPA 1992</u>	<u>NFPA 1992</u>
		<u>NFPA 1994 C3</u>	<u>NFPA 1999 MU</u>	<u>NFPA 1999 MU</u>	<u>NFPA 1999 MU</u>
			<u>NFPA 1994 C3</u>	<u>NFPA 1994 C3</u>	<u>NFPA 1994 C3</u>
			<u>NFPA 1999 SU</u>	<u>NFPA 1994 C4</u>	<u>NFPA 1994 C4</u>

Chemical resistance data for ensembles for protection against either chemical vapors or liquids can be an additional factor for the selection of an appropriate protective ensemble. NFPA ensembles are tested to a limited number of chemicals; there might be no data for the encountered chemical(s) for all of the relevant exposed materials used in the construction of the ensemble that include the garment or suit, hood, gloves, footwear, and seams joining these materials or items. Where possible, chemical resistance data for the respective ensemble should be consulted, but it is important that these data apply to all portions of the ensemble that might be exposed to the chemical(s).

Other factors to consider might not be part of NFPA standards. Certain incidents might cover unique hazards or needs. As part of the selection, other considerations include the following:

- (1) Stealth
- (2) Equipment compatibility
- (3) Differences in design and conformity levels
  - (a) Stealth. For some missions, particularly law enforcement, it might be important that the ensemble provide stealth characteristics so that the responder is difficult to see. In these cases, it is important that the ensemble is a dull, dark color and not reflective. It is also important that the ensemble not create excessive noise during movement. NFPA 1994 includes an optional category for the classes of ensembles that can be specified if these ensemble characteristics are needed. In addition,

tactical operation requirements of law enforcement will dictate ensembles that are form fitting and offer the greatest levels of mobility, functionality, tactility, and dexterity. For these reasons, encapsulating ensembles are generally not considered acceptable for tactical law enforcement or similar operations.

- (b) *Equipment Compatibility.* Ensembles consist of the garment or suit along with an attached or unattached hood, gloves, and footwear as well as a respirator. Yet, depending on the mission, there might also be a requirement for other equipment to be worn by the operator or technician such as a cooling vest, body armor, helmet, communications equipment, or hydration system. The ability of the ensemble to accommodate these additional items is another consideration that must be weighed in selecting an ensemble. Some equipment compatibility will depend on the sizes of ensembles that are offered. While the NFPA standards specify minimum sizes for the suit, gloves, and footwear, some products might be offered in a larger number of sizes or allow for features that permit adjustment of the ensemble such as side torso take-up straps or internal harnesses.

(c) *Differences in Design and Conformity Levels.* Lastly, not all ensembles that meet a given standard are alike. Each ensemble is required to meet the minimum design, performance, documentation, and labeling requirements of specific NFPA standards. Relatively few requirements exist for how the ensemble must be designed, which can lead to different features in the configuration of the ensemble (e.g., whether the zipper is placed on the front or back of the ensemble and the type of interface that is used to join a glove to a suit or garment sleeve). In addition, most products exceed the performance requirement of the respective NFPA standard. These differences might mean additional chemicals for which the ensemble barrier materials have been tested, increased physical properties, or greater levels of integrity. Differences in products can be ascertained by examining the technical data package that is provided with each ensemble.

#### **~~E-deleted Hazardous Materials PPE Information-DELETED~~**

*This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.*

#### **~~E.1 Protection Provided for Fire Department Members Involved in a Hazardous Materials Incident:~~**

~~Fire department personnel involved in a hazardous materials incident should be protected against potential chemical hazards. The purpose of chemical-protective clothing and equipment is to shield or isolate individuals from the chemical hazards that can be encountered during hazardous materials responses. Adequate chemical-protective clothing should be carefully selected and used to protect the respiratory system, skin, eyes, face, hands, feet, head, body, and hearing.~~

~~Structural fire-fighting protective clothing and equipment should not be used for hazardous materials incidents. Even where certified to the appropriate NFPA standards for structural fire fighting, these clothing and equipment items provide little or no protection against hazardous materials. Use of this clothing for hazardous materials emergency response can result in serious injury or death, as explained in E.1.1 through E.1.3.~~

##### **~~E.1.1~~**

~~Structural fire-fighting protective clothing materials are easily permeated or penetrated by most hazardous materials. Some parts of structural fire-fighting clothing can actually absorb chemical liquids or vapors, increasing the likelihood of serious exposure.~~

##### **~~E.1.2~~**

~~Many hardware items will fail or lose function when contacted by chemicals (e.g., etching of visors, deterioration of straps, corrosion of hooks or other metal items).~~

##### **~~E.1.3~~**

~~Contamination of structural fire-fighting protective clothing might not be effectively removed by laundering. Reuse of contaminated clothing can cause chronic exposure and accelerate physiological effects produced by contact with the chemical. Fire fighters should realize that no single combination of protective equipment and clothing is capable of protecting them against all~~

hazards. Therefore, chemical-protective clothing should be used in conjunction with other protective methods. The use of such clothing can create significant wearer hazards, such as heat stress and physical and psychological stress, as well as impaired vision, mobility, and communication. In general, the greater the level of chemical clothing protection, the greater are the associated risks. For any given situation, equipment and clothing should be selected that provide an adequate level of protection. Overprotection as well as underprotection can be hazardous and should be avoided. The approach to selecting personal protective clothing and equipment should encompass an ensemble of clothing and equipment items that are easily integrated to provide both an appropriate level of protection and the ability to carry out emergency response activities. The following is a checklist of components that can form the chemical-protective ensemble:

- (1) Protective clothing (i.e., suit, coveralls, hoods, gloves, boots)
- (2) Respiratory equipment (i.e., SCBA, combination SCBA/SAR)
- (3) Cooling system (i.e., ice vest, air circulation, water circulation)
- (4) Communications device
- (5) Head protection
- (6) Ear protection
- (7) Inner garments
- (8) Outer protection (i.e., overgloves, overboots, flashcovers)

## **E.2 Emergency Response PPE Information.**

For emergency response, the only acceptable types of protective clothing include fully or totally encapsulating suits and nonencapsulating or "splash" suits combined with accessory clothing items such as chemical-resistant gloves and boots. These descriptions apply to how the clothing is designed, not to its performance. NFPA has classified chemical-protective suits by their performance in the following two standards:

- (1) Vapor-protective suits (NFPA 1991) (Level A)
- (2) Liquid splash-protective suits (NFPA 1992) (Level B with SCBA)

Protective clothing should completely cover both the wearer and the wearer's breathing apparatus. Wearing SCBA or other respiratory equipment outside the suit subjects this equipment to the chemically contaminated environment. The SCBA used for hazardous materials emergency response are generally the same as those used in structural fire fighting. Respiratory protective equipment is not designed to resist chemical contamination and should be protected from these environments. NFPA 1991 vapor-protective suits require that respiratory protection SCBA be worn on the inside. NFPA 1992 liquid splash-protective suits can be configured with the SCBA on either the inside or the outside. However, it is strongly recommended that respiratory equipment be worn inside the ensemble to prevent its failure and to reduce decontamination problems.

A variety of accessories are available for chemical-protective ensembles. As with protective clothing and respirators, it is important that these components integrate easily into an ensemble without a decrease in the protective integrity offered by any one component. For the most part, the protective suit is the main integrating ensemble component because it should accommodate all other equipment while completely covering the wearer. Nevertheless, selection of an ensemble configuration should consider all items simultaneously.

Fire departments are faced with selecting a number of available chemical-protective garments and sorting through the variety of information provided by the manufacturer. What follows are some guidelines that can be used in selecting chemical-protective suits.

### **E.2.1**

It must be determined if the clothing item is intended to provide vapor or liquid splash protection. Vapor-protective suits also provide liquid splash protection. Both vapor- and liquid splash-protective suits also provide protection against solid chemicals and particles. **Many garments**

**can be labeled as totally encapsulating but do not provide gastight integrity due to inadequate seams or closures.** Splash suits must still cover the entire body when combined with the respirator, gloves, and boots. **Applying duct tape to a splash suit does not enable it to protect against vapors.** Gastight integrity can only be determined by performing a pressure or inflation test of the respective protective suit, which should be done per the manufacturer's recommendation. ASTM F1052, *Standard Test Method for Pressure Testing Vapor Protective Ensembles*, offers a procedure for conducting this test. This test involves the following:

- (1) Closing off suit exhalation valves
- (2) Inflating the suit to a prespecified pressure
- (3) Observing whether the suit holds the above pressure for a designated period of time

Liquid splash-protective suits should provide "liquidtight" integrity. Liquidtight integrity is best evaluated by determining how the chemical-protective suit and other clothing prevent sprayed liquid from contacting the wearer. ASTM F1359, *Standard Test Method for Liquid Penetration Resistance of Protective Clothing or Protective Ensembles Under a Shower Spray While on a Mannequin*, offers procedures for conducting this test involving the placement of the suit and other clothing over a mannequin that is dressed in a water-absorptive garment. Surfactant-treated water is sprayed at the suited mannequin from several different directions. Observations of water penetration on the water-absorptive garment indicate a lack of liquidtight integrity. In particular, seam, closure, and clothing item interface areas should be examined closely for watertight integrity.

### **E.2.2**

It should be determined if the clothing item provides full-body protection. A vapor-protective or totally encapsulating suit will meet this requirement by passing gastight integrity tests. Liquid splash-protective suits can have separate parts. Missing clothing items should be obtained separately and match or exceed the performance of the garment. Buying a polyvinyl chloride (PVC) glove for a PVC splash suit does not mean that the same level of protection is obtained. This determination should be made by comparing chemical resistance data.

Component parts of the liquid splash-protective suit should also integrate and provide liquidtight integrity as described previously.

### **E.2.3**

The manufacturer's chemical resistance data provided with the garment should be evaluated. Technical data packages are required to be supplied by the manufacturers of protective suits that are certified to NFPA 1991 or NFPA 1992. Manufacturers of vapor-protective suits should provide permeation resistance data for their products, while penetration resistance data should accompany liquid splash-protective garments. Data should be provided for every primary material in the suit, including the garment, visor, gloves, and boots.

Permeation data should include a citation that testing was conducted in accordance with ASTM F739, *Standard Test Method for Resistance of Protective Clothing Materials to Permeation by Liquids or Gases Under Conditions of Continuous Contact*, and the following:

- (1) Chemical name
- (2) Breakthrough time (indicates how soon the chemical permeates)
- (3) Permeation rate (indicates the rate at which the chemical permeates)
- (4) System sensitivity (allows comparison of test results from different laboratories)

If no data is provided or if the data lacks any of the information above, the manufacturer should be asked to supply the missing data or the product will not be considered. Manufacturers that provide only numerical or qualitative ratings should support their recommendations with complete test data.

Penetration data should include a pass or fail determination for each chemical listed and a citation that testing was conducted in accordance with ASTM F903, *Standard Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Liquids*. Protective suits that are certified

to NFPA 1991 or NFPA 1992 should meet all of the above requirements.

Suit materials that show no breakthrough or no penetration in response to a large number of chemicals are likely to have a broad range of chemical resistance. (Breakthrough times greater than 1 hour are usually considered to be an indication of acceptable performance.) If there are specific chemicals within a response area that have not been tested, the manufacturer should be consulted for test data on these chemicals.

#### **E.2.4**

The manufacturer's instruction manual should be obtained and examined.

This manual should document all the features of the suit and describe those materials that are used in its construction. It should cite specific limitations for the suit and the restrictions that apply to its use. Procedures and recommendations should be supplied for at least the following:

- (1) Donning and doffing
- (2) Inspection, maintenance, and storage
- (3) Decontamination
- (4) Use

The manufacturer's instructions should be thorough enough to allow trained fire department members to wear and use the suit without a large number of questions.

