clothing and equipment specified in this chapter whenever they are involved in any evolution or fire suppression operation during the live fire training evolution.

4-4.23*

All students, instructors, safety personnel, and other personnel participating in any evolution or operation of fire suppression during the live fire training evolution shall breathe from a SCBA air supply whenever operating under one or more of the following conditions:

(a) In an atmosphere that is oxygen deficient or contaminated by products of combustion, or both

(b) In an atmosphere that is suspected of being oxygen deficient or contaminated by products of combustion, or both

(c) In any atmosphere that can become oxygen deficient or contaminated, or both

(d) Below ground level

4-4.24

One person shall be designated as the "ignition officer" to control the materials being burned. The ignition officer shall not be a student.

4-4.25

The ignition officer shall wear full protective clothing, including self-contained breathing apparatus (SCBA), as required in 4-4.17 through 4-4.22, when performing this function. A charged hoseline shall accompany the ignition officer when igniting any fire.

4-4.26*

The decision to ignite the training fire shall be made by the instructor-in-charge in coordination with the safety officer. The fire shall be ignited by the ignition officer in the presence of and under the direct supervision of the safety officer.

**4-5 Instructors.**

4-5.1

All instructors shall be deemed qualified to deliver fire fighter training by the authority having jurisdiction.

4-5.2*

The participating student-to-instructor ratio shall not be greater than 5 to 1.

4-5.3

Other factors such as extreme temperatures, large groups, and classes of long-duration shall be taken into consideration, and additional instructors shall be designated as deemed necessary to ensure proper levels of safety.

4-5.4

The instructor-in-charge shall be responsible for full compliance with this standard.

4-5.5

Prior to the ignition of any fire, instructors shall ensure that all protective clothing and equipment specified in this chapter are being worn properly.

4-5.6

Instructors shall take a head count when entering and exiting the building during an actual attack evolution conducted in accordance with this standard. Instructors shall monitor and supervise all assigned students closely during the live fire training evolution.

4-5.7*

The instructor-in-charge shall consider the circumstances of each training session and make suitable provisions for the rest and rehabilitation of members operating at the scene. These considerations shall include medical evaluation and treatment, food and fluid replenishment, and relief from climate conditions, in accordance with the circumstances of the training session.

4-5.8

Where concurrent, multiple live fire training evolutions are being conducted in a specifically designed burn building, the identity of the instructor in charge of the evolutions shall be clear to all participants. It shall be this instructor's responsibility to coordinate overall burn building fireground activities to ensure proper levels of safety.

## Chapter 5 Exterior Props

### 5-1 Student Prerequisites.

5-1.1*

In order to ensure safe operations during a live fire training exercise involving exterior props, all participating students shall have achieved a minimum level of basic training.

5-1.2

Prior to being permitted to participate in live fire training evolutions, the student shall have received training to meet the performance objectives for Fire Fighter I of the following sections of NFPA 1001, *Standard for Fire Fighter Professional Qualifications:*

Section 3-3 Safety

Section 3-5 Fire Behavior

Section 3-6 Portable Extinguishers

Section 3-7 Personal Protective Equipment

Section 3-11 Ladders

Section 3-12 Fire Hose, Appliances and Streams

Section 3-19 Water Supply

5-1.3*

Students participating in a live fire training evolution who have received the required minimum basic training from other than the authority having jurisdiction shall not be permitted to participate in any live fire training evolution without presenting prior written evidence of having successfully completed the prescribed minimum training to the levels specified in 5-1.2.

### 5-2 Structures and Facilities.

5-2.1*

Strict safety practices shall be applied to all exterior props selected for live fire training evolutions.

5-2.2

For outside training, care shall be taken to select areas that limit the hazards to both personal safety and the environment. The training site shall be flat and open without obstructions that can interfere with fire-fighting operations.

5-2.3

Where using live training fires outside, the ground cover shall be such that it does not contribute to the fire. The ground cover shall be impervious and of such topography that the runoff from live fire does not enter municipal, private, or public waters or other sensitive areas.

5-2.4

Exterior props shall be inspected visually for damage prior to live fire training evolutions. Damage shall be documented. The structural integrity of the props shall be evaluated and documented periodically, but at least annually.

5-2.5

All safety devices, such as thermometers, oxygen and toxic and combustible gas monitors, evacuation alarms, and emergency shutdown switches, shall be checked prior to any live fire training evolutions to ensure they operate correctly.

5-2.6

Exterior props shall be left in a safe condition upon completion of live fire training evolutions. Debris hindering the access of fire fighters shall be removed prior to the beginning of the next training exercise.

5-2.7

All appropriate and required permits to conduct live fire training evolutions shall be obtained.

5-2.8

The permits specified in this chapter shall be provided to outside, contract, or other separate training agencies by the authority having jurisdiction upon the request of those agencies.

5-2.9

Adjacent buildings or property that might become involved shall be protected properly or removed.

5-2.10

Utility services adjacent to the live burn site shall be removed or protected.

5-2.11

Trees, brush, and surrounding vegetation that create a hazard to participants shall be removed. Combustible materials, other than those intended for the live fire training evolution, shall be removed or stored in a protected area to preclude accidental ignition.

5-2.12

Property adjacent to the training site that could be affected by the smoke from the live fire training evolution, such as railroads, airports, or heliports; and nursing homes, hospitals, or other

similar facilities shall be identified, and the persons in charge shall be informed of the date and time of the evolution.

5-2.13

Streets or highways in the vicinity of the training site shall be surveyed for potential effects from live fire training evolutions. Appropriate safeguards shall be taken to eliminate any possible hazard to motorists. Such safeguards can include street closings, traffic rerouting, signs, and police traffic control.

5-2.14

Pedestrian traffic in the vicinity of the training site shall be kept clear of the operations area of the live burn. Fire lines shall be established for this purpose.

5-2.15

Awareness of weather conditions, wind velocity, and wind direction shall be maintained. In all cases, a final check shall be made for possible changes in weather conditions immediately before actual ignition.

5-2.16

The water supply for any individual live fire training evolution shall be assessed carefully based on the extent of the evolution to be performed. Consideration shall be given to the proper control and extinguishment of the fire and the provision of necessary backup lines to protect personnel.

5-2.17

The minimum water supply and delivery for the live fire training evolutions shall meet the criteria identified in NFPA 1231, *Standard on Water Supplies for Suburban and Rural Fire Fighting*.

5-2.18

A minimum reserve of additional water in the amount of 50 percent of the fire flow demand in 5-2.17 shall be available to handle exposure protection or unforeseen situations.

5-2.19*

Separate sources shall be utilized for the supply of attack lines and backup lines in order to preclude the loss of both water supply sources at the same time.

*Exception: A single source shall be sufficient at a training center facility where the water system has been engineered to provide adequate volume for the evolutions conducted and a backup power source or backup pumps, or both, are in place to ensure an uninterrupted supply in the event of a power failure or malfunction.*

5-2.20

Adequate areas for the staging, operating, and parking of fire apparatus that are used in the live fire training evolution shall be designated.

5-2.21

An area for parking fire apparatus and vehicles that are not a part of the evolution shall be designated so as not to interfere with fireground operations. Consideration shall be given to locating this area in order to facilitate prompt response of apparatus in the event of an emergency.

5-2.22

Where required or necessary, parking areas for police vehicles or for the press shall be designated.

5-2.23

A parking area for an ambulance or an emergency medical services vehicle shall be designated. Consideration shall be given to locating this area to facilitate prompt response in the event of a personal injury to participants in the evolution.

5-2.24

Consideration shall be given to the designation and layout of ingress/egress routes in order to ensure their availability in the event of an emergency.

5-2.25

Prior to conducting actual live fire training evolutions, a preburn briefing session shall be conducted for all participants. All facets of each evolution to be conducted shall be discussed, and assignments shall be made for all crews participating in the training session. The location of simulated victims shall not be required to be disclosed, provided that the possibility of victims is discussed in the preburn briefing.

5-2.26

A preburn plan shall be prepared and shall be utilized during the preburn briefing sessions. All features of the training areas and structure shall be indicated on the plan.

5-2.27

Prior to conducting any live fire training, all participants shall have a knowledge of and familiarity with the prop or props being used for the evolution.

5-2.28

All spectators shall be restricted to an area outside the operations area perimeter established by the safety officer.

5-2.29

Appropriate control measures such as ropes, signs, and fire line markings shall be posted to indicate the perimeter of the operations area.

5-2.30

Visitors who are allowed to observe operations and who are allowed within the operations area perimeter shall be escorted at all times and shall be equipped with and shall properly wear complete protective clothing in accordance with 5-4.15 through 5-4.20.

5-2.31

All possible sources of ignition, other than those that are under the direct supervision of the person responsible for the start of the training fire, shall be removed from the operations area.

5-2.32

There shall be ample room provided around all props so that there is space for all attack lines as well as backup lines to operate freely.

5-3 Fuel Materials.

5-3.1

The fuels that are utilized in live fire training evolutions shall have known burning characteristics that are as controllable as possible. Unidentified materials, such as debris found in or around the site that could burn in unanticipated ways, react violently, or create environmental or health hazards, shall not be permitted to be used.

