



# LIVE FIRE BURN POLICY

SEPTEMBER 2019

# MFSI LIVE FIRE BURN POLICY

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## **PURPOSE**

To provide procedures to be followed by Maine Fire Service Institute (MFSI) personnel when conducting live-fire training exercises and end-testing to ensure that training objectives are achieved and that exposure to health and safety hazards for the fire fighters receiving the training or testing is minimized.

## **APPLICATION**

This standard operating procedure is to be followed by all MFSI personnel assigned responsibilities for conducting and participating in Class A and Class B live-fire evolutions related to MFSI training courses and certification end-testing. Under this directive the designated **Lead Instructor** is responsible for overseeing compliance with these requirements and ensuring the safety of all participants. Only MFSI employees qualified as competent and designated by the MFSI Director to teach live-fire training shall act as a **Lead Instructor**.

MFSI is the *authority having jurisdiction* (or training/testing AHJ) for the purpose of conducting live-fire training evolutions for MFSI firefighter training programs and certification end-tests. The live-fire training covered by this directive includes the use of training center burn buildings, exterior props, and acquired props for conducting evolutions. MFSI (as the training/testing AHJ) shall follow *NFPA 1403 – Standard on Live Fire Training Evolutions (2018 edition)*. The content of this SOP generally follows NFPA 1403. MFSI has modified the original document to a very a limited extent to reflect local conditions and characteristics.

## **Section 1 - Administration**

- 1.1 This policy provides the minimum requirements to be used by MFSI personnel for training fire suppression personnel (students) engaged in fire-fighting operations under live-fire conditions in MFSI sponsored programs and activities.
- 1.2 This live-fire training policy provides minimum requirements that may comprise a basic system adaptable to local conditions. While MFSI recognizes that other local agencies, state agencies, or associations may choose to follow, or adapt, this policy for the purpose of training their personnel, MFSI cannot be held responsible for its application under circumstances that are outside the realm of direct control.
- 1.3 The purpose of this policy shall be to provide a process for conducting live-fire training evolutions to ensure that they are conducted in safe facilities and that the exposure to health and safety hazards for the fire fighters receiving the training is minimized.
- 1.4 This policy does not cover live-fire training evolutions involving marine structures or vessels and ground cover or woodland fires.
- 1.5 All live fire training shall be conducted in compliance with this policy.

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## Section 2 – Referenced Publications

- 2.1 Any documents, standards, or guidelines, or portions thereof, listed below or referenced within this policy shall be considered part of the requirements of this policy.

*NFPA 30, Flammable and Combustible Liquids Code*

*NFPA 58, Liquefied Petroleum Gas Code*

*NFPA 59, Utility LP-Gas Plant Code*

*NFPA 1001, Standard for Fire Fighter Professional Qualifications*

*NFPA 1041, Standard for Fire Service Instructor Professional Qualifications*

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

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

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

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

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

*NFPA 1975, Standard on Station/Work Uniforms for Fire and Emergency Services*

*NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus for the Fire Service*

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

*MFSI SOP102, Worksheet for Water Supply Calculation*

*MFSI SOP103, Checklists and Forms for Live-Fire Training*

*MFSI SOP104, Staffing and Mandatory Practices for Live-Fire Training*

*MFSI SOP105, Training Courses and Programs that Include Minor Age Students*

*MFSI SOP106, Firefighter Rehabilitation*

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## Section 3 - Definitions

- 3.1 The definitions contained in this policy are those used in NFPA 1403 and shall apply to the terms used herein. Where terms are not included, common usage of the terms shall apply. *Merriam-Webster's Collegiate Dictionary*, 11<sup>th</sup> edition, shall be the source for the ordinarily accepted meaning.

### 3.2 Official Definitions

- 3.2.1 Authority Having Jurisdiction or AHJ. The Director of the Maine Fire Service Institute, or his or her designee shall be the AHJ and is the individual responsible for approving equipment, materials, an installation, and all other aspects of this policy.
- 3.2.2 Shall. Indicates a mandatory requirement.
- 3.2.3 Should. Indicates a recommendation or that which is advised but not required.

### 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 practical skill.
- 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.
- 3.3.9 Evolution. A set of prescribed actions that result in an effective fireground activity.

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- 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 the surfaces exposed to thermal radiation reach ignition temperature more or less simultaneously and fire spreads rapidly through the space, resulting in full room involvement or total fire involvement of the compartment or enclosed space.
- 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 flow within the path determined by the difference in the pressure where heat and smoke in a higher-pressure area will flow through openings towards 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.
- 3.3.14 High-Temperature Environment. An environment with a temperature above 104 degrees F (40 degrees C).
- 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.
- 3.3.16 Instructor. Any 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 may or may not be an employee of MFSI.
- 3.3.17 Lead Instructor (Instructor-in-Charge). A qualified MFSI employee assigned responsibility to lead and conduct the live-fire training evolution(s). For certification end-tests, the test supervisor is considered the Lead Instructor.
- 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 firefighters are normally required to wear while on an emergency scene, including turnout coat, protective trousers, firefighting boots, firefighting gloves, a protective hood, and a helmet with eye protection.

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- 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.
- 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 designated by the authority having jurisdiction to maintain a safe working environment at all live fire training evolutions. At least one Safety Officer position during interior attack evolutions shall be held by an MFSI employee.
- 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.

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## Section 4 – General

### **4.1 Application**

- 4.1.1 All live fire training evolutions shall comply with this section and the appropriate section for the type of training being performed.
- 4.1.2 Strict safety practices shall be applied to all structures and props utilized 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 If the runoff from live fire training evolutions will impact protected resources such as streams, water bodies, wetland, etc., proper erosion protection such as hay bales or silt fencing shall be used in accordance with the requirements of the Maine Department of Environmental Protection.

### **4.3 Student Prerequisites**

Prior to being permitted to participate in live fire training evolutions and end-testing sponsored and controlled by MFSI, the student shall have received training to meet the minimum job performance requirements for Fire Fighter I in NFPA 1001 (as specified by the Maine Department of Labor, Bureau of Labor Standards) related to the following subjects:

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

- 4.3.1 Prior to being permitted to participate in live fire training evolutions and end-testing sponsored and controlled by MFSI, the student shall have received training on modern fire behavior principles including fire dynamics, fire development in a compartment, fuel-limited and ventilation-limited fire growth, flow path, nozzle control and door control.
- 4.3.2 Students participating in a live fire training evolution who received the required minimum training specified in 4.4 and 4.3.1 from other than the authority having jurisdiction shall present written evidence of having successfully completed the prescribed training prior to being permitted to participate in any live fire training evolution.

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## **4.4 Participant Health and Safety**

- 4.4.1 Instructors and participants shall be rehabbed in accordance with Annex D.
- 4.4.2 When assessing the length and number of live fire training sessions (evolutions) conducted in a training or evaluation 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).
- 4.4.3 The training session shall be curtailed, postponed, or cancelled, as necessary, to reduce the risk of injury or illness caused by extreme weather conditions.

## **4.5 Safety Officer**

- 4.5.1 A Safety Officer shall be appointed for all live-fire training evolutions. Assistant safety Officers may be utilized as deemed necessary by the Safety Officer or Lead Instructor.
- 4.5.2 All live fire training Instructors and Safety Officers shall be trained on the application of the requirements contained in this policy.
- 4.5.3 The Safety Officer(s) shall have the authority, regardless of rank, to intervene and control any aspect of the operation when, in his or her judgment, a potential or actual danger, accident, or unsafe condition exists.
- 4.5.4 The responsibilities of the Safety Officer(s) shall include, but shall not be limited to, the following:
- (1) Prevention of unsafe acts
  - (2) Elimination of unsafe conditions
- 4.5.5 The Safety Officer(s) shall provide for the safety of all persons on the scene including students, instructors, visitors, and spectators.
- 4.5.6 The Safety Officer(s) shall not be assigned other duties that interfere with safety responsibilities.
- 4.5.7 The Safety Officer(s) 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.

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## **4.6 Lead Instructor and Instructor Responsibilities**

- 4.6.1 The Lead Instructor shall have Fire Instructor II certification and meet the minimum job performance requirements for Fire Instructor II in NFPA 1041, *Standard for Fire Service Instructor Professional Qualifications*.
- 4.6.2 The Lead Instructor shall be responsible for full compliance with this policy.
- 4.6.3 It shall be the responsibility of the Lead Instructor to coordinate overall training or testing activities to ensure correct levels of safety.
- 4.6.4 The Lead Instructor shall assign the following personnel:
1. One Instructor to each functional crew, each of which shall not exceed five (5) students
  2. One Instructor to each backup line
  3. One additional Instructor for each additional functional assignment
- 4.6.5 The Lead Instructor shall provide for the rest and rehabilitation of participants, including any necessary medical evaluation and treatment, food and fluid replenishment, and relief from climatic conditions (*see Annex D*).
- 4.6.5.1 Assignment rotation, rest, and rehabilitation shall be provided for instructors.
- 4.6.5.2 An Instructor shall not serve as the ignition officer for more than one evolution in a row.
- 4.6.6 All Instructors shall be qualified by the AHJ to deliver live fire training.
- 4.6.7 Additional Instructors shall be designated when factors such as large groups or extreme temperatures are present, and classes of long duration are planned.
- 4.6.8 Prior to the ignition of any fire, Instructors shall ensure that all protective clothing and equipment specified in this section are being worn according to manufacturer's instructions.
- 4.6.10 Instructors shall monitor and supervise all assigned students during the live fire training evolution.
- 4.6.11 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. The training session shall be curtailed, postponed, or canceled as necessary, to reduce the risk of injury or illness caused by extreme weather conditions.