#### **E.2.5**

Sample garments should be obtained and inspected.

An examination of the quality of suit construction and other features that will impact its wearing should be made. If possible, representative garments should be obtained in advance, inspected prior to purchase, and reviewed with an individual who has experience in their use. It is also helpful to "try out" representative garments prior to purchase by having personnel run through exercises to simulate response activities while wearing the garments.

Despite the fact that a fire department has gone through a very careful selection process, a number of situations will arise where no information is available to judge whether the protective clothing chosen will provide adequate protection. These situations include the following:

- (1) Chemicals that have not been tested with the garment materials
- (2) Mixtures of two or more different chemicals
- (3) Chemicals that cannot be readily identified
- (4) Lack of data in all suit components (e.g., gloves, visors)

Testing material specimens using newly developed field test kits can offer one means for making on-site clothing selections. A portable test kit has been developed by the EPA using a simple weight loss method that allows field qualification of protective clothing materials within 1 hour. Use of this kit can compensate for the absence of data and provide additional criteria for clothing selection. Selection of chemical-protective clothing is a complex task and should be performed by personnel with both extensive training and experience. Under all conditions, clothing should be selected by evaluating its performance characteristics against the requirements and limitations imposed by the response activity.

## **Submitter Information Verification**

**Committee:**

**Submittal Date:** Tue Jul 02 14:48:32 EDT 2019

## **Committee Statement**

**Committee** Annex E as currently written is using outdated versions of NFPA 1991, 1992, and 1994. The inclusion of

**Statement:** an Annex E replacement from either 1891 Appendix information or the April 2018 NFPA Risk Based Selection of Chemical Protective Clothing white paper annex material will bring the document inline with current practice.

**Response Message:** SR-51-NFPA 1500-2019

[Public Comment No. 21-NFPA 1500-2018 \[Chapter E\]](#)



**Second Revision No. 1-NFPA 1500-2019 [ Section No. 2.2 ]**



**2.2** NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 10, *Standard for Portable Fire Extinguishers*, 2018 edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, 2017 edition.

NFPA 101<sup>®</sup>, *Life Safety Code*<sup>®</sup>, 2018 edition.

NFPA 472, *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, 2018 edition.

NFPA 473, *Standard for Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents*, 2018 edition.

NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, 2019 edition.

NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*, 2017 edition.

NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications*, 2019 edition.

NFPA 1006, *Standard for Technical Rescue Personnel Professional Qualifications*, 2017 edition.

NFPA 1021, *Standard for Fire Officer Professional Qualifications*, 2020 edition.

NFPA 1031, *Standard for Professional Qualifications for Fire Inspector and Plan Examiner*, 2014 edition.

NFPA 1033, *Standard for Professional Qualifications for Fire Investigator*, 2014 edition.

NFPA 1051, *Standard for Wildland Firefighting Personnel Professional Qualifications*, 2020 edition.

NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*, 2017 edition.

NFPA 1091, *Standard for Traffic Control Incident Management Personnel Professional Qualifications*, 2019 edition.

NFPA 1143, *Standard for Wildland Fire Management*, 2018 edition.

NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2019 edition.

NFPA 1403, *Standard on Live Fire Training Evolutions*, 2018 edition.

NFPA 1404, *Standard for Fire Service Respiratory Protection Training*, 2018 edition.

NFPA 1407, *Standard for Training Fire Service Rapid Intervention Crews*, 2020 edition.

NFPA 1451, *Standard for a Fire and Emergency Service Vehicle Operations Training Program*, 2018 edition.

NFPA 1521, *Standard for Fire Department Safety Officer Professional Qualifications*, 2020 edition.

NFPA 1561, *Standard on Emergency Services Incident Management System and Command Safety*, 2020 edition.

NFPA 1581, *Standard on Fire Department Infection Control Program*, 2015 edition.

NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*, 2018 edition.

NFPA 1583, *Standard on Health-Related Fitness Programs for Fire Department Members*, 2015 edition.

NFPA 1584, *Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises*, 2015 edition.

NFPA 1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*, 2017 edition.

NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, 2020 edition.

NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments*, 2020 edition.

NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, 2019 2020 edition.

NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA)*, 2019 edition.

NFPA 1855, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Technical Rescue Incidents*, 2018 edition.

NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 edition.

NFPA 1906, *Standard for Wildland Fire Apparatus*, 2016 edition.

NFPA 1911, *Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Vehicles*, 2017 edition.

NFPA 1912, *Standard for Fire Apparatus Refurbishing*, 2016 edition.

NFPA 1917, *Standard for Automotive Ambulances*, 2019 edition.

NFPA 1925, *Standard on Marine Fire-Fighting Vessels*, 2018 edition.

NFPA 1931, *Standard for Manufacturer's Design of Fire Department Ground Ladders*, 2020 edition.

NFPA 1932, *Standard on Use, Maintenance, and Service Testing of In-Service Fire Department Ground Ladders*, 2020 edition.

NFPA 1936, *Standard on ~~Powered~~ Rescue Tools*, 2020 edition.

NFPA 1951, *Standard on Protective Ensembles for Technical Rescue Incidents*, 2020 edition.

NFPA 1952, *Standard on Surface Water Operations Protective Clothing and Equipment*, 2015 edition.

NFPA 1961, *Standard on Fire Hose*, 2020 edition.

NFPA 1962, *Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances*, 2018 edition.

NFPA 1964, *Standard for Spray Nozzles and Appliances*, 2018 edition.

NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, 2018 edition.

NFPA 1975, *Standard on Emergency Services Work Clothing Elements*, 2019 edition.

NFPA 1977, *Standard on Protective Clothing and Equipment for Wildland Fire Fighting*, 2016 edition.

NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, 2019 edition.

NFPA 1982, *Standard on Personal Alert Safety Systems (PASS)*, 2018 edition.

NFPA 1983, *Standard on Life Safety Rope and Equipment for Emergency Services*, 2017 edition.

NFPA 1984, *Standard on Respirators for Wildland Fire-Fighting Operations*, 2016 edition.

NFPA 1986, *Standard on Respiratory Protection Equipment for Tactical and Technical Operations*, 2017 edition.

NFPA 1989, *Standard on Breathing Air Quality for Emergency Services Respiratory Protection*, 2019 edition.

NFPA 1991, *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies and CBRN Terrorism Incidents*, 2016 edition.

NFPA 1992, *Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies*, 2018 edition.

NFPA 1994, *Standard on Protective Ensembles for First Responders to Hazardous Materials Emergencies and CBRN Terrorism Incidents, 2020 2018* edition.

NFPA 1999, *Standard on Protective Clothing and Ensembles for Emergency Medical Operations*, 2018 edition.

## Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Mon May 06 11:52:04 EDT 2019

## Committee Statement

**Committee Statement:** Reference FR 103. Inclusion of new standards with the hazardous materials community which were released within the last standards cycle and are applicable to guidance provided within this standard.

**Response Message:** SR-1-NFPA 1500-2019

Public Comment No. 6-NFPA 1500-2018 [Section No. 2.2]



## Second Revision No. 24-NFPA 1500-2019 [ New Section after 2.3.5 ]

### 2.3.3 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 325, *ANSI/CAN/UL Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems* , 2017.

### **Submitter Information Verification**

**Committee:** FIX-AAA

**Submittal Date:** Tue May 07 10:01:06 EDT 2019

### **Committee Statement**

**Committee Statement:** In reference to garage bay door safety from chapter 10.

**Response Message:** SR-24-NFPA 1500-2019



## Second Revision No. 47-NFPA 1500-2019 [ Section No. 2.4 ]

### 2.4 References for Extracts in Mandatory Sections.

NFPA 1, *Fire Code*, 2018 edition.

NFPA 472, *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, 2018 edition.

NFPA 600, *Standard on Facility Fire Brigades*, 2015 edition.

NFPA 921, *Guide for Fire and Explosion Investigations*, 2017 edition.

NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*, 2017 edition.

NFPA 1006, *Standard for Technical Rescue Personnel Professional Qualifications*, 2017 edition.

NFPA 1404, *Standard for Fire Service Respiratory Protection Training*, 2018 edition.

NFPA 1451, *Standard for a Fire and Emergency Service Vehicle Operations Training Program*, 2018 edition.

NFPA 1521, *Standard for Fire Department Safety Officer Professional Qualifications*, 2015 edition.

NFPA 1561, *Standard on Emergency Services Incident Management System and Command Safety*, 2014 edition.

NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*, 2018 edition.

NFPA 1600<sup>®</sup>, *Standard on Disaster/Emergency Management and Business Continuity/Continuity of Operations Programs Continuity, Emergency, and Crisis Management*, 2019 edition.

NFPA 1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*, 2017 edition.

NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, 2016 edition.

NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 edition.

NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, 2018 edition.

NFPA 1977, *Standard on Protective Clothing and Equipment for Wildland Fire Fighting*, 2016 edition.

NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, 2019 edition.

NFPA 1984, *Standard on Respirators for Wildland Fire-Fighting Operations*, 2016 edition.

NFPA 1991, *Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies and CBRN Terrorism Incidents*, 2016 edition.

NFPA 1994, *Standard on Protective Ensembles for First Responders to Hazardous Materials Emergencies and CBRN Terrorism Incidents*, 2018 edition.

NFPA 5000<sup>®</sup>, *Building Construction and Safety Code*<sup>®</sup>, 2018 edition.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Tue Jun 11 12:34:54 EDT 2019

### Committee Statement

**Committee Statement:** Updated to match current title.

**Response Message:** SR-47-NFPA 1500-2019



## Second Revision No. 36-NFPA 1500-2019 [ New Section after 3.3.109 ]

### **3.3.81\*** Power-Assisted Patient Cot.

An elevated patient conveyance device on which the primary patient is transported, also known as a transporter, gurney, stretcher, and carrier, engineered and manufactured with an automated and powered lifting system that is integrated with an ambulance mounted self-loading system.

#### **A.3.3.81** Power-Assisted Patient Cot.

This system might or might not require two attendants to operate but uses the powered assistance to reduce the strain and workload placed on attendees when raising and lowering the cot and when loading and unloading the cot from an ambulance.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Tue May 28 15:36:37 EDT 2019

### Committee Statement

**Committee Statement:** Definition added because it is listed in the mandatory section of the document.

**Response Message:** SR-36-NFPA 1500-2019

Public Comment No. 25-NFPA 1500-2018 [New Section after 3.3.80]



## Second Revision No. 48-NFPA 1500-2019 [ Sections 5.1.8.2, 5.1.8.3 ]

### 5.1.8.2

~~For maintenance~~ Maintenance of structural and proximity protective ensembles and ensemble elements, ~~refer to~~ shall be completed in accordance with NFPA 1851.

### 5.1.8.3

~~For maintenance~~ Maintenance of SCBA, ~~refer to~~ shall be completed in accordance with NFPA 1852.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Tue Jun 11 12:44:08 EDT 2019

### Committee Statement

**Committee Statement:** Wording change to create mandatory language.

**Response Message:** SR-48-NFPA 1500-2019



## Second Revision No. 50-NFPA 1500-2019 [ Section No. 5.1.8.4 ]

### 5.1.8.4

For ~~maintenance~~ Maintenance of protective ensembles for technical rescue incidents, ~~refer to~~ shall be completed in accordance with NFPA 1855.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Wed Jun 12 15:54:21 EDT 2019

### Committee Statement

**Committee Statement:** Language changed to mandatory for per Manual of Style.

**Response Message:** SR-50-NFPA 1500-2019



## Second Revision No. 34-NFPA 1500-2019 [ New Section after 5.3.14 ]

### 5.3.15

The fire department shall provide all members with training and education on safe ground ladder and aerial ladder climbing in accordance with 6.1.10 .

