NFPA®

1403

Standard on Live Fire Training Evolutions

2018

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NFPA® 1403

Standard on

Live Fire Training Evolutions

2018 Edition

This edition of NFPA 1403, *Standard on Live Fire Training Evolutions*, was prepared by the Technical Committee on Fire Service Training and acted on by NFPA at its June Association Technical Meeting held June 4–7, 2017, in Boston, MA. It was issued by the Standards Council on August 17, 2017, with an effective date of September 6, 2017, and supersedes all previous editions.

This edition of NFPA 1403 was approved as an American National Standard on September 6, 2017.

Origin and Development of NFPA 1403

The ongoing training of fire fighters is the cornerstone of good fire protection in today's world. However, the benefits derived from live fire training can be negated by the injuries and deaths suffered by fire fighters under unsafe and poorly supervised training conditions.

Following a tragic training accident in 1982, which resulted in the deaths of two fire fighters, the Committee on Fire Service Training was urged to address the issue of live fire training evolutions in structures. The committee proceeded to develop NFPA 1403 in order to provide recognized safe practices for conducting such training evolutions.

The first edition, titled *Live Fire Training Evolutions in Structures*, was issued in 1986. It was well received and served as the basis for live fire training evolutions throughout the United States. The document was updated in a 1992 edition. In the 1997 revision, the committee combined NFPA 1403 and NFPA 1406, *Outside Live Fire Training Evolutions*, into a single document.

The committee appointed a task group to review the functionality of the 1997 edition in preparation for the 2002 revision. The task group recommended a general updating of the standard. Changes were made to reflect increased experience with live fire training evolutions. The previous numbering of chapters and paragraphs was changed to reflect requirements in the 2000 edition of the *Manual of Style for NFPA Technical Committee Documents*.

The 2007 edition updated training requirements for live fire training structures, exterior props, and Class B fires. This edition also contained several editorial changes.

For the 2012 edition, the committee added a new Chapter 4 to address general requirements to which all live fire training evolutions must adhere for safety and that were previously located in individual chapters. The committee also further clarified the requirements for emergency medical services, allowable types of Class A products, instructor duties, and the role of the fire control team. A new requirement was added that mandated that each burn room have a burn plan in place to limit building damage and injuries to fire fighters. The inspection and maintenance requirements for live fire training structures were also revised.

For the 2018 addition, new definitions were added, and safety requirements were clarified and strengthened. Annex materials were also updated to provide additional recommended practices and guidance as well as additional reference links.

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

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NFPA 1403

Standard on

Live Fire Training Evolutions

2018 Edition

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex E. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

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

Chapter 1 Administration

1.1* Scope.

1.1.1 This standard shall contain the minimum requirements for training all fire suppression personnel engaged in fire-fighting operations under live fire conditions.

1.1.2 The minimum requirements for training shall comprise a basic system that can be adapted to local conditions to serve as a standard mechanism for live fire training.

1.2* Purpose.

1.2.1 The purpose of this standard shall be to provide a process for conducting live fire training evolutions to ensure that training objectives are achieved and that exposure to health and safety hazards for the fire fighters receiving the training is minimized.

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1.3 Application.

1.3.1 All live fire training shall be conducted in compliance with the current edition of this standard.

1.3.2 Procedures for live fire training evolutions that involve ground cover or wildland fires shall not be covered in this standard.

1.3.3* Procedures for suppression of fires set for the sole purpose of training individuals for fire cause and origin investigation shall not be covered in this standard.

1.3.4 Live fire training shall only be conducted using standard operating procedures (SOPs) developed by the authority having jurisdiction in compliance with this standard.

Chapter 2 Referenced Publications

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

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

NFPA 30, *Flammable and Combustible Liquids Code,* 2015 edition.

NFPA 58, *Liquefied Petroleum Gas Code,* 2017 edition.

NFPA 59, *Utility LP-Gas Plant Code,* 2015 edition.

NFPA 1001, *Standard for Fire Fighter Professional Qualifications,* 2013 edition.

NFPA 1041, *Standard for Fire Service Instructor Professional Qualifications,* 2012 edition.

NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting,* 2017 edition.

NFPA 1407, *Standard for Training Fire Service Rapid Intervention Crews,* 2015 edition.

NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting,* 2013 edition.

NFPA 1975, *Standard on Emergency Services Work Clothing Elements,* 2014 edition.

NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services,* 2013 edition.

NFPA 1982, *Standard on Personal Alert Safety Systems (PASS),* 2013 edition.

2.3 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

NFPA 1001, *Standard for Fire Fighter Professional Qualifications,* 2013 edition.

NFPA 1410, *Standard on Training for Initial Emergency Scene Operations,* 2015 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program,* 2013 edition.

NFPA 1670, *Standard on Operations and Training for Technical Search and Rescue Incidents,* 2014 edition.

Chapter 3 Definitions

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

3.2 NFPA Official Definitions.

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

3.2.2 Shall. Indicates a mandatory requirement.

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

3.2.4 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase "standards development process" or "standards development activities," the term "standards" includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Acquired Prop. A piece of equipment such as an automobile that was not designed for burning but is used for live fire training evolutions.

3.3.2 Backdraft. A deflagration resulting from the sudden introduction of air into a confined space containing oxygen-deficient products of incomplete combustion.

3.3.3 Combustible. Capable of burning, generally in air under normal conditions of ambient temperature and pressure, unless otherwise specified. Combustion can occur in cases where an oxidizer other than oxygen in air is present (e.g., chlorine, fluorine, or chemicals containing oxygen in their structure).

3.3.4 Conduction. Heat transfer to another body or within a body by direct contact.

3.3.5 Convection. Heat transfer by circulation within a medium such as a gas or a liquid.

3.3.6 Deflagration. Propagation of a combustion zone at a velocity that is less than the speed of sound in the unreacted medium.

3.3.7 Demonstration. The act of showing a skill.

Δ **3.3.8 Emergency Medical Services.** The provision of treatment, such as first aid, cardiopulmonary resuscitation, basic life support, advanced life support, and other pre-hospital procedures including ambulance transportation, to patients. [**1500,** 2013]

3.3.9 Evolution. A set of prescribed actions that result in an effective fireground activity. [**1410,** 2015]

3.3.10 Flameover (Rollover). The condition in which unburned fuel (pyrolysate) from the originating fire has accumulated in the ceiling layer to a sufficient concentration (i.e., at or above the lower flammable limit) that it ignites and burns. Flameover can occur without ignition of or prior to the ignition of other fuels separate from the origin.

3.3.11 Flashover. A transition phase in the development of a compartment fire in which surfaces exposed to thermal radiation reach ignition temperature more or less simultaneously and fire spreads rapidly throughout the space, resulting in full room involvement or total involvement of the compartment or enclosed space.

N **3.3.12 Flow Path.** A path composed of at least one intake opening, one exhaust opening, and the connecting volume between the openings with the direction of the flow within the path determined by the difference in pressure where heat and smoke in a higher-pressure area will flow through openings toward areas of lower pressure, and cool, dense ambient air at atmospheric pressure will flow through openings into areas of lower pressure.

3.3.13 Fuel Load. The total quantity of combustible contents of a building, space, or fire area, including interior finish and trim, expressed in heat units or the equivalent weight in wood.

N **3.3.14 High-Temperature Environment.** An environment with a temperature above 104°F (40°C).

N **3.3.15 Immediately Dangerous to Life or Health (IDLH).** Any condition that would pose an immediate or delayed threat to life, cause irreversible adverse health effects, or interfere with an individual's ability to escape unaided from a hazardous environment. [**1670,** 2014]

3.3.16 Instructor. An individual qualified by the authority having jurisdiction to deliver fire-fighter training, who has the training and experience to supervise students during live fire training evolutions, and who has met the requirements of an Instructor I in accordance with NFPA 1041.

