Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

Description

This module prepares students to select, prepare, use, and maintain Personal Protective Equipment (PPE) and Self-Contained Breathing Apparatus (SCBA) to work in environments that contain a variety of hazards including those that are immediately dangerous to life and health (IDLH). PPE and SCBA must be seen as essential tools for firefighter safety, requiring careful attention to inspection, donning and doffing, troubleshooting problems, and cleaning in preparation for return to service. It is essential to reinforce these practices, helping students gain the confidence and knowledge they need to stay safe while performing their duties.

Module Outcome

At the end of this module, the Firefighter I student will be able to inspect, don, work in, doff, and maintain PPE and SCBA in accordance with the appropriate standards such that they are able to complete assigned tasks as a member of a team while working in a variety of environments, including IDLH and other hazards.

Standards

This module aligns with applicable standards in:

- NFPA 1010 *Standard on Professional Qualifications for Firefighters* (2024)
- NFPA 1404 *Standard for Fire Service Respiratory Protection Training* (2018)
- NFPA 1500 *Standard on Fire Department Occupational Safety, Health, and Wellness Program* (2021)
- NFPA 1582 *Standard on Comprehensive Occupational Medical Program for Fire Departments* (2022)
- NFPA 1851 *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting* (2020)
- NFPA 1852 *Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA)* (2019)
- NFPA 1970 *Standard on Protective Ensembles for Structural and Proximity Firefighting, Work Apparel, Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services, and Personal Alert Safety Systems (PASS)* (2025)

This module directly supports three Job Performance Requirements (JPRs) from NFPA 1010.

Table 1: Module Standards NFPA 1010 (2024) Standard on Professional Qualifications for Firefighters Chapter 6 — Firefighter I (NFPA 1001)	
Standard	**Requisite Knowledge or Skills**
6.1.2 General Skills Requirements.	• Donning and doffing personal protective clothing • Performing field reduction of contaminants • Preparing PPE for reuse • Critical aspects of NFPA 1500
6.3.1 Use self-contained breathing apparatus (SCBA) during emergency operations,	• Conditions that require respiratory protection • Uses and limitations of SCBA • Components of SCBA • Donning procedures • Physical requirements of the SCBA wearer • Control breathing with breathing techniques • Indications for and emergency procedures used with SCBA • Initiating and completing emergency procedures in the event of SCBA failure or air depletion • Replacing SCBA air cylinders
6.3.2 Respond on apparatus to an emergency scene,	• Types of department PPE and the means for usage
6.5.1* Clean and check ladders, ventilation equipment, SCBA, ropes, salvage equipment, and hand tools,	• Types of cleaning methods for various tools and equipment • Correct use of cleaning solvents • Manufacturer's guidelines for cleaning equipment and tools

The NFPA defines requisite knowledge and requisite skills as the minimum a student needs to know and be able to do in order to accomplish the task defined in the JPR.

Reserve Air Supply

NFPA 1404 requires firefighters to manage their own air consumption during work and to exit an IDLH environment before the consumption of reserve air supply begins. (1404, **5.1.5**) NFPA 1970 requires that SCBA End-of-Service-Time Indicator (EOSTI) activate at approximately one third of the rated service pressure of the cylinder. (1970, **17.2.6**) NFPA 1500 requires that firefighter start exiting before their SCBA cylinder reaches 21.18 ft^3 (600 L) regardless of cylinder size or maximum pressure. (1500 **7.17.12**)

Students should not begin an evolution with less than 90% of the rated capacity of the SCBA system they are using. Instructors should determine the operational limitations posed by the equipment their students are using and adjust training to ensure compliance with NFPA standards.

NFPA 1404 also requires that a reserve supply of air is available during training involving the use of SCBA. (1404, **4.2.5**) This may include spare SCBA cylinders or the capability of refilling cylinders. The intent is to prevent unsafe conditions related to low air during evolutions in hazardous atmospheres.

Simulation of IDLH Environments

Immediately Dangerous to Life or Health (IDLH) is defined as an atmosphere that poses a threat of exposure to airborne contaminants where that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment. (1987, **3.3.39**)

During training, some IDLH environments may be simulated to support educational objectives. Simulated environments will be treated the same as real environments as student performance is concerned.

Fit Testing

NFPA 1500 requires that PPE and SCBA training and education programs be in compliance with NFPA 1851 and NFPA 1852, (1500, **5.1.8**) and that training in respirator use include the fit testing of respirators. (1500, **7.12.1**) NFPA 1404 allows training for general respirator familiarization to be done before the student 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. (1404, **A.6.4.4**)

To be in compliance with NFPA standards, students must be fit tested on their SCBA before entering any environment requiring respiratory protection.

