NFPA 1404

Standard for Fire Service Respiratory Protection Training

2006 Edition

NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

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NFPA 1404

Standard for

Fire Service Respiratory Protection Training

2006 Edition

This edition of NFPA 1404, *Standard for Fire Service Respiratory Protection Training*, was prepared by the Technical Committee on Fire Service Training. It was issued by the Standards Council on January 27, 2006, with an effective date of February 16, 2006, and supersedes all previous editions.

This edition of NFPA 1404 was approved as an American National Standard on February 16, 2006.

Origin and Development of NFPA 1404

The first edition of NFPA 1404, *Standard for a Fire Department Self-Contained Breathing Apparatus Program*, was developed in response to a perceived need and was published in 1989. The Technical Committee on Fire Service Training recognized that there were no standards on a fire department program for self-contained breathing apparatus (SCBA) and that the lack of guidance in areas such as training, maintenance, and SCBA program evaluation could cause serious problems for the fire service. At that time it was the hope of the technical committee that the void had been filled in a practical and reasonable manner.

The 1996 revised edition of NFPA 1404 was the result of efforts by the technical committee to update and provide a more user-friendly document.

A few years after the release of the 1996 edition, the committee appointed a task group to review the content and make recommendations to the full committee concerning the functionality of the document. As a result of that review, the task group suggested a general updating of the document.

In the same time frame, broad questions regarding other fire service standards resulted in the need for clarification of some issues of responsibility related to the subject of SCBA in NFPA 1404.

The Fire Service Training Committee previously included a wide coverage of the subject of SCBA in NFPA 1404 because there was a void of coverage elsewhere when NFPA 1404 was first developed. Subsequently, however, the Standards Council reassigned the "use" of SCBA to the Fire Service Occupational Safety Committee and NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*. At the same time, the Council assigned "selection, care, and maintenance" and "respiratory breathing air quality" of SCBA to the Technical Committee on Respiratory Protection, which was developing NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA)*.

The Standards Council appointed a task group to oversee the separation of these aspects of SCBA during the current revision cycle for each affected document. As a result, some SCBA subject areas previously covered in NFPA 1404 have been moved to NFPA 1500 (e.g., requirements for respiratory programs, fit-testing, and use of SCBA) and NFPA 1852 (e.g., selection, care, and maintenance), while NFPA 1404 concentrates on respiratory protection training. With these changes, the title of NFPA 1404 has now been changed to *Standard for Fire Service Respiratory Protection Training*, and the scope has been changed to cover the minimum requirements for the training component of the respiratory protection program found in NFPA 1500.

In the 2006 edition, the technical committee includes updated information on respiratory protection used in training evolutions simulating exposure to weapons of mass destruction.

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NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for all fire service training techniques, operations, and procedures to develop maximum efficiency and proper utilization of available personnel. Such activities can include training guides for fire prevention, fire suppression, and other missions for which the fire service has responsibility.

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NFPA 1404

Standard for

Fire Service Respiratory Protection Training

2006 Edition

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A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex D. Editorial changes to extracted material consist of revising references to an appropriate division in this document or the inclusion of the document number with the division number when the reference is to the original document. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex D.

Chapter 1 Administration

1.1* Scope. This standard shall contain minimum requirements for the training component of the Respiratory Protection Program found in NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program.*

1.2* Purpose. The purpose of this standard shall be to specify the minimum requirements for respiratory protection training for the emergency response organization, including safety procedures for those involved in fire suppression, rescue, and related activities in a toxic, contaminated, or oxygen-deficient atmosphere or environment.

1.2.1 The respiratory protection training program shall establish written operational policies and reinforce those policies through comprehensive training.

1.2.2 This standard shall be used to support the requirement of 5.3.1 of NFPA 1001, *Standard for Fire Fighter Professional Qualifications.* The goal of achievement of these objectives shall be to help prevent accidents, injuries, and exposure to harmful environments and to help develop an awareness of the critical importance of a respiratory protection program to the health and welfare of personnel who work in hazardous atmospheres.

1.2.3 It shall be possible to achieve many of the performance objectives of this standard in a variety of ways.

1.3 Application.

1.3.1* These requirements shall be applicable to organizations providing fire suppression, fire training, emergency medical services, rescue and respiratory protection equipment training, and other emergency services including public, military, and private fire departments and fire brigades that respond off-site.

1.3.2 The use of self-contained breathing apparatus (SCBA) by fire fighters shall always be assumed to be in an atmosphere immediately dangerous to life or health (IDLH) because there is no way to predetermine those hazardous conditions, concentrations of toxic materials, or percentages of oxygen in air that exist in a fire environment, during initial overhaul (salvage) operations, or under other immediate emergency conditions involving spills or releases of chemicals or other toxic materials.

1.3.3 Fire fighters shall be trained to use positive pressure SCBA with a rated minimum service life of 30 minutes anytime there is the potential for an IDLH atmosphere.

1.3.4 Nothing herein shall be intended to restrict any authority having jurisdiction from exceeding these minimum requirements.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

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

NFPA 1001, *Standard for Fire Fighter Professional Qualifications,* 2002 edition.

NFPA 1041, *Standard for Fire Service Instructor Professional Qualifications,* 2002 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program,* 2002 edition.

NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments,* 2003 edition.

NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA),* 2002 edition.

2.3 Other Publications.

2.3.1 U.S. Government Publications. U.S. Government Printing Office, Washington, DC 20402.

NIOSH Letters to all Respirator Manufacturers.

Title 42, Code of Federal Regulations, Part 84.

2.3.2 Other Publication. *Merriam-Webster's Collegiate Dictionary,* 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 55, *Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks,* 2005 edition.

NFPA 68, *Guide for Venting of Deflagrations,* 2002 edition.

NFPA 318, *Standard for the Protection of Semiconductor Fabrication Facilities,* 2006 edition.

NFPA 402, *Guide for Aircraft Rescue and Fire Fighting Operations,* 2002 edition.

NFPA 1403, *Standard on Live Fire Training Evolutions,* 2002 edition.

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NFPA 1451, *Standard for a Fire Service Vehicle Operations Training Program,* 2002 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program,* 2002 edition.

NFPA 1670, *Standard on Operations and Training for Technical Search and Rescue Incidents,* 2004 edition.

NFPA 1982, *Standard on Personal Alert Safety Systems (PASS),* 1998 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary,* 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4 Shall. Indicates a mandatory requirement.

3.2.5 Should. Indicates a recommendation or that which is advised but not required.

3.2.6 Standard. A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

3.3 General Definitions.

3.3.1 Air-Purifying Respirator (APR). A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

3.3.2 CBRN. Acronym for Chemical, Biological, Radiological, and Nuclear. This refers specifically to a NIOSH certification on the protective capabilities of a respirator.

3.3.3 CBRNE. Acronym for Chemical, Biological, Radiological, Nuclear, and Explosives. This term refers to the general types of terrorist attacks, or WMD events.

3.3.4 Closed-Circuit SCBA. See 3.3.32, Self-Contained Breathing Apparatus (SCBA).

3.3.5* Confined Space. An area large enough and so configured that a member can bodily enter and perform assigned work but which has limited or restricted means for entry or exit and is not designed for continuous human occupancy. [**1500,** 2002]

3.3.6 Contaminant. A harmful, irritating, or nuisance material foreign to the normal atmosphere. [**1500,** 2002]

3.3.7 Corrective Lens. A lens designed to fit the specifications of the wearer's individual corrective prescription.

3.3.8 Emergency Escape Respirators (EER). Units used by the general working population to afford effective respiratory protection in escaping from hazardous environments. These units can be either air-purifying or self-contained escape respirators.

3.3.9 Exhalation Valve. A device that allows exhaled air to leave a facepiece and prevents outside air from entering through the valve.

3.3.10* Facepiece. Describes both full facepieces that cover the nose, mouth, and eyes and half facepieces that cover the nose and mouth.

3.3.11* Fire Department. An organization providing rescue, fire suppression, emergency medical services, hazardous materials operations, special operations, and related activities.

3.3.12 Fire Service. Career or volunteer service groups that are organized and trained for the prevention and control of loss of life and property from any fire or disaster.

3.3.13 Gas. The state of matter characterized by complete molecular mobility and unlimited expansion; used synonymously with the term *vapor.* [**68,** 2002]

3.3.14* Immediately Dangerous to Life or Health (IDLH). Any condition that would pose an immediate or delayed threat to life, cause irreversible adverse health effects, or interfere with an individual's ability to escape unaided from a hazardous environment. [**1670,** 2004]

3.3.15 Individual Air Management Program. A program to develop an individual's awareness of his or her personal air consumption rate while wearing respiratory protection equipment in a work mode.

3.3.16 Live Fire. Any unconfined open flame or device that can propagate fire to the building or other combustible materials. [**1403,** 2002]

3.3.17 Maintenance. Work performed to ensure that equipment operates as directed by the manufacturer.

3.3.18* Member. A person involved in performing the duties and responsibilities of a fire department under the auspices of the organization. [**1500,** 2002]

3.3.19 NIOSH. National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services.

3.3.20* NIOSH Approved. Tested and certified by the National Institute for Occupational Safety and Health (NIOSH) of the U.S. Department of Health and Human Services.

3.3.21 Open-Circuit SCBA. See 3.3.32, Self-Contained Breathing Apparatus (SCBA).

3.3.22 OSHA. The Occupational Safety and Health Administration of the U.S. Department of Labor. [**55,** 2003]

3.3.23 Overhaul. A fire fighting term involving the process of final extinguishment after the main body of a fire has been knocked down. All traces of fire must be extinguished at this time. [**402,** 2002]

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3.3.24 Powered Air-Purifying Respirators (PAPR). Air-purifying respirator with a hood or helmet, breathing tube, canister, cartridge, filter, and a blower that passes ambient air through the purifying element. The blower can be stationary or portable. It can also be designed and equipped with a full facepiece, in which case it is referred to as a full facepiece powered air-purifying respirator (FFPAPR).

3.3.25 Qualified Person. A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the ability to deal with problems relating to a particular subject matter, work, or project. [**1451,** 2002]

3.3.26* Recruit. An individual who has passed beyond the candidate level and who has actively commenced duties as a member of the organization.

3.3.27 Respiratory Hazard. Any exposure to products of combustion, superheated atmospheres, toxic gases, vapors, or dust, or potentially explosive or oxygen-deficient atmospheres, or any condition that creates a hazard to the respiratory system.

3.3.28* Respiratory Protection Equipment. Devices that are designed to protect the respiratory system against exposure to gases, vapors, or particulates.

3.3.29 Respiratory Protection Program. A systematic and comprehensive program of training in the use and maintenance of respiratory protection devices and related equipment.

3.3.30 Sanitize. The removal of dirt and the inhibiting of the action of agents that cause infection or disease.

3.3.31 SCBA. Acronym for Self-Contained Breathing Apparatus. [**1982,** 1998]

3.3.32 Self-Contained Breathing Apparatus (SCBA). A respirator worn by the user that supplies a respirable atmosphere, that is either carried in or generated by the apparatus, and that is independent of the ambient environment.