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### **4.6.12 Training Instructors on How to Use Specialty Props**

4.6.12.1 The Instructors and Safety Officer(s) responsible for conducting live fire training evolutions with a gas-fueled training system or with other specialty prop(s) (such as a flashover simulator) shall be trained in the complete operation of the system and the prop(s).

4.6.12.2 The training of Instructors and the Safety Officer(s) shall be performed by an individual authorized by the gas-fueled training system and/or specialty prop manufacturer or by others qualified to perform this type of training.

### **4.7 Fire Control Team**

4.7.1 A Fire Control Team shall consist of a minimum of three personnel.

4.7.1.1 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.

4.7.1.2 The Ignition Officer shall be a member of the Fire Control Team.

4.7.1.3 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.

4.7.2 The decision to ignite the training fire shall be made by the Lead Instructor in coordination with the Safety Officer.

4.7.3 The fire shall be ignited by the Ignition Officer.

4.7.4 The Fire Control Team shall wear full personal protective clothing, including SCBA, when performing this control function.

4.7.5 A charged hose line shall be available when the Fire Control Team is igniting or tending to any fire.

4.7.6 Fires shall not be ignited without an Instructor or Safety Officer visually confirming that the flame area is clear of personnel being trained.

### **4.8 Personal Protective Clothing**

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

4.8.2 All participants shall be inspected by the Safety Officer(s) prior to entry into a live fire training evolution to ensure that the protective clothing and SCBA are being worn correctly and are in serviceable condition.

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- 4.8.3 Protective coats, trousers, hoods, footwear, helmets, and gloves shall have been manufactured to meet the requirements of *NFPA 1971, Standard on Protective Ensemble for Structural Fire Fighting*.
- 4.8.4 Self-contained breathing apparatus (SCBA) shall have been manufactured to meet the requirements of *NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus for the Fire Service*.
- 4.8.5 MFSI and NFPA advise that 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, Standard on Station/Work Uniforms for Fire and Emergency Services*. Where other clothing is worn by participants, it is strongly advised that the clothing worn under PPE be of natural fibers (e.g., cotton, wool, or blend of both) and not flammable synthetic materials.
- 4.8.6 Personal alarm devices shall have been manufactured to meet the requirements of *NFPA 1982, Standard on Personal Alert Safety Systems (PASS)*.
- 4.8.7 All students, instructors, safety personnel, and other personnel participating in any evolution or operation of fire suppression during the live-fire training evolution shall breathe from an SCBA air supply whenever operating under one or more of the following conditions:
- (1) In an atmosphere that is oxygen deficient and/or contaminated by products of combustion
  - (2) In an atmosphere suspected of being oxygen deficient and/or contaminated by products of combustion
  - (3) In any atmospheres that can become oxygen deficient and/or contaminated
  - (4) Below ground level

### **4.9 Communications**

- 4.9.1 A method of fire ground communications shall be established to enable coordination among the Incident Commander, the interior and exterior sectors, the Safety Officer(s), and external requests for assistance.
- 4.9.2 A building evacuation plan shall be established, including an evacuation signal to be demonstrated to all participants in an interior live fire training evolution.

### **4.10 Emergency Medical Services (EMS)**

- 4.10.1 Basic Life Support (BLS) emergency medical services shall be available on site to handle injuries.
- 4.10.2 For acquired structures, BLS emergency medical services with transport capabilities shall be available on site to handle injuries.
- 4.10.3 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.

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- 4.10.4 In the event of any injury, your respective Training Program Manager shall be notified by phone. If you cannot contact your Training Program Manager you shall contact the MFSI Director or Deputy Director. Written reports shall be completed and submitted on all injuries and on all medical aid rendered in accordance with MFSI Policy.

### **4.11 Water Supply**

- 4.11.1 The Lead Instructor and the Safety Officer (s) shall determine the rate and duration of water flow 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.
- 4.11.2 Each hose line and backup line(s) shall be capable of delivering a minimum of 95 gallons per minute (360 L/min.).
- 4.11.3 Backup lines shall be provided to ensure protection for personnel on training attack lines.
- 4.11.4 The minimum water supply for and delivery for any individual live fire training evolution shall be assessed based on the extent of the evolution to be performed.
- 4.11.5 The minimum water supply and delivery for live fire training evolutions shall meet the criteria identified in MFSI *SOP-102*.
- 4.11.6 A minimum reserve of additional water in the amount of 50 percent of the fire flow demand determined in accordance with 4.11.5 shall be available to handle exposure protection or unforeseen situations.
- 4.11.7 Separate sources shall be utilized for the supply of attack lines and backup lines in order to preclude the loss of both water supply sources at the same time. Exception: A single source shall be sufficient at a training center facility where the water system has been engineered to provide adequate volume for the evolutions conducted and a backup power source or backup pumps, or both, are in place to ensure an uninterrupted supply in the event of a power failure or malfunction.
- 4.11.8 There shall be room provided around all props so that there is space for all attack lines(s) as well as backup line(s) to operate freely.

### **4.12 Fuel Materials**

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

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- 4.12.4 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.
- 4.12.5 Fuel-fired buildings and props are permitted to use the appropriate fuel for the design of the building or prop.
- 4.12.6 Flammable or combustible liquids, as defined in NFPA 30, *Flammable and Combustible Liquids Code*, shall not be used in live fire training evolutions unless the live fire training prop has been specifically engineered to accommodate a defined quantity of fuel.
- 4.12.7 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.
- 4.12.8 Fuel materials shall be used only in the amounts necessary to create the desired fire size.
- 4.12.9 The fuel load shall be limited to avoid conditions that could cause an uncontrolled flashover or backdraft.
- 4.12.10 The Lead Instructor and the Safety Officer(s) shall assess the selected fire room environment for factors that can affect the growth, development and spread of fire.
- 4.12.11 The training exercise shall be stopped immediately when the Lead Instructor or the Safety Officer(s) determines through ongoing assessment that the combustible nature of the environment represents a potential hazard. An exercise stopped as a result of an assessed hazard shall continue only when actions have been taken to reduce the hazard.
- 4.12.12 The use of flammable gas, such as propane and natural gas, shall only be permitted in live fire training props specifically designed for their use.
  - 4.12.12.1 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.
  - 4.12.12.2 During the entire time the prop is in use, the remote shutoff shall be continuously attended by the safety personnel who are trained in its operation and who have direct communications with the Safety Officer(s) and Instructors.
  - 4.12.12.3 Liquefied petroleum gas props shall be equipped with all safety features as described in NFPA 58, *Liquefied Petroleum Gas Code* and NFPA 59, *Utility LP-Gas Plant Code*.
- 4.12.13 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.
- 4.12.14 For flammable metal fires, there shall be a sufficient quantity of the proper fire 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.

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- 4.12.15 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.

### **4.13 Parking/Staging**

- 4.13.1 Areas for the staging, operating and parking of fire apparatus that are used in the live fire training evolution shall be designated.
- 4.13.2 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. Consideration shall be given to locating this area in order to facilitate prompt response of apparatus in the event of an emergency.
- 4.13.3 Where required or necessary, parking areas for police vehicles or for the press shall be designated.
- 4.13.4 Ingress and egress routes shall be designated, identified and monitored during the training evolutions in order to ensure their availability in the event of an emergency.

### **4.14 Visitors and Spectators**

- 4.14.1 All spectators shall be restricted to an area outside the operations area perimeter established by the safety officer. Control measures such as ropes, signs, and fire line markings shall be posted to indicate the perimeter of the operations area.
- 4.14.2 Visitors who are allowed within the operations area perimeter to observe operations shall be escorted at all times.
- 4.14.3 Visitors who are allowed within the operations area perimeter shall be equipped with and shall wear appropriate protective clothing.
- 4.14.4 Control measures shall be established to keep pedestrian traffic in the vicinity of the training site shall be kept clear of the operations area of the live burn

### **4.15 Preburn Plan/Briefing**

- 4.15.1 A preburn plan shall be prepared and shall be utilized during the preburn briefing sessions.
- 4.15.1.1 All features of the training areas shall be indicated on the preburn plan.
- 4.15.1.2 Written learning objectives shall be required for all live fire training evolutions.
- 4.15.2 Prior to conducting actual live-fire training evolutions, a preburn briefing session shall be conducted by the Lead Instructor with the Safety Officer(s) for all participants.
- 4.15.3 All facets of each evolution to be conducted shall be discussed in the preburn briefing, and assignments shall be made for all crews participating in the training session.

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- 4.15.4 The location of simulated victims shall not be required to be disclosed, provided that the possibility of victims is discussed during the preburn briefing.
- 4.15.5 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.
- 4.15.6 Prior to conducting any live fire training, all participants shall be required to conduct a walk-through of the burn building or prop in order to have a knowledge of and familiarity with the layout of the building or prop and to facilitate any necessary evacuation.
- 4.15.7 Property adjacent to the training site that could be affected by the smoke from the live fire training evolution, such as railroads, airports or heliports, and nursing homes, hospitals, or other similar facilities, shall be identified.
- 4.15.7.1** The persons in charge of the properties described in 4.15.7 shall be informed **of the date and time of the evolution.**
- 4.15.8 Streets or highways in the vicinity of the training site shall be surveyed for potential effects from live fire training evolutions, and safeguards shall be taken to eliminate any possible hazard to motorists.