Module Learning Objectives

By the end of this module, Firefighter I students will:

Table 2: Terminal Learning Objectives Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)		
ID	**Objective**	**Alignment**
LO1	Recognize the capabilities and limitations of protective clothing and equipment, given a structural firefighting protective ensemble, information from relevant test standards, and a description of thermal conditions, so that threats to personal safety are described and the limit of safe operating time is determined.	6.3.1, 6.3.2
LO2	Inspect PPE and SCBA, given a structural firefighting protective ensemble, manufacturer's guidance, NFPA standards, and departmental SOP/SOG, so that components are identified, component defects are noted, and equipment is returned to service in a ready state or flagged for maintenance.	6.3.1, 6.5.1
LO3	Don PPE for work, given a non-IDLH environment, so that the correct level of PPE is identified, donned correctly, and the student is prepared to execute assigned tasks when called upon.	6.3.1
LO4	Prepare to work in an IDLH environment, given protective equipment and an assignment, so that the gear is donned correctly, exposure to IDLH environment is eliminated, and the student is prepared to execute assigned tasks when called upon.	6.3.1
LO5	Recognize conditions requiring personal and respiratory protection, given potential exposure to hazardous materials, so that PPE and SCBA is donned promptly and correctly.	6.3.1, 6.3.2
LO6	Employ breathing control techniques, while wearing PPE and SCBA, so that consumption of air is controlled, assigned tasks are accomplished, and the IDLH environment is exited before consuming reserve air supply.	6.3.1, 6.3.2
LO7	Perform assigned tasks, while wearing PPE and SCBA, so that stress is managed, communication is effective, air consumption is controlled, and the importance of cardiorespiratory fitness is recognized.	6.3.1, 6.3.2
LO8	Initiate SCBA emergency procedures, given indications of depleted air and emergency procedures used with SCBA, so that procedures are completed, and respiratory protection is not compromised.	6.3.1
LO9	Replace an SCBA cylinder, given an SCBA with a used cylinder, so that the full cylinder is correctly installed and ready for use and the used cylinder is flagged for refilling.	6.3.1
LO10	Maintain PPE and SCBA following an incident, given cleaning equipment per manufacturer recommendation, so that gear is decontaminated and returned to service in a ready state or flagged for replacement or repair.	6.5.1

Prerequisites

The prerequisites for this module are:

- Health and Fitness Module
- Communications Module

This module will require students to participate in a work capacity drill to test their ability to work in PPE and SCBA. Students with poor cardiorespiratory fitness or low VO_{2MAX} tend to perform poorly. Additionally, there is a level of risk associated with PPE and SCBA training for students in poor health. According to NIOSH Line of Duty Death reports, cardiovascular disease (CVD) and heat stroke are common causes of trainee death during PPE and SCBA training.

During this module, students will learn to communicate while wearing an SCBA facepiece. This training builds on and modifies previous training in portable radio operation.

Connections to Other Learning

The PPE & SCBA module represents a foundation of knowledge, skill, and attitude that will protect them from injury throughout the remainder of the program. The skills established in this module will be practiced throughout the rest of the course. To be successful in this module, students will need to appreciate the importance of maintaining their assigned protective equipment in a prepared state, being ready and willing to don protective equipment in an expeditious manner, controlling their reaction to dangerous conditions to preserve air and extend working time, and decontaminating their equipment, tools, and themselves after exposure to hazardous materials. By focusing on the acquisition of skill and the development of self-control in this module, students will spend less of their thought on their PPE and be able to focus on the learning in future modules.

The knowledge in this module specifically supports the following standards in other modules:

Table 3: Connections to Supported Standards
NFPA 1010 (2024) Standard on Professional Qualifications for Firefighters
Chapter 6 — Firefighter I (NFPA 1001)

Standard	Requirement
6.2.3 Activate an emergency call for assistance	• Requires PPE in vision obscured conditions.
6.3.4 Force entry into a structure,	• Requires PPE.
6.3.7 Attack a passenger vehicle fire operating as a member of a team,	• Requires PPE including respiratory protection (SCBA).
6.3.9 Conduct a search and rescue in a structure operating as a member of a team,	• Requires PPE in vision obscured conditions. • Requires that team members' safety — including respiratory protection (SCBA) — is not compromised.
6.3.10 Attack an interior structure fire operating as a member of a team,	• Requires PPE including respiratory protection (SCBA).
6.3.11 Perform horizontal ventilation on a structure operating as part of a team,	• Requires PPE including respiratory protection (SCBA).
6.3.12 Perform vertical ventilation on a structure as part of a team,	• Requires PPE including respiratory protection (SCBA).

Table 3: Connections to Supported Standards NFPA 1010 (2024) Standard on Professional Qualifications for Firefighters Chapter 6 — Firefighter I (NFPA 1001)	
Standard	**Requirement**
6.3.13 Overhaul a fire scene,	• Requires PPE including respiratory protection (SCBA).
6.3.19 Combat a ground cover fire operating as a member of a team,	• Requires PPE including SCBA if needed.
6.3.20 Tie a knot appropriate for hoisting tools,	• Requires PPE.

The use of PPE and SCBA appear again when students come back for higher level training and education. Concepts of this module are integrated into Hazardous Materials, Firefighter II, and technical rescue programs.