3.3.32.1 ***Closed-Circuit SCBA.*** A recirculation-type SCBA in which the exhaled gas is rebreathed by the wearer after the carbon dioxide has been removed from the exhalation and after the oxygen content within the system has been restored from sources such as compressed breathing gas, chemical oxygen, and liquid oxygen.

3.3.32.2 ***Open-Circuit SCBA.*** An SCBA in which exhalation is vented to the atmosphere and not rebreathed. There are two types of open-circuit SCBA: negative pressure or demand type and positive pressure or demand type.

3.3.33 Smoke. The airborne solid and liquid particulates and gases evolved when a material undergoes pyrolysis or combustion, together with the quantity of air that is entrained or otherwise mixed into the mass. [**318,** 2006]

3.3.34 Standard Operating Procedures. Written instructions that document and define the manner in which activities should be conducted.

3.3.35 Supplied-Air Respirator (SAR) or Air-Line Respirator. An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

3.3.36 Weapons of Mass Destruction (WMD). A WMD is any device, material, or substance used in a manner, in a quantity or type, or under circumstances evidencing an intent to cause death or serious injury to persons or significant damage to property. A weapon of mass destruction includes chemical, biological, radiological, nuclear, and explosive components.

Chapter 4 Provisions of Respiratory Protection Equipment Used in Training

4.1 Inventory and Allocation of Respiratory Protection Equipment.

4.1.1 Each member shall be provided with the appropriate respiratory protection equipment for the type of training evolution being conducted.

4.1.2 Spare filters, cartridges, cylinders, and breathing air supplies shall be provided for the specific type of respiratory protection equipment in use during the training session.

4.1.3 Members shall be fit-tested for each type of facepiece assigned to them or used in training.

4.1.4 All respiratory protection equipment shall be stored in accordance with Section 6.3 of NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA).*

4.2 Selection and Use of SCBA for Training.

4.2.1 SCBA used by the authority having jurisdiction (AHJ) for training shall meet the requirements of Section 4.3 of NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA).*

4.2.2 SCBA used in training exercises shall be of the type and manufacture employed by the AHJ.

4.2.3* SCBA used in training evolutions simulating exposure to weapons of mass destruction (WMD) shall meet the appropriate sections of 42 CFR 84 and shall be marked with a chemical, biological, radiological, and nuclear (CBRN) rating.

4.2.4 SCBA shall be available at the training site to provide one unit for each member who could be exposed to respiratory hazards.

4.2.5 At least one reserve SCBA shall be available at the training site for each 10 SCBA in use to provide for replacement if a failure occurs during training evolutions.

4.2.6* A reserve air supply shall be provided by use of reserve cylinders or by an on-scene refill capability, or both, during training evolutions.

4.2.7* Training policies shall be established by the AHJ regulating the use of SCBA equipped with an emergency breathing support system (EBSS) commonly known as "buddy" or rescue breathing devices.

4.3 Selection and Use of Supplied-Air Respirators (SAR) in Training. SAR units used in training shall be of the type and manufacture employed by the AHJ.

4.3.1* SARs used in training evolutions simulating exposure to weapons of mass destruction (WMD) shall meet the appropriate sections of 42 CFR Part 84.

4.3.2 At least one reserve SAR and one reserve length of hose shall be available at the training site as replacements should an SAR or length of hose fail.

4.4 Selection and Use of APRs and PAPRs. Air-purifying respirators (APR) and powered air-purifying respirator (PAPR) units used in training shall be of the type and manufacture employed by the AHJ.

4.4.1* APRs and PAPRs used in training evolutions simulating exposure to WMD shall meet the appropriate sections of

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NIOSH Letters To All Respirator Manufacturers and shall be marked with a CBRN rating. If there is no NIOSH CBRN certification for that style of respirator, the AHJ shall use the components and cartridges recommended by the manufacturer for WMD environments.

4.5 Selection and Use of PAPRs. PAPR units used in training shall be of the type and manufacture employed by the AHJ.

4.5.1* PAPRs used in training evolutions simulating exposure to WMD shall meet the appropriate sections of 42 CFR 84 and shall be marked with a CBRN rating.

4.5.2 If there is no NIOSH CBRN certification for that style of respirator, the AHJ shall use the components and cartridges recommended by the manufacturer for WMD environments.

4.6 Selection and Use of Air-Purifying Emergency Escape Respirators and Self-Contained Escape Respirators. Emergency escape respirators used in training shall be of the type and manufacture employed by the AHJ.

4.6.1* Air-purifying emergency escape respirators and self-contained emergency escape respirators used in training evolutions simulating exposure to WMD shall meet the appropriate sections of 42 CFR 84 and shall be marked with a CBRN rating.

4.7 Selection and Use of Filter, Canister, and Cartridge APRs. Filter and cartridge respirators used in training shall be of the type and manufacture employed by the AHJ.

4.7.1 Filter and cartridge respirators used in training evolutions simulating exposure to WMD shall meet the appropriate sections of 42 CFR 84 and shall be marked with a CBRN rating.

4.7.2 If there is no NIOSH CBRN certification for that style of respirator, the AHJ shall use the components and cartridges recommended by the manufacturer for WMD environments.

4.7.3 Filter and cartridge respirators used in training shall be certified for the specific type of chemical, biological, or medical hazard against which they are intended to protect.

Chapter 5 Respiratory Protection Training Component

5.1 Coordinated Administrative Policies.

5.1.1 The AHJ shall adopt and maintain a respiratory protection program that meets the requirements of Section 7.3 of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*.

5.1.2 The AHJ shall conduct ongoing respiratory protection training that meets the requirements of this standard.

5.1.3 Respiratory protection training shall be conducted according to written standard operating procedures.

5.1.4 The AHJ shall establish and enforce written standard operating procedures for training in the use of respiratory protection equipment that shall include the following:

(1)*When respiratory protection equipment is to be used
(2)*Individual air management program
(3) Emergency evacuation procedures
(4) Procedures for ensuring proper facepiece fit
(5) Cleaning of respiratory protection equipment components
(6)*A policy for changing respiratory filters and cartridges
(7) A policy defining end of service life for all types of filter or cartridge-type respirators
(8) A policy defining the proper storage and inventory control of all respiratory protection equipment

5.1.5 The AHJ shall provide respiratory protection equipment for each member at the training site who could be exposed to respiratory hazards.

5.1.6 The AHJ shall establish written training policies for respiratory protection.

5.1.7* Training policies shall include but shall not be limited to the following:

(1)*Identification of the various types of respiratory protection equipment
(2) Responsibilities of members to obtain and maintain proper facepiece fit
(3) Responsibilities of members for proper cleaning and maintenance
(4)*Identification of the factors that affect the duration of the air supply
(5)*Determination of the air consumption rate of each member
(6) Responsibilities of members for using respiratory protection equipment in a hazardous atmosphere
(7) Limitations of respiratory protection devices
(8) Battery life limitations and recharging requirements of PAPRs

5.1.8 The members of the AHJ shall be trained on the procedures for inspection, maintenance, repair, and testing of respiratory protection equipment in accordance with Chapter 7 of NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA)*.

5.2 Requirements of the Respiratory Protection Training Component. The AHJ shall ensure that each employee can demonstrate knowledge of the following:

(1) Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator
(2) What the limitations and capabilities of the respirator are
(3) How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions
(4) How to inspect, don and doff, use, and check the seals of the respirator
(5) What the procedures are for maintenance and storage of the respirator
(6) How to recognize medical signs and symptoms that can limit or prevent the effective use of respirators
(7)*How to recognize medical signs and symptoms associated with exposure to WMD
(8) How to properly dispose of contaminated filters or cartridges
(9) What the general requirements of Section 5.2 are

Chapter 6 Respiratory Protection Training

6.1 Recruit Training.

6.1.1* All training related to the use, maintenance, and care of respiratory protection equipment shall be provided by instructors meeting the objectives of Instructor I of NFPA 1041, *Standard for Fire Service Instructor Professional Qualifications*, or instructors that have been trained and certified by the respirator's manufacturer or authorized distributor.

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6.1.2* Records of all respiratory protection training shall be maintained, including training of personnel involved in maintenance of such equipment, in accordance with Section 4.3 of NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA).*

6.1.3* Minimum performance standards shall be established by NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, and the AHJ for donning respiratory protection equipment.

6.1.4* Fit-testing procedures as provided in NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, shall be required for all recruits who are expected to use a tight-fitting facepiece respirator, including SCBA, SAR, certain APRs, and certain PAPRs prior to training in contaminated atmospheres.

6.1.5 Prior to initial training, members shall be examined and certified by a physician as being medically and physically fit in accordance with the following:

(1) NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*
(2) NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*
(3) Physical fitness requirements developed and validated by the AHJ for entry-level personnel

6.2 Annual Member Retraining and Certification.

6.2.1 Retraining shall be administered annually and when the following situations occur:

(1) Changes in the hazards found in the workplace or the type of respirator in use by the jurisdiction render the previous training obsolete
(2) Inadequacies in the member's knowledge or use of the respirator indicate that the member has not retained the requisite understanding or skill
(3) Any other situation arises in which retraining appears necessary to ensure safe respirator use

6.2.2 The respiratory protection training program shall provide members with annual training concerning the following:

(1) Safely donning and doffing respiratory protection equipment
(2) Uses and limitations of respiratory protection equipment
(3) Consequences of an improper fit or poor maintenance impacting the protection being provided
(4) How to perform seal checks
(5) How to recognize medical signs and symptoms that can impact use of respirators
(6) How to inspect the respirator before use
(7) Procedures for maintenance and storage
(8) Individual limitations of members who could be required to use respiratory protection equipment
(9) Approved decontamination and disposal procedures for respiratory protection equipment

6.3 Respiratory Protection Training Safety.

6.3.1 Smoke produced from live fire shall be prohibited in SCBA training sessions.

6.3.2 The AHJ shall provide members with the most current information available concerning the correct operation of their respiratory protection equipment, its limitations and capabilities, and relevant information concerning why and how proper fitting is important to the safety of the user.

6.3.3 Standard operating procedures shall be written concerning the correct operation of respiratory protection equipment during training.

6.3.4 Members shall demonstrate knowledge of correct procedures and practices through an evaluation process that is established by the AHJ.

6.3.5 Instruction on the common reasons for the breakdown of procedures or equipment that could cause injuries shall include the following subjects:

(1) Abuse and misuse of equipment
(2) Physiological and psychological factors
(3) Unapproved equipment
(4) Buddy breathing
(5) Information supplied to agencies that collect accident information, where available

6.3.6* Members required to wear respiratory protection equipment in conjunction with specialized protection equipment in training activities (e.g., proximity suits or totally encapsulated suits) shall be evaluated for physical and emotional stresses associated with these specialized applications.