### **4.16 Victims**

- 4.16.1 No person (s) shall play the role of a victim inside any live fire training structure or acquired structure.
- 4.16.2 Rescue manikins dressed in fire-fighting personal protective clothing and used as victims shall be uniquely colored or specially marked.

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## Section 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 section 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 including a Maine Department of Environmental Protection Checklist for Live Fire Instruction and Training Activities.
- 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 MFSI 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 of the acquired structure by MFSI.
- 5.1.9 The permits specified in this section shall be provided to other participating training agencies 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.**

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## **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 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 not to 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.
  - 5.2.4.2 Missing stair treads and rails shall be repaired or replaced.
  - 5.2.4.3 Dangerous portions of any chimney shall be removed.
  - 5.2.4.4 Holes in walls and ceilings shall be patched.
  - 5.2.4.5 Roof ventilation openings that are normally closed but can be opened in the event of an emergency shall be permitted to be utilized.
  - 5.2.4.6 Low-density combustible fiberboard and other highly combustible interior finishes shall be removed.
  - 5.2.4.7 Extraordinary weight above the training area shall be removed.
  - 5.2.4.8 Fires shall not be ignited under exposed structural members.
- 5.2.5 All hazardous environmental conditions shall be removed before the live fire training evolutions are conducted in the structure.
  - 5.2.5.1 All forms of asbestos deemed hazardous shall be removed by a Maine DEP approved manner and documentation provided to MFSI.
- 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.

## MFSI LIVE FIRE BURN POLICY

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- 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.

### **5.5 Rapid Intervention Crew (RIC)**

5.5.1 A RIC trained in accordance with NFPA 1407, *Standard for Training Fire Service Rapid Intervention Crews*, shall be provided during a live fire training evolution in an acquired structure.

5.5.2 An individual that is believed to be in trouble, disoriented, low on air, lost contact with their crew, or believes their partner is in trouble shall use the radio and declare a "MAYDAY". The Lead Instructor/Incident Commander shall acknowledge the MAYDAY and deploy the RIC. All radio traffic that is not considered emergency traffic or related to the MAYDAY shall cease. Participants that are not involved in the MAYDAY shall continue with their assignments. Any available personnel shall, if able to, located near the Lead Instructor/Incident Commander and await orders.

5.5.3 The MAYDAY message shall consist of the following information using "LUNAR" for reference:

- Location
- Unit
- Name
- Air Supply Level
- Resources Needed

# MFSI LIVE FIRE BURN POLICY

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## **5.6 MFSI Staffing Requirements**

5.6.1 The Lead Instructor shall make assignments in accordance with MFSI policy, as follows:

- (1) Maintain a student to instructor ratio of five-to-one (5:1)
- (2) One instructor to each functional crew, including each hose line
- (3) Additional personnel to backup lines to provide mobility
- (4) One additional qualified instructor for each additional functional assignment

5.6.2 For live fire training in acquired structures a minimum of 10 personnel are required. Large or complex structures require additional personnel.

- **Burn Supervisor** (MFSI Director, Deputy Director, Training Program Manager or Designee)
- **Lead Instructor** (MFSI employee)
- **Safety Officer** (MFSI employee only)
- **Local Safety Officer** (local fire chief or qualified designee)
- **Attack** (MFSI certified fire instructor)
- **Back-up/Igniter** (any qualified fire instructor)
- **Search & Rescue** (any qualified fire instructor)
- **Ladder/Vent** (any qualified fire instructor)
- **RIT** (2 MFSI employees)

5.6.3 Additional safety personnel, as deemed necessary by the Lead Instructor or Safety Officer(s) shall be located strategically within the live fire training structure to react to any unplanned or threatening situation or condition.

## **5.7 Water Supply**

5.7.1 For acquired structures the minimum water supply and delivery for the live fire training evolutions shall meet the criteria identified in Annex C.

# MFSI LIVE FIRE BURN POLICY

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## **Section 6 –Gas-Fired Live Fire Training Structures and Mobile Enclosed Live Fire Training Props (MFSI Drager Mobile Live Fire Training Unit)**

### **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 firefighters shall be removed prior to the beginning of the training exercises.
- 6.1.4 Flammable gas fires shall not be ignited manually.
- 6.1.5 Water shall be the only extinguishing agent used to suppress fire in the MFSI Drager Live Fire Training Trailer.

### **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 MFSI 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 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.
  - 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.

## MFSI LIVE FIRE BURN POLICY

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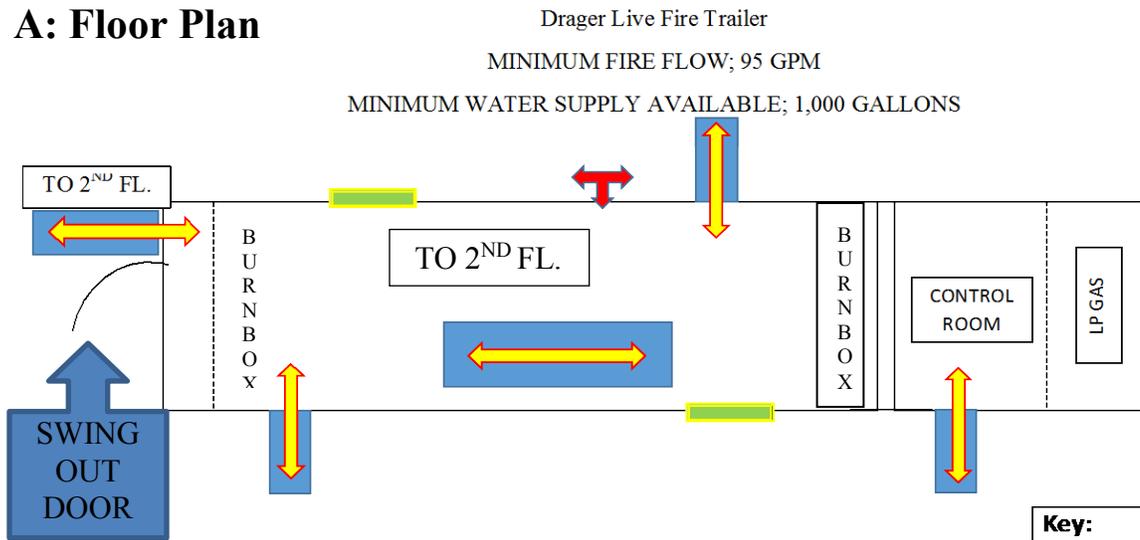
- 6.2.7 The structural integrity of the live fire training structure shall be evaluated and documented by a licensed professional engineer with live fire training structure experience and expertise, or by another competent professional as determined by MFSI, at least once every 10 years, or more frequently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

### **6.3 MFSI Staffing Requirements**

- 6.3.1 The Lead Instructor shall make assignments in accordance with MFSI policy, as follows:
- (1) Maintain a student to instructor ratio of five-to-one (5:1)
  - (2) One instructor to each functional crew
  - (3) One qualified instructor assigned to all hose lines
  - (4) Additional personnel to backup lines to provide mobility
  - (5) One additional qualified instructor for each additional functional assignment
- 6.3.2 For gas-fired live fire training structures a minimum of 5 personnel are required. Large or complex structures require additional personnel.
- **Lead Instructor** (MFSI employee)
  - **Controller Room Instructor** (MFSI employee)
  - **Attack/Pendant Operator Instructor** (MFSI employee)
  - **Safety Officer** (MFSI employee only)
  - **Local Safety Officer** (local fire chief or qualified designee)
- 6.3.3 Additional safety personnel, as deemed necessary by the Lead Instructor or Safety Officer(s) shall be located strategically within the live fire training structure to react to any unplanned or threatening situation or condition.

# MFSI LIVE FIRE BURN POLICY

## A: Floor Plan



Key:	
Equipment:	Completed:
Command Post	
Attack Engine	
Back-Up Engine	
Aerial Device	
Water Supply	
Hose Line Placement including Supply Line	
EMS Staging	

# MFSI LIVE FIRE BURN POLICY

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## **Section 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 firefighters 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 MFSI 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 MFSI.
  - 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 building owner.
- 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 building owner at least once every 5 years or more frequently if determined to be required by the evaluator.

## MFSI LIVE FIRE BURN POLICY

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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 inspect the hidden conditions behind the linings.

### **7.3 Sequential Live Fire Burn Evolutions**

7.3.1 MFSI 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.

# MFSI LIVE FIRE BURN POLICY

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## **7.4 MFSI Staffing Requirements**

7.4.1 The Lead Instructor shall make assignments in accordance with MFSI policy, as follows:

- (1) Maintain a student to instructor ratio of five-to-one (5:1)
- (2) One instructor to each functional crew
- (3) One qualified instructor assigned to all hose lines
- (4) Additional personnel to backup lines to provide mobility
- (5) One additional qualified instructor for each additional functional assignment

7.4.2 For live fire training structures a minimum of 7 personnel are required. Large or complex structures require additional personnel.

- **Lead Instructor** (MFSI employee)
- **Safety Officer** (MFSI employee only)
- **Local Safety Officer** (local fire chief or qualified designee)
- **Attack** (MFSI certified fire instructor)
- **Back-up/Igniter** (any qualified fire instructor)
- **RIT** (2 firefighters; MFSI employees or local)

7.4.3 Additional safety personnel, as deemed necessary by the Lead Instructor or Safety Officer(s) shall be located strategically within the live fire training structure to react to any unplanned or threatening situation or condition.