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Wed May 15 09:28:10 EDT 2019

### Committee Statement

**Committee Statement:** ladder safety training requirement added.

**Response Message:** SR-34-NFPA 1500-2019



## Second Revision No. 5-NFPA 1500-2019 [ Section No. 5.4.3 ]

### 5.4.3

Members expected to perform hazardous materials mitigation activities shall meet the training requirements of a technician as outlined in NFPA 472 and NFPA 1072 .

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Mon May 06 12:30:54 EDT 2019

### Committee Statement

**Committee Statement:** NFPA 1072 is the Professional Qualifications standard that is working in parallel with NFPA 472. NFPA 472 is the parent document in the parent-child relationship with 1072. However, many training organizations are now only using NFPA 1072.

**Response Message:** SR-5-NFPA 1500-2019

[Public Comment No. 10-NFPA 1500-2018 \[Section No. 5.4.3\]](#)



## Second Revision No. 46-NFPA 1500-2019 [ Section No. 6.1.5 ]

### 6.1.4.1

Fire departments that provide EMS transport shall use a power-assisted patient cot to lift assist stretcher for the loading of load patients into an automotive ambulance.

### 6.1.4.2

Power-assisted patient cot or self-loading cot shall be installed, mounted, and retained in accordance with the provisions in NFPA 1917 .

## Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Mon Jun 03 18:34:33 EDT 2019

## Committee Statement

**Committee Statement:** The use of powered cots is critical to reduce injuries of those fire service members providing EMS transport. The recommendations of both associated comments were incorporated into this revision.

**Response Message:** SR-46-NFPA 1500-2019

[Public Comment No. 26-NFPA 1500-2018 \[Section No. 6.1.5\]](#)

[Public Comment No. 3-NFPA 1500-2018 \[Section No. 6.1.5\]](#)



## Second Revision No. 35-NFPA 1500-2019 [ Section No. 6.1.11 ]

### 6.1.10

Each person ~~climbing ascending or descending~~ the ladder on the aerial apparatus shall ~~use a ladder belt and tether that meets the requirements of NFPA 1983~~ - do the following:

- (1) use Use a ladder belt and tether that meets the requirements of NFPA 1983.
- (2) Use the three points of contact climbing method — one hand and two feet or two hands and one foot in contact at all times.
- (3) At high ladder angles, ascend or descend by grasping the rungs and not the handrails.

### 6.1.10.1

Each aerial apparatus shall carry correctly sized ladder belts and tethers to accommodate all members authorized to climb the ladder or ride in the platform of the apparatus.

### 6.1.10.2

Persons working on a ladder shall be anchored to a structural feature of the ladder or platform when one of the following occurs:

- (1) The device is in motion.
- (2) They are not actively entering or exiting the platform.
- (3) They are not actively climbing or descending the ladder.

### 6.1.10.3

Personnel ascending or descending aerial or ground ladders with equipment shall have that equipment tethered to themselves in a way that allows them full use of both feet and both hands.

## Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Wed May 15 09:30:56 EDT 2019

## Committee Statement

**Committee Statement:** Additional safety requirements added in order to allow freedom of use and movement of all hands and feet when operating on ladders. This is secondary to an OSHA accident investigation in which injuries were reported to a firefighter who was carrying tools with his hands and attempting to use a ladder.

**Response Message:** SR-35-NFPA 1500-2019



## Second Revision No. 31-NFPA 1500-2019 [ Section No. 6.1.12 ]

### 6.1.11\*

The fire department shall ensure that all contaminated PPE and contaminated fire-fighting equipment are decontaminated according to manufacturer's specifications on the scene upon the termination of the incident, or that all contaminated PPE and contaminated fire-fighting equipment are taken out of service and decontaminated according to manufacturer's specifications in a controlled environment.

### A.6.1.12

Prolonged incidents such as wildland fire-fighting operations, widespread natural disasters, acts of terrorism, or other occurrences in which emergency operations are segmented into extended work periods might not be conducive to the decontamination of equipment or personnel when moving from one geographic location to another during the course of the work period. In such instances, the fire department should make every reasonable effort to decontaminate personnel and equipment at regular intervals or during rehabilitation periods. All personnel and PPE should be decontaminated at the end of every work period before being released from emergency operations.

In jurisdictions where mutual aid is not readily available, or where call volume is high, call concurrency could inhibit thorough decontamination upon termination of the initial incident. In such instances, the fire department shall ensure that all personnel, contaminated PPE, contaminated fire-fighting equipment, and any area of the fire apparatus or automotive ambulance that is exposed to contaminants are taken out of service following the completion of the concurrent incidents and decontaminated prior to being returned to service.

#### 6.1.11.1

The fire department shall ensure that contaminated PPE and contaminated fire-fighting equipment will not be transported in the enclosed seating area of the fire apparatus or patient compartment of the automotive ambulance unless sealed in a puncture-resistant container and secured in accordance with 6.1.6 .

#### 6.1.11.2

If the enclosed seating area of the fire apparatus, patient compartment of the automotive ambulance, or exterior compartments of the fire apparatus or automotive ambulance are exposed to contaminants during an incident, these areas shall be decontaminated upon completion of the incident and prior to being placed back in service.

## Submitter Information Verification

**Committee:** FIX-AAA

**Submission Date:** Tue May 07 15:42:52 EDT 2019

## Committee Statement

**Committee Statement:** The content of this section is being updated and moved to chapter 14.

**Response Message:** SR-31-NFPA 1500-2019



## Second Revision No. 8-NFPA 1500-2019 [ Sections 7.1.2.1, 7.1.2.2 ]

### 7.22 Ballistic Protective Equipment.

#### **7.22.1\***

The fire department shall provide correctly sized and fitted body armor to personnel who respond and are exposed to risks during civil unrest, active shooter incidents, or similar events where there are reasonably foreseen threats.

##### **7.22.1.1\***

Body armor provided shall be, at a minimum, a Type IIIA ballistic vest as defined by the National Institute of Justice (NIJ) *Standard 0101.06, Ballistic Resistance of Body Armor*.

#### **7.22.2**

In addition to the requirements in ~~7.1.2.1~~ 7.22.1, personnel assigned to a rescue task force (RTF) or integrated response team deployed during events as described in ~~7.1.2.1~~ 7.22.1 shall be equipped at a minimum with the following:

- (1) The vest as set forth in ~~7.1.2.1~~ 7.22.1 outfitted with Type IV plate inserts
- (2) A Type II ballistic helmet (NIJ *Standard 0106.01 for Ballistic Helmets*)
- (3) A flashlight
- (4) Medical exam gloves
- (5) A radio with remote microphone and earpiece for communication
- (6) An individual first aid kit that includes a tourniquet

#### **7.22.3**

For selection of equipment, departments shall refer to the NIJ *Selection and Application Guide 0101.06 to Ballistic-Resistant Body Armor: For Law Enforcement, Corrections, and Public Safety* .

##### **7.22.3.1**

For care and maintenance, departments shall refer to the NIJ *Selection and Application Guide 0101.06 to Ballistic-Resistant Body Armor: For Law Enforcement, Corrections, and Public Safety* .

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Mon May 06 15:25:16 EDT 2019

### Committee Statement

**Committee Statement:** Refer to Public Comment #15. Selection and care and maintenance has been added here.

**Response Message:** SR-8-NFPA 1500-2019



## Second Revision No. 38-NFPA 1500-2019 [ Section No. 7.1.6 ]

### 7.1.6

The fire department shall provide for the inspection, care, and maintenance of protective ensembles, ensemble elements, and components according to the manufacturer's instructions unless specialized care and maintenance requirements are ~~required~~ specified by NFPA standards for specific types of protective ensembles, ensemble elements, or components; in which case the specialized care and maintenance requirements in the applicable NFPA standard shall apply.

#### 7.1.6.1\*

~~Where~~ When the fire department implements ~~an on-site~~ a care and maintenance operation, the fire department shall ~~acquire the proper type and amount of equipment, materials, and supplies to properly perform cleaning, drying, inspections create procedures for advanced inspection, advanced cleaning, sanitization or disinfection , and maintenance~~ specialized cleaning of protective ensembles and ensemble elements in ~~compliance~~ accordance with NFPA 1851.

#### A.7.1.6.1

Examples of the proper type of safety equipment should include MSDSs safety data sheets (SDS for information on recommended PPE) , eye protection (safety glasses and goggles), ~~disposable nitrile gloves, rubber or other types of gloves, fluid-resistant suit coveralls or waterproof apron, optional dust mask, uniforms, sharp~~ P100 filtering facepiece, sharps containers, and eyewash station.

#### 7.1.6.2

Where such cleaning is conducted in fire stations, the fire department shall provide ~~at least one~~ NFPA 1851 – compliant washing machine for this purpose in the ~~a~~ designated cleaning area that meets the requirements specified in NFPA 1581.

#### 7.1.6.3\*

Where the organization implements an on-site care and maintenance operation, the organization shall follow applicable governing standards that provide for exposure control and protection of members performing the tasks associated with care and maintenance.

#### 7.1.6.4

Specific roles, responsibilities, and authorities shall be assigned for inspection, care, and maintenance of protective clothing and equipment.

## Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Wed May 29 10:42:03 EDT 2019

## Committee Statement

**Committee Statement:** The proposed changes attempt to align the requirements in NFPA 1500 with the new edition of NFPA 1851. Changes incorporated with some revision. The TC removed the recommendation for 7.6.5 because that content is already covered in Chapter 7, 10, and 14.

**Response Message:** SR-38-NFPA 1500-2019

[Public Comment No. 22-NFPA 1500-2018 \[Section No. 7.1.6\]](#)

[Public Comment No. 24-NFPA 1500-2018 \[Section No. A.7.1.6.2\]](#)



## Second Revision No. 10-NFPA 1500-2019 [ Section No. 7.2.1.1 ]

### 7.2.1.1\*

The member shall be provided with correctly sized and fitted protective clothing in accordance with manufacturer's recommendations.

#### A.7.2.1.1

Manufacturers offer different protective garments with different patterns and styling. Therefore, one manufacturer's garment of a given size might not correspond to a different manufacturer's garment of the same size. Even when garments are provided based on firefighter measurements, fire departments and individual firefighters should conduct a dynamic fit test, which evaluates the degree of fit of the protective clothing on the firefighter and in particular acts as a check on whether the clothing fits correctly and is neither too tight nor too loose.

A dynamic fit test involves the individual firefighter donning his or her clothing and performing a series of movements to determine whether the clothing provides ease of movement without restriction and does not encumber the firefighter from being excessively loose. Suggested movements include the following:

- (1) Reaching overhead and side to side
- (2) Bending forward and side to side
- (3) Squatting and reaching overhead and side to side
- (4) Crawling and duck walking
- (5) Climbing a ladder
- (6) Glove dexterity

In performing this assessment, it is important for the firefighter and an observer knowledgeable in correct fit to identify any restrictions or encumbrance from the clothing item being assessed. This assessment is also best performed with the firefighter wearing his or her other protective clothing items, such as a helmet, a hood, gloves, and footwear, to further ensure that proper coverage is maintained in interface areas during each movement.