3.3.17 Instructor-in-Charge. An individual qualified as an instructor and designated by the authority having jurisdiction to be in charge of the live fire training evolution, and who has met the requirements of an Instructor II in accordance with NFPA 1041.

3.3.18 Live Fire. Any unconfined open flame or device that can propagate fire to the building, structure, or other combustible materials.

3.3.19 Participant. Any student, instructor, safety officer, visitor, or other person who is involved in the live fire training evolution within the operations area.

3.3.20 Personal Accountability Report (PAR). A report requested by and communicated to the incident commander from fire crews operating at a scene as to their location and situation.

3.3.21 Personal Protective Clothing. The full complement of garments fire fighters are normally required to wear while on emergency scene, including turnout coat, protective trousers, fire-fighting boots, fire-fighting gloves, a protective hood, and a helmet with eye protection. [**1001,** 2013]

3.3.22 Personal Protective Equipment (PPE). Consists of full personal protective clothing, plus a self-contained breathing apparatus (SCBA) and a personal alert safety system (PASS) device. [**1001,** 2013]

3.3.23 Pyrolysate. Product of decomposition through heat; a product of a chemical change caused by heating.

3.3.24 Radiation. Heat transfer by way of electromagnetic energy.

3.3.25 Safety Officer. An individual appointed by the authority having jurisdiction as qualified to maintain a safe working environment at all live fire training evolutions.

3.3.26 Student. Any person who is present at the live fire training evolution for the purpose of receiving training.

3.3.27 Training Structure.

3.3.27.1 ***Acquired Structure.*** A building or structure acquired by the authority having jurisdiction from a property owner for the purpose of conducting live fire training evolutions.

3.3.27.2* ***Live Fire Training Structure.*** A structure specifically designed for conducting live fire training evolutions on a repetitive basis.

3.3.28 Ventilation-Controlled Fire. A fire in which the heat release rate or growth is controlled by the amount of air available to the fire.

Chapter 4 General

4.1 Application. All live fire training evolutions shall comply with this chapter and the appropriate chapter for the type of training being performed.

4.1.1 Strict safety practices shall be applied to all structures selected for live fire training evolutions.

4.2 Permits.

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

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

4.2.3 The runoff from live fire shall comply with the requirements of the AHJ.

4.3 Student Prerequisites.

Δ **4.3.1*** **Required Minimum Training.** Prior to being permitted to participate in live fire training evolutions, the student shall have received training to meet the minimum job performance requirements for Fire Fighter I in NFPA 1001 related to the following subjects:

(1) Safety
(2) Fire behavior
(3) Portable extinguishers
(4) Personal protective equipment (PPE)
(5) Ladders
(6) Fire hose, appliances, and streams
(7) Overhaul
(8) Water supply
(9) Ventilation
(10) Forcible entry
(11) Building construction

Δ **4.3.2 Prerequisites for Live Fire Training Participants.** Prior to being permitted to participate in live fire training evolutions, all participants shall have received training to meet the requirements in accordance with 4.3.2.1 through 4.3.2.5.

N **4.3.2.1 Fire Dynamics.** All participants shall have received training for the following:

(1) The conditions necessary for flashover to occur
(2) The components of fire and definition of a fire
(3) The three mechanisms of heat transfer — conduction, convection, and radiation

N **4.3.2.2 Health and Safety.** All participants shall have received training for the following:

(1) The components of their protective clothing and equipment required for use during operational evolutions
(2) The capabilities and limitations of their protective clothing and equipment

N **4.3.2.3 Fundamentals of Fire Behavior.** All participants shall be given classroom training for the following skills:

(1) Describing the basic chemical and physical processes involved in combustion
(2) Explaining fire phenomena using the fire triangle and tetrahedron as simple models of combustion
(3) Explaining basic concepts of thermal dynamics, including thermal energy, temperature, and methods of heat transfer
(4) Describing the combustion process for gaseous, liquid, and solid fuels
(5) Explaining the concepts of heat of combustion and heat release rate
(6) Describing the influence of the fuel/oxygen mixture on combustion
(7) Explaining the concept of chemical chain reaction as it relates to flaming combustion
(8) Recognizing characteristics of common types of combustion products
(9) Using terminology related to combustion and fire dynamics

N **4.3.2.4 Fire Development in a Compartment.** All participants shall have received training for the following:

(1) The general development of a fire and extension beyond a single room or compartment, including heat transfer methods, pressurization within the space, stages of fire development, and transition from fuel-controlled to ventilation-controlled combustion
(2) Building factors influencing fire development
(3) The stage of fire growth for fuel-limited fire
(4) The stages of fire growth for a ventilation-limited fire
(5) The significance of the transition from a contents fire to a structural fire
(6) Terminology related to fire development, including plume, ceiling jet, hot gas layer, neutral plane, flow path, and gravity current
(7) The impact of the following factors on fire development in a compartment:
    (a) Type of fuel
    (b) Availability and locations of additional fuel
    (c) Volume of the compartment

(d) Ceiling height and size, number, and arrangement of ventilation openings
(e) Thermal properties of the enclosure (i.e., insulation)

(8) The hazards presented by fire behavior that impact a singular or multiple compartment(s)
(9) How the following fire behavior phenomena occur:
(1) Flashover
(2) Backdraft
(3) Smoke explosion
(10) The influence of changes in ventilation in each of the following burning regimes:
(a) Fuel-controlled
(b) Ventilation-controlled
(11) Differences among ventilation, unplanned ventilation, and tactical ventilation
(12) The significance of fire behavior indicators in each of the following categories:
(a) Building
(b) Smoke
(c) Flow path
(d) Heat
(e) Flame
(f) Impact of wind

N **4.3.2.5 Nozzle Techniques and Door Control.** All participants shall have received training for the following:

(1) Factors influencing the effectiveness of extinguishment by cooling
(2) The application of indirect attack and direct attack
(3) Key door entry size-up and risk assessment factors
(4) Integrated door control and fire gas cooling to reduce the risk of flashover during door entry
(5) Effective door entry and control procedures

N **4.3.3* Documentation of Prescribed Minimum Training.** All participants in a live fire training evolution who have received the required minimum training from other than the AHJ shall not be permitted to participate in any live fire training evolution without first presenting written evidence of having successfully completed the prescribed minimum training to the levels specified in 4.3.1.

N **4.4 Participant Health and Safety.**

N **4.4.1** Instructors and participants shall be rehabbed in accordance with the provisions of NFPA 1584, Chapter 6.

N **4.4.2*** When assessing the length and number of live fire training sessions (evolutions) conducted in a training day, the following shall be taken into account:

(1) Nature of the work to be performed by the participant,
(2) Physical stress of the work on the participant,
(3) Temperature of the work and evolution environment
(4) Exposure time in a high temperature environment, and
(5) Other circumstances (e.g. weather, heat index).

4.5 Safety Officer.

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

4.5.2* All live fire training instructors and safety officers shall be trained on the application of the requirements contained in this standard.

4.5.3 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, potential for accident, or unsafe condition exists.

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

(1) Prevention of unsafe acts
(2) Elimination of unsafe conditions

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

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

4.5.7 The safety officer shall be knowledgeable in the operation and location of safety features available for the live fire training structure or prop, such as emergency shutoff switches, gas shutoff valves, and evacuation alarms.

4.5.8* Additional safety personnel, as deemed necessary by the safety officer, shall be located to react to any unsafe or threatening situation or condition.

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

4.7 Instructor-in-Charge and Instructors.

Δ **4.7.1** The instructor shall meet the minimum job performance requirements for Fire Instructor I in NFPA 1041.

N **4.7.2** The instructor-in-charge shall meet the minimum job performance requirements for Fire Instructor II in NFPA 1041.