5-3.2*

Fuel materials shall be used only in the amounts necessary to create the desired fire size. Pressure-treated wood, rubber, and plastic, and straw or hay treated with pesticides or harmful chemicals shall not be permitted to be used.

5-3.3*

The instructor-in-charge shall assess the selected fire room environment for factors that can affect the growth, development, and spread of the fire.

5-3.4*

The training exercise shall be stopped immediately when the instructor-in-charge determines through ongoing assessment that the combustible nature of the environment represents a potential hazard. The exercise shall continue only when the appropriate actions have been taken to reduce the hazard.

5-3.5

Props used for outside live fire training shall be designed specifically for the evolution to be performed.

5-3.6*

All props that use pressure to move fuel to the fire shall be equipped with remote fuel shutoffs. The remote fuel shutoff shall be within site of the prop, and the entire field of attack for the prop, but shall be outside of the safety perimeter. During the entire time the prop is in use, the remote shutoff shall be continuously attended by safety personnel trained in its operation.

5-3.7

Liquefied petroleum gas props shall be equipped with all safety features as described in NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*, and NFPA 59, *Standard for the Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants.* Where the evolution involves the failure of a safety feature, the failed part shall be located downstream from the properly functioning safety feature.

5-3.8

Measures shall be taken where using flammable or combustible liquids to prevent runoff from contaminating the surrounding area. There shall be oil separators for cleaning the runoff water.

5-3.9*

Vehicles used as props for live fire training shall have all fluid reservoirs, tanks, shock absorbers, drive shafts, and other gas-filled closed containers removed, vented, or drained prior to any ignition.

5-3.10

For flammable metal fires, there shall be a sufficient quantity of the proper extinguishing agent

available so that all attack crews have an adequate supply as well as a 150 percent reserve for the use of the backup crews.

5-4 Safety.

5-4.1

A safety officer shall be appointed for all live fire training evolutions.

5-4.2*

The safety officer shall have the authority, regardless of rank, to intervene and control any aspect of the operations when, in his or her judgment, a potential or actual danger, accident, or unsafe condition exists.

5-4.3

The responsibilities of the safety officer shall include, but shall not be limited to the following:

(a) The prevention of unsafe acts

(b) The elimination of unsafe conditions

5-4.4

The safety officer shall provide for the safety of all persons on the scene including students, instructors, visitors, and spectators.

5-4.5

The safety officer shall not be assigned other duties that interfere with safety responsibilities.

5-4.6

Sufficient backup lines shall be provided to ensure adequate protection for personnel on training attack lines.

5-4.7*

The instructor-in-charge of the live fire training evolutions shall determine, prior to each specific evolution, the number of training attack lines and backup lines that are necessary. Each hoseline shall be capable of delivering a minimum of 95 gpm (360 Lpm). The instructor-in-charge then shall assign the following:

(a) One instructor to each functional crew, which shall not exceed five students

(b) One instructor to each backup line

(c) Sufficient additional personnel to backup lines to provide mobility

(d) One additional instructor for each additional functional assignment

(e) One safety person to each manually activated safety station

5-4.8*

Additional safety personnel, as deemed necessary by the safety officer, shall be located strategically within the area to react to any unplanned or threatening situation or condition.

5-4.9

A method of fireground communications shall be established to enable coordination among the

incident commander, the interior and exterior sectors, the safety officer, and external requests for assistance.

5-4.10

Emergency medical services shall be available on site to handle injuries. Written reports shall be filled out and submitted on all injuries and on all medical aid rendered.

5-4.11

One person shall be designated to control the materials being burned and to ignite the training fire in the presence of and under the direct supervision of a safety officer. This person shall not be a student and shall wear full protective clothing including self-contained breathing apparatus (SCBA) as required in 5-4.15 through 5-4.20 of this standard. The decision to ignite the training fire shall be made by the instructor in charge, in coordination with the safety officer.

5-4.12

No person(s) shall play the role of a victim inside the building.

5-4.13

Fires shall not be located in any designated exit paths.

5-4.14

The training session shall be curtailed, postponed, or canceled, as necessary, to reduce the risk of injury or illness caused by extreme weather conditions.

5-4.15

Each participant shall be equipped with full protective clothing and self-contained breathing apparatus (SCBA). All participants shall be inspected by the safety officer prior to entry into a live fire training evolution to ensure that the protective clothing and SCBA are being worn properly and are in serviceable condition.

5-4.16

Protective coats, trousers, hoods, footwear, helmets, and gloves shall meet the requirements of NFPA 1971, *Standard on Protective Ensemble for Structural Fire Fighting.*

***Exception:** For outside fires, those persons who do not engage in or are not exposed to the hazards of structural fire fighting shall be permitted to use helmets that meet federal OSHA requirements.*

5-4.17

Self-contained breathing apparatus (SCBA) shall meet the requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters.*

5-4.18*

Where station or work uniforms are worn by any participant, the station or work uniform shall meet the requirements of NFPA 1975, *Standard on Station/Work Uniforms for Fire Fighters.*

5-4.19

Personal alarm devices shall meet the requirements of NFPA 1982, *Standard on Personal Alert Safety Systems (PASS) for Fire Fighters.*

5-4.20

All students, instructors, safety personnel, and other personnel shall wear properly all protective clothing and equipment specified in this chapter whenever they are involved in any evolution or fire suppression operation during the live fire training evolution.

5-4.21*

All students, instructors, safety personnel, and other personnel participating in any evolution or operation of fire suppression during the live fire training evolution shall breathe from a SCBA air supply whenever operating under one or more of the following conditions:

(a) In an atmosphere that is oxygen deficient or contaminated by products of combustion, or both

(b) In an atmosphere that is suspected of being oxygen deficient or contaminated by products of combustion, or both

(c) In any atmosphere that can become oxygen deficient or contaminated, or both

(d) Below ground level

**5-5 Instructors.**

5-5.1

All instructors shall be deemed qualified to deliver fire fighter training by the authority having jurisdiction.

5-5.2*

The participating student-to-instructor ratio shall not be greater than 5 to 1.

5-5.3

Other factors such as extreme temperatures, large groups, and classes of long duration shall be taken into consideration, and additional instructors shall be designated as deemed necessary to ensure proper levels of safety.

5-5.4

The instructor-in-charge shall be responsible for full compliance with this standard.

5-5.5

Prior to the ignition of any fire, instructors shall ensure that all protective clothing and equipment specified in this chapter are being worn properly.

5-5.6

Instructors shall take a head count when entering and exiting the area during an actual attack evolution conducted in accordance with this standard. Instructors shall monitor and supervise all assigned students closely during the live fire training evolution.

5-5.7*

The instructor-in-charge shall consider the circumstances of each training session and make suitable provisions for the rest and rehabilitation of members operating at the scene. These considerations shall include medical evaluation and treatment, food and fluid replenishment, and relief from climate conditions, in accordance with the circumstances of the training session.

5-5.8

Instructors responsible for conducting live fire training evolutions with a gas-fueled training system shall be trained properly in the complete operation of the system. The training of instructors shall be performed by an individual authorized by the system manufacturer.

## Chapter 6 Exterior Class B Fires

### 6-1 Student Prerequisites.

6-1.1*

In order to ensure safe operations during a live fire training exercise involving exterior Class B fires, all participating students shall have achieved a minimum level of basic training.

6-1.2

Prior to being permitted to participate in live fire training evolutions, the student shall have received training to meet the performance objectives for Fire Fighter I of the following sections of NFPA 1001, *Standard for Fire Fighter Professional Qualifications:*

Section 3-3 Safety

Section 3-5 Fire Behavior

Section 3-6 Portable Extinguishers

Section 3-7 Personal Protective Equipment

Section 3-12 Fire Hose, Appliances and Streams

Section 3-19 Water Supply

6-1.3*

Students participating in a live fire training evolution who have received the required minimum basic training from other than the authority having jurisdiction shall not be permitted to participate in any live fire training evolution without presenting prior written evidence of having successfully completed the prescribed minimum training to the levels specified in 6-1.2.

### 6-2 Facilities.

6-2.1*

Strict safety practices shall be applied to all props and areas selected for live fire training evolutions.

6-2.2

For outside training, care shall be taken to select areas that limit the hazards to both personal safety and the environment. The training site shall be flat and open without obstructions that can interfere with fire-fighting operations.

6-2.3

Where using live training fires outside, the ground cover shall be such that it does not contribute to the fire. The ground cover shall be impervious and of such topography that the runoff from live fire does not enter municipal, private, or public waters or other sensitive areas.

6-2.4

The burn area shall be inspected visually for damage prior to live fire training evolutions. Damage shall be documented.

6-2.5

All safety devices, such as thermometers, oxygen and toxic and combustible gas monitors, evacuation alarms, and emergency shutdown switches, shall be checked prior to any live fire training evolutions to ensure they operate correctly.

6-2.6

Props shall be left in a safe condition upon completion of live fire training evolutions. Debris hindering the access of fire fighters shall be removed prior to the beginning of the next training exercise.

6-2.7

All appropriate and required permits to conduct live fire training evolutions shall be obtained.

6-2.8

The permits specified in this chapter shall be provided to outside, contract, or other separate training agencies by the authority having jurisdiction upon the request of those agencies.

6-2.9

Adjacent buildings or property that might become involved shall be protected properly or removed.