Coherence

What Students Have Learned Previously	What Students Are Learning Now	What Students Will Learn Later
▪ **Health and Fitness**. Students have learned about the connection between cardiorespiratory fitness and the consumption of oxygen in the air. ▪ **Communications**. Students have learned the basic principles of using portable radios to communicate.	▪ **How to Wear PPE**. Students will understand how to make sure their PPE will protect them. ▪ **How to Work in PPE**. Students will become familiar with how it feels to move while wearing PPE. ▪ **Controlling Breathing**. Students will use breathing control techniques to prolong the air remaining in a cylinder.	▪ **Escaping**. Exiting through restricted passages will be addressed in the Firefighter Survival Module. ▪ **Rescue**. Converting an SCBA harness to drag a downed firefighter will be addressed in the Firefighter Survival Module.

Boundaries of Instruction and Assessment

It is interpreted that 6.3.1 requires student to replace used cylinders in their SCBA. Student will not be expected to operate equipment related to refilling SCBA cylinders.

Module Assessments

The following skills are required to be taught and practiced during this module. These skills should be evaluated through formative assessment during instruction.

Table 4: Formative Assessments Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)			
ID	**Description of Skill**	**Standard**	**Description of Assessment**
FA-01	Don Personal Protective Equipment	6.1.2	Students will don structural firefighting gear from station wear, excluding SCBA, within 120 seconds so that all pieces are worn as designed and no skin is exposed with the exception of the face.
FA-02	Doff Personal Protective Equipment	6.1.2	Students will doff structural firefighting gear so that all components are removed and returned to a ready state.
FA-03	Doff Superheated Gear	6.1.2	Students will work in teams to remove structural firefighting gear so that the doffing sequence avoids additional injury, compression of the gear is avoided, cross-contamination is limited, and the firefighter is prepared to receive follow on care.
FA-04	Perform Field Reduction of Contamination	6.5.2	Students will conduct preliminary exposure reduction procedures as a team so that the firefighter remains on air, gross contamination is removed, dry or wet mitigation techniques are used, and the components are isolated after doffing.
FA-05	Inspect Personal Protective Equipment	6.5.2	Students will systematically inspect all components of protective equipment according to the manufacturer's guidelines, including coat and trousers, hood, helmet, gloves, footwear, DRD, and interface components, so that any defects are identified, the inspection is recorded, and the equipment is returned to a ready state or reported otherwise.
FA-06	Inspect an SCBA	6.5.2	Students will systematically inspect all components of an SCBA according to the manufacturer's guidelines, including facepiece, backframe and harness assembly, cylinder, hose, end-of-service-time indicator(s) (EOSTI), regulators, and accessories, so that any defects are identified, the inspection is recorded, and the equipment is returned to a ready state or reported otherwise.
FA-07	Don an SCBA	6.3.1(B)	Students will don an SCBA, excluding facepiece, from the ground with the cylinder valve closed, while wearing full protective clothing, so that the SCBA operates correctly, all belts and straps are fastened, the cylinder is verified as full, the PASS has been activated, and all protective clothing is being worn correctly and with no skin exposed, within 60 seconds.
FA-08	Activate an SCBA Regulator	6.3.1(B)	Students will don a facepiece, verify a seal, activate their regulator, and any remaining PPE required for entry into an ILDH environment within 25 seconds.

Table 4: Formative Assessments Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)			
ID	**Description of Skill**	**Standard**	**Description of Assessment**
FA-09	Doff an SCBA	6.3.1(B)	Students will doff structural firefighting gear so that all components are removed safely without damage and returned to a ready state.
FA-10	Replace an SCBA Cylinder	6.3.1(B)	Students will replace the cylinder in an SCBA on the ground and while worn so that the used cylinder is removed without a sudden release of pressurized air, pressure in the new cylinder is verified to be greater than 90%, the cylinder is secured, all hoses are connected, the cylinder and regulator pressure readings are within 100psi, and the SCBA is ready for use.
FA-11	Clean and Disinfect an SCBA Facepiece	6.5.2	Students will clean and disinfect an SCBA facepiece according to manufacturer's guidelines so that internal components that have been exposed to bodily fluids, exhaled breath, dirt, or debris, and the second stage regulator are thoroughly cleaned and disinfected using agents approved by the manufacturer, the exhalation valve is cleaned and flushed, the facepiece is dried properly, and the exhalation valve is cycled to ensure proper operation.
FA-12	Decontaminate an SCBA	6.5.2	Students will decontaminate an SCBA according to manufacturer's guidelines so that straps and harness assemblies and cylinder valve assemblies are cleaned and disinfected using agents approved by the manufacturer, water or cleaning materials are prevented from entering the connection between the cylinder valve and the mating SCBA inlet connector, and SCBA components are thoroughly air-dried prior to storage.
FA-13	Communicate While Wearing a Facepiece	6.3.2(B)	Students will use a radio to communicate while wearing an SCBA facepiece and regulator so that the radio microphone is placed near the facepiece voice port and a loud, clear, and controlled voice is used when speaking.
FA-14	Manage Air Consumption	6.3.1(B)	Students will use breathing control techniques following a period of heavy physical activity so that they consume the remaining 1000psi of air over greater than 5 minutes.
FA-15	Mount and Dismount an Apparatus Wearing PPE and SCBA	6.3.2	Students will mount a fire apparatus wearing structural firefighting gear, don an SCBA, and dismount the apparatus so that the SCBA is worn correctly and ready for use, and handholds and proper body mechanics are used during dismount.