If the clothing does not properly fit, the department or individual firefighter should report any fit problems to the manufacturer or provider of the protective clothing to determine whether a different size or clothing modifications will improve fit.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Mon May 06 16:36:58 EDT 2019

### Committee Statement

**Committee Statement:** Paragraph 7.2. 1.1 was added during the First Revision to emphasize the need for proper fit of firefighter PPE. However, given that clothing fit is often subjective and is critical for both protection and comfort, additional guidance is needed to help departments and firefighter attain correctly fitting PPE.

**Response Message:** SR-10-NFPA 1500-2019



## Second Revision No. 11-NFPA 1500-2019 [ Section No. 7.4.1.1 ]

### 7.4.1.1

Members who perform emergency medical care or are otherwise likely to be exposed to blood or other body fluids shall be provided with emergency medical garments, emergency medical eye and face protection devices, emergency medical examination gloves, emergency medical gloves, emergency medical helmets, ~~multiple-use~~ emergency medical CBRN protective ensembles, and emergency medical footwear that are compliant with NFPA 1999.

### 7.4.1.2

Fire department members who are issued and use protective equipment during medical incidents to protect from infectious agents shall be trained in the appropriate donning and doffing procedures in accordance with manufacturer's specifications.

## Submitter Information Verification

**Committee:** FIX-AAA

**Submission Date:** Mon May 06 16:49:50 EDT 2019

## Committee Statement

**Committee Statement:** Donning and doffing is critical to the use of infectious spreading PPE. The majority of exposures occur during these phases.

**Response Message:** SR-11-NFPA 1500-2019



## Second Revision No. 39-NFPA 1500-2019 [ Section No. 7.6 ]

### **7.6\*** Chemical-Protective Clothing for Hazardous Materials Emergency Operations.

#### **A.7.6**

See Annex E, Selection of Hazardous Materials PPE Information and CBRN Protective Ensembles.

#### **7.6.1**

Members who engage in operations during hazardous materials emergencies shall be provided with and shall use chemical protective ensembles that meet the applicable requirements of NFPA 1991, NFPA 1992, or NFPA 1994.

##### **7.6.1.1\***

A risk assessment for the need, and, if necessary, selection of chemical protective clothing, ensembles, and ensemble elements shall be conducted.

##### **A.7.6.1.1**

This should be done in accordance with NFPA 475, Chapter 5, Risk Assessment.

#### **7.6.2\***

For a given hazardous materials incident, the following approach shall be used:


- (1) Perform a site-specific hazard and risk assessment: Identify all primary hazards that can cause potential harm to response personnel while taking into consideration the likelihood and consequences of exposure to the specific hazards.
- (2) Determine known threats: If entry into the site is determined to be necessary and the hazards are not identifiable, select NFPA 1991 ensembles with both flash fire escape and liquefied gas options.
- (3) Determine flash fire threats:
  - (a) If monitoring equipment or circumstances indicate an environment that is greater than 10 percent of the lower explosive limit, the environment is considered a flash fire or explosive risk.
  - (b) If skin toxic threats do not exist and there is no threat of an explosion, select protective ensembles certified in accordance with NFPA 1971 or NFPA 2112 .
  - (c) If skin toxic threats do exist and there is no threat of an explosion, select protective ensembles certified in accordance with NFPA 1991 with optional flash fire protection.
- (4) Determine CBRN threats:
  - (a) If the agent is radiological/nuclear in nature and is limited to contaminated particles that are of relatively low radiation levels, select ensembles certified in accordance with NFPA 1994 Class 4 or 4R.
  - (b) If the agent is chemical, follow the gas/vapor or liquid/particulate guidance.
  - (c) If the agent is biological, follow the biological threats guidance
- (5) Determine gas/vapor chemical threats:
  - (a) If the substance is a liquefied gas and is flammable, choose an NFPA 1991 ensemble with the optional liquefied gas protection and flash fire protection.
  - (b) If the substance is a liquefied gas but is not flammable, choose an NFPA 1991 ensemble with the optional liquefied gas protection.
  - (c) If the gas or vapor is not skin toxic, choose structural firefighting clothing or other flash fire protective clothing that conforms to NFPA 1971 or NFPA 2112 , respectively.
  - (d) If the substance is flammable vapor at a concentration over 10,000 ppm or 1 percent, choose an NFPA 1991 ensemble that also meets the optional flash fire protection requirements.
  - (e) If the substance is vapor at a concentration over 10,000 ppm or 1 percent that is not flammable, choose an NFPA 1991 ensemble.
  - (f) If the substance is flammable vapor at a concentration over 350 ppm but at or less than 10,000 ppm or 1 percent, choose either an NFPA 1994 Class 1 ensemble that also meets the optional flash fire protection requirements.
  - (g) If the substance is vapor at a concentration over 350 ppm but at or less than 10,000 ppm or 1 percent that is not flammable, choose an NFPA 1994 Class 1 ensemble.
  - (h) If the substance is flammable vapor at a concentration over 40 ppm but at or less than 350 ppm, choose an NFPA 1994 Class 2 or 2R ensemble that also meets the optional flash fire protection.
  - (i) If the substance is vapor at a concentration over 40 ppm but at or less than 350 ppm that is not flammable, choose an NFPA 1994 Class 2 or 2R ensemble.
  - (j) If the substance is below IDLH conditions and flame hazard exists, choose an NFPA 1994 Class 3 or 3R ensemble that also meets the optional flash fire protection.
  - (k) If the substance is below IDLH conditions and there is no flame hazard, choose an NFPA 1994 Class 3 or 3R ensemble.
- (6) Determine liquid/particulate chemical threats:
  - (a) If severe liquid splash or repeated/extended exposure liquid hazards exist, choose an NFPA 1992 or NFPA 1994 Class 2 or 2R ensemble.
  - (b) If low volume or infrequent liquid exposure hazards exist, choose an NFPA 1994 Class 3 or 3R ruggedized ensemble.
  - (c) If exposure is only expected to be solid particles, choose an NFPA 1994 Class 4 or Class 4R ensemble.
- (7) Determine biological threats:

- (a) If the primary hazard is from airborne or aerosolized biological substances that are considered dangerous for skin contact, choose an NFPA 1994 Class 4 or Class 4R ensemble.
- (b) If the primary hazard is from airborne or aerosolized biological substances that are not transmissible through skin contact, choose an appropriate respirator such as an air-purifying respirator (APR) with P100 filters or a powered air-purifying respirator (PAPR) with HEPA filter.
- (c) If the primary hazard is from highly hazardous liquid-borne biological substances, choose either an NFPA 1994 Class 4 or 4R or a single-use or multiple-use NFPA 1999 ensemble.
- (d) If the primary hazard is from potentially infectious blood or body fluids, choose protective NFPA 1999 garments, gloves, footwear and face/eyewear to protect those portions of the wearer's body where exposure is expected.
- (e) Determine optimal stealth, equipment interoperability, and design/conformity configurations.
- (8) Prior to the use of the ensemble, consult the technical data package, manufacturers' instructions, and manufacturers' recommendations as provided to ensure that the ensemble is designed to provide the member protection from the specific hazardous materials emergency.
- (9) In many cases, an organization might not have all the different types of ensembles available. When this occurs, a higher performing ensemble should be selected.

#### **A.7.6.2**

Table A.7.6.2 provides a hierarchy of protection for each of the major categories of protection.

Table A.7.6.2 Major Categories of Protection

<u>Level</u>	<u>Chemical Vapors</u>	<u>Chemical Liquids</u>	<u>Biological Liquids</u>	<u>Biological Aerosols</u>	<u>Radiological Particles</u>
<u>Highest</u>	<u>NFPA 1991</u>	<u>NFPA 1991</u>	<u>NFPA 1991</u>	<u>NFPA 1991</u>	<u>NFPA 1991</u>
	<u>NFPA 1994 C1</u>	<u>NFPA 1994 C1</u>	<u>NFPA 1994 C1</u>	<u>NFPA 1994 C1</u>	<u>NFPA 1994 C1</u>
	<u>NFPA 1994 C2</u>	<u>NFPA 1994 C2</u>	<u>NFPA 1994 C2</u>	<u>NFPA 1994 C2</u>	<u>NFPA 1994 C2</u>
	<u>NFPA 1994 C3</u>	<u>NFPA 1992</u>	<u>NFPA 1992</u>	<u>NFPA 1992</u>	<u>NFPA 1992</u>
<u>Lowest</u>	-	<u>NFPA 1994 C3</u>	<u>NFPA 1999 MU</u>	<u>NFPA 1999 MU</u>	<u>NFPA 1999 MU</u>
-	-	-	<u>NFPA 1994 C3</u>	<u>NFPA 1994 C3</u>	<u>NFPA 1994 C3</u>
-	-	-	<u>NFPA 1999 SU</u>	<u>NFPA 1994 C4</u>	<u>NFPA 1994 C4</u>

7.6.1\* Vapor-Protective Ensembles.

**A.7.6.1**

NFPA 1991 covers vapor-protective ensembles that are designed to provide "gastight" integrity and are intended for response situations where no chemical contact is permissible. This type of suit is equivalent to the clothing required in EPA's Level A. The standard specifies a battery of 25 chemicals and 2 chemical warfare agents, which were selected because they are representative of the classes of chemicals that are encountered during hazardous materials emergencies and terrorism incidents involving chemical agents. Vapor-protective ensembles should resist permeation by the chemicals present during a response. Permeation is the movement of chemical through a material at a molecular level. The effects of permeation are often unobservable. Permeation resistance is measured in terms of breakthrough time and permeation rate or the amount of cumulative permeation in the case of chemical warfare agents. An acceptable material is one where the breakthrough time exceeds the expected period of garment use, and the measured permeation rate is below the minimum permeation rate used for determining breakthrough time. Chemical permeation resistance for 1 hour or more against each chemical in the NFPA 1991 battery is required for primary suit materials (garment, visor, gloves, footwear, and seams) for testing of industrial chemicals. Acceptable performance of materials against chemical warfare agents is determined by measuring the amount of permeating chemical that passes through the material within 1 hour. This cumulative permeation is compared against acceptable dose levels that have been established for safe use of protective clothing without effects to individual wearers. To be certified for any additional chemicals or specific chemical mixtures, an ensemble must meet the same permeation performance requirements.

Other performance requirements are included in NFPA 1991 in order to reflect simulated emergency hazardous materials response use conditions or conditions that might be encountered during a terrorism incident involving chemical agents, biological agents, or radiological particulates. To determine adequate suit component performance in hazardous chemical environments, the following tests are required by NFPA 1991 :

- An ensemble pressurization test to check the airtight integrity of each protective suit

- An inward leakage test to demonstrate that the ensemble prevents the inward leakage of vapors or gases

- An overall suit water penetration test designed to ensure the suit provides full-body protection against liquid splashes

- Penetration resistance testing of closures

- Leak and cracking pressure tests for exhaust valves

To ensure that the materials used for vapor-protective suits will afford adequate protection in the environment where they will be used, material testing for burst strength, tear resistance, abrasion resistance, flammability resistance, cold temperature performance, and flexural fatigue are also required. Additional optional criteria based on additional tests are provided for demonstrating protection against liquefied gases or chemical flash fires.

**7.6.1.1**

Members who engage in operations during hazardous materials emergencies where there is the potential for exposure to known chemicals in gaseous or vapor form that pose skin hazards, to chemicals that have not been identified, or to chemical environments that are classified as immediately dangerous to life or health (IDLH) shall be provided with and shall use vapor-protective ensembles that meet the applicable requirements of NFPA 1991 .

**7.6.1.2**

Prior to use of the ensemble, members who engage in hazardous materials operations shall consult the technical data package, manufacturers' instructions, and manufacturers' recommendations as provided and required by NFPA 1991 to ensure that the ensemble is designed to provide the member protection for the specific hazardous materials emergency.