6-2.10

Utility services adjacent to the live burn site shall be removed or protected.

6-2.11

Trees, brush, and surrounding vegetation that create a hazard to participants shall be removed. Combustible materials, other than those intended for the live fire training evolution, shall be removed or stored in a protected area to preclude accidental ignition.

6-2.12

Property adjacent to the training site that could be affected by the smoke from the live fire training evolution, such as railroads, airports, or heliports; and nursing homes, hospitals, or other similar facilities shall be identified, and the persons in charge shall be informed of the date and time of the evolution.

6-2.13

Streets or highways in the vicinity of the training site shall be surveyed for potential effects from live fire training evolutions. Appropriate safeguards shall be taken to eliminate any possible hazard to motorists. Such safeguards can include street closings, traffic rerouting, signs, and police traffic control.

6-2.14

Pedestrian traffic in the vicinity of the training site shall be kept clear of the operations area of the live burn. Fire lines shall be established for this purpose.

6-2.15

Awareness of weather conditions, wind velocity, and wind direction shall be maintained. In all

cases, a final check shall be made for possible changes in weather conditions immediately before actual ignition.

6-2.16

The water supply for any individual live fire training evolution shall be assessed carefully based on the extent of the evolution to be performed. Consideration shall be given to the proper control and extinguishment of the fire and the provision of necessary backup lines to protect personnel.

6-2.17

The minimum water supply and delivery for the live fire training evolutions shall meet the criteria identified in NFPA 1231, *Standard on Water Supplies for Suburban and Rural Fire Fighting.*

6-2.18

A minimum reserve of additional water in the amount of 50 percent of the fire flow demand in 6-2.17 shall be available to handle exposure protection or unforeseen situations.

6-2.19*

Separate sources shall be utilized for the supply of attack lines and backup lines in order to preclude the loss of both water supply sources at the same time.

*Exception: A single source shall be sufficient at a training center facility where the water system has been engineered to provide adequate volume for the evolutions conducted and a backup power source or backup pumps, or both, are in place to ensure an uninterrupted supply in the event of a power failure or malfunction.*

6-2.20

Adequate areas for the staging, operating, and parking of fire apparatus that are used in the live fire training evolution shall be designated.

6-2.21

An area for parking fire apparatus and vehicles that are not a part of the evolution shall be designated so as not to interfere with fireground operations. Consideration shall be given to locating this area in order to facilitate prompt response of apparatus in the event of an emergency.

6-2.22

Where required or necessary, parking areas for police vehicles or for the press shall be designated.

6-2.23

A parking area for an ambulance or an emergency medical services vehicle shall be designated. Consideration shall be given to locating this area to facilitate prompt response in the event of a personal injury to participants in the evolution.

6-2.24

Consideration shall be given to the designation and layout of ingress/egress routes in order to ensure their availability in the event of an emergency.

6-2.25

Prior to conducting actual live fire training evolutions, a preburn briefing session shall be

conducted for all participants. All facets of each evolution to be conducted shall be discussed, and assignments shall be made for all crews participating in the training session. The location of simulated victims shall not be required to be disclosed, provided that the possibility of victims is discussed in the preburn briefing.

6-2.26

A preburn plan shall be prepared and shall be utilized during the preburn briefing sessions. All features of the training areas shall be indicated on the plan.

6-2.27

Prior to conducting any live fire training, all participants shall have a knowledge of and familiarity with the prop or props being used for the evolution.

6-2.28

All spectators shall be restricted to an area outside the operations area perimeter established by the safety officer.

6-2.29

Appropriate control measures such as ropes, signs, and fire line markings shall be posted to indicate the perimeter of the operations area.

6-2.30

Visitors who are allowed to observe operations and who are allowed within the operations area perimeter shall be escorted at all times and shall be equipped with and shall properly wear complete protective clothing in accordance with 6-4.15 through 6-4.20.

6-2.31

All possible sources of ignition, other than those that are under the direct supervision of the person responsible for the start of the training fire, shall be removed from the operations area.

6-2.32

There shall be ample room provided around all props so that there is space for all attack lines as well as backup lines to operate freely.

**6-3 Fuel Materials.**

6-3.1

The fuels that are utilized in live exterior Class B fire training evolutions shall have known burning characteristics that are as controllable as possible. Unidentified materials found in or around the structure that could burn in unanticipated ways, react violently, or create environmental or health hazards, shall not be permitted to be used.

6-3.2*

Fuel materials shall be used only in the amounts necessary to create the desired fire size.

6-3.3*

The instructor-in-charge shall assess the selected fire environment for factors that can affect the growth, development, and spread of the fire.

6-3.4*

The instructor-in-charge, as a minimum, shall document fuel loading.

6-3.5*

The training exercise shall be stopped immediately when the instructor-in-charge determines through ongoing assessment that the combustible nature of the environment represents a potential hazard. The exercise shall continue only when the appropriate actions have been taken to reduce the hazard.

6-3.6

Props used for outside live fire training shall be designed specifically for the evolution to be performed.

6-3.7*

All props that use pressure to move fuel to the fire shall be equipped with remote fuel shutoffs. The remote fuel shutoff shall be within site of the prop, and the entire field of attack for the prop, but shall be outside of the safety perimeter. During the entire time the prop is in use, the remote shutoff shall be continuously attended by safety personnel trained in its operation.

6-3.8

Liquefied petroleum gas props shall be equipped with all safety features as described in NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*, and NFPA 59, *Standard for the Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants.* Where the evolution involves the failure of a safety feature, the failed part shall be located downstream from the properly functioning safety feature.

6-3.9

Measures shall be taken where using flammable or combustible liquids to prevent runoff from contaminating the surrounding area. There shall be oil separators for cleaning the runoff water.

**6-4 Safety.**

6-4.1

A safety officer shall be appointed for all live fire training evolutions.

6-4.2*

The safety officer shall have the authority, regardless of rank, to intervene and control any aspect of the operations when, in his or her judgment, a potential or actual danger, accident, or unsafe condition exists.

6-4.3

The responsibilities of the safety officer shall include, but shall not be limited to the following:

(a) The prevention of unsafe acts

(b) The elimination of unsafe conditions

6-4.4

The safety officer shall provide for the safety of all persons on the scene including students, instructors, visitors, and spectators.

6-4.5

The safety officer shall not be assigned other duties that interfere with safety responsibilities.

6-4.6

The safety officer shall be knowledgeable in the operation and location of safety features available, such as emergency shutoff switches, gas shutoff valves, and evacuation alarms.

6-4.7

Sufficient backup lines shall be provided to ensure adequate protection for personnel on training attack lines.

6-4.8*

The instructor-in-charge of the live fire training evolutions shall determine, prior to each specific evolution, the number of training attack lines and backup lines that are necessary. Each hoseline shall be capable of delivering a minimum of 95 gpm (360 Lpm). The instructor-in-charge then shall assign the following:

(a) One instructor to each functional crew, which shall not exceed five students

(b) One instructor to each backup line

(c) Sufficient additional personnel to backup lines to provide mobility

(d) One additional instructor for each additional functional assignment

(e) One safety person to each manually activated safety station

6-4.9

A method of fireground communications shall be established to enable coordination among the incident commander, the interior and exterior sectors, the safety officer, and external requests for assistance.

6-4.10

Emergency medical services shall be available on site to handle injuries. Written reports shall be filled out and submitted on all injuries and on all medical aid rendered.

6-4.11

One person shall be designated to control the materials being burned and to ignite the training fire in the presence of and under the direct supervision of a safety officer. This person shall not be a student and shall wear full protective clothing including self-contained breathing apparatus (SCBA) as required in 6-4.15 through 6-4.20 of this standard. The decision to ignite the training fire shall be made by the instructor in charge, in coordination with the safety officer.

6-4.12

No person(s) shall play the role of a victim inside the building.

6-4.13

Fires shall not be located in any designated exit paths.

6-4.14

The training session shall be curtailed, postponed, or canceled, as necessary, to reduce the risk of injury or illness caused by extreme weather conditions.

6-4.15

Each participant shall be equipped with full protective clothing and self-contained breathing apparatus (SCBA). All participants shall be inspected by the safety officer prior to entry into a live fire training evolution to ensure that the protective clothing and SCBA are being worn properly and are in serviceable condition.

6-4.16*

Protective coats, trousers, hoods, footwear, helmets, and gloves shall meet the requirements of NFPA 1971, *Standard on Protective Ensemble for Structural Fire Fighting.*

*Exception: For outside fires, those persons who do not engage in or are not exposed to the hazards of structural fire fighting shall be permitted to use helmets that meet federal OSHA requirements.*

6-4.17

Self-contained breathing apparatus (SCBA) shall meet the requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters.*

6-4.18*

Where station or work uniforms are worn by any participant, the station or work uniform shall meet the requirements of NFPA 1975, *Standard on Station/Work Uniforms for Fire Fighters.*

6-4.19

Personal alarm devices shall meet the requirements of NFPA 1982, *Standard on Personal Alert Safety Systems (PASS) for Fire Fighters.*

6-4.20

All students, instructors, safety personnel, and other personnel shall wear properly all protective clothing and equipment specified in this chapter whenever they are involved in any evolution or fire suppression operation during the live fire training evolution.