Table 4: Formative Assessments Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)			
ID	**Description of Skill**	**Standard**	**Description of Assessment**
FA-16	Activate a manual PASS alarm	6.3.1(B)	Students will manually activate the Personal Alert Safety System integrated into their SCBA so that the alarm sounds.
FA-17	Employ an Emergency Regulator Bypass	6.3.1(B)	Students will control air flow from an SCBA using the regulator bypass valve.
FA-18	Respond to a Facepiece Failure	6.3.1(B)	Students will respond to a simulated crack or leak in their facepiece so that the failure is covered with a hand, command is notified, the environment is exited immediately, and a MAYDAY is called if needed.
FA-19	Respond to a No-Air Emergency	6.3.1(B)	Students will conduct a no-air emergency maneuver in a limited visibility environment so that air consumption is managed, a MAYDAY is called, the PASS is activated, the bypass valve is used to control air flow, and the regulator is only removed as a last resort.

The following criteria must be assessed during certification testing.

Table 5: Summative Assessments Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)	
Standards Assessed	**Description of Assessment**
Wear SCBA correctly (6.3.1)	Students will don and wear PPE and SCBA during the execution of an assigned task so that they are protected from hazards.
Use other PPE is correctly (6.3.2)	
Use controlled breathing techniques (6.3.1)	Students will use breathing control techniques following a period of activity so that they extend time before depletion of air.
Enact emergency procedures if the SCBA fails (6.3.1)	Students will perform emergency procedures for an SCBA failure so that respiratory protection is not compromised.
Avoid intentional compromise of respiratory protection (6.3.1)	
Recognize all low-air warnings (6.3.1)	Students will respond to a low-air warning so that they exit the hazardous area before respiratory protection is compromised.
Exit hazardous areas prior to air depletion (6.3.1)	
Mount and dismount apparatus correctly (6.3.2)	Students will mount a fire apparatus, fasten their seatbelts, and don a seat-mounted SCBA. When given the command, the students will dismount the apparatus wearing the SCBA.
Use seat belts while the vehicle is in motion (6.3.2)	
Clean and maintain equipment according to manufacturer's guidelines (6.5.1)	Students will clean and inspect an SCBA using a checklist and will document any
Record maintenance (6.5.1)	

Table 5: Summative Assessments Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)	
Standards Assessed	**Description of Assessment**
Place equipment in a ready state or reported otherwise (6.5.1)	findings that would require the equipment to be taken out of service.

Module Completion Criteria

To successfully complete this module, students must demonstrate all skills listed in Table 4.

Preparation, Materials, and Resources

Student Preparation

Students should review the relevant materials in their assigned textbook.

Instructor Preparation

- Read and annotate Chapter in Textbook.
- Review other book chapters or supplemental material.
- Review and annotate the associated lesson plans and standard evolutions for this module.

Materials and Resources

- Step box
- 50ft hose or 20lb weight without handles
- 2x power saws or 2x 25lb weights with handles
- Weighted manikin or 100lb weighted sled
- SCBA and other PPE (6.3.1, 6.3.2)
- Cleaning tools and supplies (6.5.1)

Key Terms

- **Reserve Air Supply**. The final third of available air in an SCBA cylinder, as indicated by the End-of-Service-Time Indicator (EOSTI) warning. Intended to provide time for emergency egress, self-rescue, or assisted rescue. (NFPA 1981 3.3.41, NFPA 1970 3.3.169)
- **Used (SCBA Cylinder)**. An SCBA cylinder is considered used when the available air is less than 90% of the cylinder's capacity.

Revision History

The following table is provided as a quick reference.

Table 6: Revision History Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)	
Revision Date	**Revision Description**
TBD	First draft

Module Outline

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

Block 1: Introduction to PPE and SCBA

Lesson 1: Introduction to Personal Protective Equipment
(-- minutes)

Learning Objectives

LO1 Recognize the capabilities and limitations of protective clothing and equipment
LO2 Inspect PPE and SCBA
LO3 Don PPE for work
LO5 Recognize conditions requiring personal and respiratory protection
LO10 Maintain PPE and SCBA following an incident

Enabling Learning Objectives

1. Describe threats to personal safety, given information from relevant test standards and a description of thermal conditions, so that the need to correctly don PPE and the need to limit exposure to high temperature environments is recognized (LO1)
2. Determine the limit of safe operating time, given information from relevant test standards, so that overexposure to environmental conditions that would compromise PPE integrity is prevented. (LO1)
3. Identify the components of the firefighter personal protective equipment, given descriptions, diagrams, and pictures of a firefighter protective ensemble, so that all elements are correctly named, and their functions are described. (LO2)
4. Inspect PPE elements, given an inspection checklist and visual examples of PPE defects, so that common issues are identified. (LO2)
5. Describe how to store equipment in a ready state (LO2)
6. Identify the characteristics of station wear (LO3)
7. Describe the steps for handling contaminated PPE after an incident, given decontamination procedures, so that the steps for preliminary exposure reduction and proper storage are identified. (LO10)

Content Outline	Resources
▪ **Capabilities of PPE** • Why is PPE necessary? • Thermal protection • Water repellence • Protection from cuts and impacts • Visibility in dark or smokey environments ▪ **Limitations of PPE** • Heavy gear requires physical fitness • Reduces sensory input • Reduces communication • Improper donning leads to exposure • Limits of safe operating time ▪ **PPE components and their functions**	**Activities** **Materials** **Facilities** **Notes** The content of this lesson is based on training requirements outlined in NFPA 1851.