6.3.7 The AHJ shall be responsible for establishing a written training component that provides members with training in the use and limitations of respiratory protection equipment and related equipment, in the policies and procedures related to the AHJ's respiratory protection program, and in those areas outlined by this standard.

6.3.8 The program shall provide a means for evaluating member performance in the use of respiratory protection equipment and member knowledge of the respiratory equipment used.

6.3.9 Respiratory protection training shall be conducted as an ongoing training program.

6.4 Ability to Act Properly in Simulated Emergencies.

6.4.1 The AHJ shall provide a means for evaluating a member's ability to act properly during emergency situations that require the use of respiratory protection equipment.

6.4.2* This evaluation shall be accomplished through the use of simulated emergencies and shall include the following:

(1) Ability to select the correct respiratory protection equipment to match the simulated hazard or emergency
(2) Ability to don and doff respiratory protection under simulated emergency incidents
(3) Ability to use and operate respiratory protection equipment under simulated emergency incidents where respiratory protection can be required
(4) Ability to correctly match respiratory protection equipment with the appropriate level of personal protective equipment (clothing)

6.4.3 The evaluation shall be based on the member's ability to successfully operate under simulated emergency incident conditions.

6.4.4 All simulations shall conform to safe training practices within the limits of acceptable risk factors.

6.5 Requirements for the Progression of Training.

6.5.1 Recruit training shall include the identification of SCBA, SAR, APR, and PAPR, components, terminology, and equipment specifications through the following:

(1) Operation of SCBA, SAR, APR, and PAPR, and related equipment

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(2) Inspection and maintenance of equipment
(3) Donning methods employed by the AHJ
(4) Performance of related emergency scene activities, such as advancing hose lines, climbing ladders, crawling through windows and confined spaces, performing rescues, and providing medical assistance while wearing respiratory protection
(5) Comprehension of organizational policies and procedures concerning safety procedures, emergency operations, use, inspection, and maintenance
(6) Performance of activities under simulated emergency conditions
(7) Use and limitations of conventional respiratory protection equipment in exposure to WMD environments
(8) Compliance with all performance standards of the AHJ
(9) Approved decontamination and disposal procedures for contaminated respiratory protection equipment

6.5.2* Required Training. Training shall be conducted in a sequential format with a logical progression toward achieving specific goals, including the following:

(1) Establishing policies by the AHJ
(2) Requiring theoretical understanding of respiratory protection
(3) Developing practical skills

6.6 Recognizing Hazards.

6.6.1 The training program of the AHJ shall evaluate the ability of personnel to identify the following:

(1) Hazardous environments that require the use of respiratory protection
(2) Primary gases produced by combustion
(3) Primary characteristics of gases that are present or generated by processes other than combustion
(4)*Any toxic gases that are unique to the particular AHJ resulting from manufacturing or industrial processes
(5) Shipping labels of hazardous materials
(6)*Possible signs of chemical, biological, radiological, or nuclear contamination (a WMD event)

6.6.2 Fire department members shall be trained to handle problems related to the following situations that can be encountered during the use of respiratory protection equipment:

(1)*Low temperatures
(2)*High temperatures
(3)*Rapid temperature changes
(4)*Use of communications equipment
(5)*Confined spaces
(6)*Use of corrective lenses
(7)*Facepiece-to-face sealing problems
(8)*Absorption through or irritation of the skin
(9)*Effects of ionizing radiation on the skin and the entire body
(10) Punctured or ruptured eardrums
(11)*Use near water
(12)*Overhaul

6.7 Specialized Training on SCBA.

6.7.1 Understanding the Components of SCBA. The training program of the AHJ shall evaluate the ability of members to perform the following skills:

(1) Identify the components of facepieces, regulators, harnesses, and cylinders used by the AHJ.
(2) Demonstrate the operation of the SCBA used by the AHJ.
(3) Describe the operation of the SCBA used by the AHJ.
(4)*Describe the potential incompatibility of different makes and models of SCBA.
(5)*Determine if a given SCBA has been tested and certified by NIOSH for use by emergency responders in CBRN environments.

6.7.2 Understanding the Safety Features and Limitations of SCBA. The training program of the AHJ shall evaluate the ability of members to demonstrate the following skills:

(1)*Describe the operational principles of warning devices required on an SCBA.
(2) Identify the limitations of the SCBA used by the AHJ.
(3)*Describe the limitations of the SCBA's ability to protect the body from absorption of toxins through the skin.
(4) Describe the procedures to be utilized if member is unintentionally submerged in water while wearing an SCBA.
(5) Demonstrate the possible means of communications when wearing an SCBA.
(6) Describe the emergency bypass operation.
(7) Describe how to recognize medical signs and symptoms that could prevent the effective use of respirators.
(8)*Describe the limitations of conventional SCBA exposure to WMD.

6.7.3 Donning and Doffing SCBA. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Techniques for donning and doffing all types of SCBA used by the AHJ while wearing the full protective clothing used by the AHJ
(2) That a proper facepiece-to-face seal has been achieved by using the seal check

6.7.4 Practical Application in SCBA Training. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Knowledge of the components of respiratory protection
(2)*Use of all types of SCBA utilized by the AHJ under conditions of obscured visibility
(3)*Emergency operations that are required when an SCBA fails
(4)*Emergency techniques using an SCBA to assist other members, conserve air, and show restrictions in use of bypass valves
(5) Use of an SCBA in confined spaces
(6) Proper cleaning and sanitizing of the facepiece

6.8 Specialized Training in the Use of SAR.

6.8.1 Understanding the Components of SAR Units. The training program of the AHJ shall evaluate the ability of members to perform the following skills:

(1) Describe the air source, air hose limitations, and NIOSH-approved inlet pressure gauge range.
(2) Identify the components of facepieces, regulators, harnesses, manifold systems, and cylinders or compressors used by the AHJ.
(3) Describe the operation of the SAR used by the AHJ.
(4) Describe the limitations of the escape cylinder.
(5)*Describe the potential incompatibility of different makes and models of SAR units.
(6) Describe proper procedures for inspection, cleaning, and storage of SAR units.

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(7) Describe the limitations on using SAR in CBRN environments.
(8) Describe the approved decontamination and disposal procedures for contaminated SAR units or components.

6.8.2 Understanding the Safety Features and Limitations of a SAR. The training program of the AHJ shall evaluate the ability of members to perform the following skills:

(1) *Describe the operational principles of emergency escape cylinder required on an SAR when used in IDLH atmospheres.
(2) Identify the limitations of the SAR used by the AHJ.
(3) *Describe the limitations of the SAR's ability to protect the body from absorption of toxins through the skin.
(4) Describe the possible means of communications when wearing an SAR.
(5) Describe the prohibition in using compressed oxygen with a SAR system.
(6) Describe how to recognize medical signs and symptoms that could prevent the effective use of SAR.
(7) Describe the limitations of conventional SAR exposure to WMD.

6.8.3 Donning and Doffing SAR. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Proper techniques for donning and doffing all types of SAR used by the AHJ while wearing the full protective clothing
(2) That a proper facepiece-to-face seal has been achieved by using the seal check
(3) *Proper methods for tending SAR air hoses

6.8.4 Practical Application in SAR Training. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Knowledge of the components of the SAR system
(2) Understanding that the use of SAR is prohibited for fire fighting
(3) *Use of SAR utilized by the AHJ under conditions of obscured visibility
(4) *Emergency operations that are required when a SAR fails
(5) Use of SAR when using hazardous materials personal protective equipment if utilized by the AHJ
(6) Use of an SAR in confined spaces
(7) Proper cleaning and sanitizing of the facepiece
(8) Ability to describe the approved decontamination and disposal procedures for contaminated SAR units or components

6.9 Specialized Training in the Use of APRs and PAPRs.

6.9.1 Understanding the Components of APR and PAPR Units. The training program of the AHJ shall evaluate the ability of members to perform the following skills:

(1) Identify the components of facepieces and cartridges used by the AHJ.
(2) Describe the operation of the APRs and PAPRs used by the AHJ.
(3) *Describe the limitations of the APR and PAPR.
(4) Demonstrate the operation of the APRs and PAPRs used by the AHJ.
(5) Describe how a selected APR or PAPR must be appropriate for the chemical state and physical form of the contaminant.
(6) *Determine when to replace cartridge units.
(7) Demonstrate proper procedures for inspection, cleaning, and storage of APRs and PAPRs.
(8) Determine an appropriate PAPRs battery recharge or replacement schedule.

6.9.2 Understanding the Safety Features and Limitations of APRs and PAPRs. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Describe the operational principles of the APRs and PAPRs.
(2) Identify the limitations of the APRs and PAPRs used by the AHJ.
(3) *Describe the limitations of the APRs and PAPRs to protect the body from absorption of toxins through the skin.
(4) Describe the procedures for determining canister and cartridge selection by color-coded labeling as well as NIOSH-approved labeling.
(5) Understand that labels are not to be removed from cartridges.
(6) Understand that the use of APRs and PAPRs is prohibited for fire fighting.
(7) *Describe the limitations of APRs and PAPRs in fireground activities.
(8) *Describe the limitations of conventional APRs and PAPRs in exposure to WMD.

6.9.3 Donning and Doffing APRs and PAPRs. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Proper techniques for donning and doffing all types of APRs and PAPRs used by the AHJ while wearing the full protective clothing
(2) That a proper facepiece-to-face seal has been achieved

6.9.4 Practical Application in APR and PAPR Training. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Knowledge of the components of respiratory protection
(2) Limits of communications when wearing APRs and PAPRs
(3) Use of APRs and PAPRs utilized by the AHJ under conditions of obscured visibility
(4) Correct selection and installation of cartridges for a given situation
(5) Proper method of donning and doffing APRs and PAPRs
(6) The positive pressure and the negative pressure facepiece-to-face leak test
(7) Use of APRs and PAPRs in confined spaces
(8) Proper cleaning and sanitizing
(9) Ability to describe the approved decontamination and disposal procedures for contaminated APR and PAPR units or components

6.10 Specialized Training on Emergency Escape Respirators.

6.10.1 Air-Purifying Escape Respirators (APERs).

6.10.1.1 Understanding the Components of APERs. The training program of the AHJ shall evaluate the ability of members to perform the following skills:

(1) Identify the components of the unit used by the AHJ.
(2) Describe the operation of the APER used by the AHJ.
(3) Describe the limitations of the APER.
(4) Demonstrate the operation of the APER used by the AHJ.
(5) *Demonstrate proper procedures for inspection, storage, and disposal of the APER.

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6.10.1.2 Understanding the Safety Features and Limitations of APERs. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Describe the operational principles of the APER.
(2) Identify the limitations of the APER used by the AHJ.
(3)*Describe the limitations of the APER's ability to protect the body from absorption of toxins through the skin.
(4) Understand that the use of APERs are for escape purposes only.
(5)*Describe the limitations of APERs in exposure to WMD.