6-4.21*

All students, instructors, safety personnel, and other personnel participating in any evolution or operation of fire suppression during the live fire training evolution shall breathe from a SCBA air supply whenever operating under one or more of the following conditions:

(a) In an atmosphere that is oxygen deficient or contaminated by products of combustion, or both

(b) In an atmosphere that is suspected of being oxygen deficient or contaminated by products of combustion, or both

(c) In any atmosphere that can become oxygen deficient or contaminated, or both

(d) Below ground level

6-5 Instructors.

6-5.1

All instructors shall be deemed qualified to deliver fire fighter training by the authority having jurisdiction.

6-5.2*

The participating student-to-instructor ratio shall not be greater than 5 to 1.

6-5.3

Other factors such as extreme temperatures, large groups, and classes of long duration shall be taken into consideration, and additional instructors shall be designated as deemed necessary to ensure proper levels of safety.

6-5.4

The instructor-in-charge shall be responsible for full compliance with this standard.

6-5.5

Prior to the ignition of any fire, instructors shall ensure that all protective clothing and equipment specified in this chapter are being worn properly.

6-5.6*

The instructor-in-charge shall consider the circumstances of each training session and make suitable provisions for the rest and rehabilitation of members operating at the scene. These considerations shall include medical evaluation and treatment, food and fluid replenishment, and relief from climate conditions, in accordance with the circumstances of the training session.

6-5.7

Instructors responsible for conducting live fire training evolutions with a gas-fueled training system shall be trained properly in the complete operation of the system. The training of instructors shall be performed by an individual authorized by the system manufacturer.

## Chapter 7 Reports and Records

### 7-1 General.

7-1.1

The following records and reports shall be maintained on all live fire training evolutions in accordance with the requirements of this standard:

(a) An accounting of the activities conducted

(b) A listing of instructors present and their assignments

(c) A listing of all other participants

(d) Documentation of unusual conditions encountered

(e) Any injuries incurred and treatment rendered

(f) Any changes or deterioration of the structure

(g) Documentation of the condition of the premises and adjacent area at the conclusion of the training exercise

7-1.2*

For acquired buildings, records pertaining to the structure shall be completed.

7-1.3

Upon completion of the training session, an acquired building shall be formally turned over to the control of the property owner. A standard form indicating the transfer of authority for the building shall be completed.

7-1.4

A post-training critique session, complete with documentation, shall be conducted to evaluate student performance and to reinforce the training that was covered.

## Chapter 8 Referenced Publications

8-1

The following documents or portions thereof are referenced within this standard as mandatory requirements and shall be considered part of the requirements of this standard. The edition indicated for each referenced mandatory document is the current edition as of the date of the NFPA issuance of this standard. Some of these mandatory documents might also be referenced in this standard for specific informational purposes and, therefore, are also listed in Appendix D.

**8-1.1 NFPA Publications.**

National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 30, *Flammable and Combustible Liquids Code*, 1996 edition.

NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*, 1995 edition.

NFPA 59, *Standard for the Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants*, 1995 edition.

NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, 1992 edition.

NFPA 1041, *Standard for Fire Service Instructor Professional Qualifications*, 1996 edition.

NFPA 1231, *Standard on Water Supplies for Suburban and Rural Fire Fighting*, 1993 edition.

NFPA 1402, *Guide to Building Fire Service Training Centers*, 1997 edition.

NFPA 1561, *Standard on Fire Department Incident Management System*, 1995 edition.

NFPA 1971, *Standard on Protective Ensemble for Structural Fire Fighting*, 1997 edition.

NFPA 1975, *Standard on Station/Work Uniforms for Fire Fighters*, 1994 edition.

NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters*, 1992 edition.

NFPA 1982, *Standard on Personal Alert Safety Systems (PASS) for Fire Fighters*, 1993 edition.

## Appendix A Explanatory Material

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

A-1-3 Drills conducted to familiarize fire fighters with the proper use of self-contained breathing apparatus in a smoke environment should not be conducted under live fire conditions.

A-1-4 Authority Having Jurisdiction. The phrase "authority having jurisdiction" 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-2-1.1 The actual structural fire attack evolution is normally conducted for one of the two following purposes:

(a) As the final phase of basic training

(b) As an ongoing means of maintaining and improving acquired skills

In both instances, the live fire training evolution is a means by which a fire fighter can collectively display many combinations of earlier acquired skills and develop an appreciation of the necessary safety aspects of structural fire fighting.

A-2-1.3 The type of written documentation required can vary, depending upon the instructor's familiarity with the student participants' level of training from outside agencies. All student participants from outside agencies should be allowed to participate only as official representatives of an established organization. Prior documentation should be required in order to facilitate planning of the training session.

A-2-2.1 Where training facility burn buildings are available, they should be used instead of acquired structures.

A-2-2.3 Information pertaining to building ownership should be reviewed by the legal counsel of the authority having jurisdiction prior to accepting the structure.

A-2-2.4 Information regarding the written permission of the building owner should be reviewed by the legal counsel of the authority having jurisdiction prior to accepting the structure.

A-2-2.5 Information regarding cancellation of insurance by the building owner should be reviewed by the legal counsel of the authority having jurisdiction prior to accepting the structure.

A-2-2.9 Care should be exercised in the neutralization of hazards posed by closed tanks and vessels. The vessel or its contents can pose a hazard that should be eliminated. Appropriate references should be consulted or assistance should be obtained based on the specific circumstances encountered. The area within the tank should be filled with dry sand as a preferred means of rendering the internal atmosphere inert. Under no circumstances should water or other liquids be utilized as a means of inerting a tank or other closed vessel.

A-2-2.10 Low-density combustible fiberboard has been implicated as a major factor in the following rapidly spreading fires that resulted in fatalities:

(a) Our Lady of the Angels School (Chicago, IL, 1958)

(b) Hartford Hospital (Hartford, CT, 1961)

(c) Opemiska Social Club (Chapais, Quebec, 1980)

(d) Boulder Fire Department training fire (Boulder, CO, 1982)

Unconventional interior finishes include burlap, carpeting, and artificial turf.

The collapse of overhead structural members can result from the combined effect of the weight of both live and dead overhead loads as well as the loss of structural integrity caused by fire. Linoleum is a potential fuel source, particularly after being preheated by repeated fire exposure and thus can contribute to an unanticipated increase in fire intensity.

A-2-2.23 Reliability should be considered when determining what constitutes valid separate sources. The intent of this paragraph is to prevent the simultaneous loss of both attack lines and backup lines in the event of a pump or water supply failure. Where a public water supply system is used, two pumpers on two different hydrants should be used. Two pumpers drafting from the same pond or river also are appropriate, provided the source contains sufficient usable water. Where tankers or folding tanks, or both, are used, two separate pumpers should be used to supply the attack and backup lines.

A-2-3.2 Acceptable Class A materials include pine excelsior, wooden pallets, straw, hay, and other ordinary combustibles. An excessive fuel load can contribute to conditions that create unusually dangerous fire behavior. This can jeopardize structural stability, egress, and the safety of participants.

A-2-3.4 The instructor-in-charge is concerned with the safety of participants and the assessment of conditions that can lead to rapid, uncontrolled burning, commonly referred to as "flashover." Flashover can trap, injure, and kill fire fighters. Conditions known to be variables affecting the attainment of flashover are as follows:

(a) The heat release characteristics of materials used as primary fuels

(b) The preheating of combustibles

(c) The combustibility of wall and ceiling materials

(d) The room geometry (e.g., ceiling height, openings to rooms)

In addition, the arrangement of the initial materials to be ignited, particularly the proximity to walls and ceilings, and the ventilation openings are important factors to be considered when assessing the potential fire growth.

A-2-3.5 Plotting the expected avenues of firespread and the time factors for expected buildup of the fire provides an extra degree of safety for the participants of the exercise. Voids can result in sudden and unexpected vertical spread of the fire and trap participants by cutting off exit routes, or can result in unexpected weakening of the structural members, leading to collapse. To compensate for this potential hazard, the instructor-in-charge should prescribe primary and secondary exit paths for participants in the exercises.

A-2-3.6 Incidents of injuries and deaths during live fire training exercises indicate that fire growth dynamics were not considered or were inaccurately assessed prior to the beginning of the exercises. Fire growth is typically linear until the flame height reaches the ceiling; thereafter, rapid acceleration can be expected. It might be necessary to remove combustible wall and ceiling materials, reduce the amount of furnishings, or take other similar measures to reduce rapid fire

growth. Careful consideration should be given to the presence of combustible void spaces, and steps should be taken to ensure that the fire is not able to gain unexpected growth in such areas.

A-2-4.2 Severe weather presents the potential for health and safety hazards to all persons attending and participating in an exercise. Extreme heat can cause heat exhaustion or heat stroke, and extreme cold can cause frostbite, hypothermia, or slippery surfaces. An impending severe storm can bring lightning or high winds. Such situations warrant the careful consideration of limiting activity, waiting for a storm to pass, or postponing the exercise.