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

Block 1: Introduction to PPE and SCBA

- Coat and trouser garment elements
  - Overlap of 2 inches when bending forward
- Structural Firefighting Protective Hood elements
- Helmet elements
- Glove elements
- Footwear elements
- Drag Rescue Device (DRD) components
- Interface components
- Face and eye protection

- **Approach for Handling Ensemble Elements After Incident Response**
  - CBRNE contamination
  - Hazmat contamination
  - Body fluids and other potentially infectious materials
  - Soiling
- **Preliminary Exposure Reduction**
  - Field decontamination
- **Cleaning**
  - Structural protective clothing that is cleaned and properly and completely dried before the next use will last longer and provide greater protection than soiled or damp garments.
- **Storage**
  - Returning to service in a ready state
- **Retirement of PPE**
- **Station wear**
  - Natural vs synthetic fibers
  - Thermally unstable materials
  - Melting hazards of undergarments
  - Melting hazards of fitness clothing
  - Certification
  - Aftermarket accessories
    - Emblems and patches (NFPA 1975 A.3.3.7)
    - Applied finishes (NFPA 1975 A.6.1.5)
- **Other PPE**
  - Traffic safety vests
  - Wildland protective clothing
- **Selecting PPE**
  - Selecting PPE based on hazards present
  - Minimizing use of PPE when appropriate to avoid exposure to PFAS
  - Follow department SOP/SOG for PPE wear

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

Block 1: Introduction to PPE and SCBA

Lesson 2: Introduction to Self-Contained Breathing Apparatus
(-- minutes)

Learning Objectives

LO1 Recognize the capabilities and limitations of protective clothing and equipment
LO2 Inspect PPE and SCBA
LO5 Recognize conditions requiring personal and respiratory protection
LO8 Initiate emergency procedures in the event of SCBA failure or air depletion
LO10 Maintain PPE and SCBA following an incident

Enabling Learning Objectives

1. Describe the common barriers to proper facepiece fit, given instructions and visual demonstrations, so that a correct seal is achieved and verified. (LO1)
2. Determine the limit of safe operating time, given information from relevant standards and about cylinder capacity, so that awareness of cylinder pressure is maintained and the IDLH environment is exited before the EOSTI activates. (LO1)
3. Identify the components of a Self-Contained Breathing Apparatus (SCBA), given descriptions, diagrams, and images of SCBA systems, so that all key components are correctly named, and their functions are explained. (LO2)
4. Perform a visual inspection of SCBA equipment, given an inspection checklist and visual examples of SCBA defects, so that common issues are identified. (LO2)
5. Recognize when respiratory protection equipment is required, given examples of hazardous or oxygen-deficient environments, so that situations requiring the use of SCBA are identified. (LO5)
6. Summarize the emergency procedures for SCBA failure or air depletion, given descriptions of common emergency scenarios, so that the proper actions to avoid compromising respiratory protection are taken. (LO8)
7. Outline the procedures for cleaning and disinfecting SCBA components, given guidance on cleaning techniques and appropriate disinfectants, so that proper hygiene is maintained, and cross-contamination is prevented. (LO10)
8. Identify the need to refill an air cylinder, given descriptions, diagrams, and images of SCBA systems, so that used cylinders are identified and the need to exchange cylinders is recognized. (LO10)
9. Explain the purpose of air cylinder testing and requalification, given information on SCBA cylinder maintenance, so that safety standards and procedures related to SCBA cylinder integrity and operation are identified. (LO10)

Content Outline	Resources
▪ **Why respiratory protection equipment is necessary** • Exposure to toxic fumes, irritants, particulates, or heated gases ▪ **When and how respiratory protection equipment is to be used**	**Activities** **Materials**