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

4.7.4 It shall be the responsibility of the instructor-in-charge to coordinate overall fireground activities to ensure correct levels of safety.

4.7.5 The instructor-in-charge shall assign the following personnel:

(1) One instructor to each functional crew, each of which shall not exceed five students
(2) One instructor to each backup line
(3) One additional instructor for each additional functional assignment

4.7.6 The instructor-in-charge shall provide for rest and rehabilitation of participants operating at the scene, including any necessary medical evaluation and treatment, food and fluid replenishment, and relief from climatic conditions. *(See Annex D.)*

4.7.6.1* Instructors shall be rotated through duty assignments. An instructor shall not serve as the ignition officer for more than one evolution in a row.

N **4.7.6.2** Assignment rotation, rest, and rehabilitation shall be provided for instructors.

4.7.7 All instructors shall be qualified by the AHJ to deliver live fire training.

4.7.8 Additional instructors shall be designated when factors such as extreme temperatures or large groups are present, and classes of long duration are planned.

4.7.9 Prior to the ignition of any fire, instructors shall ensure that all protective clothing and equipment specified in this chapter are being worn according to manufacturer's instructions.

4.7.10 Instructors shall take a personal accountability report (PAR) when entering and exiting the structure or prop during an actual attack evolution conducted in accordance with this standard.

4.7.11 Instructors shall monitor and supervise all assigned students during the live fire training evolution.

4.7.12* Awareness of weather conditions, wind velocity, and wind direction shall be maintained, including a final check for possible changes in weather conditions immediately before actual ignition.

4.7.13 Training Instructors on How to Use Specialty Props.

4.7.13.1 The instructors and the safety officer responsible for conducting live fire training evolutions with a gas-fueled training system or with other specialty props (such as flashover simulator) shall be trained in the complete operation of the system and the props.

4.7.13.2 The training of instructors and the safety officer shall be performed by an individual authorized by the gas-fueled training system and specialty prop manufacturer or by others qualified to perform this type of training.

N **4.7.14 Training Instructors on How to Develop a Ventilation-Controlled Evolution.** The instructors and safety officers responsible for conducting live fire training evolutions with flow path and ventilation-controlled conditions shall be trained in means to develop the evolutions as specified in 4.13.7.

4.8 Fire Control Team.

4.8.1 A fire control team shall consist of a minimum of two personnel.

4.8.1.1 One person who is not a student or safety officer shall be designated as the "ignition officer" to ignite, maintain, and control the materials being burned.

4.8.1.1.1 The ignition officer shall be a member of the fire control team.

4.8.1.2* One member of the fire control team shall be in the area to observe the ignition officer ignite and maintain the fire, and to recognize, report, and respond to any adverse conditions.

4.8.2 The decision to ignite the training fire shall be made by the instructor-in-charge in coordination with the safety officer.

4.8.3 The fire shall be ignited by the ignition officer.

4.8.4 The fire control team shall wear full personal protective clothing, including SCBA, when performing this control function.

4.8.5 A charged hose line shall be available when the fire control team is igniting or tending to any fire.

4.8.6 Fires shall not be ignited without an instructor visually confirming that the flame area is clear of personnel being trained.

4.9 Personal Protective Clothing.

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

4.9.2* The safety officer shall ensure that all participants' PPE has been inspected in accordance with NFPA 1851 and NFPA 1852 prior to entry into a live fire training evolution to verify that the protective clothing and SCBA are being worn correctly and are in serviceable condition.

Δ **4.9.3** Protective coats, trousers, hoods, footwear, helmets, and gloves shall have been manufactured to meet the requirements of NFPA 1971.

Δ **4.9.4** SCBA shall have been manufactured to meet the requirements of NFPA 1981.

Δ **4.9.5*** Where station or work uniforms are worn by any participant, the station or work uniform shall have been manufactured to meet the requirements of NFPA 1975.

Δ **4.9.6** Personal alarm devices shall have been manufactured to meet the requirements of NFPA 1982.

4.9.7* The fire department shall provide and require all students, instructors, safety personnel, and other personnel participating in any evolution or operation of fire suppression during the live fire training evolution to use SCBA when engaged in any operation where they could encounter atmospheres that are IDLH or potentially IDLH or where the atmosphere is unknown.

4.10 Communication.

4.10.1 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.

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

4.11 Emergency Medical Services (EMS).

4.11.1* Basic life support (BLS) emergency medical services shall be available on site to handle injuries.

4.11.1.1 For acquired structures, BLS emergency medical services with transport capabilities shall be available on site to handle injuries.

4.11.2 A parking area for an ambulance or an emergency medical services vehicle shall be designated and located where it will facilitate a prompt response in the event of personal injury to participants in the evolution.

4.11.3 Written reports shall be completed and submitted on all injuries and on all medical aid rendered.

4.12* Water Supply.

4.12.1 The instructor-in-charge and the safety officer shall determine the rate and duration of waterflow necessary for each individual live fire training evolution, including the water necessary for control and extinguishment of the training fire, the water supply necessary for backup line(s) to protect personnel, and any water needed to protect exposed property.

4.12.2 Each hose line and backup line(s) shall be capable of delivering a minimum of 95 gpm (360 L/min).

4.12.3 Backup line(s) shall be provided to ensure protection for personnel on training attack lines.

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4.12.4 A minimum reserve of additional water in the amount of 50 percent of the fire flow demand, determined in accordance with 4.12.1, shall be available to handle exposure protection or unforeseen situations.

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4.12.5* Except under the conditions of 4.12.5.1, separate water 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.

4.12.5.1* A single water 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.

4.12.6 There shall be room provided around all props so that there is space for all attack line(s) as well as backup line(s) to operate freely.

4.13 Fuel Materials.

4.13.1* The fuels that are utilized in live fire training evolutions shall only be wood products.

4.13.1.1 Fuel-fired buildings and props are permitted to use the appropriate fuels for the design of the building or prop.

4.13.2 Pressure-treated wood, rubber, plastic, polyurethane foam, tar paper, upholstered furniture, carpeting, and chemically treated or pesticide-treated straw or hay shall not be used as part of the fuel load.

Δ **4.13.3** Flammable or combustible liquids, as defined in NFPA 30, shall not be used in live fire training evolutions.

4.13.3.1 Combustible liquid with a flash point above 100°F (38°C) shall be permitted to be used in a live fire training structure or prop that has been specifically engineered to accommodate a defined quantity of the fuel.

4.13.4 Unidentified materials, such as debris found in or around the structure or prop that could burn in unanticipated ways, react violently, or create environmental or health hazards, shall not be used.

4.13.5 Propane lighters, butane lighters, fusees (safety flares), kitchen-type matches, and similar devices are permitted to be used to ignite training fires if the device is removed immediately after ignition of the training fire.

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

4.13.7* The fuel load shall be limited to avoid conditions that could cause an uncontrolled flashover or backdraft. If a controlled flashover is designed to occur for training purposes, additional safety measures for providing a safe observation space for instructors and students shall be documented and followed.

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

4.13.9* The instructor-in-charge and the safety officer shall document fuel loading, including all of the following:

(1) Fuel material
(2) Wall and floor coverings and ceiling materials
(3) Type of construction of the structure, including type of roof and combustible void spaces
(4) Dimensions of the room

4.13.10* The training exercise shall be stopped immediately when the instructor-in-charge or the safety officer determines through ongoing assessment that the combustible nature of the environment represents a potential hazard.

4.13.10.1 An exercise stopped as a result of an assessed hazard according to 4.13.10 shall continue only when actions have been taken to reduce the hazard.

4.13.11* The use of flammable gas, such as propane and natural gas, shall be permitted only in live fire training structures specifically designed for their use.

4.13.11.1 Liquefied versions of the gases specified in 4.13.11 shall not be permitted inside the live fire training structure.