**7.6.1.3**

All members who engage in operations during hazardous materials emergencies where there is potential for exposure to known chemicals in gaseous or vapor form that pose skin hazards, to chemicals that have not been identified, or to chemical environments that are classified as IDLH shall be provided with and shall use SCBA that meet the applicable requirements of Section 7.14 .

**7.6.1.3.1**

Additional outside air supplies shall be permitted to be utilized in conjunction with SCBA, provided such systems are positive pressure and have been certified by NIOSH under 42 CFR 84, "Approval of Respiratory Protective Devices."

#### 7.6.1.4

Vapor-protective ensembles certified to the 2016 edition of NFPA 1991 shall be permitted to be used for protection from chemical agents, biological agents, and radioactive particulate encountered during terrorism incidents.

#### 7.6.1.5

Where the risk assessment shows that members will also be exposed to liquefied gases, members shall be provided with and shall use vapor-protective ensembles that meet the additional optional requirements for liquefied gas protection in NFPA 1991.

#### 7.6.1.6

Where the risk assessment shows that members will also be exposed to potential chemical flash fires, members shall be provided with and shall use vapor-protective ensembles that meet the additional optional requirements for chemical flash fire protection in NFPA 1991.

#### 7.6.1.7\*

Vapor-protective ensembles shall not be used alone for any fire-fighting applications or for protection from ionizing radiation, cryogenic liquid hazards, or explosive atmospheres.

#### A.7.6.1.7

Materials used in vapor-protective ensembles are tested for limited thermal resistance; however, this testing only prevents the use of inherently flammable materials. There are no performance criteria provided in NFPA 1991 to demonstrate protection of NFPA 1991-compliant vapor-protective ensembles during fire-fighting operations. There are no test requirements or performance criteria in NFPA 1991 addressing protection from ionizing radiation, cryogenic liquid hazards, or explosive atmospheres.

#### 7.6.1.8

Vapor-protective ensembles shall be permitted to be used for protection from liquid splashes or solid chemicals and particulates.

#### 7.6.2\* Liquid-Splash-Protective Ensembles and Clothing.

#### A.7.6.2

NFPA 1992 covers liquid splash-protective ensembles or clothing, which are designed to protect emergency responders against liquid chemicals in the form of splashes, but not against continuous liquid contact or chemical vapors and gases. Liquid splash-protective ensembles or clothing can be acceptable for some chemicals that do not present vapor hazards. Essentially, this type of clothing meets EPA Level B needs. It is important to note, however, that wearing liquid splash-protective ensembles or clothing does not protect the wearer from exposure to chemical vapors and gases, since this clothing does not offer gastight performance, even if duct tape is used to seal clothing interfaces. Therefore, where the environment is unknown or not quantified through monitoring, where exposures include carcinogens or skin-toxic chemicals involving chemicals with vapor pressures above 5 mm Hg at 25°C (77°F), or where the splash-protective ensemble or clothing has not been certified for the chemical exposure, an ensemble compliant with NFPA 1991 should be utilized.

NFPA 1992 specifies a battery of seven chemicals, including liquid chemicals with low vapor pressures with no known skin absorption toxicity or no known or suspected human carcinogenicity, that are representative of the classes of chemicals likely to be encountered during hazardous materials emergencies. Chemical penetration resistance against the NFPA 1992 battery of test chemicals is required. Any additional chemicals or specific chemical mixtures for which the manufacturer is certifying the suit should meet the same penetration performance requirements. Additional optional criteria are provided for demonstrating protection against chemical flash fires.

Other NFPA 1992 performance requirements include an overall suit water penetration test to ensure the suit provides integrity of the ensemble or clothing against the inward leakage of liquids. The standard contains performance criteria to ensure that the materials used for liquid splash suits afford adequate protection in the environment where they will be used. The test requirements include material testing for burst strength, tear resistance, flammability resistance, abrasion resistance, cold temperature performance, and flexural fatigue testing.

#### 7.6.2.1

Members who engage in operations during hazardous materials emergencies that will expose them to known chemicals in liquid-splash form shall be provided with and shall use liquid splash-protective ensembles or clothing that meet the applicable requirements of NFPA 1992.

#### **7.6.2.2**

~~Prior to use of the ensemble or clothing, members who engage in hazardous materials operations shall consult the technical data package, manufacturers' instructions, and manufacturers' recommendations as provided and required by NFPA 1992, to ensure that the ensemble or clothing is designed to provide the member protection for the specific hazardous chemical emergency.~~

#### **7.6.2.3**

~~All members who engage in operations during hazardous materials emergencies that will expose them to known chemicals in liquid splash form shall be provided with and shall use either SCBA that meet the applicable requirements of 7.14.1, or other respiratory protective devices that are certified by NIOSH under 42 CFR 84, "Approval of Respiratory Protective Devices," as suitable for the specific chemical environment.~~

#### **7.6.2.3.1**

~~Additional outside air supplies shall be permitted to be utilized in conjunction with SCBA, provided such systems are positive pressure and have been certified by NIOSH under 42 CFR 84.~~

#### **7.6.2.4**

~~Liquid splash protective ensembles or clothing shall not be used for protection from chemicals in vapor form or from unknown liquid chemicals or chemical mixtures.~~

#### **7.6.2.4.1**

~~Only vapor protective ensembles specified in 7.6.1 and SCBA specified in 7.14.1 shall be considered for use.~~

#### **7.6.2.5**

~~Liquid splash protective ensembles or clothing shall not be used for protection from chemicals or specific chemical mixtures that have a vapor pressure greater than 5 mm Hg at 77°F (25°C) and have known or suspected carcinogenicity as indicated by one of the following documents:~~

*Sax's Dangerous Properties of Industrial Materials*

*NIOSH Pocket Guide to Chemical Hazards*

#### **7.6.2.6**

~~Liquid splash protective suits shall not be used for protection from chemicals or specific chemical mixtures with skin toxicity notations as indicated by the American Conference of Governmental Industrial Hygienists, TLVs<sup>®</sup> and BEIs<sup>®</sup>, and that have a vapor pressure greater than 5 mm Hg at 77°F (25°C).~~

#### **7.6.2.7**

~~Where the risk assessment shows that members will also be exposed to potential chemical flash fires, members shall be provided with and shall use liquid splash protective ensembles and clothing that meet the additional optional requirements for chemical flash fire protection in NFPA 1992.~~

#### **7.6.2.8\***

~~Liquid splash protective suits shall not be used alone for any fire fighting applications or for protection from ionizing radiation, biological, liquefied gas or cryogenic liquid hazards, or from flammable or explosive atmospheres, or from hazardous chemical vapor atmospheres.~~

#### **A.7.6.2.8**

~~There are no performance criteria provided in NFPA 1992, to demonstrate protection of NFPA 1992 – compliant liquid splash protective suits during fire fighting operations. There are no test requirements or performance criteria in NFPA 1992 addressing protection from ionizing radiation, biological, liquefied gas, or cryogenic liquid hazards, from flammable or explosive atmospheres, or from hazardous chemical vapor atmospheres.~~

#### **7.6.2.9**

~~Liquid splash protective suits shall be permitted to be used for protection from solid chemicals and particulates.~~

#### **7.6.3\*** Protective Ensembles for CBRN Terrorism Incidents.

**A.7.6.3**

CBRN protection is addressed in three standards, including NFPA 1991, NFPA 1994, and NFPA 1971. NFPA 1991 provides requirements for the highest level of CBRN protection, where hazards involving CBRN terrorism agents are most severe. These include the conditions where the agent has not been identified, the release is still occurring, and victims in the area of the release are apparently dead or unconscious. Testing of ensembles for NFPA 1991 requirements is described in A.7.6.4.

NFPA 1994 sets requirements for different classes of protective ensembles for use at incidents involving CBRN terrorism agents as used by first responders. Class 2 ensembles provide the highest level of protection against CBRN terrorism agents, including vapors, liquids, and particulates, and have performance consistent with SCBA use for IDLH conditions. Class 3 ensembles also protect against CBRN terrorism agents that include vapors, liquids, or particulates but are at conditions of exposure that are less than IDLH, which would permit the use of air-purifying respirators (APRs).

There are two primary areas of evaluation: tests for integrity of the ensemble against the hazardous environment and tests of the material to demonstrate how it acts as a barrier against different CBRN terrorism agents. There are three different integrity tests. An inward leakage test is applied to Class 2 and Class 3 ensembles using the Man-in-Simulant test (MIST). This test measures the inward leakage of a surrogate agent into the clothing while worn by a test subject. The higher the MIST result or protection factor, the better the integrity. Class 2 performance has been set for levels that are consistent based on SCBA use while Class 3 performance is consistent with APR use. MIST does not apply to Class 4 because these ensembles are not intended to provide chemical protection. Class 4 protective ensembles provide only biological or radiological particulate protection. A liquid integrity test is applied to each ensemble. A longer test is used for Class 2 than for Class 3 and Class 4. The liquid integrity test is applied to Class 4 because this clothing could be subjected to wet decontamination. For Class 4, a particle integrity test is used where a test subject wears the ensemble inside a closed environment with fluorescent particles. Particle leakage is detected using ultraviolet light. This particle test is not applied to Class 2 and Class 3 because it is believed that successful MIST evaluations indicate particle holdout. For material tests, permeation testing as described in A.7.6.4 is used for Class 2 and Class 3 ensembles. For Class 2, permeation testing with gases is carried out at levels that are used for CBRN approvals of APRs. The liquid chemical permeation tests for Class 2 are performed using the more rigorous closed-top procedures compared to open-top procedures for Class 3. All ensemble materials are evaluated for viral penetration resistance using a bloodborne pathogen surrogate.

The CBRN option for NFPA 1971 is based on Class 2 performance. The same integrity and material barrier requirements are applied; however, ensemble elements and materials are subjected to extensive conditioning involving laundering, heat exposures, repeated flexing, and abrasion prior to testing integrity and barrier characteristics. The tests are intended to simulate extensive use of the ensemble prior to encountering CBRN terrorism agents. (See also A.7.6.3.6.)

**7.6.3.1**

Members who engage in assessment, extrication, rescue, triage, treatment decontamination, and support function operations for incidents involving CBRN terrorism agents shall be provided with the protective ensembles and protective equipment specified in 7.6.3.3 through 7.6.3.6.

**7.6.3.2\***

The approach to any potentially hazardous atmosphere, including biological hazards, shall be made with a plan that includes an assessment of the hazard and exposure potential, respiratory protection needs, entry conditions, exit routes, and decontamination strategies.

**A.7.6.3.2**

Any response plan involving a biological or weapons of mass destruction (WMD) biological hazard should be based on relevant infectious disease or biological safety recommendations by the Centers for Disease Control and Prevention (CDC) and other expert bodies.

**7.6.3.2.1**

Before emergency response personnel are assigned to operations involving CBRN terrorism agents, the incident commander shall perform a risk assessment of the incident to determine the type of protective ensembles and other protective equipment that is needed.