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

Block 1: Introduction to PPE and SCBA

- Limitations of respiratory protection equipment
  - Lower thermal exposure tolerance than components of the protective ensemble. As a result, the lens can become soft or lose its integrity prior to damage occurring to the rest of the protective ensemble.
  - A sealed facepiece does not prevent infiltration of toxins through exposed skin.
- **Procedures for ensuring facepiece fit**
  - Fit testing
  - How improper fit can compromise the protective effect of the respirator
  - Beard or facial hair at any point where the facepiece is designed to seal with the face or whose hair could interfere with the operation of the unit.
  - Glasses
  - Head coverings
- **Visual inspection of respiratory protection equipment components**
  - Common reasons for the breakdown of procedures or equipment that could cause injuries
    - Abuse and misuse of equipment
    - Physiological and psychological factors
    - Unapproved equipment
    - Buddy breathing
  - NIOSH Reports involving SCBA
- **Cleaning and Disinfecting**
- **Contamination and Decontamination**
- **Storage**
- **Maintenance**
  - How improper maintenance can compromise the protective effect of the respirator
  - Inspection Frequency
    - In-service SCBA cylinders shall be inspected weekly, monthly, and prior to filling, according to NIOSH requirements, CGA standards, and manufacturers' recommendations.
  - Inspection Procedure
    - Facepiece
      - It is important to use only SCBA lenses that are free from mechanical, chemical, or thermal damage.

Facilities

Notes

The content of this lesson is based on training requirements outlined in

- NFPA 1404 Chapter 5, 6.4, 6.6
- NFPA 1500 5.3, Chapter 7
- NFPA 1852 Chapter 5

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

Block 1: Introduction to PPE and SCBA

- The lens should have no cracks, crazing, bubbling, deformation, discoloring, gaps, or holes.
- A lens showing any damage should be replaced with a new lens.

- Backframe and harness assembly
- Breathing Air Cylinder
- Hose
  - High and Low pressure lines
- End-of-service-time indicator(s) (EOSTI)
- Regulators
- Universal Air Connection (UAC)
- Accessories

- Repair
  - Identification of need
  - Qualification of repair personnel
- Removal from Service

- **Air Cylinder Maintenance**
  - In-service SCBA cylinders shall be stored fully charged.
  - Air Cylinder Testing
  - Air Cylinder Requalification

Lesson 3: Working in PPE & SCBA
(-- minutes)

Learning Objectives

LO4 Prepare to work in an IDLH environment
LO6 Employ breathing control techniques
LO7 Perform assigned tasks
LO8 Initiate emergency procedures in the event of SCBA failure or air depletion
LO9 Replace an SCBA cylinder

Enabling Learning Objectives

1. Explain breathing control techniques, given guidance and demonstrations of air management strategies, so that strategies for conserving air while performing tasks in an IDLH environment are identified. (LO6)
2. Identify the notifications and warnings of low air, given descriptions, diagrams, and images of SCBA indicators and alarms, so that low air warnings are recognized, and steps to exit the IDLH environment safely are described. (LO6)
3. Describe the importance of cardiorespiratory fitness for working in PPE and SCBA, given information on physical fitness requirements for firefighters, so that the connection between fitness and efficient air consumption is understood. (LO7)
4. Describe techniques for managing stress while working in SCBA (LO7)

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

Block 1: Introduction to PPE and SCBA

5. Describe the importance of maintaining awareness of SCBA cylinder pressure. (LO7)
6. Describe effective communication techniques while wearing SCBA, given descriptions of SCBA communication challenges and solutions, so that communication is clear and effective. (LO7)
7. Summarize emergency procedures for SCBA failure, given descriptions of emergency scenarios, so that steps are followed to avoid compromising respiratory protection. (LO8)
8. Explain when to replace an SCBA cylinder, given descriptions, diagrams, and images of indicators of used SCBA cylinders, so that the need for refilling is identified. (LO9)

Content Outline	Resources
▪ **Importance of physical fitness** • Cardiovascular health • Metabolic health (VO_{2MAX}) • How to recognize medical signs and symptoms that can limit or prevent the effective use of RPE ▪ **Individual air management** • Check and maintain awareness of cylinder pressure • Skip breathing • Reily (humming) technique • Tactical "Box" breathing ▪ **Managing stress while working in SCBA** • Definition of claustrophobia • Strategies ▪ **Breathe**: Focus on breathing techniques ▪ **Talk**: Talk yourself through the task you're trying to accomplish. ▪ **See**: "Tactical" pause to get your bearings ▪ **Focus**: Use a focus word ▪ Exposure over time ▪ Don't give up ▪ **Notifications and Warnings of Low Air** • End-of-Service-Time Indicator (EOSTI) • Heads-Up Display (HUD) ▪ **Communicating while wearing an SCBA** • Location of the voice port • Modification of microphone positioning ▪ **Emergency procedures** • How to use the RPE effectively in emergency situations, including situations in which the RPE malfunctions • Emergency Breathing Safety System (EBSS) if provided ▪ Not initiated if "donor" cylinder has less than 2/3 air remaining.	**Activities** **Materials** **Facilities** **Notes** The content of this lesson is based on training requirements outlined in ▪ NFPA 1407 ▪ NFPA 1500

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)	
Block 1: Introduction to PPE and SCBA	
• Universal Air Connection (UAC) • Potential incompatibility of different makes and models of SCBA.	