4.13.11.2* All props that use pressure to move fuel to the fire shall be equipped with remote fuel shutoffs outside of the safety perimeter but within sight of the prop and the entire field of attack for the prop.

4.13.11.3 During the entire time the prop is in use, the remote shutoff shall be continuously attended by safety personnel who are trained in its operation and who have direct communications with the safety officer and instructors.

Δ **4.13.11.4** Liquefied petroleum gas props shall be equipped with all safety features as described in NFPA 58 and NFPA 59.

4.13.11.5 Where the evolution involves the failure of a safety feature, the failed part shall be located downstream from the correctly functioning safety feature.

4.13.11.6 Where flammable or combustible liquids are used, measures shall be taken to prevent runoff from contaminating the surrounding area.

4.13.11.6.1 There shall be oil separators for cleaning the runoff water.

4.13.11.7* 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.

4.13.11.8 For flammable metal fires, there shall be a sufficient quantity of the proper extinguishing agent available so that all attack crews have the required supply as well as a 150 percent reserve for use by the backup crews.

4.13.11.9 All possible sources of ignition, other than those that are under the direct supervision of the ignition officer, shall be removed from the operations area.

4.14 Parking/Staging.

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

4.14.2 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.

4.14.3 If any of the apparatus described in 4.14.2 is in service to respond to an emergency, it shall be located in an area that will facilitate a prompt response.

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

4.14.5 Ingress and egress routes shall be designated, identified, and monitored during the training evolutions to ensure their availability in the event of an emergency.

4.15 Visitors and Spectators.

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

4.15.2 Control measures shall be posted to indicate the perimeter of the operations area.

4.15.3 Visitors who are allowed within the operations area perimeter shall be escorted at all times.

4.15.4 Visitors who are allowed within the operations area perimeter shall be equipped with and shall wear appropriate protective clothing.

4.15.5 Control measures shall be established to keep pedestrian traffic in the vicinity of the training site clear of the operations area of the live burn.

4.16 Preburn Plan/Briefing.

4.16.1 A preburn plan shall be prepared and shall be utilized during the preburn briefing sessions.

4.16.1.1 All features of the training areas shall be indicated on the preburn plan.

4.16.2 Prior to conducting actual live fire training evolutions, a preburn briefing session shall be conducted by the instructor-in-charge with the safety officer for all participants.

N **4.16.3** Written learning objectives shall be required for all live fire training evolutions.

4.16.4 All facets of each evolution to be conducted shall be discussed.

4.16.5 Assignments shall be made for all crews participating in the training session.

4.16.6 The location of the manikin shall not be required to be disclosed, provided that the possibility of victims is discussed in the preburn briefing.

4.16.7 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.

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

4.16.9 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.

4.16.9.1 The persons in charge of the properties described in 4.16.9 shall be informed of the date and time of the evolution.

4.16.10 Streets or highways in the vicinity of the training site shall be surveyed for potential effects from live fire training evolutions.

4.16.10.1* Safeguards shall be taken to eliminate possible hazards to motorists.

4.17 Victim(s).

4.17.1 No person(s) shall play the role of a victim inside any live fire training structure or acquired structure.

4.17.2 Rescue manikins dressed in fire-fighting personal protective clothing and used as victims shall be uniquely colored or specially marked.

Chapter 5 Acquired Structures

5.1 Structures and Facilities.

5.1.1* Any acquired structure that is considered for a structural fire training exercise shall be prepared for the live fire training evolution.

5.1.1.1 Buildings that cannot be made safe as required by this chapter shall not be utilized for interior live fire training evolutions.

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

5.1.3* Preparation shall include application for and receipt of required permits and permissions.

5.1.4* Ownership of the acquired structure shall be determined prior to its acceptance by the AHJ.

5.1.5 Evidence of clear title shall be required for all structures acquired for live fire training evolutions.

5.1.6* Written permission shall be secured from the owner of the structure in order for the fire department to conduct live fire training evolutions within the acquired structure.

5.1.7* A clear description of the anticipated condition of the acquired structure at the completion of the evolution(s) and the method of returning the property to the owner shall be put in writing and shall be acknowledged by the owner of the structure.

5.1.8* Proof of insurance cancellation or a signed statement of nonexistence of insurance shall be provided by the owner of the structure prior to acceptance for use of the acquired structure by the AHJ.

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

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

5.1.11 No person(s) shall play the role of a victim inside the acquired structure.

5.1.12 Only one fire at a time shall be permitted within an acquired structure.

5.2 Hazards.

5.2.1 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.

5.2.2* All hazardous storage conditions shall be removed from the structure or neutralized in such a manner as to not present a safety problem during use of the structure for live fire training evolutions.

5.2.3 Closed containers and highly combustible materials shall be removed from the structure.

5.2.3.1 Oil tanks and similar closed vessels that cannot be removed shall be vented to prevent an explosion or overpressure rupture.

5.2.3.2 Any hazardous or combustible atmosphere within the tank or vessel shall be rendered inert.

5.2.4 All hazardous structural conditions shall be removed or repaired so as to not present a safety problem during use of the structure for live fire training evolutions.

5.2.4.1 Floor openings shall be covered to be made structurally sound.

N **5.2.4.2** Fires shall not be ignited under exposed structural members.

5.2.4.3 Missing stair treads and rails shall be repaired or replaced.

5.2.4.4 Dangerous portions of any chimney shall be removed.

5.2.4.5 Holes in walls and ceilings shall be patched.

5.2.4.6* Roof ventilation openings that are normally closed but can be opened in the event of an emergency shall be permitted to be utilized.

5.2.4.7* Low-density combustible fiberboard and other highly combustible interior finishes shall be removed.

5.2.4.8* Extraordinary weight above the training area shall be removed.

5.2.5* All hazardous environmental conditions shall be removed before live fire training evolutions are conducted in the structure.

5.2.5.1 All forms of asbestos deemed hazardous shall be removed by an approved manner and documentation provided to the AHJ.

5.2.6 Debris creating or contributing to unsafe conditions shall be removed.

5.2.7 Any toxic weeds, insect hives, or vermin that could present a potential hazard shall be removed.

5.2.8 Trees, brush, and surrounding vegetation that create a hazard to participants shall be removed.

5.2.9 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.

5.3 Utilities.

5.3.1 Utilities shall be disconnected.

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

5.4 Exits.

5.4.1 Exits from the acquired structure shall be identified and evaluated prior to each training burn.

5.4.2 Participants of the live fire training shall be made aware of exits from the acquired structure prior to each training burn.

5.4.3 Fires shall not be located in any designated exit paths.

Δ **5.5 Rapid Intervention Crew (RIC).** A RIC trained in accordance with NFPA 1407 shall be provided during a live fire training evolution.

N **5.6 Water Supply.** For acquired structures the minimum water supply and delivery for the live fire training evolutions shall meet the criteria identified in NFPA 1142.

Chapter 6 Gas-Fired Live Fire Training Structures and Mobile Enclosed Live Fire Training Props

6.1 Structures and Facilities.

6.1.1 This section pertains to all interior spaces where gas-fired live fire training exercises occur.

6.1.2 Live fire training structures shall be left in a safe condition upon completion of live fire training evolutions.

6.1.3 Debris hindering the access or egress of fire fighters shall be removed prior to the beginning of the training exercises.

6.1.4 Flammable gas fires shall not be ignited manually.

6.2 Inspection and Testing.

6.2.1* Live fire training structures shall be inspected visually for damage prior to live fire training evolutions.

6.2.1.1* Damage shall be documented and the building owner or AHJ shall be notified.

6.2.2 Where the live fire training structure damage is severe enough to affect the safety of the participants, training shall not be permitted.

6.2.3 All doors, windows and window shutters, railings, 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 prior to any live fire training evolution to ensure they operate correctly.