A-2-4.7 A minimum flow rate of 95 gpm (360 Lpm) is necessary in order to provide adequate quantities of water to cover the planned evolution plus a reserve for unanticipated emergencies. The appropriate quantity and exact flow rates that are needed for fire control and extinguishment should be calculated in advance, and certain factors such as equipment, manpower, fire area, and topography should be taken into consideration. Knowledge of the hoseline sizes, types of nozzles, type of fire stream to be utilized, and principles of fire attack and deployment aid in determining the exact flow rates that are necessary.

A-2-4.8 The additional safety personnel can be necessary to watch for signs of fire in voids, concealed spaces, and exit paths, or combinations thereof, at acquired structures. Where fire is discovered in any of these areas, the operation should cease as a training exercise and should be treated as a working structure fire.

A-2-4.10 Participants involved in the live fire training evolutions should be instructed to report to a predetermined location for a roll call if evacuation of the building is signaled. Instructors should immediately report any personnel not accounted for to the instructor-in-charge. Examples of an evacuation signal that could be used include a whistle, apparatus air horn, or high-low electronic siren.

A-2-4.20 Clothing worn under protective clothing can degrade and cause injury to the wearer, even without damaging the protective clothing. All wearers of protective clothing should be aware of the dangers of clothing made from certain all-synthetic materials that can melt and adhere to and burn the wearer even while wearing protective clothing that meets NFPA standards. Any clothing, such as shirts, pants, underwear, and sweatshirts, worn under protective clothing should meet the requirements of NFPA 1975, *Standard on Station/Work Uniforms for Fire Fighters*, whenever possible, or clothing should be selected, at a minimum, for the fabric's ability to resist ignition. Fire retardant fabrics and all-natural fibers should be considered.

A-2-4.23 No person should be allowed to breathe smoke, toxic vapors or fumes, products of combustion, or other contaminated atmospheres or be exposed to an oxygen-deficient atmosphere.

A-2-4.26 The gas-fueled training systems that are available can provide the instructors with the ability to ignite the fires from a remote control room. Igniting a fire in this manner can present a safety risk to unsuspecting personnel within the burn building. It is important for the instructor located in the control room to keep in constant communication with the instructor present within the burn building. This communication is critical when initiating a fire and throughout the training exercise.

A-2-5.2 It is important that the participating student-to-instructor ratio be monitored so it does not exceed the span of control necessary to provide proper supervision of trainees.

A-2-5.7 The two most serious heat-related illnesses are heat exhaustion and heat stroke. According to the NIOSH document, *Occupational Exposure to Hot Environments, Revised Criteria*, symptoms of heat exhaustion include fatigue, nausea, headache, dizziness, pallor, weakness, and thirst. Factors that predispose a person to heat exhaustion include sustained exertion in the heat, failure to replace the water lost in sweat, and lack of acclimatization. Heat exhaustion responds readily to prompt treatments such as moving to a cooler environment, resting in a recumbent position, and taking fluids by mouth.

Heat stroke is the more serious of the heat-related illnesses and is considered a medical emergency. Symptoms of heat stroke include hot, red, dry skin, a rectal temperature of 104°F (40°C) or above, confusion, possible convulsions or loss of consciousness, or any combination of these symptoms. Factors that predispose a person to heat stroke include sustained exertion in the heat by unacclimatized workers, lack of physical fitness, obesity, recent alcohol intake, dehydration, individual susceptibility, and chronic cardiovascular disease. Heat stroke should be treated immediately. Treatments to reduce body temperature rapidly include immersing in chilled water, rinsing with alcohol, wrapping in a wet sheet, or fanning with cool, dry air, or any combination of these treatments. A physician's care is necessary to treat possible secondary disorders such as shock or kidney failure. While heat exhaustion cases greatly outnumber heat stroke cases, every case of heat exhaustion should be treated as having the potential to develop into heat stroke.

Acclimatization is a physiological adaptation to heat stress that occurs over a short period of time. After acclimatization has occurred, the body sweats more while losing less salt and can maintain a lower core temperature and lower cardiovascular demands. A person becomes acclimatized to a certain work intensity and temperature with repeated exposures to that work load and temperature. Formal acclimatization procedures might not be necessary for all fire fighters; however, training drills should be held outdoors regularly so that seasonal acclimatization can occur. For additional protection against heat stress, fire fighters might want to perform their regular aerobic training activities outdoors, especially during the spring and summer.

The metabolic demands of fire fighting range from 60 percent to 100 percent of maximum aerobic capacity. Tasks such as stair climbing, roof venting, and rescue operations, when performed in full gear, have an energy cost of 85 percent to 100 percent of maximum capacity and lead to near maximum heart rates.

It is clear from these estimates that a high level of cardiovascular fitness is an advantage in performing fire-fighting tasks. The higher level of fitness allows a longer work period and provides a greater reserve in case of an unexpected increase in work demands or in extreme environmental conditions.

There are fire incidents during which even the fittest, most acclimatized fire fighter is exposed to significant heat stress. For this reason, many fire departments have adopted formal procedures for on-scene rehabilitation and have incorporated them into their manuals for standard operating procedures. The general goals of rehabilitation are as follows:

(a) To provide physical and mental rest, allowing the fire fighter to recuperate from demands of emergency operations and adverse environmental conditions

(b) To revitalize fire fighters by providing fluid replacement and food as needed

(c) To provide medical monitoring, including treatment of injuries, to determine if and when fire fighters are able to return to action

NOTE: This material was excerpted from the *NIOSH Health Hazard Evaluation Report*, HETA 90-395-2121, International Association of Fire Fighters (IAFF), Sedgwick County, KS, June 1991.

A-3-1.1 See A-2-1.1.

A-3-1.3 See A-2-1.3.

A-3-2.2 There should be ongoing concern for the progressive damage to burn buildings associated with fire intensity during live fire training evolutions. Excessive fire intensity can result in accelerated destruction of the training center burn building and can increase the risk to personnel to an unacceptable level.

A-3-2.4 Some training center burn buildings might utilize propane-fueled fires in lieu of Class A-fueled fires and still create a realistic fire training experience. Propane-fueled fires produce less smoke and other by-products than ordinary Class A combustibles and, therefore, create less of a negative environmental impact. Such fires also negate the need to clean up large amounts of burned materials at the end of the exercise, since no such materials are used. Such buildings might incorporate emergency shutdown switches and other electronic devices to monitor burn evolutions, which should provide an increased level of safety for fire fighters.

A-3-2.5 Some training center burn buildings utilize gas-fueled fires in lieu of Class A-fueled fires. Gas-fueled fires produce less smoke and other by-products than ordinary Class A combustibles and, therefore, create less of a negative environmental impact. Such fires also negate the need to clean up large amounts of burned materials at the end of the exercise, since no such materials are used. Such buildings incorporate emergency shutdown switches, ventilation systems, and other electronic devices to monitor burn evolutions, which should provide an increased level of safety for fire fighters.

A-3-2.12 See A-2-2.23.

A-3-3.2 Propane and liquefied natural gas remain in the liquid state only when they are stored and distributed under pressure. When either of these gases is released, the difference in the storage and atmospheric pressures can cause the liquid to convert quickly to a gas. During this conversion, liquid propane, for example, can expand 272.7 times its volume. With such a high expansion rate, a leaking liquid propane pipe has the potential to cause the space to reach an explosive level.

A-3-3.3 See A-2-3.4.

A-3-3.4 See A-2-3.6.

A-3-4.2 See A-2-4.2.

A-3-4.8 See A-2-4.7.

A-3-4.9 See A-2-4.8.

A-3-4.11 See A-2-4.10.

A-3-4.20 See A-2-4.20.

A-3-4.23 See A-2-4.23.

A-3-4.24 See A-2-4.26.

A-3-5.2 See A-2-5.2.

A-3-5.7 See A-2-5.7.

A-4-1.1 See A-2-1.1.

A-4-1.3 See A-2-1.3.

A-4-2.2 See A-3-2.2.

A-4-2.4 See A-3-2.4.

A-4-2.14 See A-2-2.23.

A-4-3.2 See A-2-3.2.

A-4-3.3 Where combustible liquids are used in a training center burn building, safety precautions should include, but should not be limited to, the following:

(a) The fuel is contained in a noncombustible container.

(b) A qualified person verifies that the rate of heat release does not result in unsafe conditions for the students, instructors, or structure.

(c) A system is in place to prevent overflow of the container when fire-fighting water is applied.

(d) A system is in place to prevent splashing of the fuel.

(e) A method is in place to control unburned vapors.

A-4-3.4 See A-2-3.4.

A-4-3.5 See A-2-3.5.

A-4-3.6 See A-2-3.6.

A-4-4.2 See A-2-4.2.

A-4-4.8 See A-2-4.7.

A-4-4.9 See A-2-4.8.

A-4-4.11 See A-2-4.10.

A-4-4.20 See A-2-4.20.

A-4-4.23 See A-2-4.23.

A-4-4.26 See A-2-4.26.

A-4-5.2 See A-2-5.2.

A-4-5.7 See A-2-5.7.

A-5-1.1 See A-2-1.1.

A-5-1.3 See A-2-1.3.

A-5-2.1 These practices vary greatly, depending on the evolutions performed and the location where performed. Props that are specifically designed for live fire training represent different challenges than props that are acquired for training. Acquired props were never designed to withstand repeated burning and might present unexpected reactions when exposed to fire.

A-5-2.19 See A-2-2.23.