**7.6.3.3**

Where the risk assessment indicates one or more of the following, all members who will be performing the operations shall be provided with and shall use at least ensembles certified as compliant with NFPA 1994 :

~~There is an ongoing release of the agent with likely gas/vapor exposure.~~

~~The identity or concentration of the vapor or liquid agent is unknown.~~

~~Liquid contact is expected, and no direct skin contact can be permitted.~~

~~Exposure of members could be at levels that would result in substantial possibility of immediate death, immediate serious incapacitation, or a severely impaired ability to escape.~~

~~Most victims in the area appear to be unconscious or dead.~~

~~Members will be close to the point of release.~~

#### **7.6.3.3.1**

All members who engage in operations for incidents involving CBRN terrorism agents and who are required to wear vapor-protective ensembles that meet NFPA 1994 , shall be provided with and shall use either of the following respiratory protection:

~~SCBA that meet the applicable requirements of 7.14.1 , provided that the SCBA is fully encapsulated by the protective ensemble~~

~~Open-circuit SCBA that are certified by NIOSH as compliant with NIOSH *Standard for Chemical, Biological, Radiological, and Nuclear (CBRN) Open Circuit Self-Contained Breathing Apparatus (SCBA)*~~

#### **7.6.3.4**

Where the risk assessment indicates one or more of the following, all members who will be performing the operations for incidents involving CBRN terrorism agents shall be provided with and shall use at least Class 2 ensembles certified as compliant with NFPA 1994 :

~~Exposure is at IDLH conditions.~~

~~The agent or threat has generally been identified.~~

~~The actual release has subsided except for where the potential for direct contact with residual vapor or gas is probable.~~

~~Surfaces at the emergency scene are highly contaminated.~~

~~Victims in the area are symptomatic, not ambulatory, but showing signs of movement.~~

#### **7.6.3.4.1**

All members who engage in operations for incidents involving CBRN terrorism agents and who are required to wear NFPA 1994 , Class 2 ensembles shall use open-circuit SCBA that are certified by NIOSH as compliant with NIOSH *Standard for Chemical, Biological, Radiological, and Nuclear (CBRN) Open Circuit Self-Contained Breathing Apparatus (SCBA)* .

#### **7.6.3.5**

Where the risk assessment indicates one or more of the following, all members who will be performing the operations for incidents involving CBRN terrorism agents shall be provided with and shall use at least Class 3 ensembles certified as compliant with NFPA 1994 :

~~Exposure is at levels below IDLH conditions.~~

~~Exposure to liquids is expected to be incidental through contact with contaminated surfaces or victims well after the release has occurred.~~

~~Victims are symptomatic but ambulatory.~~

#### **7.6.3.5.1**

All members who engage in operations for incidents involving CBRN terrorism agents and who are required to wear NFPA 1994 Class 3 ensembles shall use one of the following types of respirators:

~~Open-circuit SCBA that are certified by NIOSH as compliant with NIOSH *Standard for Chemical, Biological, Radiological, and Nuclear (CBRN) Open Circuit Self-Contained Breathing Apparatus (SCBA)*~~

~~Air-purifying respirators (APRs) with a minimum rated service life of at least 30 minutes that are certified by NIOSH as compliant with NIOSH *Standard for Chemical, Biological, Radiological, and Nuclear (CBRN) Full Facepiece Air Purifying Respirator (APR)*~~

#### **7.6.3.6\***

Where the risk assessment indicates the potential presence of biological or radiological particulates only, all members who will be performing the operations for incidents involving CBRN terrorism agents shall be provided with and shall use at least Class 4 ensembles certified as compliant with NFPA 1994 .

**A.7.6.3.6**

The CBRN option for structural and proximity fire-fighting protective ensembles in NFPA 1971 can only be applied to complete ensembles of garments, helmet, gloves, footwear, and hood with a specified SCBA that has been certified by NIOSH as compliant with the NIOSH *Standard for Chemical, Biological, Radiological, and Nuclear (CBRN) Full Facepiece Air Purifying Respirator (APR)*. Non-CBRN elements cannot be used with the CBRN ensemble. CBRN ensembles are only intended to allow members escape and provide rescue during the escape when CBRN agents are encountered.

**7.6.3.6.1**

All members who engage in operations during chemical and biological terrorism incidents and who are required to wear NFPA 1994, Class 4 ensembles shall use one of the following types of respirators:

*Open-circuit SCBA that are certified by NIOSH as compliant with NIOSH Standard for Chemical, Biological, Radiological, and Nuclear (CBRN) Open Circuit Self-Contained Breathing Apparatus (SCBA)*

*APR with a minimum rated service life of at least 30 minutes that are certified by NIOSH as compliant with NIOSH Standard for Chemical, Biological, Radiological, and Nuclear (CBRN) Full Facepiece Air Purifying Respirator (APR)*

**7.6.3.7**

Vapor-protective ensembles, certified as compliant with NFPA 1991 that are used in operations involving any exposure to CBRN terrorism agents, shall be decontaminated following that use or shall be disposed of where decontamination will not stop the chemical or biological assault on the ensemble and the protective qualities would be diminished or nullified.

**7.6.3.8**

All NFPA 1994 Class 2, Class 3, and Class 4 protective ensembles and NFPA 1971 protective ensembles with the CBRN option that are used in operations involving any exposure to chemical or biological terrorism agents shall be disposed of following that use.

**7.6.3.9**

Disposal shall be in accordance with applicable local, state/provincial, and federal regulations.

**7.6.3.10**

All protective ensembles that are to be used for incidents involving CBRN terrorism agents shall be inspected and maintained as required by the technical data package and the manufacturer's instructions.

**Supplemental Information**

File Name	Description	Approved
2018-11-15_NFPA_1500_Changes_REF_Chem_Protective_Clothing.1542313227950.1557177487112.docx	Please replace text with attached word document - for staff use	

**Submitter Information Verification**

**Committee:** FIX-AAA

**Submittal Date:** Wed May 29 15:32:11 EDT 2019

**Committee Statement**

**Committee Statement:** The current language in the standard represents an outdated status of the chemical protective clothing industry (Level A all the way). The replacement language brings 1500 in-line with the technical committee on hazardous materials protective clothing including NFPA 1891, 1991, 1992, and 1994.

**Response Message:** SR-39-NFPA 1500-2019

Public Comment No. 11-NFPA 1500-2018 [Section No. 7.6]



## Second Revision No. 13-NFPA 1500-2019 [ Section No. 7.12.7 ]

### 7.12.7\*

When engaged in any operation where members could encounter atmospheres that are IDLH or potentially IDLH, or where the atmosphere is undefined or hazardous (including overhaul), the fire department shall provide and require all members to use SCBA that has been certified as being compliant with NFPA 1981 or NFPA 1986 (for non-firefighting operations) .

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Mon May 06 17:20:03 EDT 2019

### Committee Statement

**Committee Statement:** NFPA 1986, SCBA for technical and tactical operations, was developed for hazmat response and provides the appropriate protection for a hazardous materials response.

**Response Message:** SR-13-NFPA 1500-2019

[Public Comment No. 13-NFPA 1500-2018 \[Section No. 7.12.7\]](#)



## Second Revision No. 40-NFPA 1500-2019 [ Section No. 7.12.9 ]

### 7.12.9\*

Respiratory protection for any entry into the post-fire environment before or after overhaul shall be at least a fitted full-face air-purifying respirator (APR) with protection against contaminants when used in compliance with 14.5.2.1 NIOSH-certified self-contained breathing apparatus for at least the first two hours post-extinguishment .

#### A.7.12.9

A NIOSH-approved full-face air-purifying respirator (APR) is permissible when used in compliance with Chapter 14 .

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Wed May 29 15:43:30 EDT 2019

### Committee Statement

**Committee Statement:** NIOSH certifies Air Purifying Respirators at ambient temperatures. The interaction of chemicals with the carbon materials within the filters is temperature and humidity dependent requiring that filters only be used when temperatures have reduced to ambient levels. In addition, while Carbon Monoxide levels during fire suppression have been determined to have a median concentration of 110 ppm CO with spikes up to 5000 ppm, the levels during overhaul demonstrate median concentration of 53 ppm CO with spikes up to 671 ppm [References available upon request]. Very few filters are commercially available today with will allow for protection against CO and spikes of this level. IAAI recommends the two hour window for increased safety and dissipation.

**Response Message:** SR-40-NFPA 1500-2019

Public Comment No. 14-NFPA 1500-2018 [Section No. 7.12.9]



## Second Revision No. 14-NFPA 1500-2019 [ Section No. 7.14.1.1 ]

### 7.14.1.1

All open-circuit SCBA that is are purchased new shall be certified as compliant with NFPA 1981(for firefighting operations) or NFPA 1986 (non-firefighting operations) and shall also be certified by NIOSH as compliant with NIOSH *Standard for Chemical, Biological, Radiological, and Nuclear (CBRN) Open Circuit Self-Contained Breathing Apparatus (SCBA)*.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Mon May 06 18:18:08 EDT 2019

### Committee Statement

**Committee Statement:** NFPA 1986 is also a suitable SCBA certification when non-firefighting operations are in play (ie, hazmat).

**Response Message:** SR-14-NFPA 1500-2019

[Public Comment No. 16-NFPA 1500-2018 \[Section No. 7.14.1.1\]](#)



## Second Revision No. 41-NFPA 1500-2019 [ Section No. 7.14.1.2 ]

### 7.14.1.2

Open-circuit SCBA that does not meet the 1997 or later editions of NFPA 1981 shall be removed from fire service use in accordance with [NFPA 1852](#) .

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Wed May 29 15:47:40 EDT 2019

### Committee Statement

**Committee Statement:** NFPA 1852 already has this provision and is referenced.

**Response Message:** SR-41-NFPA 1500-2019

[Public Comment No. 17-NFPA 1500-2018 \[Section No. 7.14.1.2\]](#)



## Second Revision No. 16-NFPA 1500-2019 [ New Section after 7.14.1.3 ]

### 7.14.1.3.1

Closed-circuit SCBAs shall not be permitted for use with NFPA 1991 ensembles.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Mon May 06 18:22:01 EDT 2019

### Committee Statement

**Committee Statement:** NFPA 1991 specifically prohibits the use of closed-circuit SCBAs due to the build up of oxygen (and the associated increase flammability) within the encapsulated, vapor-tight ensemble.

**Response Message:** SR-16-NFPA 1500-2019

Public Comment No. 19-NFPA 1500-2018 [New Section after 7.14.1.3]



## Second Revision No. 25-NFPA 1500-2019 [ Section No. 8.7 ]

### 8.7 Emergency Incident Hazard Control Zones.

#### 8.7.1

Emergency incident hazard control zones shall be established at every emergency incident to identify the level of risk to emergency responders and the appropriate level of PPE.

##### 8.7.1.1

Hazard control zones shall be utilized for the purpose of emergency incident contamination control.

#### 8.7.2

The perimeters of the emergency incident hazard control zones shall be designated by the incident commander.

#### 8.7.3

If the perimeters change during the course of the incident, these changes shall be communicated to all members on the scene.

#### 8.7.4\*

Emergency incident hazard control zones shall be as follows:

- (1) Designated as no-entry, hot, warm, and cold (similar to hazardous materials incidents)
- (2) Marked with the applicable colored hazard tape, signage, or other appropriate means wherever possible
- (3) Communicated to all personnel attending the incident prior to being assigned to a hazard zone

##### 8.7.4.1\*

Hot zone (red tape) is the area that ~~presenting presents~~ the greatest risks of injury and contamination exposure to members; ~~and will often be classified as an IDLH atmosphere, and presents the highest risk of human injury and/or exposure~~; therefore all members shall wear all of the PPE appropriate for the risks that might be encountered while in the hot zone.

###### 8.7.4.1.1\*

All members operating within the hot zone shall have an assigned task.

##### 8.7.4.2\*

Warm zone (yellow tape) shall serve as a limited access area for members directly aiding or in support of operations in the hot zone where significant risk of human injury can still exist.

###### 8.7.4.2.1\*

The warm zone shall serve as a limited access area where preliminary exposure reduction strategies are employed and the threat of cross contamination persists.