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

6.2.5 The instructors shall run the training system prior to exposing students to live flames in order to ensure the correct operation of devices such as the gas valves, flame safeguard units, agent sensors, combustion fans, and ventilation fans.

6.2.6* The structural integrity of the live fire training structure shall be evaluated and documented annually by the building owner or AHJ.

6.2.6.1 If visible structural defects are found, such as cracks, rust, spalls, or warps in structural floors, columns, beams, walls, or metal panels, the building owner shall have a follow-up evaluation conducted by a licensed professional engineer with live fire training structure experience and expertise, or by another competent professional as determined by the building owner or AHJ.

6.2.7* The structural integrity of the live fire training structure shall be evaluated and documented by a licensed professional engineer with live fire training structure experience and expertise, or by another competent professional as determined by the AHJ, at least once every 10 years, or more frequently if determined to be required by the evaluator.

6.2.8* All structures constructed with calcium aluminate refractory structural concrete shall be inspected by a structural engineer with expertise in live fire training structures every 3 years.

6.2.8.1 The structural inspection shall include removal of concrete core samples from the structure to check for delaminations within the concrete.

6.2.9* Part of the live fire training structure evaluation shall include, at least once every 10 years, the removal and reinstallation of a representative area of thermal linings (if any) to inspect the hidden conditions behind the linings.

Chapter 7 Non-Gas-Fired Live Fire Training Structures and Mobile Enclosed Live Fire Training Props

7.1 Structures and Facilities.

7.1.1 This section pertains to all interior spaces where non-gas-fired live fire training exercises occur.

7.1.2 Live fire training structures shall be left in a safe condition upon completion of live fire training evolutions.

7.1.3 Debris hindering the access or egress of fire fighters shall be removed prior to the beginning of the training exercises.

7.2 Inspection and Testing.

7.2.1* Live fire training structures shall be inspected visually for damage prior to live fire training evolutions.

7.2.1.1* Damage shall be documented, and the building owner or AHJ shall be notified.

7.2.2 Where the live fire training structure damage is severe enough to affect the safety of the participants, training shall not be permitted.

7.2.3 All doors, windows and window shutters, railings, 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 prior to any live fire training evolution to ensure they operate correctly.

7.2.4 All safety devices, such as thermal sensors, 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.

7.2.5* The structural integrity of the live fire training structure shall be evaluated and documented annually by the building owner or AHJ.

7.2.5.1 If visible structural defects are found, such as cracks, rust, spalls, or warps in structural floors, columns, beams, walls, or metal panels, the building owner shall have a follow-up evaluation conducted by a licensed professional engineer with live fire training structure experience and expertise or by another competent professional as determined by the AHJ.

7.2.6* The structural integrity of the live fire training structure shall be evaluated and documented by a licensed professional engineer with live fire training structure experience and expertise or by another competent professional as determined by the AHJ at least once every 5 years or more frequently if determined to be required by the evaluator.

7.2.7* All structures constructed with calcium aluminate refractory structural concrete shall be inspected by a structural engineer with expertise in live fire training structures every 3 years.

7.2.7.1 The structural inspection shall include removal of concrete core samples from the structure to check for delaminations within the concrete.

7.2.8* Part of the live fire training structure evaluation shall include, once every five years, the removal and reinstallation of a representative area of thermal linings (if any) to allow inspections of the conditions hidden behind the linings.

7.3 Sequential Live Fire Burn Evolutions.

7.3.1 The AHJ shall develop and utilize a safe live fire training action plan when multiple sequential burn evolutions are to be conducted per day in each burn room.

7.3.2 A burn sequence matrix chart shall be developed for the burn rooms in a live fire training structure.

7.3.2.1 The burn sequence matrix chart shall include the maximum fuel loading per evolution and maximum number of sequential live fire evolutions that can be conducted per day in each burn room.

7.3.3* The burn sequence for each room shall define the maximum fuel load that can be used for the first burn and each successive burn.

7.3.4* The burn sequence matrix for each room shall also specify the maximum number of evolutions that can be safely conducted during a given training period before the room is allowed to cool.

7.3.5 The fuel loads per evolution and the maximum number of sequential evolutions in each burn room shall not be exceeded under any circumstances.

Chapter 8 Exterior Live Fire Training Props

8.1 Props, Structures, and Facilities.

8.1.1 This section pertains to all exterior props where live fire training exercises occur.

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

8.1.3 Exterior props shall be left in a safe condition upon completion of live fire training evolutions.

8.1.4 For outside training, care shall be taken to select areas that limit the hazards to both personal safety and the environment.

8.1.5 The training site shall be without obstructions that can interfere with fire-fighting operations.

8.1.6 Where live training fires are used outside, the ground cover shall be such that it does not contribute to the fire.

8.1.7 Debris hindering the access of fire fighters shall be removed prior to the beginning of the training exercise.

8.2 Inspection and Maintenance.

8.2.1 Exterior props shall be inspected visually for damage prior to live fire training evolutions.

8.2.1.1 Damage to exterior props shall be documented and the owner or AHJ shall be notified.

8.2.2 All safety devices and emergency shutdown switches, plus doors, shutters, vents, and other operable devices, shall be checked prior to any live fire training evolutions to ensure they operate correctly.

8.2.3 The structural integrity of the props shall be evaluated and documented annually.

Chapter 9 Reports and Records

9.1 General.

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

(1) An accounting of the activities conducted
(2) A listing of instructors present and their assignments
(3) A listing of all other participants
(4) Documentation of unusual conditions encountered
(5) Any injuries incurred and treatment rendered
(6) Any changes or deterioration of the structure
(7) Documentation of the condition of the premises and adjacent area at the conclusion of the training exercise

9.1.2* For acquired structures, records pertaining to the structure shall be completed.

9.1.3 Upon completion of the training session, an acquired structure shall be formally turned over to the control of the property owner.

9.1.3.1 The turnover process shall include the completion of a standard form indicating the transfer of authority for the acquired structure.

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

Annex A Explanatory Material

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

A.1.1 Live fire training of entry level and experienced fire suppression personnel are high-risk activities. This risk can be effectively managed through compliance with this standard.

A.1.2 Drills conducted to familiarize fire fighters with the proper use of self-contained breathing apparatus (SCBA) in a smoke environment should not be conducted under live fire conditions.

A.1.3.3 While this standard does not deal with the suppression of fires set to train individuals on fire cause and origin, this standard does contain procedures that can be adapted to ensure maximum safety during those types of operations. For fire scenarios set with flammable or combustible liquids, fire suppression should be achieved by fixed-fire suppression systems or by exterior application of hose streams. Interior fire suppression operations in scenarios that do not involve the use of flammable or combustible liquids should be conducted in compliance with the requirements of this standard.

A.3.2.1 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.3.27.2 Live Fire Training Structure. Live fire training structures include structures built of conventional building materials, such as concrete, masonry, and steel, as well as structures built of containers, in which live fire training evolutions are conducted. This includes fixed structures that are marketed as "mobile props," such as the following:

(1) Pre-engineered metal structures that can be disassembled and transported to a new site
(2) Containerized structures in which one or more containers are assembled, whether single story or multi-story, for purposes of interior live fire training evolutions

Live fire training structures also include fire behavior labs (also known as "flashover" containers) and mobile live fire training props.

Live fire training structures do not include structures that are used for training in the use of SCBA where only smoke conditions are created, without a live fire, and the participants are not subjected to risk of the effects of fire other than the smoke produced.