## **7.5 Additional Requirements**

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

7.5.2 No person(s) shall play the role of a victim inside the live fire training structure.

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

7.5.4 Where the interior of the burn room may be observed safely from outside the structure (through a window, door or observation hole) the Safety Officer shall observe the Ignition Officer light the fire and retreat. Where direct observation is not possible the Safety Officer shall enter the structure with the crew of the back-up line to observe the Ignition Officer. The Ignition Officer, Safety Officer, and hose crew shall exit together.

# MFSI LIVE FIRE BURN POLICY

## **Section 8 - Exterior Live Fire Training Props (MFSI Kirila Car Fire Prop, Drager System 64 Prop and Drager Tudor Fire Extinguisher Training Prop)**

### **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 Strict safety practices shall be applied to all exterior props selected for live fire training evolutions.
- 8.1.4 Exterior props shall be left in a safe condition upon completion of live fire training evolutions.
- 8.1.5 For outside training, care shall be taken to select areas that limit the hazards to both personal safety and the environment.
- 8.1.6 The training site shall be flat and open without obstructions that can interfere with fire-fighting operations.
- 8.1.7 Where using live training fires outside, the ground cover shall be such that it does not contribute to the fire.
- 8.1.8 Debris hindering the access of fire fighters shall be removed prior to the beginning of the training exercise.
- 8.1.9 Water shall be the only extinguishing agent used to suppress fire in the MFSI Kirila Car Fire Prop and the Drager System 64 Prop.

### **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 MFSI shall be notified.
- 8.2.2 The structural integrity of the props shall be evaluated and documented annually.
- 8.2.3 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.
- 8.2.4 Exterior props shall be left in a safe condition upon completion of live fire training evolutions.

# MFSI LIVE FIRE BURN POLICY

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## **8.3 MFSI Staffing Requirements**

8.3.1 The Lead Instructor shall make assignments in accordance with MFSI policy, as follows:

- (1) Maintain a student to instructor ratio of five-to-one (5:1)
- (2) One instructor to each functional crew
- (3) One qualified instructor assigned to all hose lines
- (4) Additional personnel to backup lines to provide mobility
- (5) One additional qualified instructor for each additional functional assignment

8.3.2 For exterior live fire training props a minimum of 3 personnel are required. Large or complex props require additional personnel.

- **Lead Instructor** (MFSI employee)
- **Safety Officer** (MFSI or local)
- **Attack Hose Line** (any qualified fire instructor) (not required for the Fire Extinguisher Prop)
- **Back-Up Hose Line** (any qualified fire fighters) (not required for Fire Extinguisher Prop)

8.3.3 Additional safety personnel, as deemed necessary by the Lead Instructor or Safety Officer(s) shall be located strategically within the live fire training structure to react to any unplanned or threatening situation or condition.

# MFSI LIVE FIRE BURN POLICY

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## **Section 9 - Reports and Records**

### **9.1 General**

- 9.1.1 As part of the after action review, the following records and reports shall be maintained on all live-fire training evolutions in accordance with the requirements of this standard and submitted with the course close-out:
- (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 A post-training critique session, complete with documentation, shall be conducted to evaluate student performance and to reinforce the training that was covered.

### **9.2 Acquired Structures**

- 9.2.1 For acquired structures, records pertaining to the structure shall be completed.
- 9.2.2 Upon completion of the training session, an acquired structure shall be formally turned over to the control of the property owner.
- 9.2.3 The turnover process shall include the completion of a standard form indicating the transfer of authority for the acquired structure.

# MFSI LIVE FIRE BURN POLICY

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## Annex A - Explanatory Material

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

- A.1.1 Drills conducted to familiarize fire fighters with the proper use of self-contained breathing apparatus in a smoke environment should not be conducted under live fire conditions.
  
- A.3.3.27 Training Structure. It does not include a structure that is used primarily for training in the use of Self-Contained Breathing Apparatus (SCBA) where only smoke conditions are created, without a live fire, and the trainee is not subjected to risk of the effects of fire other than the smoke produced.
  
- A.4.3 The current minimum job performance requirements for interior structural firefighting as determined by Maine BLS should be used as guidance related to the list of subjects as follows:
  - (1.) The History and Orientation of the Fire Service**
    - a. History of the Fire Service
    - b. The Organization of the Fire Service
    - c. Roles within the Department
    - d. Regulations, Policies, and Standard Operating Procedures (or Guidelines)
    - e. Working with other Organizations
    - f. Fire Fighter Guidelines
  
  - (2.) Firefighter Qualifications and Safety**
    - a. Firefighter Qualifications
    - b. Firefighter Safety
    - c. Safety and Health
    - d. Personal Protective Equipment
  
  - (3.) Fire Service Communications**
    - a. Communications Center
    - b. Radio Systems
    - c. Records and Reporting
  
  - (4.) Incident Management System**
    - a. Characteristics of the Incident Management System
    - b. The IMS (NIMS) Organization
    - c. Standard IMS Concepts
    - d. Implementing ICS
    - e. Working within the Incident Management System

# MFSI LIVE FIRE BURN POLICY

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## **(5.) Fire Behavior**

- a. Units of Measure
- b. Fire Triangle and Tetrahedron
- c. Chemistry of Combustion
- d. Products of Combustion
- e. Characteristics of Liquid Fuel Fires
- f. Characteristics of Gas Fuel Fires
- g. Classes of Fires
- h. Phases of Fire
- i. Characteristics of an Interior Fire

## **(6.) Portable Fire Extinguishers**

- a. Purposes of Fire Extinguishers
- b. Classes of Fires
- c. Classification of Extinguishers
- d. Labeling of Extinguishers
- e. Types of Extinguishers
- f. Fire Extinguisher Design
- g. Fire Extinguisher Characteristics
- h. Use of Fire Extinguishers
- i. Care of Fire Extinguishers

## **(7.) Firefighter Tools and Equipment**

- a. General Considerations
- b. Functions
- c. Phases of Use
- d. Tool Staging
- e. Maintenance
- f. Cleaning and Inspection

## **(8.) Response and Size-Up**

- a. Response
- b. Arrival at the Incident Scene
- c. Size-Up
- d. Incident Action Plan

## **(9.) Forcible Entry**

- a. Forcible Entry Situations
- b. Forcible Entry Tools
- c. Doors
- d. Windows
- e. Locks
- f. Breaching Walls and Floors
- g. Forcible Entry and Salvage

# MFSI LIVE FIRE BURN POLICY

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## **(10.) Ladders**

- a. Functions of Ladders
- b. Ladder Construction
- c. Types of Ladders
- d. Inspection, Maintenance
- e. Cleaning
- f. Ladder Safety
- g. Using Portable Ladders

## **(11.) Search and Rescue**

- a. Search and Rescue
- b. Search Techniques
- c. Search Safety
- d. Rescue Techniques

## **(12.) Ventilation**

- a. Benefits of Proper Ventilation
- b. Factors Effecting Ventilation
- c. Building Construction Considerations
- d. Tactical Priorities
- e. Location and Extent of Smoke and Fire Conditions
- f. Types of Ventilation
- g. Horizontal Ventilation
- h. Vertical Ventilation
- i. Vertical Ventilation Techniques
- j. Special Considerations
- k. Backdraft and Flashover Considerations

## **(13.) Water Supply**

- a. Municipal Water Supply
- b. Fire Hydrants
- c. Rural Fire Supplies

## **(14.) Fire Hose, Nozzles, Streams, and Foam**

- a. Fire hydrants
- b. Fire Hoses
- c. Hose Care, Maintenance, and Inspection
- d. Hose Appliances
- e. Hose Rolls
- f. Fire Hose Evolutions
- g. Nozzles
- h. Foam

# MFSI LIVE FIRE BURN POLICY

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## **(15.) Firefighter Survival**

- a. Introduction
- b. Safe Operating Procedures
- c. Firefighter Survival Procedures
- d. Air Management
- e. Rehabilitation
- f. Critical Incident Stress

## **(16.) Salvage and Overhaul**

- a. Salvage
- b. Overhaul
- c. Lighting

## **(17.) Firefighter Rehabilitation**

- a. Factors, Cause, Need for Rehabilitation
- b. Types of Incidents Affecting Firefighters
- c. How Does Rehabilitation Work?
- d. Personal Responsibility in Rehabilitation

## **(18.) Fire Suppression**

- a. Offensive versus Defensive Operations
- b. Operating Hose Lines
- c. Protecting Exposures
- d. Vehicle Fires
- e. Flammable Liquid Fires
- f. Flammable Gas Cylinders
- g. Fire Involving Electricity

A.4.8.2 Protective trousers might be susceptible to wicking where used with flammable and combustible liquids. Precautions should be taken to prevent protective trouser contact with flammable or combustible liquids. Leather boots might be susceptible to degradation when contact is made with flammable or combustible liquids. Precautions should be taken to prevent leather boots from coming in contact with flammable or combustible liquids.

A.4.12.13 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, 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.7.1 There should be ongoing concern for the progressive damage to burn buildings associated with fire intensity during live-fire training evolutions. Excessive fire intensity can result in accelerated destruction of the training center burn building and can increase the risk to personnel to an unacceptable level.

A.7.2 Routine maintenance is important to providing a safe, durable structure for live-fire training. Periodic engineering evaluations are one step in that process. Burn buildings 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.

## MFSI LIVE FIRE BURN POLICY

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Before a registered (licensed) Professional Engineer (P.E.) understands “burn building engineering,” it takes significant efforts on the part of the P.E. to learn how burn buildings are used, how repetitive live-fire training affects structural and non-structural elements within the burn building, and what materials have been proven to work (or not work) within such a harsh environment. This effort typically requires both research/educational efforts and experience with burn building 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, meaning that “P.E.” could mean structural engineer or 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 burn building.