###### A.8.7.4.2.1

The warm zone is the portion of the emergency scene where the contaminants might have been transported by the firefighters as they leave the hot zone with contamination. In many respects, the risk to responders is equal to that in the hot zone, and the need to wear PPE continues. Until the contaminants have been removed from the PPE or the contaminated PPE removed from the firefighters, the precautions used in the hot zone must continue to be used.

##### 8.7.4.3

Cold zone (green tape) shall establish the public exclusion or clean zone where there are minimal risks for human injury or exposure, or both, in this zone.

###### 8.7.4.3.1

The cold zone shall be established outside the area where contamination is being mitigated.

##### 8.7.4.4

No-entry zone (red/white chevron tape) is the area at an incident scene that no person(s) shall be permitted to enter due to imminent hazard(s), dangerous conditions, or the need to protect evidence.

###### 8.7.4.4.1\*

Where a no-entry zone is designated, no personnel shall enter regardless of PPE.

#### **A.8.7.4.4.1**

Any emergency incident hazard control zone can include a no-entry zone. In the event that personnel are exposed to a no-entry zone, appropriate contamination reduction strategies for the hazards encountered should be utilized.

#### **8.7.4.4.2\***

Where red/white chevron tape is not readily available, no-entry zones shall be marked using three horizontal strands of yellow barrier tape, spaced 18 to 24 in. (460 to 610 mm) apart and securely fixed to stationary supports.

#### **8.7.4.4.3\***

No-entry zones shall be illuminated to enhance nighttime visibility.

#### **8.7.4.4.4**

Where the threat of a building collapse exists, a collapse zone shall be established.

#### **8.7.4.4.4.1**

A collapse zone shall be a No-Entry Zone.

#### **8.7.4.4.4.2\***

Collapse zones shall be established around the perimeter of the building at a distance that is equal to a minimum of 1.5 times the height of the building.

#### **8.7.5**

The incident commander shall ensure that the designation of the correct protective clothing and equipment is commensurate with the hazard in the zone the member will be operating in.

#### **8.7.6**

All officers and members shall ensure the correct use of PPE within that zone.

#### **8.7.7**

The process of utilizing emergency incident hazard control zones shall continue until the incident hazards have been mitigated or the incident is over.

## **Submitter Information Verification**

**Committee:** FIX-AAA

**Submittal Date:** Tue May 07 10:03:54 EDT 2019

## **Committee Statement**

**Committee Statement:** Context and detail added for measures to be taken in control zones. This increases understanding of zone environments and required measures to reduce exposure to contaminants.

**Response Message:** SR-25-NFPA 1500-2019



## Second Revision No. 27-NFPA 1500-2019 [ Section No. 10.1.1 ]

### 10.1.1\*

All fire department facilities shall comply with all legally applicable health, safety, building, and fire code requirements.

#### A.10.1.1

Where health, safety, building, and fire codes are not legally applicable to fire department facilities, steps should be taken to ensure that equivalent standards are applied and enforced. In the absence of local requirements, the provisions of NFPA 1, *NFPA 70*, *NFPA 101*, *NFPA 5000*, the *Uniform Plumbing Code*, and the *Uniform Mechanical Code* should be applied. In addition, the workplace safety standards specified in 29 CFR 1910, "Occupational Safety and Health Standards," or an equivalent standard should be applied. Applicable requirements of the Americans with Disabilities Act should be met.

For a more thorough overview of safety and health considerations that should be addressed at fire department facilities, see FA-168, *Safety and Health Considerations for the Design of Fire and Emergency Medical Service Stations*.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Tue May 07 15:05:33 EDT 2019

### Committee Statement

**Committee Statement:** New guidance that provides specific health and safety based design guidance for fire and EMS stations added to annex A.

**Response Message:** SR-27-NFPA 1500-2019



## Second Revision No. 42-NFPA 1500-2019 [ New Section after 10.1.8 ]

### 10.1.9

Fire station apparatus bay doors shall comply with the safety features, meant to prevent entrapment and injury, detailed in Section 31 of UL 325, *ANSI/CAN/UL Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems* .

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Thu May 30 09:28:46 EDT 2019

### Committee Statement

**Committee Statement:** Justification: UL325 is a voluntary standard. By mandating these safety features in this document, tragedies such as the one at a Scottsdale, Arizona fire station on February 3, 2018 wherein a child was killed by an apparatus bay door can be avoided, The UL Standard will be reviewed by the TC before completion.

**Response Message:** SR-42-NFPA 1500-2019

Public Comment No. 8-NFPA 1500-2018 [New Section after 10.1]



## Second Revision No. 28-NFPA 1500-2019 [ Section No. 10.5 ]

### 10.5 Contamination Control Inside Facilities.

#### 10.5.1

All fire stations shall have zones designated indicating the likelihood of contamination exposure.

#### 10.5.2

Contamination control zones shall be designated as follows:

- (1) Red — Spaces likely to be exposed to contaminants or carcinogens (hot zone)
- (2) Yellow — Transition area between contaminated area and clean area (warm zone)
- (3) Green — Clean areas such as living, kitchen, dormitory, and so forth (cold/clean zone)

#### 10.5.2.1\*

Each zone shall have an isolated HVAC system.

#### A.10.5.2.1

The transition area (yellow) should function as an air-lock vestibule between zones.

#### 10.5.2.2

The green zone shall be higher pressure than areas leading into it.

#### 10.5.2.3

The transition area (yellow) shall include restroom and shower facilities.

#### 10.5.3

The decontamination of contaminated PPE, contaminated clothing, and contaminated equipment ~~decontamination areas~~ shall take place in the red zone.

#### 10.5.4

PPE and fire-fighting equipment that is stored in a firehouse when not in use shall be in an enclosed and ventilated locker or in an enclosed area off the apparatus floor that prevents exposure to contaminants or UV light.

#### 10.5.4.1

All protective clothing ensembles and ensemble elements shall be stored in accordance with NFPA 1851 .

#### 10.5.4.2

Wet, soiled, or contaminated protective clothing and equipment shall not be permitted in areas designated for clean storage.

#### 10.5.5\*

Ice machines shall not be located in red or yellow zones.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Tue May 07 15:07:30 EDT 2019

### Committee Statement

**Committee Statement:** Additional detailed added to further define the functions and potential activities of each zone within the fire station.

**Response Message:** SR-28-NFPA 1500-2019



## Second Revision No. 23-NFPA 1500-2019 [ New Section after 12.2 ]

### 12.2.3.4\*

The fire department shall develop and implement SOP/Gs to provide strategies to manage the effects of acute and chronic sleep and circadian rhythm disruption that lead to sleep deprivation, fatigue, and other adverse health effects.

#### A.12.2.3.4

Research indicates that firefighters are at a high risk for sleep deprivation, fatigue, and sleep disorders. Firefighters who grapple with their “internal body clock” or circadian rhythm due to shift work or other long work hours and are sleep deprived often struggle with memory, focus impairment, irritability, depression, and relationship/social problems. In turn these can lead to an increased risk of accidents and injuries. These studies also note that firefighters face potential health problems, including a higher risk of ulcers, insulin resistance, metabolic syndrome, heart disease, and cancer. Strategies to consider to combat acute and chronic sleep and circadian rhythm disorders include the following:

- (1) Strategic caffeine use
- (2) Taking naps
- (3) Proper sleep hygiene
- (4) Identification and treatment of sleep disorders

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Tue May 07 09:48:55 EDT 2019

### Committee Statement

**Committee Statement:** Research indicates that firefighters are at high risk for sleep deprivation, fatigue, and sleep disorders. These studies note that lack of proper sleep can lead to increased risk of accidents and injury, cognitive impairment, and poor health outcomes. These risks can be mitigated through proper sleep hygiene, effective and appropriate use of caffeine, and identification and treatment of sleep disorders.

**Response Message:** SR-23-NFPA 1500-2019

Public Comment No. 2-NFPA 1500-2018 [New Section after 12.2]



## Second Revision No. 32-NFPA 1500-2019 [ Section No. 14.4 ]

### 14.4 Cleaning and Maintenance.

#### 14.4.1

The AHJ shall provide for the cleaning and maintenance of protective clothing and equipment.

#### 14.4.2\*

The fire department shall ensure that all contaminated protective clothing and protective equipment are immediately removed from service following the incident and cleaned in accordance with NFPA 1851 prior to returning the protective clothing and protective equipment to service.

#### A.14.4.2

Prolonged incidents such as wildland fire-fighting operations, widespread natural disasters, acts of terrorism, or other occurrences in which emergency operations are segmented into extended work periods might not be conducive to the decontamination of equipment or personnel when moving from one geographic location to another during the course of the work period. In such instances, the fire department should make every reasonable effort to decontaminate personnel and equipment at regular intervals or during rehabilitation periods. All personnel and PPE should be decontaminated at the end of every work period before being released from emergency operations.

In jurisdictions where mutual aid is not readily available, or where call volume is high, call concurrency could inhibit thorough decontamination upon termination of the initial incident. In such instances, the fire department shall ensure that all personnel, contaminated PPE, contaminated fire-fighting equipment, and any area of the fire apparatus or automotive ambulance that is exposed to contaminants are taken out of service following the completion of the concurrent incidents and decontaminated prior to being returned to service.

#### 14.4.3

The fire department shall ensure that all contaminated fire-fighting equipment is immediately removed from service following the incident where it was exposed to the products of combustion, soiled, or contaminated and decontaminated according to manufacturer's instructions.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Tue May 07 15:51:13 EDT 2019

### Committee Statement

**Committee Statement:** Cleaning and maintenance information from Chapter 6 moved to this section.

**Response Message:** SR-32-NFPA 1500-2019



## Second Revision No. 43-NFPA 1500-2019 [ Section No. 14.5.2.1.1 ]

### 14.5.2.1.1\*

An APR with an appropriate chemical cartridge canister shall be permitted only when all of the following conditions are met:

- (1) The APR is used ~~≥30 minutes post-~~ two hours after extinguishment.
- (2) No active overhaul is taking place.
- (3) Positive pressure ventilation is in place.
- (4) Continuous air monitoring is in place and levels are within the following acceptable short-term occupational exposure limits:
  - (a) Hydrogen cyanide (HCN)  $\leq$  4.7 ppm
  - (b) Carbon monoxide (CO)  $\leq$  35 ppm

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Thu May 30 09:55:35 EDT 2019

### Committee Statement

**Committee Statement:** In order for an APR canister to work as tested, the temperature cannot be elevated above ambient. Otherwise, the chemical interactions can be vastly shortened resulting in early breakthrough.

Monitoring for HCN and CO are insufficient to characterize a post-fire environment. While still not fully characterizing an area, the inclusion of acid gases (via HCl), formaldehyde (sensors cross sensitive for aldehydes), and total VOCs will provide a far more accurate picture of the operational environment.

In studies evaluating post-fire/overhaul environments, the following levels have been observed: CO at 671 ppm, HCN at 23 ppm, HCl at 2.7 ppm, VOCs at 0.3 ppm, and aldehydes at 1.2 ppm. In addition, this does not account for the PAHs and diethyl phthalates that we are not able to measure in real-time using current detection equipment.

**Response Message:** SR-43-NFPA 1500-2019

[Public Comment No. 20-NFPA 1500-2018 \[Section No. 14.5.2.1.1\]](#)



## Second Revision No. 22-NFPA 1500-2019 [ Section No. 14.5.2.1.2 ]

### 14.5.2.1.2\*

The ~~chemical cartridge shall be~~ NIOSH-approved APR with CBRNE canister shall be worn to provide protection against atmospheres containing particulates, acid gases, organic vapors, and formaldehyde.