A-5-3.2 A fire should not be larger than is necessary for the evolution. It should be understood that it is not necessary to have large fires to teach many of the basic evolutions and tactics. Where the objective of the training session is to train in the use of master streams or multiple attack lines, larger fires might be necessary. The key element is to maintain a fire that is controllable using the available resources.

A-5-3.3 See A-2-3.4.

A-5-3.4 See A-2-3.6.

A-5-3.6 The safety person at the remote shutoff should have the authority to shut off the fuel supply to the prop when, in the safety person's judgment, the prop has malfunctioned, the fire has gone dangerously out of control, or the extinguishment team is in jeopardy.

A-5-3.9 The list of the items to be removed prior to a vehicle burn evolution should consist of, but should not be limited to, bumper compression cylinders, shock absorbers, fuel tanks, drive shafts, battery, and brake shoes (asbestos). The oil pan, transmission, and differential drain plugs should be removed, and the fluids should be drained and disposed of properly.

A-5-4.2 See A-2-4.2.

A-5-4.7 See A-2-4.7.

A-5-4.8 See A-2-4.8.

A-5-4.18 See A-2-4.20.

A-5-4.21 See A-2-4.23.

A-5-5.2 See A-2-5.2.

A-5-5.7 See A-2-5.7.

A-6-1.1 See A-2-1.1.

A-6-1.3 See A-2-1.3.

A-6-2.1 See A-5-2.1.

A-6-2.19 See A-2-2.23.

A-6-3.2 See A-5-3.2.

A-6-3.3 See A-2-3.4.

A-6-3.4 See A-2-3.5.

A-6-3.5 See A-2-3.6.

A-6-3.7 See A-5-3.6.

A-6-4.2 See A-2-4.2.

A-6-4.8 See A-2-4.7.

A-6-4.16 Protective trousers might be susceptible to wicking where used with flammable and combustible liquids. Precautions should be taken to prevent protective trouser contact with flammable or combustible liquids.

Leather boots might be susceptible to degradation when contact is made with flammable or

combustible liquids. Precautions should be taken to prevent leather boots from coming in contact with flammable or combustible liquids.

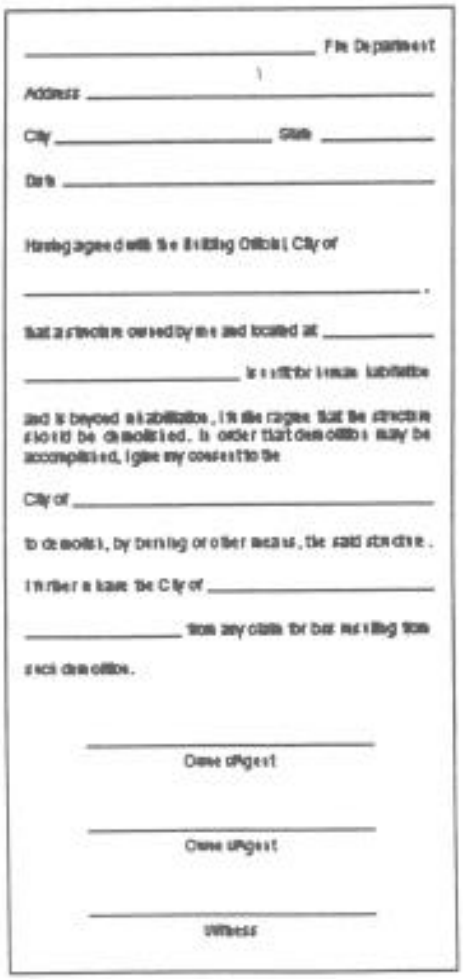
A-6-4.18 See A-2-4.20.

A-6-4.21 See A-2-4.23.

A-6-5.2 See A-2-5.2.

A-6-5.6 See A-2-5.7.

A-7-1.2 Figure A-7-1.2(a) shows a sample release form that can be used with acquired buildings. The exact form should be approved locally. Figure A-7-1.2(b) shows a standard notice of cancellation or nonrenewal of insurance.



_____ Fire Department

Address _____

City _____ State _____

Date _____

Having agreed with the Building Official, City of

_____,

that structure owned by me and located at _____

_____ is unfit for human habitation

and is beyond rehabilitation, it is agreed that the structure should be demolished. In order that demolition may be accomplished, I give my consent to the

City of _____

to demolish, by burning or other means, the said structure.

I further release the City of _____

_____ from any claim for loss resulting from

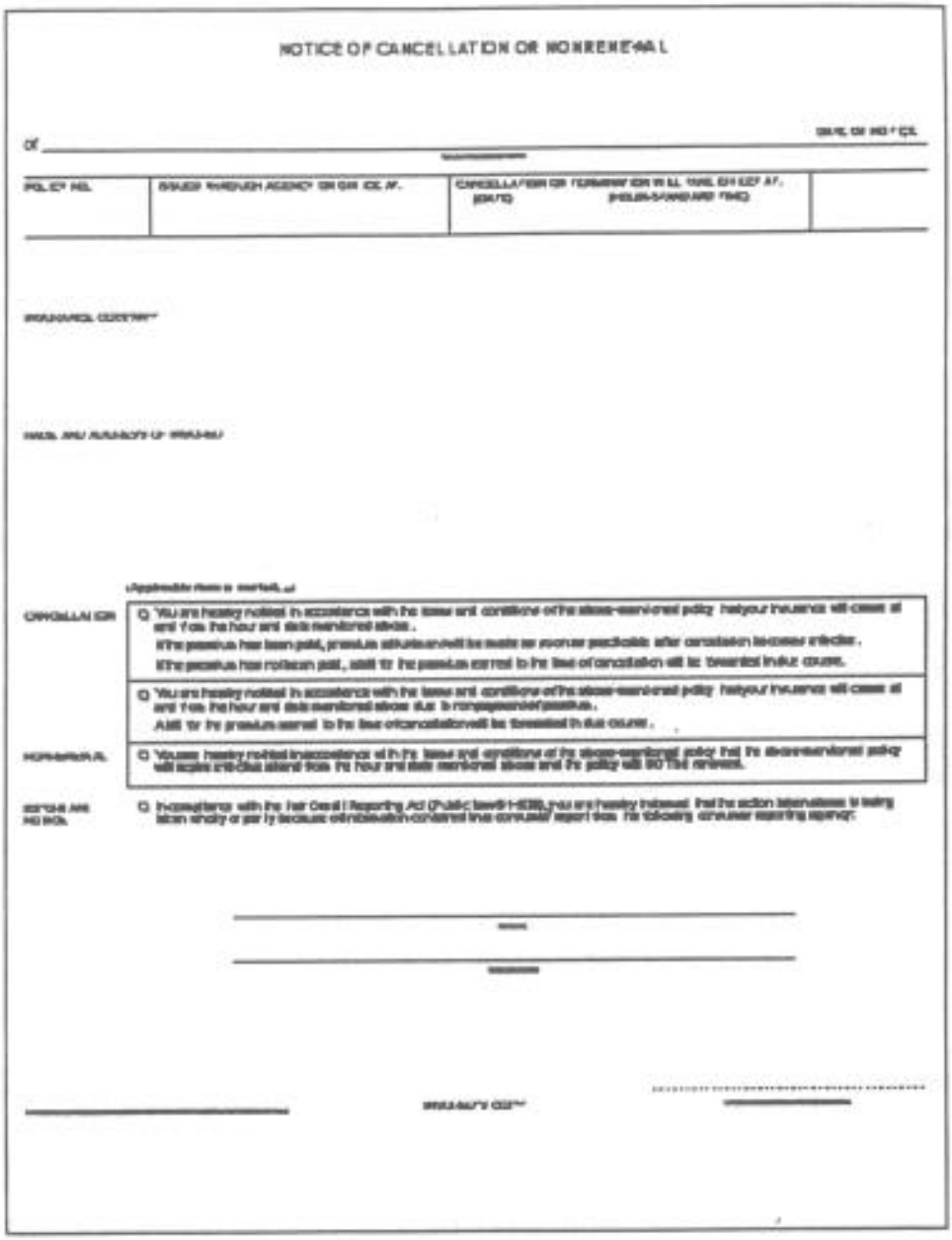
such demolition.

_____
Owner of Agent

_____
Owner of Agent

_____
Witness

Figure A-7-1.2(a) Sample release (exact form should be approved by local officials).



NOTICE OF CANCELLATION OR NONRENEWAL

Figure A-7-1.2(b) Notice of cancellation or nonrenewal.

## Appendix B Live Fire Evolution Sample Checklist

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

### B-1 Permits, Documents, Notifications, Insurance

☐ 1. Written documentation received from owner:

4-1.1*

In order to ensure safe operations during a live fire training exercise involving non-gas-fired training center buildings, all participating students shall have achieved a minimum level of basic training.

4-1.2

Prior to being permitted to participate in live fire training evolutions, the student shall have received training to meet the performance objectives for Fire Fighter I of the following sections of NFPA 1001, *Standard for Fire Fighter Professional Qualifications:*

Section 3-3 Safety

Section 3-5 Fire Behavior

Section 3-6 Portable Extinguishers

Section 3-7 Personal Protective Equipment

Section 3-11 Ladders

Section 3-12 Fire Hose, Appliances and Streams

Section 3-16 Overhaul

Section 3-19 Water Supply

4-1.3*

Students participating in a live fire training evolution who have received the required minimum basic training from other than the authority having jurisdiction shall not be permitted to participate in any live fire training evolution without presenting prior written evidence of having successfully completed the prescribed minimum training to the levels specified in 4-1.2.