6.10.1.3 Donning and Doffing APERs. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Proper techniques for donning and doffing all types of APERs used by the AHJ
(2) That a proper fit is achieved on the wearer

6.10.1.4 Practical Application in APER Training. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Knowledge of the components of respiratory protection
(2) Limits of communications when wearing the APER
(3) Use of APER utilized by the AHJ under conditions of obscured visibility
(4) The proper techniques for donning and doffing the APER
(5) The use of APER in confined spaces
(6) Proper disposal of the APER after use

6.10.2 Self-Contained Escape Respirators (SCERs).

6.10.2.1 Understanding Components of SCERs. The training program of the AHJ shall evaluate the ability of members to perform the following skills:

(1) Identify the components of the unit used by the AHJ.
(2) Describe the operation of the SCER used by the AHJ.
(3) Describe the limitations of the SCER.
(4) Demonstrate the operation of the SCER used by the AHJ.
(5)*Demonstrate proper procedures for inspection, storage, and cleaning of SCER.

6.10.2.2 Understanding Safety Features and Limitations of SCERs. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Describe the operational principles of the SCER.
(2) Identify the limitations of the SCER used by the AHJ.
(3)*Describe the limitations of the SCER's ability to protect the body from absorption of toxins through the skin.
(4) Understand that the use of SCERs is for escape purposes only.
(5)*Describe the limitations of SCERs in exposure to WMD.

6.10.2.3 Donning and Doffing SCERs. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Proper techniques for donning and doffing all types of SCERs used by the AHJ
(2)*That a proper fit is achieved on the wearer

6.10.2.4 Practical Application in SCER Training. The training program of the AHJ shall evaluate the ability of members to demonstrate the following:

(1) Knowledge of the components of respiratory protection
(2) Limits of communications when wearing the SCER
(3) Use of SCER utilized by the AHJ under conditions of obscured visibility
(4) The proper techniques for donning and doffing the SCER
(5) The use of SCER in confined spaces
(6) The proper procedures for placing the SCER back in service after use

6.11 Specialized Respiratory Protection Training for WMD Response.

6.11.1* Understanding WMD Threats. The training program of the AHJ shall evaluate the ability of members to identify the WMD threats [chemical, biological, radiological, nuclear, explosive (CBRNE)].

6.11.2* Understanding WMD Response. The training program of the AHJ shall evaluate the ability of members to identify the probability and potential of a CBRNE event. This shall include an assessment of the following:

(1) Local exposure and risks to personnel
(2) Types of casualties that could be encountered
(3) Likely response by emergency agencies
(4) CBRNE events that will not require emergency response
(5) Physiological risks and methods of exposure for likely CBRNE events

6.11.3* Evaluating WMD Risks. The training program of the AHJ shall evaluate the ability of members to identify the types and probability of WMD threats, which shall include knowing the following:

(1) Chemical threats are more likely (and knowing the delivery methods of chemical threats).
(2) Biological threats are unlikely to require emergency response.
(3) Radiological threats are unlikely to be detected.
(4) Nuclear threats are unlikely to require response in the affected area.
(5) Explosive threats are similar to normal structural fire and collapse events.

6.11.4 WMD Respiratory Protection. The training program of the AHJ shall evaluate the ability of members to identify and select proper respiratory protection based on the potential exposure, the anticipated working environment, and the expected length of operations, which shall include the following:

(1) Identifying the uses and limitations for the following respirators: SCBA, SAR, PAPR, APR, P-100/P-99, and N-95
(2) Identifying the uses and limitations of different filters on respirators with removable filters or cartridges
(3) An assessment of preferred respirators under the most likely CBRNE events

6.12* Training Conditions. Training shall be conducted under simulated stressful circumstances to promote immediate response to emergency operations.

6.13 Maintenance and Testing. Training in the maintenance and testing of respiratory protection equipment shall be in accordance with the provisions of Chapter 7 of NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA).*

6.14 Manufacturer's Instructions. Training for maintenance and testing of respiratory protection equipment shall be in accordance with the manufacturer's instructions for the units provided.

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6.15 Inspection. The AHJ's training program shall evaluate the ability of members to demonstrate the following:

(1) Procedure for conducting routine and post-incident inspections of respiratory protection equipment
(2) Thorough inspection and test of the respiratory protection equipment
(3) Procedure for reporting defective respiratory protection equipment
(4) Procedures for decontamination and/or disposal of contaminated respiratory protection equipment

Chapter 7 In-Service Inspection of Respiratory Protection Equipment Used in Training

7.1 SCBA Service Checks.

7.1.1 SCBA service checks shall be conducted in accordance with 7.1.2 of NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA).*

7.1.2 Closed-circuit SCBA used in training shall be inspected at frequencies determined by the AHJ in accordance with the manufacturer's recommendations but at no less than weekly intervals.

7.1.3 Closed-circuit SCBA shall be checked before and after each use in accordance with the manufacturer's recommendations.

7.2 SAR Unit Service Checks.

7.2.1 Inspection, maintenance, and repair records shall be maintained for SAR units used in training as required in Chapter 4 of this standard.

7.2.2 All training SAR units used in emergency situations shall be inspected at least monthly in accordance with the manufacturer's instructions and shall be checked for proper function before and after each use.

7.2.3 All SAR units used in training shall be operated in accordance with the manufacturer's instructions.

7.2.4* The SAR unit shall consist of an emergency-escape air cylinder and a pressure-demand-only facepiece when used in an IDLH atmosphere.

7.3 APR Service Checks.

7.3.1 Inspection, maintenance, and repair records for APR used in training shall be maintained as required in Chapter 6 of this standard.

7.3.2 The APR used for training shall be thoroughly inspected upon receipt and prior to each use.

7.3.3 The APR used for training shall be tested for leakage prior to each use in accordance with the manufacturer's instructions.

7.3.4 The AHJ shall establish a policy for replacing filters and cartridges used in training and in-service operations, including but not limited to hazardous materials responses, abatement exercises, overhaul and salvage operations, and responses to CBRNE emergencies.

7.4 PAPR Service Checks.

7.4.1 Inspection, maintenance, and repair records for PAPR used in training shall be maintained as required in Chapter 6 of this standard.

7.4.2 The PAPR used for training shall be thoroughly inspected upon receipt and prior to each use.

7.4.3 The PAPR used for training with full face mask shall be tested for leakage prior to each use in accordance with the manufacturer's instructions.

7.4.4 The PAPR battery and charging system shall be thoroughly inspected for proper operation and for any damage. The battery life shall be evaluated regularly to ensure the battery conforms to nominal specifications from the manufacturer.

7.4.5 The PAPR shall be flow tested per the manufacturer's instructions using approved methods and equipment.

7.4.6 The AHJ shall establish a policy for replacing filters and cartridges used in training and in-service operations, including but not limited to hazardous materials responses, abatement exercises, overhaul and salvage operations, and responses to CBRNE emergencies.

7.5 Emergency Escape Respirators (EER) Service Checks.

7.5.1 Inspection, maintenance, and repair records for EER used in training shall be maintained as required in Chapter 6 of this standard.

7.5.2 The EER used for training shall be thoroughly inspected upon receipt and prior to each use.

7.5.3 The EER used for training shall be tested for leakage prior to each use in accordance with the manufacturer's instructions.

7.5.4 The AHJ shall establish a policy for replacing filters and cartridges used in training and in-service operations, including but not limited to hazardous materials responses, abatement exercises, overhaul and salvage operations, and responses to CBRNE emergencies.

Chapter 8 Maintenance

8.1 User Maintenance.

8.1.1* All maintenance and repairs on respiratory protection equipment used for training shall be conducted by qualified persons in accordance with NFPA standards or manufacturer's recommended practices.

8.1.2 Annual inspection and servicing of SCBA systems and SAR systems used in training shall be conducted by qualified personnel and whenever an operational problem is reported.

8.1.2.1 Inspections and servicing of SCBA shall be performed in accordance with NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA).*

8.1.2.2 Inspection of SAR units shall be in accordance with manufacturer's instructions for the unit in service.

8.1.3 Cleaning and sanitizing of SCBA training units shall be conducted in accordance with Section 6.1 of NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA).*

8.1.4 SAR units, PAPR, and APR training units shall be cleaned and sanitized as specified in the manufacturer's instructions.

8.1.5 Fire fighters, or other designated and trained personnel, shall clean and sanitize each SCBA, SAR unit, PAPR, and APR after each training session use or upon their return to the fire station.

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8.1.5.1 SCBA units shall be cleaned and disinfected in accordance with Chapter 6 of NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA).*

8.1.5.2 SAR, PAPR, and APR units shall be cleaned and disinfected in accordance with the manufacturer's instructions.

8.1.5.3 The entire device shall be cleaned, filters or cartridges shall be replaced if appropriate, and the facepiece and breathing tube shall be sanitized.

Chapter 9 Breathing Air for Respiratory Protection Training

9.1 Air Quality Control. Air for respiratory protection training taken from the regular production of a compressor and storage system shall meet the testing and quality requirements of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program.*

9.2 Recharging Air Cylinders Used in Training.

9.2.1 Air cylinders used in training shall be inspected and filled in accordance with the provisions of Chapter 7 of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program.*

9.2.2 Air cylinders shall be filled only by personnel who have been trained on the procedures and equipment.

9.2.3 The operating procedures and safety precautions shall be posted in a conspicuous location at the fill station.

Chapter 10 Respiratory Protection Training Evaluation

10.1 Annual Review. An annual evaluation of members shall be performed to determine their proficiency for each type of respiratory protection equipment used by the AHJ.

10.2 Review and Revise. The AHJ shall review the organization's respiratory protection training component annually and revise this component, where necessary, to ensure continuity with the AHJ's respiratory protection program.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1 In addition to this standard, other components of the Respiratory Protection Program are contained in NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA),* and NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments.*

A.1.2 Organizations that train with or use respiratory protection equipment need to recognize their responsibility for the safety and welfare of personnel. A part of this responsibility is the development and implementation of a comprehensive respiratory protection program. This standard can also assist an organization with the development of a respiratory protection program that meets the requirements of 29 CFR 1910.134; 29 CFR 1910.156; NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*; NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*; and NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA).*

A.1.3.1 It also should be noted that, unlike industrial users of respiratory protective devices who consider respirators as a secondary defense against breathing hazards and engineering controls as the primary means, the fire service depends on positive-pressure SCBA as the first and only means of respiratory protection during live fire training evolutions. Positive-pressure ventilation will help reduce the level of hazard but will not be a substitute for the use of SCBA.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.3.5 Confined Space. Additionally, a confined space is further defined as having one or more of the following characteristics:

(1) The area contains or has a potential to contain a hazardous atmosphere, including an oxygen-deficient atmosphere.
(2) The area contains a material with a potential to engulf a member.
(3) The area has an internal configuration such that a member could be trapped by inwardly converging walls or a floor that slopes downward and tapers to a small cross section.
(4) The area contains any other recognized serious hazard.