Note that a P.E. with refractive materials experience and expertise, but not burn building experience and expertise, might not have sufficient understanding of how refractory concrete performs in a burn building environment. Many P.E.s with refractive materials experience have gained that experience working with industrial applications, where 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 burn building environment, where rapid heating, cooling, and thermal shock deteriorate refractory concrete differently than a furnace application would. Many P.E.s with only refractive materials experience, but no burn building experience, do not know this. As a result, the requirement for burn building 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 burn building.

The phrase “with burn building 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 burn building 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 burn building project(s). This could include a previous burn building evaluation, the repair or renovation to an existing burn building, or the design of a new burn building. In many cases, it would be acceptable for a P.E. without burn building experience or expertise to perform the evaluation as long as he or she has teamed with a P.E. with burn building experience or expertise.

Although the standard requires only the “structural integrity” to be evaluated annually, it is advisable to have the non-structural elements evaluated at the same time. Illustrative examples include the following:

- (1) A spray-on refractory concrete thermal lining is not a structural element. It is a concrete material on the ceiling intended to protect the structural concrete. Exposure to live-fire training can cause it to wear out over time. Portions of it can loosen and fall out, creating a safety concern for occupants. Even though it is not structural, it is good to have the P.E. evaluate the condition of the lining concrete and advise on its repairs and/or maintenance in order to enhance training safety.

## MFSI LIVE FIRE BURN POLICY

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- (2) Doors in burn buildings at times do not operate properly, sticking shut during training and creating safety problems relating to emergency egress. The P.E. could evaluate this and make recommendations for repairs.
- (3) A rusted hinge at a second floor window shutter could cause the shutter to fall to the ground below. The P.E. could evaluate the burn building shutters and make recommendations for necessary repairs to enhance safety and durability.

A.7.3.2 A fire should not be larger than is necessary for the evolution. It should be understood that it is not necessary to have large fires to teach many of the basic evolutions and tactics. Where the objective of the training session is to train in the use of master streams or multiple attack lines, larger fires might be necessary. The key element is to maintain a fire that is controllable using the available resources.

# MFSI LIVE FIRE BURN POLICY

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## Annex B - Checklists and Forms

### **PURPOSE**

To provide required forms and checklist for use by MFSI personnel when conducting live-fire suppression training and end-testing.

### **APPLICATION**

This standard operating procedure is to be followed by all Maine Fire Service Institute (MFSI) personnel assigned responsibilities for conducting and participating in Class A and Class B live-fire evolutions related to MFSI training courses and certification end-testing. Under this directive the designated **Lead Instructor** is responsible for overseeing compliance with these requirements and ensuring the safety of all participants. MFSI is the *authority having jurisdiction* (i.e., state training/testing AHJ) for the purpose of conducting live-fire training evolutions for MFSI firefighter training programs and certification end-tests.

MFSI Lead Instructors shall complete the training checklist, forms, etc. and provide documentation for the purpose of verifying that all required procedures and precautions were taken to ensure a safe training event. Documentation shall be submitted with the course close-out package. Packages submitted without required documentation shall be returned to the lead instructor.

### **List of Required Forms and Attachments for Live-Fire Suppression Training and Testing**

- ✓ Checklist for Conducting Live-Fire Training
- ✓ Tactical Worksheet
- ✓ Floor Plan of Burn Building (with dimensions)
- ✓ Documentation showing calculations for minimum total water supply
- ✓ Weather forecast for each day of scheduled training
- ✓ Chief's Permission Form for all firefighters to participate certifying age, worker's compensation insurance coverage, and compliance with Maine BLS respiratory protection requirements
- ✓ Documentation for each candidate that verifies their compliance with Maine BLS minimum training requirements for interior structural fire attack
- ✓ Equipment service test records in accordance with Maine BLS requirements
- ✓ Apparatus service test records in accordance with Maine BLS requirements

# MFSI LIVE FIRE BURN POLICY

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## CHECKLIST FOR CONDUCTING LIVE-FIRE TRAINING

- ✓ **The MFSI Lead Instructor has primary responsibility to ensure the following items have been addressed and shall check off each entry to indicate action taken and then sign and date the checklist prior to any live fire operations.**
- ✓ **For interior fire attack the Safety Officer shall review the documents prior to commencement of the burn.**
- ✓ **Completed documents shall be attached to the Training Report/Close-out package when training is complete.**
- ✓ **Completed burn documents shall be reviewed by the MFSI Deputy Director.**

### A. PERMITS, DOCUMENTS, NOTIFICATIONS, INSURANCE

- Maine Outdoor Open Burning Permit obtained from the local Forest Fire Warden and attached (if required by the local warden).
- Permission from the local water department to utilize hydrants(s), if applicable.
- Notified the regional PSAP (E-911) center and/or any local dispatch center.
- Notified all police agencies with jurisdiction and received authority to block off roads (if required).
- Secured qualified and trained individuals for assistance with in traffic control (if required).
- Provided a designated staging/parking spot for EMS vehicle.
- Notified local EMS responder agency of the date and time of the live-fire training.
- Notified owners of adjacent property of date and time of live-fire training.
- Verified that the host fire department maintains property liability insurance (that covers damage to other property) and the document is on file at the department or municipal office.

## MFSI LIVE FIRE BURN POLICY

### **B. SITE INSPECTION AND PRE-BURN PLANNING**

- Conducted a visual survey of the structure and found it to appear to be structurally sound for intended purposes (e.g., foundation walls intact, columns secure, supporting walls not bowed or cracked, floors intact, roof members secure, roof covering intact).
- Surveyed the work area surrounding this property and corrected any hazards (i.e., wells, cisterns, large holes, tree hazards, poison ivy, bee hives, electric/utility lines protected, etc.)
- Prepared a site plan showing burn building, exposures, apparatus spotting, access roads, parking areas, rehab area, food areas, sanitary facilities, and water supply sources, etc.
- Prepared burn building floor plan(s) with key structural details, dimensions, egress, exits, emergency escape routes, and any potential hazards.
- Calculated water supply needs, delivery rate, and application rate as determined by MFSI policy and provided a copy of the worksheet with calculations for documentation.
- Obtained apparatus, equipment, and water supply to provide required needed fire flow for the burn building and exposures, as well as provided for independent water supply sources for water for the attack and back-up lines.
- Completed and attached a tactical worksheet showing location of:
  - Command Post
  - Position of all apparatus
  - Position of all hose lines, including supply and back-up
  - Designated access and parking for an EMS vehicle
  - Emergency evacuation area
  - Travel routes for arriving and departing emergency vehicles
  - Rehab Area
  - Resource Area
- Established and marked the fireground operations area (secure all hazards and set up spectator barriers).
- Identified and established fireground radio communications frequencies.
- Established a firefighter rehab area and provided essential supplies (i.e., drinking cups, water, sports drinks, food, cover/shade from direct sunlight, and/or protection from weather elements like wind, rain, snow, etc.).
- Obtained weather forecast for each training day.

# MFSI LIVE FIRE BURN POLICY

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## C. TRAINING PREPARATION

- All participants are listed on an attached MFSI Chief's Permission Form or other similar documentation and are capable of participating in this evolution. All participants in live-fire training shall meet the minimum Maine BLS requirements for interior attack and respiratory protection. In addition, all participants shall be covered by worker's compensation insurance. Required documents are attached.
- Participants entering IDLH atmospheres shall be wearing full PPE and SCBA with PASS device in full standby monitor mode (i.e., power on). A means for accounting of personnel shall be in place and maintained to track current status. Time-on-air records shall be kept for all personnel entering and working in IDLH atmospheres.
- Participants have been assigned to companies, each led by a designated company officer. Tasks shall be assigned to companies by command via company officers.
- A building evacuation signal (steady sounding of apparatus air horns) shall be established and tested. If sounded all participants are directed immediately to an assembly area for accounting (head count).

## D. BUILDING PREPARATION

**Follow the applicable sections from the MFSI Live Fire Training Policy for the type of live fire training structure or prop or situation covered by this training session.**

**Note: Ignore any item that does not apply to your structure or prop and draw a line through the item to show you read it.**

- Emergency escape paths are identified and egress travel distances are met for this structure.
- Ladders will be placed to window openings on floors above ground level as necessary.
- All extraordinary interior and exterior hazards have been remedied.
- Dead loads (materials of exceptional weight) were removed from all floors.
- All vertical ventilation openings were pre-cut (min. 4ft. x 4ft. opening for each separate or divided roof section) Trench cuts should be used as required.
- Fire room "sets" are Class A combustibles only (no flammable or combustible liquids).
- All window openings closed with the exception of the window to the fire room which is kept open until the fire is lit for observation by the interior safety officer.
- Doors were checked to ensure they will open and close completely; lock sets should be removed or rendered inoperable. Wood latches should be fabricated to secure doors in closed position.

## MFSI LIVE FIRE BURN POLICY

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- Stairways were made safe with railings in place.
- All inside debris cleaned up and rooms swept.
- All outside debris moved away from building and weeds were cut to make a safe work area.
- Porches and outside steps were made safe.
- Cistern, cesspool, wells, or other such ground openings were filled or otherwise protected.
- Insect hives and toxic weeds removed.
- Exposures protected or removed.

### **E. EQUIPMENT PREPARATION:**

- All hose, equipment, and apparatus to be used have passed an appropriate service test within the last year, or as required by Maine BLS rules. Lack of written fire department records shall be taken to indicate that tests have not been done.