#### A.14.5.2.1.2

Various methods can be used for respirator change-out schedules to meet the OSHA requirement for respiratory protection. OSHA Instruction, Directive Number: CPL 02-00-158, Inspection Procedures for the Respiratory Protection Standard, can be found here: [https://www.osha.gov/OshDoc/Directive\\_pdf/CPL\\_02-00-158.pdf](https://www.osha.gov/OshDoc/Directive_pdf/CPL_02-00-158.pdf). These include, among many methods, data from the manufacturer and software models to determine when to change the canister — some manufacturers provide “end of service life” models on their websites, which require information such as breathing rate, humidity, chemical, chemical concentration, and so forth.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Tue May 07 09:45:39 EDT 2019

### Committee Statement

**Committee Statement:** Cannister is the appropriate NIOSH terminology for the resource. Annex adds schedule and change-out guidance.

**Response Message:** SR-22-NFPA 1500-2019



## Second Revision No. 44-NFPA 1500-2019 [ New Section after 14.5.2.1.3 ]

### 14.5.3

The fire department shall ensure that following on-scene operations all contaminated PPE are subjected to preliminary exposure reduction while on the scene in accordance with NFPA 1851 .

#### 14.5.3.1\*

Following preliminary exposure reduction, contaminated PPE shall be taken out of service and isolated and contained in accordance with NFPA 1851 prior to leaving the scene.

#### A.14.5.3.1

Contaminated and soiled ensembles and ensemble elements can present a health risk to individuals who come in contact with them and need to be segregated. The potential for spread of contamination is particularly high when newly contaminated or soiled ensembles and ensemble elements are transported inside the passenger compartments of vehicles or stored in living quarters. It is recognized that it is not always possible to segregate contaminated or soiled elements. Therefore, airtight protective containers or bags should be used to minimize cross-contamination. Examples include disposable polyethylene bags or sealable plastic cases that are cleanable. If a plastic bag is used, it is recommended that the bag be clear to ensure that the contents can be readily identified.

If the protective ensemble or elements are wet, they should be removed as soon as possible following transport from the fire or other emergency scene since ensembles and elements that remain wet under closed conditions can result in the growth of mold or mildew that can cause permanent damage. It is further important that protective ensembles and elements be subjected to appropriate cleaning procedures. (see NFPA 1851) or stored under conditions where the ensemble or elements can dry following their transport. To prevent the spread of disease or infections through cross-contamination, soiled elements should not be cleaned with other items of clothing or laundry.

#### 14.5.3.2

Following on-scene operations, contaminated fire-fighting equipment shall be cleaned in accordance with manufacturer instructions.

#### 14.5.4

Fire department personnel engaged in cleaning of soiled or contaminated protective clothing and equipment shall wear at least the following safety equipment to mitigate exposure to dermal and airborne contaminants:

- (1) Disposable examination gloves (nitrile or other type)
- (2) Coveralls/protective garments
- (3) A fit-tested P-100 filtering facepiece

### Submitter Information Verification

Committee: FIX-AAA

Submittal Date: Thu May 30 10:14:28 EDT 2019

### Committee Statement

Committee Statement: Using NFPA 1851 as reference, this new language add detailed requirements for contamination exposure reduction and cleaning.

Response Message: SR-44-NFPA 1500-2019



## Second Revision No. 26-NFPA 1500-2019 [ Section No. 14.7 ]

### 14.7 Exposure Reporting Requirements.

#### 14.7.1

The AHJ shall establish an exposure reporting system for its members to use to record possible exposure to contaminants, airborne hazards, dusts, or chemicals. Following a possible exposure to toxic substances or harmful biological, chemical, or physical agents, the appropriate exposure report(s) shall be completed.

##### 14.7.1.1

The exposure report records shall be maintained by the AHJ for at least 30 years following the member's separation from the AHJ. Members that experience symptoms associated with occupational exposure to toxic substances or harmful biological, chemical, or physical agents shall request medical evaluation and report the exposure to their supervisor for appropriate exposure report documentation.

##### 14.7.1.2

The member shall have access to their personal exposure records.

#### 14.7.2\* Incident Exposure Report.

All personnel potentially exposed to contaminants, airborne hazards, dusts, or chemicals shall complete an exposure report. An incident exposure report shall be utilized to document the possible exposure to toxic substances or harmful biological, chemical, or physical agents during an incident or response.

#### **A.14.7.2**

Possible inhalation, dermal, or ocular exposure hazards include the following: Fire smoke, products of combustion, chemical vapors, diesel exhaust, burning synthetics, bedbugs, vermin, biological hazards, asbestos, perfluorooctanoic acid (PFOA), heavy metals, black mold, hazardous materials, radiation, infectious disease, unknown vapors or mists.

Toxic substances and harmful physical agents might include the following:

- (1) Metals and dusts, such as lead, cadmium, and silica
- (2) Biological agents, such as bacteria, viruses, and fungi
- (3) Physical stress, such as noise, heat, cold, vibration, repetitive motion, and ionizing and nonionizing radiation

Biological agent is a term used to describe microorganisms that are biological in nature and origin, to which exposure in sufficient quantities and duration could result in illness or injury to human health. Biological agents include bacteria, viruses, fungi, and parasites or parts thereof or products they generate. Reporting exposures to common agents such as cold and common influenza is not required.

Chemical agent is a term used to describe all chemical elements and compounds in a natural state or in a processed state and their by-products, the exposure to which in sufficient quantities and duration could result in illness or injury to human health.

Physical agent is a term used to describe energies, the exposures to which in sufficient quantities and duration could result in illness or injury to human health. Physical agents include noise, ionizing or nonionizing radiation, extremes in temperature and pressure, vibration, electric and magnetic fields.

##### 14.7.2.1

The incident exposure report shall be completed as part of an electronic incident reporting system, where responding members are linked with the incident response record.

#### 14.7.3 Personal Exposure Report.

A personal exposure report shall be utilized by the member to document an exposure or an injury-related exposure to toxic substances or harmful biological, chemical, or physical agents.

##### 14.7.3.1\*

A personal exposure report shall be completed by the member following an exposure to toxic substances or harmful biological, chemical, or physical agents during a training exercise or an incident or response.

**A.14.7.3.1**

Exposures include direct dermal, respiratory, or ocular exposure to a toxic substance or harmful biological, chemical, or physical agent.

A personal exposure report should collect responder-specific information about the potential exposure and activities undertaken during the response. A personal exposure reporting system, such as the National Fire Operations Reporting System (NFORS), should be used.

The NFORS exposure tracking module serves as a personal database providing a detailed history of work and exposures in a private, encrypted, and secure online environment.

With the mobile app, any fire fighter, paramedic, or officer can access and use the exposure tracker. NFORS exposure tracking module is available as an app from the Google Play store and the Apple App store.

**14.7.3.2**

Following a training event, or other non-incident-related exposure, where toxic substances or harmful biological, chemical, or physical agents are present, a personal exposure report shall be completed by the member.

**14.8 Exposure Report Retention and Access.****14.8.1**

Exposure reports shall be retained by the fire department for 30 years (see OSHA 3110, Access to Medical and Exposure Records) .

**14.8.2**

The fire department shall provide members access to their exposure records.

**Submitter Information Verification**

**Committee:** FIX-AAA

**Submittal Date:** Tue May 07 10:44:59 EDT 2019

**Committee Statement**

**Committee Statement:** Exposure reporting requirements have been expanded to match NIOSH and OSHA requirements and to provide fire departments more detailed information.

**Response Message:** SR-26-NFPA 1500-2019



## Second Revision No. 49-NFPA 1500-2019 [ Section No. A.1.5.2 ]

### A.1.5.2

For a fire department to evaluate its compliance with this standard, it must develop some type of logical process. The worksheet in Annex B (Figure B.2) illustrates one way that an action plan can be developed to determine code compliance.

This standard is intended to be implemented in a logical sequence, based upon a balanced evaluation of economic as well as public safety and personnel safety factors. The compliance schedule request ~~assures~~ ensures that risk is objectively assessed and reasonable priorities set toward reaching compliance. Interim compensatory measures are intended to ensure that safety action is being addressed until full compliance is reached and formally adopted into the fire department organization's policies and procedures. This can include, but is not limited to, increased inspections, testing, temporary suspension or restriction of use of specific equipment, specialized training, and administrative controls.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submittal Date:** Tue Jun 11 13:33:24 EDT 2019

### Committee Statement

**Committee Statement:** Edited for grammar.

**Response Message:** SR-49-NFPA 1500-2019



## Second Revision No. 29-NFPA 1500-2019 [ Section No. G.1.2.3 ]

**G.1.2.8** Federal Emergency Management Agency, United States Fire Administration  
Publications [USFA Publications](#) .

US Fire Administration, 16825 S. ~~Seaton~~ South Seton Avenue, Emmitsburg, MD 21727. Also at  
<http://www.usfa.fema.gov/>

FA-118, *Fire and Emergency Service Hearing Conservation Program Manual*, 1991.

FA-168, *Safety and Health Considerations for the Design of Fire and Emergency Medical Service Stations* ,  
2013.

FA-220, *Firefighter Fatality Retrospective Study*, 2002.

FA-248, *Safe Operation of Fire Tankers*, 2003.

### Submitter Information Verification

**Committee:** FIX-AAA

**Submission Date:** Tue May 07 15:22:00 EDT 2019

### Committee Statement

**Committee Statement:** This reference was added to annex A for chapter 10.

**Response Message:** SR-29-NFPA 1500-2019



## Second Revision No. 30-NFPA 1500-2019 [ Section No. G.1.2.11 ]

### G.1.2.10 US Government Publications.

US Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

*Americans with Disabilities Act (ADA)*, 1992.

Federal Register, Vol. 59, 38028, July 26, 1994.

Federal Register, Vol. 64, 56243, October 18, 1999.

*Health Insurance Portability and Accountability Act (HIPAA)*, 1996.

NIOSH *Pocket Guide to Chemical Hazards*, US Department of Health and Human Services, Public Health Services, Publication DHHS No. 85-114, September 1985.

NIOSH Respirator User Notice of December 7, 1999.

NIOSH *Standard for Chemical, Biological, Radiological, and Nuclear (CBRN) Full Facepiece Air Purifying Respirator (APR)*, March 2003.

OSHA Instruction, Directive Number: CPL 02-00-158, Inspection Procedures for the Respiratory Protection Standard, June 26, 2014. [https://www.osha.gov/OshDoc/Directive\\_pdf/CPL\\_02-00-158.pdf](https://www.osha.gov/OshDoc/Directive_pdf/CPL_02-00-158.pdf)

Title 29, Code of Federal Regulations, Part 1910, "Occupational Safety and Health Standards."

Title 29, Code of Federal Regulations, Part 1910.95, "Occupational Noise Exposure."

Title 29, Code of Federal Regulations, Part 1910.120, "Hazardous Waste Operations and Emergency Response."

Title 29, Code of Federal Regulations, Part 1910.134, "Respiratory Protection."

Title 29, Code of Federal Regulations, Part 1910.1030, "Bloodborne Pathogen Standard."

Title 29, Code of Federal Regulations, Parts 1926.1407–1411, "Power Line Safety."

Title 29, Code of Federal Regulations, Part 1990.103, "Definitions."

Title 40, Code of Federal Regulations, Part 311, "Worker Protection."

### Submitter Information Verification

**Committee:** FIX-AAA

**Submission Date:** Tue May 07 15:37:22 EDT 2019

### Committee Statement

**Committee Statement:** This document is referenced in new Annex A material.

**Response Message:** SR-30-NFPA 1500-2019