A.3.3.10 Facepiece. A facepiece is designed to make a gas-tight or particle-tight fit with the face and includes the headbands, exhalation valves, and other necessary components required to connect it to a respirable gas source.

A.3.3.11 Fire Department. The term *fire department* should include any public, governmental, private, industrial, or military organization engaging in this type of activity.

The organization can be staffed by personnel who are career, volunteer, or a combination of both.

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A.3.3.14 Immediately Dangerous to Life or Health (IDLH). A hazardous atmosphere can be immediately dangerous to life and health.

A.3.3.18 Member. A fire department member can be a full-time or part-time employee or a paid or unpaid volunteer, can occupy any position or rank within the fire department, and can engage in emergency operations.

A.3.3.20 NIOSH Approved. A NIOSH approval meets the requirements of 42 CFR 84.

A.3.3.26 Recruit. As defined by NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*.

A.3.3.28 Respiratory Protection Equipment. Examples are filter respirators, chemical cartridge or canister respirators, airline respirators, powered air-purifying respirators, emergency escape respirators, and SCBA.

A.4.2.3 When training involves a simulated WMD attack it is implied that incidents of this nature are anticipated by the AHJ; therefore, by implication, appropriate CBRN-approved respiratory protection should be available to responding personnel.

A.4.2.6 The intent of this paragraph is to prevent unsafe or lowered air pressures in breathing air cylinders for the express purpose of extending the number of training evolutions that are performed in hazardous atmospheres.

A.4.2.7 Several manufacturers of SCBA currently market "buddy" or rescue breathing devices as a component of their SCBA. NIOSH has no guidelines and does not test or certify respirators when being used to give or receive emergency breathing support. However, OSHA 29 CFR 1910.156(f)(1)(iii) states, "Approved self-contained breathing apparatus may be equipped with either a buddy-breathing device or a quick disconnect valve, even if these devices are not certified by NIOSH. If these accessories are used, they shall not cause damage to the apparatus, or restrict the air flow of the apparatus, or obstruct the normal operations of the apparatus."

Until and unless NIOSH approves an auxiliary device for buddy breathing, the practice of buddy breathing is not endorsed in any way by the Technical Committee on Fire Service Training. The practice of passing the SCBA facepiece back and forth between two users is considered unsafe because highly toxic air contaminants can enter the facepiece during the exchange of the facepiece.

A.4.3.1 The SAR used in the training evolution should be equipped with an emergency escape cylinder.

A.4.4.1 See A.4.2.3.

A.4.5.1 See A.4.2.3.

A.4.6.1 See A.4.2.3.

A.5.1.4(1) Paragraph 7.3.2 of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, provides specific information on when an SCBA is to be used.

A.5.1.4(2) This program will develop the ability of an individual to manage his or her air consumption as part of a team during a work period. This can require team members to rotate positions of heavy work to light work so air consumption is equalized among team members. The individual air management program should include the following directives:

(1) Exit from an IDLH atmosphere should be before consumption of reserve air supply begins.
(2) Low air alarm is notification that the individual is consuming the reserve air supply.
(3) Activation of the reserve air alarm is an immediate action item for the individual and the team.

A.5.1.4(6) Ambient relative humidity in the environment in which an air-purifying respirator is used or stored is one of the factors that, over time, can cause the sorbent in a cartridge to lose its ability to collect organic vapors from the air breathed through the cartridge. New software is available that enables administrators to consider the effects of relative humidity on the service life of NIOSH-approved organic vapor (OV) chemical cartridges. Those factors include, for example, the types of air contaminant against which the chemical cartridge will protect the user, the concentration of the contaminant, the parameters of the cartridge, and the rate at which the user is working. This is especially important in situations when air-purifying respirators can be necessary for hours. [Source: NIOSH/CDC Bulletin dated December 22, 2003, *New Computer Program Advances Guidance on Predicting Air-Purifying Respirator Filter Cartridge Service Life, Update*]

A.5.1.7 One role of any training program is to generate acceptance of operational evolutions for coordination and skill. The use of proper procedures and the dispelling of false notions concerning the use and application of respiratory protection equipment are equally important. The state of the art in today's fire-fighting environment demands a commitment by each AHJ to ensure maximum acceptance in the use of respiratory protection equipment.

A.5.1.7(1) The AHJ is responsible for providing respirators that are applicable and suitable for the purpose intended.

A.5.1.7(4) Members should be instructed in the variables that affect the duration of an air supply. Factors such as physical fitness and condition, physical exertion, and emotional stability all influence the duration of the air supply or the operational duration of air filters and cartridges. Particulate buildup on the filtration surfaces can also reduce or otherwise affect airflow. Other considerations for air supply duration include the following:

(1) Travel distance and time to the IDLH atmosphere
(2) Amount of air when entering the IDLH atmosphere
(3) Travel distance and time in the IDLH atmosphere
(4) Coordination of team activities in the IDLH atmosphere
(5) Travel distance and time to a safe zone after working in the IDLH atmosphere

A.5.1.7(5) The air consumption rate will be different for each individual. Some factors that determine the individual's air consumption rate are as follows:

(1) Physical fitness and condition
(2) Size and weight of the individual
(3) Work being performed
(4) Environment where the work is being performed
(5) Other stressors (e.g., people trapped, difficult access, outside temperatures)
(6) Type of protective clothing used
(7) Training

A.5.2(7) Refer to Table C.1(a) through Table C.1(h).

A.6.1.1 This paragraph does not prohibit the use of manufacturers' representatives to provide training related to their products.

A.6.1.2 A method of maintaining the information deemed appropriate by the AHJ concerning respiratory protection recruit training should be developed. This method could vary

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from entries in the station log to specialized individual, company, or departmental records. (See NFPA 1401, *Recommended Practice for Fire Service Training Reports and Records.*)

A.6.1.3 The minimum level of performance recommended by this standard is for a member wearing full protective clothing to be capable of donning SCBA and to be fully operational within 60 seconds. This timed performance should begin with the member standing in full protective clothing with the SCBA placed on the ground and should stop when the member is properly attired in full protective clothing and is properly wearing fully operational SCBA. The SCBA cylinder valve should be in the closed position before starting the performance. It is understood that members normally do not don SCBA by first picking it up off the ground; however, this procedure is used in this document to set a performance standard.

It is recommended that additional performance standards be established by each AHJ for all other types of respiratory protection equipment used by the AHJ. This training should be based on performance standards established by the AHJ for the types of respiratory protection used and the manner in which the equipment is stored on the apparatus or otherwise available to members.

A.6.1.4 Training for general respirator familiarization can be done before the recruit has been fit-tested, provided each recruit has met the medical and physical fitness requirements and provided that he or she is not exposed to any hazardous atmosphere.

A.6.3.6 Significant increases in blood pressure and respiratory rates, unusual signs of fatigue, and claustrophobic tendencies are factors that could disqualify members from performing these activities.

A.6.4.2 Although all aspects of the physical and emotional stresses an emergency scene creates cannot be fully duplicated during training exercises, many of these aspects can be simulated. The more stresses that are duplicated, the more beneficial the training. Furthermore, the student's performance can be evaluated more accurately. These simulations should take into consideration varying situations during which the student can be required to wear respiratory protection, such as where using a fully encapsulating suit when engaged in overhaul and salvage, or hazardous materials incidents, including WMD drills. The use of filter-type masks should be required in overhaul, investigation, and medical situations, and training should be provided.

A.6.5.2 The first level of instruction normally takes place in a classroom setting, allowing the students to become thoroughly familiar with respiratory protection equipment by actual "hands-on" training. This setting allows the instructor to use various testing and evaluation methods to determine a student's level of comprehension. Manipulative skills are best learned and retained by using the actual respiratory protection equipment as soon as possible after the classroom instruction.

The second level of respiratory protection training should allow the student to operate the equipment while performing various emergency response tasks, so the student becomes familiar with the unit and becomes confident with its use. This training should take place in a setting that can be safely controlled by the instructor and should be pertinent to the tasks being performed. The use of a training maze is one alternative application for this level of training and builds confidence in the student.

The third level of training should allow the student to operate with respiratory protection equipment under simulated emergency conditions. Up to this point, the student should have demonstrated his or her ability to identify, operate, and use the assigned respiratory protection equipment in performing various manipulative emergency scene tasks. When the student has successfully demonstrated the ability to perform emergency scene tasks, he or she is ready to perform these same tasks under simulated emergency conditions. The student should be allowed to demonstrate his or her ability to perform under emergency conditions by operating under various simulated emergency conditions during this level of training. Such training can include conducting tasks while wearing hazardous material suits and other job-related tasks required by the AHJ. The facility or area for conducting this type of training should allow the instructor to maintain student safety and provide for the proper evaluation of the student's performance.

A.6.6.1(4) Management representatives from various companies in the response district, as well as information from prefire planning visits, are helpful in identifying features unique to the jurisdiction.

A.6.6.1(6) The possible signs of a WMD event should be combined with the possible likelihood and appearance of such an event. Certain WMD events are more likely than others to have obvious effects, as well as require emergency response. For additional information on WMD assessment, refer to Annex B.

A.6.6.2(1) The major problems in the use of full facepieces at low temperatures are poor visibility and freezing of exhalation valves. All full facepieces are designed so that the incoming fresh air sweeps over the inside of the lens to reduce fogging. Anti-fogging compounds can be permitted to be used to coat the inside of some lenses to prevent fogging in temperatures as low as 0°C (32°F). Below 0°C (32°F), a nosecup usually is needed to inhibit fogging of the lens. Full facepieces are available with nosecups that direct the warm, moist, exhaled air through the exhalation valve without contacting the lens.

At very low temperatures, the exhalation valve can collect moisture and freeze in the open position, allowing the wearer to breathe contaminated air, or in the closed position, preventing normal exhalation. Where SCBA or SAR units are used in low temperatures, they should be used according to the manufacturer's instructions and under the conditions for which they are approved by NIOSH.

High-pressure connections on SCBA can leak because of metal contraction at low temperatures. These connections should be tightened enough to prevent leakage but not so tight that they break when the temperature returns to normal. In temperatures below 0°C (32°F), moisture contained in breathing air can condense in the breathing circuits and freeze, rendering the device inoperable. If water spraying from the discharging fire lines comes in contact with the regulator housing or valve assemblies, it can freeze, forming an ice coating that can render the device inoperable. This is especially true if the ice coating covers the atmospheric pressure ports on the regulator, thereby preventing its proper operation.

Other problems that could occur in SCBA exposed to below-freezing temperatures for any length of time (e.g., SCBA in storage), depending on the make and model, are as follows:

(1) Emptying of the air cylinder due to leakage at cylinder and valve connections
(2) Shattering of the facepiece lens if bumped or dropped
(3) Rigidity and inflexibility of rubber parts (e.g., the breathing tube or facepiece), affecting facepiece fit and head movement
(4) Any leaks around all connections
(5) Difficulty in operating control valves (e.g., main, bypass, and cylinder)
(6) Failure of the low-pressure alarm to operate

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All members should be trained to be aware of these problems and should know how to correct them.