All tools and equipment that do not (by NFPA standards or Maine BLS rules) require service testing have been visually inspected for wear, damage, or any condition that might endanger users.

- Records of service test results and tool and equipment inspections forms have been reviewed. No live-fire training shall be conducted with untested or unserviceable apparatus.
- All student and instructor PPE is NFPA and Maine BLS compliant.

### **F. PERSONNEL REQUIREMENTS AND RESPONSIBILITIES**

All MFSI-sponsored live-fire training programs shall follow the MFSI Live Fire Training Policy and minimum staffing requirements shall be met. The Lead Instructor generally assumes the role of Command. The MFSI Policy specifies, by chapter, the positions needed to be filled for training. Each position shall be filled by a trained, qualified individual at all times, who shall perform operations assigned as explained above and follow standard procedures. MFSI is the training-AHJ. The fire chief with jurisdiction is the local-AHJ and shall assume control of the training burn at any time he/she (or designee) feels necessary in order to maintain a safe operation. Should the local fire chief assume command of the incident, any personnel acting as Command or within the command system shall immediately surrender such position and withdraw from the operation and incident scene (or accept reassignment from the fire chief). In this scenario, the local fire chief assuming such command automatically assumes full and complete responsibility for the safety and welfare of all personnel on the scene.

# MFSI LIVE FIRE BURN POLICY

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## E. CONCLUDING OPERATIONS

Upon completion of the training burn, all firefighters should remain in the immediate area for overhaul and cleanup operations. It is essential that all personnel remain so that no one individual is overloaded with cleanup. The sooner the evolution is picked up, the sooner all companies can be released. There should be a post-operations analysis held after operations to discuss lessons learned, and to allow questions about practices observed.

### **Acknowledgements:**

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**MFSI Lead Fire Instructor**

**Date**

\_\_\_\_\_

**Local AHJ**

**Date**

# MFSI LIVE FIRE BURN POLICY

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## Annex C - Water Supply Calculations

### **PURPOSE**

To provide procedures to be followed by Maine Fire Service Institute (MFSI) personnel when calculating minimum total water supply (TWS) for supporting suppression crews when conducting live-fire training exercises and end-testing.

### **APPLICATION**

This standard operating procedure is to be followed by all MFSI personnel assigned responsibilities for conducting and participating in Class A and Class B live-fire evolutions related to MFSI training courses and certification end-testing. Under this directive the designated *lead instructor* and *burn supervisor* are responsible for overseeing compliance with these requirements and ensuring the safety of all participants. The Maine Fire Service Institute is the *authority having jurisdiction* (i.e., state training/testing AHJ) for the purpose of conducting live-fire training evolutions for MFSI firefighter training programs and certification end-tests. The calculation of minimum total water supply is required by the MFSI Live Fire Training Policy.

#### **1.0 Basic Rule for Determining Needed Fire Flow (NFF):**

(Adapted from the ISO Guide for Determination of Needed Fire Flow, Chp.7, Ed. 8-05)

- Where hydrant water is available for fire training at fixed-facilities use the following for NFF:

#### **Distance between Buildings Needed Fire Flow**

More than 100 feet: 500 gpm

31 feet – 100 feet: 750 gpm

11 feet – 30 feet: 1,000 gpm

10 feet or less: 1,500 gpm

- When the subject building or exposure buildings have a wood-shingle roof covering and it is probable that the roof can contribute to spreading fires, add 500 gpm to the NFF.
- The TWS (total water supply) required is the NFF delivered for a minimum of 2 hours from the available water source (e.g., pressurized hydrant, dry hydrant, tanker shuttle, relay with LDH).
- For Class B fire training the recommended available NFF is 1,000 gpm; the minimum is 500 gpm. The NFF is deliverable for a minimum of 2 hours.

# MFSI LIVE FIRE BURN POLICY

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## 2.0 Determining Total Water Supply and Delivery Rate without Hydrants

Fire training conducted in rural areas requires additional planning. The NFF and TWS for these fire training structures must be handled differently. For these situations we rely on a method developed by the NFPA. The following method of calculating TWS and Delivery Rate is based on *NFPA 1231 (1993) Standard on Water Supplies for Rural and Suburban Fire Fighting and Planning for Water Supply and Distribution in the Wildland/Urban Interface: Operation Water*, sponsored by the National Wildland Coordinating Group, National Interagency Fire Center, NFES Document #2295.

### 2.1 Minimum TWS is determined using following information:

- Occupancy classification (this factor must be entered in the formula)
- Construction classification
- Dimensions of the training or burn building
- Exposures (if any)

#### 2.1.1 Classification of Occupancy Hazard

The occupancy classification numbers run from 3 through 7, each corresponding to a specific level of hazard, with the lowest class numbers being the most hazardous. The class number is used in the calculation. Utilize **Occupancy Hazard Class 7** (*light-hazard* occupancies where quantity and combustibility of contents are low).

#### 2.1.2 Classification of Construction

Determine the construction class number by classifying the type of construction and assigning the corresponding construction classification number. Where more than one type of construction is present in a structure, the higher construction classification number shall be used for the entire structure. The types of construction include five basic types designated by roman numerals. Each type is assigned a multiplier for use in the calculation, either 0.5, 0.75, 1.0, or 1.50.

#### Guide to Classification of Types of Building Construction:

##### **Type I (Fire-Resistive) Construction** (Class 0.5)

A building constructed of noncombustible materials (reinforced concrete, brick, stone, etc.) and having any metal members properly *fireproofed* with major structural members designed to withstand collapse and to prevent the spread of fire.

##### **Type II (Noncombustible) Construction** (Class 0.75)

A building having all structural members (including walls, floors, and roofs) of noncombustible materials (reinforced concrete, brick, stone, etc.) and not qualifying as fire-resistive construction.

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## MFSI LIVE FIRE BURN POLICY

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### **Type III (Ordinary) Construction (Class 1.0)**

Any structure having exterior walls of masonry, or other noncombustible material, in which the other structural members are wholly or partly of wood or other combustible material. (Note: Dwellings with wood frames are considered wood frame, even with brick veneer, and thus are assigned Type V with class multiplier 1.0)

### **Type IV (Heavy Timber) Construction (Class 0.75)**

A building having heavy timber construction in which walls are masonry, columns are 8-inch wood supports, floors are 3-inch tongue-and-groove plank, and roof decks are 2-inch tongue-and-groove plank. All wood beams and girders are 6-inch wide and 10-inch deep.

### **Type V (Wood Frame) Construction (Class 1.50)**

Any construction in which the structural members are wholly or partly wood or other combustible material and in which the construction does not qualify as ordinary construction. (Note: Dwellings with wood frames are considered wood frame, even with brick veneer, and thus are assigned Type V with class multiplier 1.0)

### **2.1.3 Calculating TWS**

After determining the Construction Classification Number and the Occupancy Hazard Classification Number compute the required minimum total water supply. A structure shall be considered an exposure hazard if it is 100 sq. ft. or larger in area and is within 50 ft. of burn building. However, if a structure, regardless of size, is of occupancy hazard classification number 3 or 4, it shall be considered an exposure hazard if within 50 ft. of the burn building.

**For structures with no exposure hazards**, the minimum water supply, in gallons, shall be determined by the total cubic footage of the structure, including any attached structures, divided by the Occupancy Hazard Classification Number and multiplied by the Construction Classification Number. The minimum water supply required for any structure without exposure hazards shall not be less than 2000 gallons.

**For structures with unattached structural exposure hazards**, the minimum water supply, in gallons, shall be determined by the cubic footage of the structure, divided by the Occupancy Hazard Classification Number and multiplied by the Construction Classification Number, and that figure multiplied by 1.5. The minimum water supply required for a structure with exposure hazards shall not be less than 3000 gallons.

### **2.1.4 Determining the Rate of Delivery**

The rate at which water is delivered to the fire burning is critical to fire control. After you have calculated the TWS use the chart below to determine the delivery rate:

#### **TWS in gallons Delivery Rate at the Fireground**

Up to 2,500: 250 gpm

2,500 – 10,000: 500 gpm

10,000 – 20,000: 750 gpm

20,000 or more: 1,000 gpm

## MFSI LIVE FIRE BURN POLICY

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### Other Notes:

Information needed to compute the minimum water supplies that should be collected during the building survey includes the following:

- ⌚ Area of all floors, including attics, basements, and crawl spaces.
- ⌚ Height between floors or crawl spaces and in the attics from floor to ridgepole.
- ⌚ Construction materials used in each building, including walls, floors, roofs, ceilings, interior partitions, stairs, and so forth.
- ⌚ Occupancy (occupancies) of buildings.
- ⌚ Occupancy (occupancies) of yard areas.
- ⌚ Exposures to buildings and yard storage and distances between them.
- ⌚ Fire protection systems, such as automatic and manual protection systems, hydrants, yard mains, and other protection facilities.
- ⌚ On-site water supplies, including natural and constructed sources of water.

In determining suitable water supply, the AHJ should consider potential environmental contaminants or particulate matter in the proposed source.

The fire fighter operating without a water system with hydrants (or with a very limited number of hydrants) has two of the following means of getting water:

- ⌚ From supplies on the fireground, which can be constructed or natural
- ⌚ From supplies transported to the scene

The water supply for fire-fighting purposes, as specified above, is considered the minimum total water supply. It is assumed that water made is available to the fire department from a single water point, often using a mobile water supply shuttle or mobile water supply relay in conjunction with a portable folding tank or dry hydrant, and so forth.