Δ **A.4.3.1** The following job performance requirements from NFPA 1001 should be used as guidance related to the list of subjects in 4.3.1:

(1) 5.2.3 Radio use
(2) 5.3.1 SCBA
(3) 5.3.2 Vehicle safety
(4) 5.3.4 Forcible entry
(5) 5.3.6 Ground ladders
(6) 5.3.7, 5.3.8 Fire extinguishment
(7) 5.3.9 Search and rescue
(8) 5.3.10 Structural fire fighting
(9) 5.3.11 Horizontal ventilation
(10) 5.3.12 Vertical ventilation
(11) 5.3.13 Overhaul
(12) 5.3.15 Water supply
(13) 5.3.16 Fire extinguishers
(14) 5.3.17 Scene illumination
(15) 5.5.1 Tool maintenance
(16) 5.5.2 Fire hose care and maintenance

Industrial fire brigade members should meet the requirements of NFPA 1081.

A.4.3.3 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.

N **A.4.4.2** Further guidance and information may be obtained in *Health and Safety Guidelines for Firefighter Training*, University of Maryland, Center for Fire Fighter Safety Research and Development, Maryland Fire and Rescue Institute, College Park, Maryland.

A.4.5.2 NFPA 1403 must be applied with the understanding that every training structure, whether an acquired structure or a training center burn building, is unique. The following are just some of the factors that would affect how NFPA 1403 is applied to a specific structure:

(1) Number of stories.
(2) Construction (concrete, concrete block, metal building).
(3) Type and quantity of structural protective lining system (SPLS).
(4) Type of temperature monitoring system (TMS), if any.
(5) Size of burn rooms.
(6) Number of burn rooms.
(7) Type, size, and number of windows/doors.
(8) Type, size, and number of passive ventilation openings/chop outs.
(9) Fuel utilized in live fire evolutions (straw, excelsior, pallets, propane gas, natural gas, or a combination).
(10) Type of interior finish materials on the ceiling, walls, and floors. If combustible, they need to be accounted for in the fuel load evaluation, or they need to be removed. Combustible materials on the ceiling, wall, or floor surfaces can lead to a rapid transition to flashover.
(11) Type and number of means of egress and means of escape.
(12) Prevailing winds.
(13) Altitude.

A.4.5.8 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.4.6 Severe weather could require the participants to respond to other incidents, or could expose trainees to danger if training takes place during severe weather. Wind velocity can contribute to spreading the fire within the training structure or throughout a neighborhood, or wind direction could cause smoke problems in the neighborhood. 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.

Δ **A.4.7.6.1** Instructors should be provided rest and rehabilitation as required in 4.7.6.1. Instructors should remove their personal protective clothing to reduce thermal saturation of the PPE.

N **A.4.7.12** Monitoring the wind and weather conditions is important for determining the impact of the wind on your live fire evolution. Placing students and instructors downwind of the fire, either inside or outside of the structure, could result in exposure to thermal or chemical hazards that exceed those normally associated with the planned evolution, which could result in injury or death.

A.4.8.1.2 The purpose and principal function is to observe the ignition officer while igniting or maintaining the fire. Members of the fire control team should rotate duties to prevent overheating and thermal saturation.

Δ **A.4.9.2** Guidance is provided in NFPA 1851 and NFPA 1852 to assist the instructor and department in determining if personal protective clothing and breathing apparatus are in serviceable condition.

Δ **A.4.9.5** Clothing worn under personal protective clothing can degrade and cause injury to the wearer, even without damaging the protective clothing. All wearers of personal protective clothing should be aware of the dangers of clothing made from certain all-synthetic materials that can melt and then adhere to and burn the wearer even if protective clothing that meets NFPA standards is worn. Any clothing, such as shirts, pants, underwear, and sweatshirts, worn under personal protective clothing should meet the requirements of NFPA 1975 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.4.9.7 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.4.10.2 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 acquired structure 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.

N **A.4.11.1** If available, advanced life support (ALS) should be provided on site.

A.4.12 A minimum flow rate of 95 gpm (360 L/min) 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 hose line 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.4.12.5 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.4.12.5.1 See A.4.12.5.

A.4.13.1 Acceptable fuels include pine excelsior, wooden pallets, straw, hay, and other wood-based products.

A.4.13.6 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.

Excess fuel load can result in a ventilation-controlled fire, which can result in flameover (rollover) or flashover. These fire conditions increase the amount of thermal energy (the heat

release rate of the fire) that is being transferred by conduction, convection, and radiation to any fire fighters in the compartment, which can lead to the degradation of protective equipment and injury or death. Venting a ventilation-controlled fire can result in an increase in heat release rate in the fire structure.

N **A.4.13.7** An operational plan for accomplishing training objectives with a ventilation-controlled fire/flow path training, utilizing a fuel load that could generate a controlled flashover, should include the following:

(1) This material outlines considerations for an operation plan, based on this standard, for evolutions during which a ventilation-controlled fire with a fuel load designed to be capable of generating a controlled flashover in the ignition room is being used for training purposes.
(2) The lead instructor should identify the fire growth observation area prior to ignition of any live fires. The observation area should be out of the exhaust portion of the flow path. Students and instructors should have a charged hose line in the observation area that has a fire stream capable of reaching the ignition room and suppressing the fire. Students and instructors should be in the observation area prior to ignition of fire.
(3) Charged hose lines should be placed in position prior to ignition of fire. The hose line should be used to control temperature and fire growth from the observation area.
(4) Observation areas should be on the same level as or below the level of the fire with direct unimpeded access to an exit.
(5) No students or instructors should be in the fire room after ignition.
(6) The identification of the potential flow path should be communicated to all students and instructors prior to ignition. The lead instructor should designate the flow path.
(7) No unidirectional flow paths that exhaust over fire fighters should be created. If weather or the fire creates a potentially hazardous change to the flow path, the interior instructor should be notified immediately and personnel should exit the structure or take other action to maintain the safety of the instructors and personnel.
(8) The interior instructor should coordinate ventilation with exterior personnel to complete the ventilation to achieve the desired fire effect. After charged hose lines are placed, and instructors and students are located in the observation area, ventilation should be coordinated.
(9) The instructor-in-charge should use an assessment, such as the following equation, to estimate the minimum heat release rate needed to flash over the ignition room based on available ventilation:

Δ

$$\dot{Q} = 750\ A_o\sqrt{H_o} \qquad \textbf{[A.4.13.7]}$$

where:

$\dot{Q}$ = Minimum heat release rate (kW) needed for flashover
A_o = Area of opening (m^2)
H_0 = Height of opening (m)

For example, determine the minimum heat release rate required to flash over a small room with one exterior door 80 in. (2.03 m) high and 36 in. (0.91 m) wide and one window 40 in. (1.02 m) high and 30 in. (0.76 m) wide. Based on the size of the open door only, flashover would occur at approximately 2 MW. Based on the size of the open window only, flashover would occur at approximately 0.6 MW. Therefore, the minimum energy required to flashover the room would be approximately 2.6 MW.

Fuel Load: For this training exercise, calculate the fuel load required to achieve a sustained flashover in a ventilated space.

A.4.13.8 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:

(1) The heat release characteristics of materials used as primary fuels
(2) The preheating of combustibles
(3) The combustibility of wall and ceiling materials
(4) 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.4.13.9 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.4.13.10 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.4.13.11 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 to 270 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.4.13.11.2 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.4.13.11.7 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, batteries, air bags and igniters, 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.4.16.10.1 Such safeguards can include street closings, traffic rerouting, signs, and police traffic control.

A.5.1.1 Where live fire training structures are available, they should be used instead of acquired structures.

A.5.1.3 The permits required for the exercise could include the following:

(1) Air quality
(2) Water runoff
(3) Water usage
(4) Burning
(5) Traffic

Other permits could be required and thorough research of required permits should be completed prior to acceptance of the building for use for training.

A.5.1.4 Information pertaining to building ownership should be reviewed by the legal counsel of the AHJ prior to acceptance of the structure.