**4-2 Structures and Facilities.**

4-2.1

Strict safety practices shall be applied to all structures selected for live fire training evolutions. These practices vary greatly in the degree of application where comparing burn building structures to acquired structures. By nature, burn buildings have been designed specifically for the purpose of repeated live fire training evolutions and include safeguards that become unacceptably hazardous only through misuse or improper maintenance.

4-2.2*

Training center burn buildings shall be inspected visually for damage prior to live fire training evolutions. Damage shall be documented. The structural integrity of the building shall be evaluated and documented periodically, but at least annually. Where the burn building damage is severe enough to affect the safety of the students, training shall not be permitted.

4-2.3

All doors, windows and window shutters, roof scuttles and automatic ventilators, mechanical equipment, lighting, manual or automatic sprinklers, and standpipes necessary for the live fire training evolution shall be checked and operated, where appropriate, prior to any live fire training evolution to ensure they operate correctly.

4-2.4*

All safety devices, such as thermometers, oxygen and toxic and combustible gas monitors, evacuation alarms, and emergency shutdown switches, shall be checked prior to any live fire training evolutions to ensure they operate correctly.

4-2.5

Training center burn buildings shall be left in a safe condition upon completion of live fire training evolutions. Debris hindering the access or egress of fire fighters shall be removed prior to the beginning of the next training exercises.

4-2.6

In preparation for live fire training, an inspection of the structure shall be made to determine that the floors, walls, stairs, and other structural components are capable of withstanding the weight of contents, participants, and accumulated water.

4-2.7

Property adjacent to the training site that could be affected by the smoke from the live fire training evolution, such as railroads, airports, or heliports; and nursing homes, hospitals, or other similar facilities shall be identified, and the persons in charge shall be informed of the date and time of the evolution.

4-2.8

Streets or highways in the vicinity of the training site shall be surveyed for potential effects from live fire training evolutions. Appropriate safeguards shall be taken to eliminate any possible hazard to motorists. Such safeguards can include street closings, traffic rerouting, signs, and police traffic control.

4-2.9

Pedestrian traffic in the vicinity of the training site shall be kept clear of the operations area of the live burn. Fire lines shall be established for this purpose.

4-2.10

Awareness of weather conditions, wind velocity, and wind direction shall be maintained. In all cases, a final check shall be made for possible changes in weather conditions immediately before actual ignition.

4-2.11

The water supply for any individual live fire training evolution shall be assessed carefully based on the extent of the evolutions to be performed. Consideration shall be given to the proper control and extinguishment of the fire and the provision of necessary backup lines to protect personnel.

4-2.12

The minimum water supply and delivery for live fire training evolutions shall meet the criteria identified in NFPA 1231, *Standard on Water Supplies for Suburban and Rural Fire Fighting.*

4-2.13

A minimum reserve of additional water in the amount of 50 percent of the fire flow demand in 4-2.12 shall be available to handle exposure protection or unforeseen situations.

4-2.14*

Separate sources shall be utilized for the supply of attack lines and backup lines in order to preclude the loss of both water supply sources at the same time.

*Exception: A single source shall be sufficient at a training center facility where the water system has been engineered to provide adequate volume for the evolutions conducted and a backup power source or backup pumps, or both, are in place to ensure an uninterrupted supply in the event of a power failure or malfunction.*

**4-2.15**

Adequate areas for the staging, operating, and parking of fire apparatus that are used in the live fire training evolution shall be designated.

**4-2.16**

An area for parking fire apparatus and vehicles that are not a part of the evolution shall be designated so as not to interfere with fireground operations. Consideration shall be given to locating this area in order to facilitate prompt response of apparatus in the event of an emergency.

**4-2.17**

Where required or necessary, parking areas for police vehicles or for the press shall be designated.

**4-2.18**

A parking area for an ambulance or an emergency medical services vehicle shall be designated. Consideration shall be given to locating this area to facilitate prompt response in the event of a personal injury to participants in the evolution.

**4-2.19**

Consideration shall be given to the designation and layout of ingress/egress routes in order to ensure their availability in the event of an emergency.

**4-2.20**

Prior to conducting actual live fire training evolutions, a preburn briefing session shall be conducted for all participants. All facets of each evolution to be conducted shall be discussed, and assignments shall be made for all crews participating in the training session. The location of simulated victims shall not be required to be disclosed, provided that the possibility of victims is discussed during the preburn briefing.

**4-2.21**

A preburn plan shall be prepared and shall be utilized during the preburn briefing sessions. All features of the training areas and structure shall be indicated on the plan.

**4-2.22**

Prior to conducting any live fire training, all participants shall have a knowledge of and familiarity with the layout of the building in order to facilitate any necessary evacuation of the building. Prior to conducting any live fire training in the structure, all participants in the evolution shall be required to conduct a walk-through of the structure.

**4-2.23**

All spectators shall be restricted to an area outside the operations area perimeter established by the safety officer.

4-2.24

Appropriate control measures such as ropes, signs, and fire line markings shall be posted to indicate the perimeter of the operations area.

4-2.25

Visitors who are allowed to observe operations and who are allowed within the operations area perimeter shall be escorted at all times and shall be equipped with and shall properly wear complete protective clothing in accordance with 4-4.17 through 4-4.22.

4-2.26

All possible sources of ignition, other than those that are under the direct supervision of the person responsible for the start of the training fire, shall be removed from the operations area.

**4-3 Fuel Materials.**

4-3.1

The fuels that are utilized in live fire training evolutions shall have known burning characteristics that are as controllable as possible. Unidentified materials, such as debris found in or around the structure that could burn in unanticipated ways, react violently, or create environmental or health hazards, shall not be permitted to be used.

4-3.2*

Fuel materials shall be used only in the amounts necessary to create the desired fire size. Pressure-treated wood, rubber, and plastic, and straw or hay treated with pesticides or harmful chemicals shall not be permitted to be used. The fuel load shall be limited to avoid conditions that could cause an uncontrolled flashover or backdraft.

4-3.3*

The use of flammable or combustible liquids, as defined in NFPA 30, *Flammable and Combustible Liquids Code,* shall not be permitted for use in live fire training evolutions in structures.

*Exception: Limited quantities of combustible liquid with a flash point above 100°F (38°C) shall be permitted to be used in a training center burn building that has been specifically engineered to accommodate this fuel.*

4-3.4*

The instructor-in-charge shall assess the selected fire room environment for factors that can affect the growth, development, and spread of the fire.

4-3.5*

The instructor-in-charge, as a minimum, shall document fuel loading including furnishings; wall and floor coverings, and ceiling materials; type of construction of the structure including type of roof and combustible void spaces; and dimensions of room.

4-3.6*

The training exercise shall be stopped immediately when the instructor-in-charge determines through ongoing assessment that the combustible nature of the environment represents a potential hazard. The exercise shall continue only when the appropriate actions have been taken to reduce

the hazard.

4-4 Safety.

4-4.1

A safety officer shall be appointed for all live fire training evolutions.

4-4.2*

The safety officer shall have the authority, regardless of rank, to intervene and control any aspect of the operations when, in his or her judgment, a potential or actual danger, accident, or unsafe condition exists.

4-4.3

The responsibilities of the safety officer shall include, but shall not be limited to the following:

(a) The prevention of unsafe acts

(b) The elimination of unsafe conditions

4-4.4

The safety officer shall provide for the safety of all persons on the scene including students, instructors, visitors, and spectators.

4-4.5

The safety officer shall not be assigned other duties that interfere with safety responsibilities.

4-4.6

The safety officer shall be knowledgeable in the operation and location of safety features available within the burn building, such as emergency shutoff switches, gas shutoff valves, and evacuation alarms.

4-4.7

Sufficient backup lines shall be provided to ensure adequate protection for personnel on training attack lines.

4-4.8*

The instructor-in-charge of the live fire training evolutions shall determine, prior to each specific evolution, the number of training attack lines and backup lines that are necessary. Each hose line shall be capable of delivering a minimum of 95 gpm (360 Lpm). The instructor-in-charge then shall assign the following:

(a) One instructor to each functional crew, which shall not exceed five students

(b) One instructor to each backup line

(c) Sufficient additional personnel to backup lines to provide mobility

(d) One additional instructor for each additional functional assignment

4-4.9*

Additional safety personnel, as deemed necessary by the safety officer, shall be located strategically within the structure to react to any unplanned or threatening situation or condition.

4-4.10

A method of fireground communications shall be established to enable coordination among the incident commander, the interior and exterior sectors, the safety officer, and external requests for assistance.

4-4.11*

A building evacuation plan shall be established and an evacuation signal shall be demonstrated to all participants in an interior live fire training evolution.

4-4.12

Emergency medical services shall be available on site to handle injuries. Written reports shall be filled out and submitted on all injuries and on all medical aid rendered.

4-4.13

A thorough search of the structure shall be conducted to ensure that no unauthorized persons, animals, or objects are in the building immediately prior to ignition.