The authority having jurisdiction (MFSI or local FD) can determine that an additional, secondary water supply is warranted. This determination might be made as a result of on-site survey of buildings by the fire department having jurisdiction or by review of architectural plans of proposed construction and planned development.

The determination of the need of a secondary water supply is based on anticipation of a large-scale fire situation. Such a situation would require a water supply delivery system consisting of multiple water points. Generally this can best be achieved by a water system that includes hydrants, a distribution system, storage, and a source of supply capable of delivering a minimum flow of 250 gpm at a gauge pressure of 20 psi residual pressure for a 2-hour duration. In these situations consult with MFSI senior staff.

# MFSI LIVE FIRE BURN POLICY

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## Annex D - Firefighter Rehabilitation During Training

### **PURPOSE**

To ensure that the physical and mental condition of members operating at the scene of a training exercise or practical skills end test does not deteriorate to a point that affects the health and safety of each member or that jeopardizes the safety and integrity of the operation.

### **APPLICATION**

The physical and mental demands associated with firefighting and other emergency operations, coupled with the environmental dangers of extreme heat and humidity or extreme cold, create conditions that can have an adverse impact upon the safety and health of the individual emergency responder. Members who are not provided adequate rest and rehydration during emergency operations or training exercises are at increased risk for illness or injury, and may jeopardize the safety of others on the incident scene. When emergency responders become fatigued, their ability to operate safely is impaired. As a result, their reaction time is reduced and their ability to make critical decisions diminishes. Rehabilitation is an essential element on the incident scene to prevent more serious conditions such as heat exhaustion or heat stroke from occurring.

The two most serious heat-related illnesses are heat exhaustion and heat stroke. The following material is excerpted from the NIOSH document *Occupational Exposure to Hot Environments, Revised Criteria*.

Symptoms of heat exhaustion include fatigue, nausea, headache, dizziness, pallor, weakness, and thirst. Factors that predispose a person to heat exhaustion include sustained exertion in the heat, failure to replace the water lost in sweat, and lack of acclimatization. Heat exhaustion responds readily to prompt treatments such as moving to a cooler environment, resting in a recumbent position, and taking fluids by mouth.

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

## MFSI LIVE FIRE BURN POLICY

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

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

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

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

- (1) To provide physical and mental rest, allowing the fire fighter to recuperate from demands of emergency operations and adverse environmental conditions.
- (2) To revitalize fire fighters by providing fluid replacement and food as needed
- (3) To provide medical monitoring, including treatment of injuries, to determine if and when fire fighters are able to return to action

### **SCOPE**

This SOP applies to all participants in MFSI training programs. This SOP shall apply to all operations and training exercises where strenuous physical activity or exposure to heat or cold exists.

### **RESPONSIBILITY**

All MFSI staff and Instructors are responsible to enforce, explain and encourage members to comply with this SOP. All program participants are expected to comply with this SOP.

# MFSI LIVE FIRE BURN POLICY

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## A. SPECIFIC RESPONSIBILITIES

1. **THE LEAD INSTRUCTOR** - The LEAD INSTRUCTOR shall consider the circumstances of each training session and make adequate provisions prior to the training session for the rest and rehabilitation of everyone operating at the session. These provisions shall include: medical evaluation, treatment and monitoring; food and fluid replacement; mental rest; and relief from extreme climatic conditions and other environmental parameters of the incident. If deemed necessary by the lead instructor, the rehabilitation shall include the provision of Emergency Medical Services (EMS) at the Basic Life Support (BLS) or Advanced Life Support (ALS) level.
2. **INSTRUCTORS** - All Instructors and others in supervisory roles shall maintain awareness of the conditions of each participant operating within their span of control and ensure that adequate steps are taken to provide for each participant's safety and health. The command structure shall be utilized to request relief and the reassignment of fatigued crews.
3. **PERSONNEL** - During periods of hot weather, participants shall be encouraged to drink water and activity beverages throughout the day. During any training evolution, all participants shall advise their supervisor when they believe that their level of fatigue or exposure to heat or cold is approaching a level that could affect themselves, their crew, or the operation in which they are involved. Instructors shall also remain aware of the health and safety of other Instructors.

## B. ESTABLISHMENT OF REHABILITATION AREA

1. The LEAD INSTRUCTOR shall establish a REHABILITATION AREA when conditions indicate that rest and rehabilitation is needed for personnel operating at any training evolution. Rehabilitation should be considered during the initial planning of the evolution. However, the climatic or environmental conditions of the training ground should not be the sole justification for establishing a Rehab Area. Any training or evaluation activity that is large in size, long in duration, and/or labor intensive will rapidly deplete the energy and strength of personnel and therefore merits consideration for rehabilitation.

Climatic or environmental conditions that indicate the need to establish Rehabilitation Area are a heat stress index above 90 degrees F (see SOP 106A) or a wind-chill index below 10 degrees F (see SOP 106B).

2. The location of the Rehabilitation Area will normally be near the ambulance parking area. The Rehabilitation Area should: be located in a safe area where firefighters can remove SCBA and turnout gear, be in a location that will allow physical rest, provide suitable protection from prevailing environmental conditions, be free from vehicle exhaust fumes, be large enough to accommodate multiple crews, be easily accessible by EMS, and allow prompt re-entry back into the training or evaluation operation upon complete recuperation.

## MFSI LIVE FIRE BURN POLICY

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3. The Rehab Officer shall secure all necessary resources required to adequately staff and supply the Rehabilitation Area. The supplies should include the items listed below:
  - a. Fluids - water, activity beverage, oral electrolyte solutions and ice.
  - b. Food - soup, broth, or stew in hot/cold cups.
  - c. Medical - blood pressure cuffs, stethoscopes, oxygen administration devices, cardiac monitors, intravenous solutions, thermometers and an AED.
  - d. Relief from extreme climatic conditions.
  - e. Other - awnings, fans, tarps, smoke ejectors, heaters, dry clothing, extra equipment, floodlights, blankets and towels, traffic cones and fire line tape (to identify the entrance and exit of the Rehab Area).

### C. GUIDELINES

1. **HYDRATION** - A critical factor in the prevention of heat injury is the maintenance of water and electrolytes. Water must be replaced during exercise periods and at emergency incidents. During heat stress, the firefighter should consume at least one quart of water per hour. The rehydration solution should be a 50/50 mixture of water and an activity beverage administered at about 40 degrees F.

Rehydration is important even during cold weather operations where, despite the outside temperature, heat stress may occur during firefighting or other strenuous activity when protective equipment is worn. Alcohol and caffeine beverages should be avoided before and during heat stress because both interfere with the body's water conservation mechanisms. Carbonated beverages should also be avoided.

2. **NOURISHMENT** - Food should be provided at the scene of an extended incident when units are engaged for more than two (2) hours. A cup of soup, broth, or stew is highly recommended because it is digested much faster than sandwiches and fast-food products. In addition, foods such as apples, oranges and bananas provide energy replacement. Fatty and/or salty foods should be avoided.
3. **REST** - The "two bottle rule", or 30 minutes of work time, is an acceptable level prior to mandatory rehabilitation. Participants shall rehydrate (at least eight ounces) while SCBA cylinders are being changed. Firefighters having worked two full 30-minute rated bottles, or 30 minutes, shall be immediately placed in the Rehabilitation Area for rest and evaluation. In all cases the objective evaluation of a participant's fatigue level shall be the criteria for rehab time. Rest shall not be less than ten minutes and may exceed an hour as determined by the Rehab Officer.

## MFSI LIVE FIRE BURN POLICY

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4. RECOVERY - Participants in the Rehabilitation Area should maintain a high level of hydration. Participants should not be moved from a hot environment directly into an air conditioned area because the body's cooling system can shut down in response to the external cooling. An air conditioned environment is acceptable after a cool-down period at ambient temperature with sufficient air movement. Certain drugs impair the body's ability to sweat and extreme caution must be exercised if the member has taken antihistamines, such as Actifed or Benadryl, or has taken diuretics or stimulants.
5. MEDICAL EVALUATION - Emergency Medical Services (EMS) should be provided and staffed by the most highly trained and qualified EMS personnel on the scene (at a minimum of BLS level). They shall evaluate vital signs, examine members, and make proper disposition (return to duty, continued rehabilitation, or medical treatment and transport to a medical facility). Continued rehabilitation should consist of continued monitoring of vital signs, providing rest, and providing fluids for rehydration. Medical treatment for members whose signs and/or symptoms indicate potential problems, should be provided in accordance with local medical control procedures. EMS personnel shall be assertive in an effort to find potential medical problems early.
6. ACCOUNTABILITY - Upon assignment to the Rehab Sector, the firefighter shall surrender his or her Accountability Tag to the Rehab Officer. The Rehab Officer (or his or her designee) shall maintain a log of firefighters entering and exiting the Rehab Area. Whenever possible, firefighters should be rehabilitated as a crew. Firefighters shall not leave the Rehab Area until authorized to do so by the Rehab Officer. Firefighters must obtain their Accountability Tag upon exiting the Rehab Area prior to returning to the Staging Area.

# MFSI LIVE FIRE BURN POLICY

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## Annex E - Minor Age Students

### **PURPOSE**

To provide procedures to be followed by Maine Fire Service Institute (MFSI) personnel when minor age students are present.

### **APPLICATION**

This standard operating procedure is to be followed by all Maine Fire Service Institute (MFSI) personnel assigned responsibilities for conducting and participating in assigned courses, programs, and end-tests where minor age students are involved. Minor age is defined here as being less than 18 years of age at the time of training or testing. MFSI is the *authority having jurisdiction* (i.e., state training/testing AHJ).