A.5.1.6 Information regarding the written permission of the building owner should be reviewed by the legal counsel of the AHJ prior to acceptance of the structure.

N **A.5.1.7** Live fire training evolutions leave debris on the lot that is hazardous and a potential public nuisance. Removal of this debris after the training evolution is the responsibility of the owner, and written acknowledgment of responsibility should be obtained by the AHJ.

A.5.1.8 Information regarding cancellation of insurance by the building owner should be reviewed by the legal counsel of the AHJ prior to acceptance of the structure.

A.5.2.2 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.5.2.4.6 Roof ventilation openings can consist of precut panels or hinged covers.

A.5.2.4.7 Low-density combustible fiberboard has been implicated as a major factor in the following rapidly spreading fires that resulted in fatalities:

(1) Our Lady of the Angels School (Chicago, IL, 1958)
(2) Hartford Hospital (Hartford, CT, 1961)
(3) Opemiska Social Club (Chapais, Quebec, 1980)
(4) Boulder Fire Department training fire (Boulder, CO, 1982)

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

A.5.2.4.8 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.5.2.5 Figure A.5.2.5 provides a sample form for the inspection of acquired structure and to identify hazards.

A.6.2.1 There should be ongoing concern for the progressive damage to live fire training structures associated with fire intensity during live fire training evolutions. Excessive fire intensity can result in accelerated destruction of the live fire training structure and can increase the risk to personnel to an unacceptable level.

Examples of common damage to check for include the following:

(1) Visible structural defects such as cracks, spalls, or warps in structural floors, columns, beams, and walls.
(2) Thermal linings. Thermal linings are intended to protect the structural components. Exposure to live fire training can cause the thermal linings to wear out over time. Portions of it can loosen and fall out, anchoring devices can loosen, and reinforcing and supporting pieces can corrode, creating a safety concern for occupants. In addition, cracks, holes, openings, gaps, or penetrations in the thermal lining can lead to damage to the structure behind the lining.
(3) Doors. Doors in live fire training structures at times do not operate properly, sticking shut during training and creating safety problems relating to emergency egress.
(4) Hinges. A rusted hinge at a second-floor window shutter could cause the shutter to fall to the ground below.
(5) Loose, rusted, or damaged handrails and guardrails.
(6) Loose or missing stair nosings, or damage to stair treads.

A.6.2.1.1 Figure A.6.2.1.1 is an example of a live fire training facility inspection form.

A.6.2.6 Personnel making the annual structural integrity evaluation should understand the structural system that is being evaluated and where damage is most likely to occur, given the unique design of that live fire training structure. For example, live fire training structures constructed of hollow core plank roofs and floors supported on masonry bearing walls tend to exhibit several problems, such as the following, listed below, which would be helpful to know when conducting the evaluation:

(1) Cracks occur in the topping slabs directly over the joints between the planks, causing leaks into the structure and onto thermal linings below.
(2) Cracks occur in the ends of the planks and at the two courses of masonry block below the plank bearing points.
(3) Vertical cracks occur in masonry bearing walls at building corners.
(4) Cracks in the bottoms of the planks occur below the hollow cells and at the bottom corners of the planks.
(5) Topping slabs separate from the tops of the planks, reducing the structural capacity of the structural system.
(6) Cracks in the topping slabs near guardrail anchor points could cause guardrails to loosen.

SITE INSPECTION WORKSHEET — RESIDENTIAL PROPERTIES

Instructors' names: _____ Date: _____

_____ Construction date: _____

Site address: _____ Parcel # / PIN: _____

Comments: _____

_____

_____

Category	Items	Description/Location/Notes	Quantity
Universal wastes	Fluorescent/HID fixtures		
	Batteries		
	Mercury devices		
Building materials	Exterior siding		
	Roofing		
	Paint condition		
	Mold condition		
	Septic system		
	Wells		
	Treated wood		
Refrigerants	Air conditioner		
	Refrigerator/ice box		
	Other		
Household wastes	Waste oil		
	Fuel		
	Paints/solvents		
	Household cleaners		
	Yard care products		
	Other		
Building structures	Basement/Crawl space		
	Garage		
	Shed		
	Other		

Other potential issues:

Δ **FIGURE A.5.2.5 Example of a Site Inspection Worksheet.**

LIVE STRUCTURAL FIRE TRAINING FACILITY INSPECTION

Region: _____

Facility: _____

Date: _____

Inspected by: _____

Legend: ✓ = OK N = Noteworthy D = Requires attention

GENERAL

(1) _____ Floors, walls, stairs, and other structural components appear capable of withstanding the weight of the contents, participants, and accumulated water.

EXTERIOR

(2) _____ Perimeter lighting
(3) _____ General appearance
(4) _____ Exterior of structure
(5) _____ Windows
(6) _____ Doors
(7) _____ Railings
(8) _____ Stairs

INTERIOR

(9) _____ Housekeeping (swept clean, no fuel storage on fire floor)
(10) _____ Windows/shutters
(11) _____ Functional doors
(12) _____ Lined ceilings/walls (crazing, cracking, delamination, metal mesh visible)
(13) _____ High temperature linings (loose/damaged tile, exposed bolts)
(14) _____ Burn racks
(15) _____ Fuel inventory/storage

OTHER

(16) _____ _____
(17) _____ _____

Documentation of Issues:

Item #	Description

Note: If damage is present in approved burn rooms, use the form on the reverse side to specify the details of the damage.

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Δ **FIGURE A.6.2.1.1 Example of a Live Structural Fire Training Facility Inspection Form.**

LIVE STRUCTURAL FIRE TRAINING FACILITY INSPECTION *(continued)*

Describe damage in detail below and attach photos.

Floor: _____ Room: _____

Wall or ceiling: _____ Area involved (ft or in.): _____

Damage description: _____

_____

_____

Distance in Feet of the Entire Burn Room	Distance in Feet of the Entire Burn Room																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				

Indicate the entire size of the burn room and the exact area that is damaged.

Δ **FIGURE A.6.2.1.1** *Continued*

Ideally, the architect/engineer that designed the live fire training structure would have provided a description of what to look for during the periodic evaluations. If no such description was obtained when the live fire training structure was first built, then the AHJ should retain a licensed professional engineer with live fire training structure experience and expertise or other competent professional as determined by the building owner or AHJ to help create such a description.

A.6.2.7 Routine maintenance is important to providing a safe, durable live fire training structure for live fire training. Periodic engineering evaluations are one step in that process. Live fire training structures present unique engineering problems that are not taught to engineers in college or in their daily practice of engineering office buildings, schools, and fire stations. Before a registered (licensed) Professional Engineer (P.E.) understands live fire training structure engineering, it takes significant efforts on the part of the P.E. to learn how live fire training structures are used, how repetitive live fire training affects structural and nonstructural elements within the live fire training structure, and what materials have been proven to work (or not work) within such a harsh environment. This effort typically requires research and educational efforts and experience with live fire training structure projects.

Because the required evaluation is for structural integrity, the P.E. performing the evaluation should be a structural engineer or teamed with a structural engineer to perform the evaluation. Many states do not license P.E.s by discipline; "P.E." could refer to a structural engineer or to some other engineering discipline, such as electrical, mechanical, fire protection, or aeronautical. State laws require P.E.s to offer engineering services for only those branches of engineering for which they are qualified. Therefore, a P.E. who is an electrical engineer or fire protection engineer with no structural qualifications would not be allowed, under law, to evaluate the structural integrity of a live fire training structure.