4-4.14

No person(s) shall play the role of a victim inside the building.

4-4.15

Fires shall not be located in any designated exit paths.

4-4.16

The training session shall be curtailed, postponed, or canceled, as necessary, to reduce the risk of injury or illness caused by extreme weather conditions.

4-4.17

Each participant shall be equipped with full protective clothing and self-contained breathing apparatus (SCBA). All participants shall be inspected by the safety officer prior to entry into a live fire training evolution to ensure that the protective clothing and SCBA are being worn properly and are in serviceable condition.

4-4.18

Protective coats, trousers, hoods, footwear, helmets, and gloves shall meet the requirements of NFPA 1971, *Standard on Protective Ensemble for Structural Fire Fighting.*

4-4.19

Self-contained breathing apparatus (SCBA) shall meet the requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters.*

4-4.20*

Where station or work uniforms are worn by any participant, the station or work uniform shall meet the requirements of NFPA 1975, *Standard on Station/Work Uniforms for Fire Fighters.*

4-4.21

Personal alarm devices shall meet the requirements of NFPA 1982, *Standard on Personal Alert Safety Systems (PASS) for Fire Fighters.*

4-4.22

All students, instructors, safety personnel, and other personnel shall wear properly all protective

- ☐ Press vehicles
- ☐ Private vehicles
- ☐ 9. Operations area established and perimeter marked
- ☐ 10. Communications frequencies established, equipment obtained

**B-3 Building Preparation**

- ☐ 1. Building inspected to determine structural integrity
- ☐ 2. All utilities disconnected (acquired buildings only)
- ☐ 3. Highly combustible interior wall and ceiling coverings removed
- ☐ 4. All holes in walls and ceilings patched
- ☐ 5. Materials of exceptional weight removed from above training area (or area sealed from activity)
- ☐ 6. Ventilation openings of adequate size precut for each separate roof area
- ☐ 7. Windows checked and operated, openings closed
- ☐ 8. Doors checked and operated, opened or closed, as needed
- ☐ 9. Building components checked and operated:
  - ☐ Roof scuttles
  - ☐ Automatic ventilators
  - ☐ Mechanical equipment
  - ☐ Lighting equipment
  - ☐ Manual or automatic sprinklers
  - ☐ Standpipes
- ☐ 10. Stairways made safe with railings in place
- ☐ 11. Chimney checked for stability
- ☐ 12. Fuel tanks and closed vessels removed or adequately vented
- ☐ 13. Unnecessary inside and outside debris removed
- ☐ 14. Porches and outside steps made safe
- ☐ 15. Cisterns, wells, cesspools, and other ground openings fenced or filled
- ☐ 16. Hazards from toxic weeds, hives, and vermin eliminated
- ☐ 17. Hazardous trees, brush, and surrounding vegetation removed
- ☐ 18. Exposures such as buildings, trees, and utilities removed or protected
- ☐ 19. All extraordinary exterior and interior hazards remedied
- ☐ 20. Fire "sets" prepared:
  - ☐ Class A materials only
  - ☐ No flammable or combustible liquids
  - ☐ No contaminated materials

**B-4 Preburn Procedures**

- ☐ Permission to burn structure
- ☐ Proof of clear title
- ☐ Certificate of insurance cancellation
- ☐ Acknowledgment of post-burn property condition

☐ 2. Local burn permit received

☐ 3. Permission obtained to utilize fire hydrants

☐ 4. Notification made to appropriate dispatch office of date, time, and location of burn

☐ 5. Notification made to all affected police agencies:

- ☐ Received authority to block off roads
- ☐ Received assistance in traffic control

☐ 6. Notification made to owners and users of adjacent property of date, time, and location of burn

☐ 7. Liability insurance obtained covering damage to other property

☐ 8. Written evidence of prerequisite training obtained from participating students from outside agencies

**B-2 Preburn Planning**

☐ 1. Preburn plans made, showing the following:

- ☐ Site plan drawing, including all exposures
- ☐ Building plan, including overall dimensions
- ☐ Floor plan detailing all rooms, hallways, and exterior openings
- ☐ Location of command post
- ☐ Position of all apparatus
- ☐ Position of all hoses, including backup lines
- ☐ Location of emergency escape routes
- ☐ Location of emergency evacuation assembly area
- ☐ Location of ingress and egress routes for emergency vehicles

☐ 2. Available water supply determined

☐ 3. Required fire flow determined for the burn building and exposure buildings

☐ 4. Required reserve flow determined (50 percent of fire flow)

☐ 5. Apparatus pumps obtained that meet or exceed the required fire flow for the building and exposures

☐ 6. Separate water sources established for attack and backup hoselines

☐ 7. Periodic weather reports obtained

☐ 8. Parking areas designated and marked:

- ☐ Apparatus staging
- ☐ Ambulances
- ☐ Police vehicles

- ☐ 1. All participants briefed:
  - ☐ Building layout
  - ☐ Crew and instructor assignments
  - ☐ Safety rules
  - ☐ Building evacuation procedure
  - ☐ Evacuation signal (demonstrate)
- ☐ 2. All hoselines checked:
  - ☐ Sufficient size for the area of fire involvement
  - ☐ Charged and test flowed
  - ☐ Supervised by qualified instructors
  - ☐ Adequate number of personnel
- ☐ 3. Necessary tools and equipment positioned
- ☐ 4. Participants checked:
  - ☐ Approved full protective clothing
  - ☐ Self-contained breathing apparatus
  - ☐ Adequate SCBA air volume
  - ☐ All equipment properly donned

**B-5 Post-Burn Procedures**

- ☐ 1. All personnel accounted for
- ☐ 2. Remaining fires overhauled, as needed
- ☐ 3. Building inspected for stability and hazards where more training is to follow (see B-3, "Building Preparation")
- ☐ 4. Training critique conducted
- ☐ 5. Records and reports prepared, as required:
  - ☐ Account of activities conducted
  - ☐ List of instructors and assignments
  - ☐ List of other participants
  - ☐ Documentation of unusual conditions or events
  - ☐ Documentation of injuries incurred and treatment rendered
  - ☐ Documentation of changes or deterioration of training center burn building
  - ☐ Acquired building release
  - ☐ Student training records
  - ☐ Certificates of completion
- ☐ 6. Building and property released to owner, release document signed

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

**C-1 Instructor-in-Charge**

- ☐ 1. Plan and coordinate all training activities
- ☐ 2. Monitor activities to ensure safe practices
- ☐ 3. Inspect building integrity prior to each fire
- ☐ 4. Assign instructors:
  - ☐ Attack hoselines
  - ☐ Backup hoselines
  - ☐ Functional assignments
  - ☐ Teaching assignments
- ☐ 5. Brief instructors on responsibilities:
  - ☐ Accounting for assigned students
  - ☐ Assessing student performance
  - ☐ Clothing and equipment inspection
  - ☐ Monitoring safety
  - ☐ Achieving tactical and training objectives
- ☐ 6. Assign coordinating personnel, as needed:
  - ☐ Emergency medical services
  - ☐ Communications
  - ☐ Water supply
  - ☐ Apparatus staging
  - ☐ Equipment staging
  - ☐ Breathing apparatus
  - ☐ Personnel welfare
  - ☐ Public relations
- ☐ 7. Ensure adherence to this standard by all persons within the training area

**C-2 Safety Officer**

- ☐ 1. Prevent unsafe acts
- ☐ 2. Eliminate unsafe conditions
- ☐ 3. Intervene and terminate unsafe acts
- ☐ 4. Supervise additional safety personnel, as needed
- ☐ 5. Coordinate lighting of fires with instructor-in-charge
- ☐ 6. Ensure compliance of participants' personal equipment with applicable standards:
  - ☐ Protective clothing
  - ☐ SCBA

☐ Personal alarm devices, where used

☐ 7. Ensure that all participants are accounted for, both before and after each evolution

**C-3 Instructor**

☐ 1. Monitor and supervise assigned students (no more than five per instructor)

☐ 2. Inspect students' protective clothing and equipment

☐ 3. Account for assigned students, both before and after evolutions

**C-4 Student**

☐ 1. Acquire prerequisite training

☐ 2. Become familiar with building layout

☐ 3. Wear approved full protective clothing

☐ 4. Wear approved self-contained breathing apparatus

☐ 5. Obey all instructions and safety rules

☐ 6. Provide documentation of prerequisite training, where from an outside agency

## Appendix D Referenced Publications

**D-1** The following documents or portions thereof are referenced within this standard for informational purposes only and are thus not considered part of the requirements of this standard unless also listed in Chapter 8. The edition indicated here for each reference is the current edition as of the date of the NFPA issuance of this standard.

**D-1.1 NFPA Publication.** National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 1975, *Standard on Station/Work Uniforms for Fire Fighters*, 1994 edition.

**D-1.2 Other Publications.**

**D-1.2.1 NIOSH Publications.** NIOSH, 944 Chestnut Ridge Road, Morgantown, WV 26505.

HETA 90-395-2121, NIOSH *Health Hazard Evaluation Report*, 1990.

*Occupational Exposure to Hot Environments, Revised Criteria*, 1986.

**D-1.2.2 Additional Reference.**

International Association of Fire Fighters (IAFF), Sedgwick County, KS.