This SOP covers minor age students enrolled in fire service training programs and tests where high-risk tasks or activities are involved. To protect this special class of student MFSI as the AHJ implements special precautions where the training and testing activities are deemed to be hazardous. The most important precaution is added supervision. All MFSI sponsored classes, courses, programs, and events where minor age students are present will require *two-deep supervision*.

### **TWO-DEEP SUPERVISION**

**Two-deep supervision means that there shall ALWAYS be two adult supervisors (adult being here defined as at least 21 years of age) present; one being the MFSI instructor and the other a state certified firefighter assigned by the local AHJ. A local AHJ without an available certified firefighter may assign another qualified individual with approval of MFSI Senior Staff or regional Training Program Manager.**

Where the MFSI training program includes activities and practice deemed *hazardous* (e.g., use of a portable fire extinguisher to attack a fire, structural fire suppression, wildland and ground fire suppression, use of striking and cutting hand-tools, use of striking and cutting power-driven tools, vehicle extrication, ladder handling, ladder climbing, vertical ventilation of a roof using any tool, search and rescue, water supply, hose handling, salvage, overhaul, haz-mat operations, haz-mat technician, technical high-angle rescue, technical low-angle rescue, and operation of portable fire pumps, operation of pumps mounted on motorized apparatus, and operation of aerial apparatus) added precautions shall be taken.

## MFSI LIVE FIRE BURN POLICY

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**MFSI training classes covering the above identified hazardous skills and tasks where students of minor age are present require minimum two-deep supervision.**

**AND**

**There shall be no more than five (5) minor age students for every MFSI instructor present (in addition to the local fire department representative). The Lead MFSI instructor may oversee 5 (five) students in addition to having overall responsibility for the course and instructors.**

**AND**

**It is further suggested that any minor enrolled in a training program be partnered with an adult student to allow for one-on-one mentoring.**

**IN ADDITION**

**As Maine BLS rules for minors under age 16 attending training deemed *hazardous* require that an instructor supervise the minor, MFSI as the AHJ has determined this to mean that one MFSI instructor shall directly supervise each minor under age 16. This requirement is in addition to the minimum requirement of two-deep supervision and the specified ratio for hazardous training classes where five or more 16 and 17 year old minors are in attendance. This simply means one MFSI instructor to every one student under the age of 16.**

# ANNEX F

## Open Burning Fire Training Guidance

### General Information

The Maine Department of Environmental Protection (DEP) allows municipal, volunteer, and industrial fire departments to conduct live fire training for research or bona fide instruction and training on structures. Live fire training must take place under the direct control and supervision of a qualified instructor who has met the requirements of an Instructor II in accordance with NFPA 1041. This may include the local chief, his or her designee, or an individual qualified as an instructor and designated by the authority having jurisdiction to be in charge of the live fire training evolution. A written objective for the instruction and training is required. The qualified instructor or sponsoring fire department must ensure that this requirement is met.

### Environmental Concerns

The environmental concerns from live fire instruction and training activities include releases of toxic emissions to the air and impacts to surface and groundwater from combustion of waste material and the presence of lead painted and asbestos-containing material.

The DEP strongly recommends that prior to the planned event outreach is conducted to inform neighbors and nearby properties that could potentially be impacted by the live fire instruction and training activity. Sites in rural areas are preferred. Structures considered for training burns must be located at least 50' away from waterbodies and have adequate erosion controls installed .



Chapter 102: Open Burning

[www.maine.gov/dep/air/rules](http://www.maine.gov/dep/air/rules)

### Notification Process

The DEP has created a notification form that includes a checklist to aid Fire Departments in documenting all actions taken to ensure the live fire training and instruction exercise meets the pertinent DEP regulations [www.maine.gov/dep/air/compliance/docs/fire-notify.pdf](http://www.maine.gov/dep/air/compliance/docs/fire-notify.pdf). The notification form and written objective for the training shall be electronically submitted or mailed to the Department at least **7 working days prior** to the planned event so a pre-burn inspection by Department staff can be conducted. Staff time and resources will determine availability, so provide adequate time and plan accordingly. A copy of the submitted documents should be retained for your records. Electronic submission email address:

[DEPFireTraining@maine.gov](mailto:DEPFireTraining@maine.gov)

**The intentional burning of a structure or previously demolished structure for disposal purposes is prohibited.**



## Planning and conducting live fire training activities

- **Pre-Burn:** A number of steps taken prior to burning of a structure will increase the possibility that the residues (ash and incompletely burned materials) from a training burn may be disposed on the property where the structure is located, or removed and disposed of at a solid waste landfill licensed to accept the material.

- \* **Lead Paint:** If a structure was constructed prior to 1979, it is presumed to contain lead paint. The structure may be inspected by a licensed lead inspector and identified lead painted materials removed and disposed at a facility licensed to accept the material.
- \* If a structure containing lead paint is burned, the resulting ash must be characterized and may require disposal as a hazardous waste. If a structure was constructed in 1979 or later, it is presumed not to contain lead paint, provided there is no evidence lead paint was used.

[www.maine.gov/dep/waste/lead](http://www.maine.gov/dep/waste/lead)

- \* **Asbestos:** Any structure to be burned for live fire training, including a residential dwelling, needs to have a National Emissions Standards for Hazardous Air Pollutants (NESHAP) inspection by a Maine-certified asbestos inspector. Any



asbestos identified needs to be removed and disposed properly by a Maine licensed asbestos abatement contractor.

- \* **A building demolition form must be completed and sent to the DEP regardless if asbestos is identified or not.**

[www.maine.gov/dep/waste/asbestos](http://www.maine.gov/dep/waste/asbestos)



- \* **Other Waste Materials:** Structures may contain many materials with the potential for creating an environmental hazard, causing impacts to air quality and ground and/or surface water, or a nuisance. These materials must be removed and disposed, in accordance with applicable DEP regulations, prior to the training burn unless a waste material is included in the written training objective. For example, subject to DEP approval, vinyl siding and asphalt shingles may remain in place if part of the training objective. The characterization program for ash/residues will be based on the types of materials planned to be burned. All transportation of waste materials must be done by non-hazardous or hazardous waste transporters licensed by the DEP. See the checklist included in the notification form for a listing of the most common waste materials expected.

- \* [www.maine.gov/dep/waste/hazardouswaste](http://www.maine.gov/dep/waste/hazardouswaste)

- **During the Burn:** If any unexpected materials are noticed during the training burn, they should be documented; removed from the burn area and extinguished, if possible; and disposed at a facility licensed to accept them. Runoff from the burn area must be managed to prevent impacts to surface water.



- **Post-Burn:**

- \* The disposal of ash/residues after the training burn is the responsibility of the property owner, unless responsibility has been legally transferred to another party, as documented in the completed notification form and/or the written objective for the training. Ash/residues that test as hazardous may not be disposed on site, nor is there currently a hazardous waste disposal site in Maine. Hazardous ash will need to be disposed in a state or Canada, that has a licensed hazardous waste landfill licensed to accept the waste.
- \* The options for handling non-hazardous ash/residues from burning a structure are the following:
  - ◆ a non-hazardous waste transporter licensed by the DEP may be hired to

transport the ash for disposal at a landfill licensed to accept this waste; or

- ◆ Ash and other residues from the burning of a structure may be disposed of on the same parcel as the structure, provided the following conditions are met:
  - ✓ materials were removed during the pre-burn stage as documented;
  - ✓ analyses of representative samples of ash/residues demonstrate the ash is non-hazardous;
  - ✓ ash/residues are buried above the high water table on the property; and
  - ✓ ash/residues are completely covered by at least 18 inches of soil (not gravel or rocks).

**NOTE: If the ash and other residues from the burning of a structure are disposed on site, the owner of the property may be asked to disclose the on site disposal at the time of property sale. If it is known the property contained lead paint when burned, the presence of this material on the property must be disclosed at the time of property sale, in accordance with 02-039 C.M.R. ch. 410 (the Maine Real Estate Commission’s Minimum Standards of Practice rule).**

### ***Air Quality***

Contact staff in the Air Quality Compliance Section about the Chapter 102 regulations, air emissions, submission of a notification package, and arranging a pre-burn inspection.

### ***Water Quality***

Contact staff in the Water Quality section about the planned fire training site location and methods to prevent runoff from impacting waterbodies and groundwater.

### ***Solid Waste***

Contact staff in the Solid Materials Management Unit about appropriate sampling and analytical procedures for testing ash and residues; a list of licensed non-hazardous waste transporters, and arranging a pre-burn inspection.

### ***Lead and Asbestos***

Contact staff in the Lead and Asbestos Unit about demolition forms, lead hazards, and management of asbestos-containing materials.

### ***Hazardous Waste***

Contact staff in the Hazardous Waste Management Unit about storage, transportation resources, and disposal options for hazardous waste ash and residues.

Contact staff at the nearest DEP office (see contact numbers below) for guidance and specific information and regulations related to the five program areas covered by these guidelines:

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## **DEP Offices**

### ***Augusta***

17 State House Station  
28 Tyson Drive  
Augusta Maine  
04333-0017

800 452-1942  
207 287-7688

### ***Bangor***

106 Hogan Road  
Bangor, Maine 04401  
888 769-1137  
207 941-4570

### ***Portland***

312 Canco Road  
Portland, Maine 04103  
888 769-1036  
207 822-6300

### ***Presque Isle***

1235 Central Drive,  
Skyway Park  
Presque Isle, Maine  
04769-2094

888 769-1053  
207 764-0477