SAR air-supplying hoses have various temperature limitations for low and high temperatures. Refer to manufacturer's instructions for operational limitations.

A.6.6.2(2) A member in areas of high ambient or radiant temperature is under stress. Although the SCBA, together with a helmet and protective clothing, affords some protection against the heated atmosphere, members should know their own limitations as well as the limitations of the protective clothing and equipment. Members should be trained to recognize the warning signs of extremely high temperatures that might not be obvious while they are breathing somewhat cooler air from the SCBA.

SAR air-supplying hoses have various high-temperature limitations. Refer to manufacturer's limitations for high temperatures. SARs are not suitable for fire-fighting operations.

A.6.6.2(3) Problems arise where SCBA are subjected to rapid changes in temperatures on the fireground. This is particularly true where a single-lens facepiece is used. The large lens on some makes is subject to distortions caused by rapid temperature changes or by high air temperatures alone, causing leakage around the lens mounting or the facepiece-to-face seal, or both. Such a situation is more likely to occur in areas where extremely cold climatic conditions are encountered but can also occur even during warm weather when the devices are taken into the extremely high temperatures encountered on the fireground. All members should be trained to know these limitations and corrective procedures in the event such conditions occur.

A.6.6.2(4) Voice communication while wearing a respirator is necessary to perform specific tasks during emergency scene operations. Although a respirator facepiece distorts the voice to some extent, the respirator's exhalation valve usually provides a pathway for some speech transmission over short distances in relatively quiet areas. Understanding the limitations of communications and use of devices to enhance communications are extremely important. Where necessary, communications through hand signals should be practiced.

Where a walkie-talkie radio transmitter is used, speech transmission is often distorted when the walkie-talkie microphone is held near the exhalation valve. Holding the microphone firmly against the facepiece lens usually allows a clearer transmission without the voice distortion created by the operation of the exhalation valve. An even clearer transmission is possible for walkie-talkies in a leather case if the perforated leather over the microphone is cut out and a thin layer of foam rubber is cemented around the edge of the hole in the leather. The hole over the microphone then can be held securely against the facepiece lens for clearer voice transmission.

A.6.6.2(5) All confined spaces should be considered to be IDLH unless proven otherwise. No member should be permitted to enter a confined space for fire-fighting operations, including emergency rescue operations, without wearing an SCBA or an SAR. Confined spaces include, but are not limited to, wells, cisterns, holds of ships, tunnels, subway tunnels, basements, subbasements, pits, windowless buildings, and other such spaces where oxygen deficiency or hazardous airborne materials, or both, can be present. Users of SCBA or SARs entering such spaces are required to work in teams of two or more and should maintain some form of contact with a person wearing an SCBA who is located in a safe atmosphere and who, in an emergency, is capable of performing the necessary rescue operations. Such contact can be maintained by voice communication, visual communication, lifeline communication, radio communication, or other acceptable means of communication. The same requirement should apply to members entering and operating in any hazardous area at the scene of a fire, including smoke-filled rooms or areas of a building.

A.6.6.2(6) If a member wears corrective glasses or goggles or other personal protective equipment, the AHJ shall ensure that such equipment is worn in a manner that does not interfere with the facepiece-to-face seal.

A.6.6.2(7) The AHJ should not permit respirators with tight-fitting facepieces to be worn by members who have facial hair that comes between the sealing surface of the facepiece and the face or that interferes with the valve function, or any condition that interferes with the facepiece-to-face seal or valve function.

A.6.6.2(8) Some airborne contaminants are extremely irritating to the skin (e.g., ammonia and hydrochloric acid), while others are capable of being absorbed through the skin and into the bloodstream with serious, possibly fatal, results. Hydrogen cyanide and many of the organic phosphate pesticides, such as thiophosphate insecticide and tetraethyl pyrophosphate (TEPP), can penetrate unbroken skin. Respiratory protection equipment does not afford complete protection against these contaminants. If such materials are encountered or suspected, an effective full-body covering suit of impermeable materials should be worn with the SCBA or SAR as specified in NFPA's *Fire Protection Guide to Hazardous Materials*.

A.6.6.2(9) Respiratory protection equipment does not protect the skin or the entire body against ionizing radiation from airborne concentrations of certain radioactive materials. All users of respiratory protection equipment in such contaminated atmospheres should be made aware of the fact that special protection is necessary in addition to the respiratory protection equipment.

A.6.6.2(11) Although SCBA should never be used for underwater operations, occasionally a member could fall into water when operating near the water or on a fireboat. In departments where such a possibility exists, SCBA training should include an explanation of what happens to the equipment when submerged in water.

A.6.6.2(12) This phase of fire-fighting operations has historically been responsible for many member injuries and deaths. In addition, the temptation to remove respiratory protection prematurely is common. SCBA must be worn until the atmosphere is safe and authorization to remove SCBA has been approved. APR, if available, should then be employed to protect fire fighters from airborne dust particles and other contaminants and to protect against eye injuries.

A.6.7.1(4) It should be noted that the components of SCBA made by different manufacturers are not interchangeable. In addition, different models of SCBA from the same manufacturer are not necessarily compatible with each other.

A.6.7.1(5) Look to see if the CBRN Agent Approval label is on the respirator. If an SCBA is CBRN-approved by NIOSH, it will always carry this label. If this CBRN Agent Approval label is not on the SCBA, the device is not approved by NIOSH for use by emergency responders in CBRN environments.

A.6.7.2(1) A personal alert safety system (PASS) device is required by Section 7.13 of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*. The PASS device should be

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considered as an integral safety companion device and, therefore, included in any training session involving SCBA.

A.6.7.2(3) A sealed facepiece does not prevent infiltration of toxins through exposed skin.

A.6.7.2(8) See A.4.2.3.

A.6.7.4(2) Smoke produced from live fire should be prohibited in SCBA training sessions. The AHJ could decide to use a substitute for smoke that has the same effect in demonstrating the value of SCBA. Several accidents have occurred when smoke bombs, or other smoke-generating devices that produce a toxic atmosphere, have been used for training exercises. Where training exercises are intended to simulate emergency conditions, smoke-generating devices that do not create a health or environmental hazard are required.

A.6.7.4(3) For the use of SCBA equipped with emergency breathing support system (EBSS), fire fighters should be trained to perform and coordinate the following activities at a minimum:

(1) Procedures for walking
(2) Procedures for climbing up a ladder
(3) Procedures for descending a ladder
(4) Procedures for climbing out of or into a manhole or hatch
(5) Procedures for walking through a narrow space
(6) Procedures for going through a crawl space (hands and knees)
(7) Procedures for going through a crawl space (on stomach)
(8) Other procedures recommended by the manufacturer for operation of EBSS

A.6.7.4(4) The intent of this objective, required by NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, is to ensure that members are familiar with procedures for assisting other members as well as those for their own personal protection in emergency situations. The committee is opposed to any procedure that breaks the facepiece-to-face seal of any operable SCBA while in use.

A.6.8.1(5) It should be noted that the components of SAR made by different manufacturers are not interchangeable. In addition, different model components of SAR units from the same manufacturer are not necessarily compatible with each other.

A.6.8.2(1) The emergency escape cylinder should not be turned on during normal operation of the SAR unit because the air will be expended first. Emergency escape cylinders should be manually activated and are limited to 5-minute or 10-minute (depending on the size of the cylinder) durations requiring immediate exit from the IDLH atmosphere once activated.

A PASS device is required by Section 7.13 of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*. Although the PASS device is not a component of the SAR, it should be considered as an integral safety companion device and, therefore, included in any training session involving SAR.

A.6.8.2(3) A sealed facepiece does not prevent infiltration of toxins through exposed skin.

A.6.8.3(3) The air-supply hose of each SAR unit must be protected from snags or sharp objects by the wearers and be tended continuously by safety persons operating outside of the IDLH atmosphere. Excessive slack or kinking in the air hose should be avoided at all times. The attendees performing the safety task should have no other duties and should be equipped with SCBA for quick-rescue response.

A.6.8.4(3) Smoke produced from live fire is prohibited in SAR training sessions. The AHJ could decide to use a substitute for vapor clouds that has the same effect in demonstrating the value of SARs. Several accidents have occurred when smoke bombs, or other smoke-generating devices that produce a toxic atmosphere, have been used for training exercises. Where training exercises are intended to simulate emergency conditions, vapor- or smoke-generating devices that do not create a health or environmental hazard are required.

A.6.8.4(4) The intent of this objective is to ensure that members are familiar with procedures for using the emergency escape cylinder for their own personal protection in emergency situations.

A.6.9.1(3) APRs and PAPRs are not to be used in IDLH atmospheres, including oxygen-deficient and potentially explosive atmospheres.

A.6.9.1(6) The AHJ should establish a policy for the removal and disposal of cartridges placed in service and for exposure to contaminants. While some units have end-of-life service indicators, prudence would suggest that cartridges placed in service should be removed as a safety factor, regardless of the exposure time. This practice will ensure that uncontaminated cartridges are used under emergency conditions.

A.6.9.2(3) A sealed facepiece does not prevent infiltration of toxins through exposed skin.

A.6.9.2(7) Since APRs and PAPRs are not to be used in IDLH atmospheres, their use in fireground training should be restricted to overhauling operations and then only after air monitoring has determined that an IDLH atmosphere does not exist. Continuous monitoring should be conducted during the overhaul phase of operations.

A.6.9.2(8) See A.4.2.3.

A.6.10.1.1(5) The AHJ should establish a written policy for the proper procedures for the inspection, storage, and disposal of units that meet all applicable regulations the AHJ is bound by. All APERs are for one-time use. After use they must be disposed of. All wearers should have a copy of the manufacturer's user's instructions available for review.

A.6.10.1.2(3) The APER does not prevent infiltration of toxins through exposed skin.

A.6.10.1.2(5) See A.4.2.3.

A.6.10.2.1(5) The AHJ should establish a written policy for the proper procedures for the inspection, storage, and cleaning of units that meet all applicable regulations the AHJ is bound by. All wearers should have a copy of the manufacturer's user's instructions available for review.

A.6.10.2.2(3) An SCER does not prevent infiltration of toxins through exposed skin.

A.6.10.2.2(5) See A.4.2.3.

A.6.10.2.3(2) Annual fit-testing of all wearers can be required. The AHJ is responsible for enforcement of this requirement, if applicable.

A.6.11.1 For a further understanding of WMD threat analysis, refer to 4.2.1(13) through 4.2.1(16) and A.4.2.1(13) through A.4.2.1(16) of NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*.

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A.6.11.2 For member safety as well as to ensure a properly planned respiratory program, members must have realistic expectations of how a CBRNE event could materialize and present to emergency agencies. Agencies with local risks, such as chemical plants, should evaluate those risks appropriately and with greater concern. The size of a locale, as well as the presence of famous or strategic targets, should be considered in evaluating risk as well. It is critical that members understand that certain CBRNE events will not require an emergency response and that others can be best handled by containment of a zone rather than response into a zone.