Note that a P.E. with refractive materials experience and expertise, but not live fire training structure experience and expertise, might not have sufficient understanding of how refractory concrete performs in a live fire training structure environment. Many P.E.s with refractive materials experience have gained that experience working with industrial applications in which furnaces are heated and cooled slowly. Certain applications of refractory concrete work well under those furnace conditions. However, the same applications of refractory concrete at times work poorly in the live fire training structure environment, where rapid heating, rapid cooling, and thermal shock deteriorate refractory concrete differently than a furnace application would. Many P.E.s with only refractive materials experience, but no live fire training structure experience, do not know this. As a result, the requirement for live fire training structure experience and expertise has been added to the standard. In many cases, the P.E. retained to evaluate the integrity can also, under the same contract, be required to make recommendations for how to repair, maintain, or improve the live fire training structure.

The phrase "with live fire training structure experience and expertise" must be interpreted by each entity following its own local and state laws and guidelines. The intent is for the P.E. to have performed at least one live fire training structure project previously, so that the entity hiring the P.E. will benefit from the educational and research efforts performed, and experience gained, by the P.E. for the previous live fire training structure project(s). This experience could include a previous live fire training structure evaluation, the repair or renovation to an existing live fire training structure, or the design of a new live fire training structure. In many cases, it would be acceptable for a P.E. without live fire training structure experience or expertise to perform the evaluation as long as he or she has teamed with a P.E. with live fire training structure experience or expertise.

A.6.2.8 Refractory concrete should not be used as a structural element. Structural calcium aluminate refractory concrete has been found to delaminate (crack and lose bond) along the lines of reinforcing within walls and suspended slabs, presenting serious structural deficiencies that threaten the life and safety of training personnel.

A.6.2.9 Heat can soak through thermal linings and reach the protected structure, especially if the linings are cracked or otherwise require maintenance when live fire training occurs. This heat could damage the structure, a hidden condition that would otherwise go undetected if the panels are not occasionally removed to expose the hidden conditions.

A.7.2.1 See A.6.2.1.

A.7.2.1.1 See A.6.2.1.1.

A.7.2.5 See A.6.2.6.

A.7.2.6 See A.6.2.7.

A.7.2.7 See A.6.2.8.

A.7.2.8 See A.6.2.9.

A.7.3.3 Reducing fuel loads for successive evolutions to maintain a safe environment should be considered.

A.7.3.4 The following facts will affect conditions encountered in a burn room during a live fire evolution:

(1) Larger burn rooms and rooms with higher ceilings will have more cubic feet of air than smaller burn rooms.
(2) Generally, with a given quantity of fuel, the lower the cubic footage in a room, the higher the temperatures and more rigorous the environment will be.
(3) As the number of openings in a burn room increase, the available ventilation area increases, resulting in typically lower temperatures and less severe environments.
(4) The construction of the burn room will affect how much energy the room will retain with each successive evolution. All burn rooms will retain a level of heat with each burn. The temperature and radiant heat in the burn room will increase with each additional evolution. At some point, every room will become too hot to safely conduct further training. Outside environmental conditions might also affect this.

A.9.1.1 See NFPA 1401 for additional guidance on training records.

A.9.1.2 Figure A.9.1.2(a) shows a standard notice of cancellation or nonrenewal of insurance. Figure A.9.1.2(b) shows a sample release form that can be used with acquired structures. The exact form should be approved by local officials.

NOTICE OF CANCELLATION OR NONRENEWAL

of _____
KIND OF POLICY

POLICY NO.	ISSUED THROUGH AGENCY OR OFFICE AT:	CANCELLATION OR TERMINATION WILL TAKE EFFECT AT: (DATE) (HOUR–STANDARD TIME)	DATE OF NOTICE

INSURANCE COMPANY:

NAME AND ADDRESS OF INSURED:

(Applicable item is marked ☒)

CANCELLATION	❑ You are hereby notified in accordance with the terms and conditions of the above-mentioned policy that your insurance will cease at and from the hour and date mentioned above. If the premium has been paid, premium adjustment will be made as soon as practicable after cancellation becomes effective. If the premium has not been paid, a bill for the premium earned to the time of cancellation will be forwarded in due course.
	❑ You are hereby notified in accordance with the terms and conditions of the above-mentioned policy that your insurance will cease at and from the hour and date mentioned above due to nonpayment of premium. A bill for the premium earned to the time of cancellation will be forwarded in due course.
NONRENEWAL	❑ You are hereby notified in accordance with the terms and conditions of the above-mentioned policy that the above-mentioned policy will expire effective at and from the hour and date mentioned above and the policy will NOT be renewed.
IMPORTANT NOTICE	❑ In compliance with the Fair Credit Reporting Act (Public Law 91-508), you are hereby informed that the action taken above is being taken wholly or partly because of information contained in a consumer report from the following consumer reporting agency:

_____
NAME

_____
ADDRESS

GU 8811b (Ed. 3-73) Uniform Printing & Supply Div. **INSURED'S COPY**

. . . . . .
Authorized Representative

FIGURE A.9.1.2(a) Standard Notice of Cancellation or Nonrenewal of Insurance Form.

Release Form

_____ Fire Department

Address _____

City _____ State _____

Date _____

Having agreed with the Building Official, City of

_____ ,

that a structure owned by me and located at _____

_____ is unfit for human habitation

and is beyond rehabilitation, I further agree 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/Agent

_____
Owner/Agent

_____
Witness

FIGURE A.9.1.2(b) Sample Release Form.

Annex B Live Fire Evolution Sample Checklist

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

B.1 Sample Checklist. Figure B.1 provides a checklist for a live fire evolution.

Annex C Responsibilities of Personnel

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

C.1 Responsibilities. The lists in Figure C.1 outline the responsibilities of participants in a live fire training evolution.

LIVE FIRE EVOLUTION SAMPLE CHECKLIST

PERMITS, DOCUMENTS, NOTIFICATIONS, INSURANCE

____ 1. Written documentation received from owner:
- ❑ Permission to burn structure
- ❑ Proof of clear title
- ❑ Certificate of insurance cancellation
- ❑ Acknowledgment of postburn 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

PREBURN PLANNING

____ 1. Preburn plans made, showing the following:
- ❑ Site plan drawing, including all exposures
- ❑ 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 acquired structure/live fire training structure/burn prop 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 hose lines

____ 7. Periodic weather reports obtained

____ 8. Parking areas designated and marked:
- ❑ Apparatus staging
- ❑ Ambulances
- ❑ Police vehicles
- ❑ Press vehicles
- ❑ Private vehicles

____ 9. Operations area established and perimeter marked

____ 10. Communications frequencies established, equipment obtained

TRAINING STRUCTURE PREPARATION

____ 1. Training structure inspected to determine structural integrity

____ 2. All utilities disconnected (acquired structures 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. Training structure 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

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Δ **FIGURE B.1 Sample Checklist for Procedures for a Live Fire Evolution.**

LIVE FIRE EVOLUTION SAMPLE CHECKLIST *(continued)*

____ 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

PREBURN PROCEDURES

____ 1. All participants briefed:
- ❑ Training structure layout
- ❑ Crew and instructor assignments
- ❑ Safety rules
- ❑ Training structure evacuation procedure
- ❑ Evacuation signal (demonstrate)

____ 2. All hose lines 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 (SCBA)
- ❑ Adequate SCBA air volume
- ❑ All equipment properly donned

POSTBURN PROCEDURES

____ 1. All personnel accounted for

____ 2. Remaining fires overhauled, as needed

____ 3. Training structure inspected for stability and hazards where more training is to follow *(see Training Structure 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 live fire training structure
- ❑ Acquired structure release
- ❑ Student training records
- ❑ Certificates of completion

____ 6. Building and property released to owner, release document signed

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RELEASE FORM

Having agreed with the Building Official, City of _____, that a structure owned by me and located at _____ is unfit for human habitation and is beyond rehabilitation, I further agree 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.

Fire Department _____

Address _____

City, State _____

Date _____

Owner/Agent _____

Owner/Agent _____

Witness _____

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Δ FIGURE B.1 ***Continued***