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

Block 2: PPE and SCBA Lab

Lab 1: Structural Firefighting Ensemble Inspection, Functions, and Features
(-- minutes)

Learning Objectives
LO2 Inspect PPE and SCBA
LO9 Maintain PPE and SCBA

Content Outline	Resources
Structural Firefighting Ensemble Inspection *(est. time)* ▪ **PPE Inspection** • Lead groups of students through a detailed inspection of structural PPE • Universal precautions (gloves) when handling ensemble elements. • Coat and trouser garment elements • Hood elements • Helmet elements • Glove elements • Footwear elements • DRD components • Interface components ▪ Field Reduction of Contamination • Elements that are soiled or contaminated shall be cleaned before any additional inspection is initiated.	**Activities** ▪ FA-05 Inspect Personal Protective Equipment ▪ FA-04 Perform Field Reduction of Contamination **Materials** ▪ Structural firefighting protective ensemble (1x per student) **Facilities** ▪ 6'x6' area per student **Notes** The content of this lesson is based on the standards outlined in NFPA 1851.

Lab 2: SCBA Inspection, Functions, and Features
(-- minutes)

Learning Objectives
LO2 Inspect PPE and SCBA
LO9 Maintain PPE and SCBA

Content Outline	Resources
SCBA Inspection *(est. time)* ▪ **SCBA Inspection** • Lead groups of students through a detailed inspection of SCBA • Facepiece • Backframe and harness assembly • Cylinder • Hose • End-of-service-time indicator(s) (EOSTI)	**Activities** ▪ FA-06 Inspect an SCBA ▪ FA-10 Replace an SCBA Cylinder ▪ FA-11 Clean and Disinfect an SCBA Facepiece ▪ FA-12 Decontaminate an SCBA **Materials**

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

• Regulators • Pressure indicator • Integrated PASS • Pressure retention check ▪ Replacing an Air Cylinder ▪ Cleaning an facepiece ▪ Decontaminating an SCBA	▪ Structural firefighting protective ensemble (1x per student) ▪ SCBA (1x per student) ▪ SCBA cylinder (2x per student) ▪ Manufacturer-approved cleaning agent and supplies **Facilities** ▪ 6'x6' area per student **Notes** The content of this lesson is based on the standards outlined in NFPA 1852.

Lab 3: Donning and Doffing
(-- minutes)

Learning Objectives
LO3 Prepare to work in an IDLH environment

Content Outline	Resources
Title *(est. time)* ▪ **Intro to Donning and Doffing PPE** • Demonstrate how to don and doff PPE from the floor • Walk students through donning and doffing PPE • Students don PPE ▪ Inspect students and provide feedback ▪ Students doff PPE • Students don PPE ▪ Students inspect each other ▪ Students doff PPE ▪ **Intro to Donning and Doffing SCBA** • Demonstrate how to don and doff SCBA • Walk students through donning and doffing SCBA • Students don SCBA ▪ Inspect students and provide feedback ▪ Students doff SCBA • Students don SCBA ▪ Students inspect each other ▪ **Intro to Donning and Doffing Facepiece and Regulator**	**Activities** ▪ FA-01 Don Personal Protective Equipment ▪ FA-02 Doff Personal Protective Equipment ▪ FA-07 Don an SCBA ▪ FA-08 Activate an SCBA Regulator ▪ FA-09 Doff an SCBA ▪ FA-03 Doff Superheated Gear **Materials** ▪ Structural firefighting protective ensemble (1x per student) ▪ SCBA with cylinder ▪ Reserve air supply **Facilities** ▪ 6'x6' area per student

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

• Demonstrate how to don and doff facepiece and regulator
• Walk students through donning and doffing facepiece and regulator
• Students don regulator and facepiece
  ▪ Inspect students and provide feedback
  ▪ Students remove regulator and facepiece
• Students don regulator and facepiece
  ▪ Students inspect each other
  ▪ Students remove regulator and facepiece	

Lab 4: Donning and Doffing for Work
(-- minutes)

Learning Objectives
LO3 Prepare to work in an IDLH environment

Content Outline	Resources

Title
(est. time)
 	
▪ **Donning from a Locker**
• Demonstrate donning PPE from a hanging position
• Walk students through the technique
• Students don PPE from a hanging position
  ▪ Instructor observes student performance and gives feedback on technique
• Students don PPE from a hanging position again with coaching from the instructor
▪ **Donning from an Apparatus**
• Demonstrate
  ▪ Mounting and dismounting an apparatus wearing PPE
  ▪ Donning SCBA
  ▪ Securing with a seatbelt
• Walk students through
  ▪ Mount the apparatus
  ▪ Donning SCBA
  ▪ Secure seatbelt
  ▪ Dismounting the apparatus
▪ **Doffing Superheated Gear**
• Demonstrate how to doff superheated gear
• Walk students, in teams of three, through doffing superheated gear
• Students don PPE and SCBA, go on air.
	Activities
	▪ FA-01 Don Personal Protective Equipment
	▪ FA-02 Doff Personal Protective Equipment
	▪ FA-07 Don an SCBA
	▪ FA-08 Activate an SCBA Regulator
	▪ FA-09 Doff an SCBA
	▪ FA-03 Doff Superheated Gear
	
	Materials
	▪ Structural firefighting protective ensemble (1x per student)
	▪ SCBA with cylinder
	▪ Reserve air supply
	
	Facilities
	▪ 6’x6’ area per student

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

▪ Students, in teams of three, doff superheated gear ▪ Instructors observe and provide feedback ▪ **Donning for Work** • Drills will focus first on accuracy and then on speed. ▪ Structural PPE goal: 120 seconds. ▪ SCBA without facepiece goal: 60 seconds. ▪ Facepiece and regulator: 25 seconds. • Students do not need to meet these time goals before the end of the lesson but should continue to strive toward these goals throughout the program. • The **Donning for Work** drill should be incorporated into future modules as the need for practice arises.	