A.6.11.3 See Annex B for information on threat assessments.

A.6.12 The intent is to simulate stressful conditions without endangering the physical well-being of the individual.

A.7.2.4 If the air supply should fail during training, the user should have adequate means to escape from the IDLH atmosphere. This situation would be further complicated if the wearer were totally encapsulated in hazardous materials personal protective equipment. It is important to remember that the emergency-escape cylinder valve should be closed during normal operation. If the cylinder valve is opened, the air supply will be expended immediately, defeating the purpose of the escape cylinder.

A.8.1.1 Daily and weekly checks and inspections can be conducted by any members who have completed the performance objectives of Chapter 6. Maintenance and repair of an SCBA and a SAR system is more technical and should be performed only by persons who have been specially trained for this work.

Annex B Considerations for CBRNE Events

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

B.1 The issue of WMD applies to a terrorist event, and the accepted theory is that a major terrorist incident can be precipitated by one of five sources. Some of these can be combined, but they are commonly known by the acronym CBRNE (chemical, biological, radiological, nuclear, and explosives). By addressing each of these potential sources, the respiratory risk to fire fighters as first responders can be assessed. Then, the type of training that should be required can be determined.

B.1.1 Chemical. There are three main types of chemical attack. First, there can be a "war-like" attack where a specific chemical is released in a concentrated and controlled manner, such as through a missile or warhead. This could also apply to nerve agents. Second, there can be a "hijacking" attack, where the chemical is a common chemical transported within the United States. The transport vehicle then becomes the delivery system. Third, there can be a "facility" attack, where a chemical manufacturing plant is attacked with explosives to cause a chemical release.

In all three of these incidents, fire departments can be called on to rescue incapacitated civilians, contain the incident, and then eventually abate the incident. While the chemical can be known or unknown, the process of handling a chemically contaminated scene is not new to fire fighters. Unknown agents are handled in Level A suits, and first-responding companies should have already been trained to recognize a chemical incident and stay outside the "hot zone."

Fire departments around the world have plans for handling spills, explosions, and releases of various chemicals in their districts. Most of these center on the issue of abatement.

B.1.2 Biological. The primary concern is a biological attack aimed at humans. While there is a concern about a biological attack on agriculture, the threat to humans will be much lower than an attack aimed directly at people. Again, there are three main methods of conducting such an attack. First, there can be an "active" attack, which would include the use of warhead delivery systems, spraying by aircraft or vehicles, and the like. There can also be a passive attack, where the biological agent waits for contact or release, which would include intentionally contaminating surfaces on a public bus, or mailing a letter containing a powdered agent. The third potential attack is a "carrier" attack. Now that terrorists have proven they are willing to die during the act of terrorism, it is possible that a group of terrorists would intentionally infect themselves with a contagious agent, then travel or attend events in such a manner as to expose as many people as possible.

In analyzing these possible events, two facts should be considered. First, most biological agents have an incubation period. The effects are not immediate. This leads to the second fact. If there is no obvious exposure, such as with a letter with powdered agent, *there is no first response.* In most of these attack scenarios, there will be no obvious exposure. As a result, the first clue of a biological attack is the populace showing the illness associated with the agent. It is highly unlikely that fire fighters will be called to rescue civilians. Fire fighters are more likely to be called to abate the contaminated area. This is essentially a hazmat response, such as would be seen with a chemical release.

B.1.3 Radiological. The common term for a radiological device is a "dirty bomb." This device is a conventional explosive that is laced with a radioactive material. There is no nuclear chain reaction, such as with atomic/nuclear weapons. The explosives are designed to cause damage by themselves, as well as to spread the radioactive material. The most common materials would not be immediately hazardous to life. (The most dangerous radioactive materials are the most regulated, therefore the most difficult to get. They also tend to be the ones most easily converted into fission or fusion weapons. It is unlikely a terrorist would waste plutonium on a radiological device, when the material could be used for a more devastating fission device.)

Very few fire departments have equipped front-line companies with radiation detectors. As a result, fire fighters will not know if they are operating at a regular explosion or a radiation-tainted explosion. If fire fighters were going to be trained to handle radiological emergencies, they would have to be equipped with detectors that announce the presence of radioactive material. They would also have to use the detectors at every fire or explosion to determine the exposure risk. While the risk to personnel is an issue, the health effects will be chronic, not acute. The likelihood is that most fire departments will not know the explosion is radiological until it is too late. Fire departments that equip front-line companies with radiation detection equipment should train members on proper use, reading, and calibration of the equipment.

B.1.4 Nuclear. This type of attack is catastrophic in nature on a number of fronts. The effects from the attack itself will be devastating, and it is likely that the U.S. response against the nation associated with the event will be equally devastating. A nuclear event will be obvious, with the easily recognized mushroom cloud. In the remote chance that terrorists acquire the proper radioactive material, it is unlikely they will build anything more destructive than the first atomic devices. Each of the bombs dropped on Japan during World War II completely destroyed everything within a 1-mile radius. Out to about a

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3-mile radius, everything was heavily damaged. The survival time in the first zone was zero; in the second zone, it was measured in minutes or hours. Should terrorists acquire a stronger device, the damage rings expand, and the likelihood of fire companies being able to effect any response drops proportionally (as the vehicles and personnel would be in the damage rings).

The widespread destruction and disruption will demand that victims self-rescue and transport for treatment. Any first responders would triage those from the inner zones as "black," since their likelihood for survival is low, especially with a compromised emergency care system. Fire departments should be concentrating on the outer rings of damage, where victims will have a higher survival rate and where responders are not exposed to immediate threats. There could be a radiological issue to address, similar to a radiological event.

Depending on the size and type of device, fire fighter operations close to "ground zero" will be minimal. Either the damage will be too great to find survivors, or the area will be too contaminated for safe human movement. Chances are, containing the firestorm from the explosion will be of higher priority than trying to effect the rescue of civilians closer to "ground zero."

B.1.5 Explosive. This is the most likely event, whether it is a rental truck with explosives or an aircraft flown into a building. The two biggest consequences of this attack are collapse and fire. These respiratory issues are well-known to fire departments.

B.2 The Technical Committee on Fire Service Training believes that the likely WMD scenarios fall into three main categories. There is the emergency response with possible rescue, the emergency response without rescue, and the non-response. Chemical, radiological, and explosive attacks potentially fall into the first grouping. Nuclear attacks fall into the second grouping. Biological attacks are likely in the third grouping.

With this in mind, the technical committee recommends the following general considerations:

(1) Rather than have fire fighters train on specific respiratory equipment for each response, the technical committee believes it is more prudent to focus the training on potential respiratory risks, the recognition of different types of scenarios, and the proper respiratory protection.
(2) Training should include the advantages and disadvantages of different types of respirators, encouraging fire fighters and fire officers to choose the most effective and reasonable respirator possible in any given situation.
(3) Fire fighters should be trained on what to realistically expect in the CBRNE scenarios. The emphasis should be on realistic potentials and performance of different respiratory hazards. For example, our position on a biological attack would be counter to what most fire departments currently expect. Fire fighters should also be trained to recognize if and when entering an environment with any type of personal protective equipment will generate more risk than potential return, especially in CBRNE scenarios.
(4) A chemical, radiological, or explosive attack is most likely to require emergency response. Operating within these environments could be easier using respiratory protection other than an SCBA. As such, the AHJ should include general training information on SARs, PAPRs, APRs, P-100/P-99 masks, and N-95 dust masks. These respirators can play a role in CBRNE response/abatement, overhaul operations, collapse rescue, and rescue/recovery operations.

Annex C Common Signs and Symptoms of WMD

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

C.1 There are many substances that can be used as WMD. Table C.1(a) through Table C.1(h) identify several of the more commonly known substances, the signs and symptoms of exposure, and the methods of release.

Table C.1(a) Mustard Gas

Name of Agent: Mustard Gas
Signs and Symptoms of Exposure: Inhalation: Runny nose, dry/barking cough, hoarseness, coughing up blood, difficulty breathing Skin: Reddening and swelling of skin, blisters Eyes: Tearing, light sensitivity, irritation of lining of eye and cornea, blindness Ingestion: Nausea and vomiting
Incubation Period (Biological)/Onset of Effects: Typically, signs and symptoms do not occur immediately. Depending on the severity of the exposure, symptoms might not occur for 2 to 24 hours. Mustard gas breaks down slowly in the body, so long-term or repeated exposure can have a cumulative effect.
Effects of Agent: It is a powerful irritant and blistering agent that damages the skin, eyes, and respiratory tract; however, it is usually not fatal. Exposure to liquid is likely to produce second- and third-degree burns. Vapors can cause chronic respiratory disease, respiratory infections, blindness, or death. Continued exposure can increase a person's risk for lung and respiratory cancer.
How People Are Exposed: If released into the air as a vapor, people can be exposed through skin contact, eye contact, or breathing in the vapors. If released into the water, people can be exposed by drinking the contaminated water or getting the contaminated water on their skin.
On-Scene Indicators of Agent Release: It can smell like mustard, garlic, or onions. There could be multiple victims and/or dead and dying animals in the area.

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Table C.1(b) Cyanide

Name of Agent:
Cyanide

Signs and Symptoms of Exposure:
"Metallic" taste, anxiety and/or confusion, headache, vertigo, hyperpnea followed by dyspnea, convulsions, cyanosis, respiratory arrest, bradycardia, cardiac arrest

Incubation Period (Biological)/Onset of Effects:
Onset is usually rapid. Effects of inhalation of lethal amounts can be observed within 15 seconds, with death occurring in less than 10 minutes.

Effects of Agent:
The poisonous effects of cyanide are due to its ability to block a specific enzyme that plays an essential role in the uptake of oxygen by the body's cells. This blocking action deprives cells of oxygen, causing the cells to die.

How People Are Exposed:
If released into the air, people can be exposed through skin contact, eye contact, or breathing in the vapors.
People can also be exposed by eating food contaminated with cyanide.

On-Scene Indicators of Agent Release:
Vapors can have an odor that has been described as that of bitter almonds. There could be multiple victims and/or dead and dying animals in the area.

Table C.1(c) Ricin

Name of Agent:
Ricin

Signs and Symptoms of Exposure:
Inhalation: Respiratory distress, fever, cough, nausea, tightness in the chest, and heavy sweating
Ingestion: Vomiting and diarrhea that can become bloody, severe dehydration, low blood pressure, hallucinations, seizures, blood in the urine

Incubation Period (Biological)/Onset of Effects:
Initial symptoms of exposure by inhalation can occur within 2 to 8 hours of exposure. Symptoms of exposure by ingestion typically occur in less than 6 hours.
Death could take place within 36 to 72 hours of exposure. If death has not occurred within 3 to 5 days, the victim usually recovers.

Effects of Agent:
Ricin works by getting inside the cells of a person's body and preventing the cells from making the proteins they need. Without the proteins, cells die. Eventually this is harmful to the whole body and death can occur. Ricin can also cause severe allergic reactions.

How People Are Exposed:
People can breathe in a ricin mist or powder.
Ricin can be placed into food or water and then be swallowed.
Pellets of ricin or ricin dissolved in a liquid can be injected into people's bodies.

On-Scene Indicators of Agent Release:
None

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Table C.1(d) Sarin

Name of Agent:
Sarin (GB)

Signs and Symptoms of Exposure:
Nervousness/restlessness, miosis (contraction of the pupil), rhinorrhea (runny nose), excessive salivation, dyspnea, sweating, bradycardia, loss of consciousness, convulsions, flaccid paralysis, loss of bladder and bowel control, apnea

Incubation Period (Biological)/Onset of Effects:
Symptoms will appear within a few seconds after exposure to the vapor form of sarin and within a few minutes to up to 18 hours after exposure to the liquid form.

Effects of Agent:
Sarin prevents the proper operation of the chemical that acts as the body's "off switch" for glands and muscles. Without an "off switch," the glands and muscles are constantly being stimulated. The muscles can tire and no longer be able to sustain breathing or other body functions.

How People Are Exposed:
If sarin is released into the air, people can be exposed through skin contact, eye contact, or breathing in the vapors.
If sarin is released into the water, people can be exposed by drinking the contaminated water or getting the contaminated water on their skin.
People can also be exposed by eating food contaminated with sarin.

On-Scene Indicators of Agent Release:
There could be multiple victims and/or dead and dying animals in the area.

Table C.1(e) Anthrax

Name of Agent:
Anthrax (cutaneous, inhalation, gastrointestinal)

Signs and Symptoms of Exposure:
Cutaneous: A small sore that develops into a blister, which develops into a skin ulcer with a black area in the center
Gastrointestinal: Loss of appetite, bloody diarrhea, fever followed by stomach pain
Inhalation: Early symptoms are cold or flu-like symptoms, sore throat, mild fever, muscle aches
Later symptoms include cough, chest discomfort, shortness of breath, tiredness

Incubation Period (Biological)/Onset of Effects:
Symptoms can appear within 7 days of coming in contact with the bacterium for all three types of anthrax. For inhalation anthrax, symptoms can appear within a week or can take up to 42 days to appear.

Effects of Agent:
The bacterium's destructive properties are due largely to toxins, which consist of the following three proteins:
(1) "Protective antigen" binds to select cells and forms a channel that permits edema factor and lethal factor to enter those cells.
(2) "Edema factor" causes fluid to accumulate at the site of infection and can inhibit some of the body's immune functions.
(3) "Lethal factor" disrupts a key molecular switch that regulates the cells' functions.

How People Are Exposed:
Cutaneous: Spores are introduced into the skin via small cuts/abrasions
Gastrointestinal: Consumption of food that has been contaminated with anthrax
Inhalation: Breathing in aerosolized spores

On-Scene Indicators of Agent Release:
Evidence of a fine white powder at the scene

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Table C.1(f) Smallpox

Name of Agent:
Smallpox

Signs and Symptoms of Exposure:
Initial symptoms (7 to 17 days after exposure) are high fever [101°F to 104°F (38°C to 40°C)], head and body aches, and sometimes vomiting. Two to four days later a rash emerges, first as small red spots on the tongue and in the mouth. Around the time the sores in the mouth break down, a rash appears on the skin, starting on the face and spreading to the arms and legs. Usually the rash spreads to all parts of the body within 24 hours.

Incubation Period (Biological)/Onset of Effects:
Following exposure to the virus there is an incubation period averaging 12 to 14 days. During this time the exposed person is not contagious. The infected person starts becoming contagious with the onset of the initial symptoms and remains contagious until all of the scabs have resolved and fallen off.

Effects of Agent:
Smallpox can cause severe systemic toxicity, pulmonary edema, diffuse ecchymosis

How People Are Exposed:
Smallpox is transmitted by direct and fairly prolonged face-to-face contact with an infected and contagious person. It can also be spread through direct contact with infected bodily fluids or contaminated objects. Although a rare occurrence, smallpox has been spread by the virus being carried in the air in an enclosed setting.

On-Scene Indicators of Agent Release:
Contact with a person showing the rash, pustules, or scabs

Table C.1(g) Radiation

Name of Agent:
Radiological Dispersal Device (Dirty Bomb) Alpha, Beta, and Gamma Radiation

Signs and Symptoms of Exposure:
Nausea, vomiting, and diarrhea, swelling, itching and redness of the skin (like a bad sunburn), hair loss, seizures, and coma

Incubation Period (Biological)/Onset of Effects:
The onset of adverse health effects due to radiation exposure varies with the amount and type of exposure. Following exposure to very large doses of radiation, symptoms of Acute Radiation Syndrome can appear within minutes. Exposure to lower doses of radiation can lead to an increased risk of developing cancer or other adverse health effects later in life.

Effects of Agent:
The explosion itself will kill and wound just like a regular bomb. The radioactivity will then bombard the cells of the body with energy and cause them to function improperly or die. Adverse health effects range from mild effects such as skin reddening to serious effects such as cancer and death. These adverse health effects are determined by the amount of radiation absorbed by the body, type of radiation, route of exposure, and length of time exposed.

How People Are Exposed:
External contamination occurs when radioactive material in the form of dust, powder, or liquid comes into contact with a person's skin, hair, or clothing. Internal contamination occurs when people swallow or breathe in radioactive materials or when radioactive materials enter the body through an open wound or are absorbed through the skin. An uncontaminated person can be exposed by being too close to radioactive material or a contaminated person or object.

On-Scene Indicators of Agent Release:
Bomb explosion: However, until radiation detection devices are utilized there will be no way of confirming that there has been a release of radioactive material.

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Table C.1(h) Acute Radiation Syndrome Fact Sheet

Syndrome	Dose[a]	Prodromal Stage	Latent Stage	Manifest Illness Stage	Recovery
Bone Marrow (Hematopoietic)	0.7–10 Gy[b] (70–1,000 rads) Mild symptoms can occur as low as 0.3 Gy (30 rads)	• Anorexia, nausea, and vomiting • Occurs 1 hour to 2 days after exposure • Lasts for minutes to days	• Stem cells in bone marrow are dying, though patient can appear and feel well • Lasts 1 to 6 weeks	• Drop on all blood cell counts for several weeks • Anorexia, fever, malaise • Primary cause of death is infection and hemorrhage • Survival decreases with increasing dose • Most deaths occur within a few months after exposure	• In most cases, bone marrow cells will begin to repopulate the marrow • There should be full recovery for a large percentage of individuals from a few weeks up to 2 years after exposure • Death can occur in some individuals at 1.2 Gy (120 rads) • The LD 50/60[c] is about 2.5 to 5 Gy (250 to 500) rads
Gastrointestinal (GI)	10–100 Gy (1,000–10,000 rads) Some symptoms can occur as low as 6 Gy (600 rads)	• Anorexia, severe nausea, vomiting, cramps, and diarrhea • Occurs within a few hours after exposure • Lasts about 2 days	• Stem cells in bone marrow and cells lining GI tract are dying, though patient can appear and feel well • Lasts less than 1 week	• Malaise, anorexia, severe diarrhea, fever, dehydration, electrolyte imbalance • Death is due to infection, dehydration, and electrolyte imbalance • Death occurs within 2 weeks of exposure	• The LD 100[d] is about 10 Gy (1,000 rads)
Cardiovascular (CV) / Central Nervous System (CNS)	>50 Gy (5,000 rads) Some symptoms can occur as low as 20 Gy (2,000 rads)	• Extreme nervousness, confusion, severe nausea, vomiting, and watery diarrhea, loss of consciousness, burning sensations of the skin • Occurs within minutes of exposure • Lasts for minutes to hours	• Patient can return to partial functionality • Can last for hours but often is less	• Return of watery diarrhea, convulsions, coma • Begins 5 to 6 hours after exposure • Death within 3 days of exposure	• No recovery

[a]The absorbed doses quoted here are "gamma equivalent" values. Neutrons or protons generally produce the same effects as gamma, beta, or x-rays, but at lower doses. If the patient has been exposed to neutrons or protons, consult experts on how to interpret the dose.

[b]The gray (Gy) is a unit of absorbed dose and reflects an amount of energy deposited into a mass of tissue (1 Gy = 100 rads). In this table, the absorbed dose that is referred to is that dose inside the patient's body (i.e., the dose that is normally measured with personal dosimeters).

[c]The LD 50/60 is the dose necessary to kill 50 percent of the exposed population in 60 days.

[d]The LD 100 is the dose necessary to kill 100 percent of the exposed population.

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Annex D Informational References

D.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

D.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*, 2002 edition.

NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, 2002 edition.

NFPA 1401, *Recommended Practice for Fire Service Training Reports and Records*, 2006 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, 2002 edition.

NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*, 2003 edition.

NFPA 1852, *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA)*, 2002 edition.

Fire Protection Guide to Hazardous Materials, 13th edition, 2001.

D.1.2 Other Publications.

D.1.2.1 U.S. Government Publications. U.S. Government Printing Office, Washington, DC 20402.

Title 29, Code of Federal Regulations, Part 1910.134.

Title 29, Code of Federal Regulations, Part 1910.156.

Title 42, Code of Federal Regulations, Part 84.

NIOSH/CDC Bulletin, *New Computer Program Advances Guidance on Predicting Air-Purifying Respirator Filter Cartridge Service Life, Update,* December 22, 2003.

D.2 Informational References. The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

D.2.1 NFPA Publication. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 600, *Standard on Industrial Fire Brigades*, 2005 edition.

D.2.2 CDC Publications. Centers for Disease Control and Prevention, 1600 Clifton Road, Atlanta, GA 30333.

CDC Fact Sheet – Facts about Cyanide (last reviewed 02/26/03)

CDC Fact Sheet – Facts about Ricin (last reviewed 10/31/03)

CDC Fact Sheet – Facts about Sarin (last reviewed 3/7/03)

CDC Fact Sheet – Anthrax: What You Need To Know (last reviewed 7/31/03)

CDC Fact Sheet – Smallpox Overview (last reviewed 12/9/02)

CDC Fact Sheet – Facts about Sulfur Mustard (last reviewed 2/25/03)

CDC Fact Sheet – Acute Radiation Syndrome (last reviewed 4/7/03)

CDC Fact Sheet – Acute Radiation Syndrome: A Fact Sheet for Physicians (last reviewed 9/03)

CDC Fact Sheet – Radioactive Contamination and Radiation Exposure (last reviewed 12/24/03)

CDC Fact Sheet – Dirty Bombs (last reviewed 6/03)

D.3 References for Extracts in Informational Sections. (Reserved)

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- Committee votes by written ballot on Proposals. If two-thirds approve, Report goes forward. Lacking two-thirds approval, Report returns to Committee.
- Report on Proposals (ROP) is published for public review and comment.

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