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

Block 3: Standard Evolutions

Evolution 1: Mounting and Dismounting an Apparatus
(-- minutes)

Learning Objectives

LO6 Perform assigned tasks
LO5 Employ breathing control techniques
LO7 Initiate emergency procedures in the event of SCBA failure or air depletion

Content Outline	Resources
▪ **Demonstrate the evolution** • Position PPE and SCBA at the apparatus • Verbalize donning PPE correctly • Mount the apparatus using handholds and proper body mechanics • Verbalize donning SCBA • Demonstrate securing the seatbelt • Verbalize arriving on-scene • Dismount the apparatus using handholds, appropriate points of contact, and proper body mechanics • Verbalize donning facepiece and regulator ▪ **Evolution** • Students position gear at apparatus ▪ PPE positioned either in a nearby locker or on the ground next to the apparatus ▪ SCBA mounted in the seat	**Activities** ▪ FA-15 Mount and Dismount an Apparatus Wearing PPE and SCBA ▪ FA-01 Don Personal Protective Equipment ▪ FA-07 Don an SCBA **Materials** ▪ Fire apparatus equipped with seat-mounted SCBA ▪ Structural firefighting protective ensemble (1x per student) ▪ SCBA with cylinder **Facilities**

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

- Students will don PPE (FA-01)
- Students will mount the apparatus using handholds and proper body mechanics
- Students will don their SCBA from the seat mount
- Students will secure their seat belt
- **Instructor** will announce arrival on-scene
- Students will dismount the apparatus using handholds, appropriate points of contact, and proper body mechanics
- Students will don facepiece and attach regulator.

Notes
Once practiced, this evolution can be repeated with a time component. All steps must be performed correctly.

Evolution 2: Air Management
(-- minutes)

Learning Objectives

LO6 Perform assigned tasks
LO5 Employ breathing control techniques
LO7 Initiate emergency procedures in the event of SCBA failure or air depletion

Content Outline	Resources
▪ **Communicating Through a Face Mask** • Radio position • Controlling volume, pace, and tone ▪ **Breathing Control** • Skip breathing • Reily (humming) technique • Tactical "Box" breathing ▪ **Emergency Procedures** • Facepiece failure • Manually activating a PASS • Regulator bypass valve • No-Air Emergency maneuver	**Activities** ▪ FA-13 Communicate While Wearing a Facepiece ▪ FA-18 Respond to a Facepiece Failure ▪ FA-16 Activate a manual PASS alarm ▪ FA-17 Employ an Emergency Regulator Bypass ▪ FA-20 Use a Universal Rescue Connection ▪ FA-19 Respond to a No-Air Emergency **Materials** ▪ Portable radios ▪ Structural firefighting protective ensemble (1x per student) ▪ SCBA with cylinder ▪ Reserve air supply **Facilities** ▪ Space sufficient for practice while wearing PPE

Module: Personal Protective Equipment (PPE) & Self-Contained Breathing Apparatus (SCBA)

Evolution 3: Thousand-Pound Drill
(-- minutes)

Learning Objectives

LO6 Perform assigned tasks
LO5 Employ breathing control techniques
LO7 Initiate emergency procedures in the event of SCBA failure or air depletion

Content Outline	Resources
▪ **Work Capacity Drill** • Students complete two cycles of physical tasks: ▪ Box step – 10 inches ▪ Hose carry – 15ft ▪ Hose pull – 10ft with 100ft of 1¾" hose ▪ Tool carry – 20ft ▪ Bear Crawl – 70ft ▪ Rescue drag – 70ft ▪ **Breathing Control Evaluation** • Students will be taken to the rehab area after completing two cycles or when their EOSTI activates, whichever is first. • Student will remain on air. • Bleed residual air to 1000 psi If greater than 1000psi • Student will employ breath control techniques. • Student will signal when air supply is completely exhausted and remove their regulator. • Time until regulator is removed will be recorded. • Emphasize to student that the time is not a comparative metric, but a measurement of the student's capability with the student's equipment. ▪ Continue to improve cardiores	**Activities** ▪ FA-14 Manage Air Consumption **Materials** ▪ 10in step box ▪ 50ft hose or 20lb weight without handles ▪ 2x power saws or 2x 25lb weights with handles ▪ Weighted manikin or 160lb weighted sled ▪ Structural firefighting protective ensemble (1x per student) ▪ SCBA with cylinder ▪ Reserve air supply **Facilities** ▪ Clean, open area with a hard surface. Not grass or gravel.