Instructor: Live Fire Training - Fixed Facility

Course Plan

Course Details

Description: This course provides the knowledge and skills that prepare an instructor to teach fire fighters how to locate, control, and extinguish an interior structure fire in a fixed facility. Key learning areas include an overview of the Fire Control 3: Structural Fire Fighting course plan; an introduction to live fire training; preburn planning; fire dynamics; set up and walk through; live fire training evolutions; and postburn procedures.

Designed For: Individuals who wish to conduct NFPA-compliant live fire training or qualify to teach State Fire Training's Fire Control 3: Structural Fire Fighting course

Authority: NFPA 1403: Standard on Live Fire Training Evolutions (2018)

California Health and Safety Code 41801(b)

Cal/OSHA (Title 8 CCR 3395)

Prerequisites: Fire Control 3: Structural Fire Fighting (2018), or Fire Control 3A (2009), or Fire Control 3B (2009)

Authorization to attend training from fire agency or ALA/ARTP

Verification of meeting NFPA 1403 (2018 / 4.3.1) live fire training prerequisite requirements (SFT Fire Fighter I certification waives this requirement)

Current SCBA fit test documentation

Cal/OSHA compliant structural PPE

Completed release of liability form

Standard: Attend all class sessions and complete all mandatory activities and skills

Hours: 24 hours (12.75 lecture / 11.25 application)

(AHJ determines practice and assessment times)

Maximum Class Size: 20

Instructor Level: Primary instructor

Instructor/Student Ratio:	Two primary instructors at all times Additional requirements (per NFPA 1403) • One instructor for each functional crew of five students • One instructor for each backup line • One additional instructor for each additional functional assignment
Restrictions:	See Facilities, Equipment, and Personnel requirements (page 5)
SFT Designation:	FSTEP

Table of Contents

Required Resources

Instructor Resources

To teach this course, instructors need:

- NFPA 1403: Standard on Live Fire Training Evolutions (current edition)
- NFPA 1582: Standard on Comprehensive Occupational Medical Programs for Fire Departments (current edition)
- NFPA 1583: Standard on Health-Related Fitness Programs for Fire Department Members (current edition)
- NFPA 1584: Rehabilitation Process for Members During Emergency Operations and Training Exercises (current edition)
- Title 8 California Code of Regulations (T8 CCR) Section 3395 – Heat Illness Prevention Standard
- *Live Fire Training: Principles and Practice*
  (Jones & Bartlett Learning, 1st ed. revised, ISBN: 978-1-284-04123-1)
- *3D Fire Fighting: Training, Techniques, and Tactics*
  (Fire Protection Publications, Oklahoma State University, 1st ed., ISBN: 0-87939-258-4)

Additional recommended resources:

- *Enclosure Fires* (Lars-Göran Bengtsson)
  Available for download at: https://www.msb.se/en/Products/Publications/Publications-from-the-SRSA/Enclosure-fires/

Online Instructor Resources

The following instructor resources are available online at
https://osfm.fire.ca.gov/divisions/state-fire-training/instructor-registration/

- Fire Control 3: Structural Fire Fighting course plan (and supporting documentation)
  - Instructor Demonstration 1 – Dust Explosion
  - Instructor Demonstration 2 – Combustion
  - Instructor Demonstration 3 – Pyrolysis
  - Props and Structures – Matrix
  - Props and Structures – Acquired Structure
  - Props and Structures – Container (Class A)
  - Props and Structures – Fixed Facility (Class A)
  - Props and Structures – Gas-Fired Prop
  - Props and Structures – Scalable Burn Prop
  - Skills Exercise 1 – Combustion
  - Skills Exercise 2 – Risk Assessment and Door Entry
  - Skills Exercise 3 – Stretching, Flaking, and Advancing and Attack Line
  - Skills Exercise 4 – Water Application
  - Skills Exercise 5 – Fire Attack
  - Skills Exercise 6 – Transitional Fire Attack

    - Skills Exercise 7 – Interior Attic Fire Attack
    - Skills Exercise 8 – Below Grade (Basement) Fire Attack
    - Skills Exercise 9 – VEIS
    - Skills Exercise 10 – Ventilation
    - Skills Exercise 11 – Portable Water Extinguisher Attack
- Documents
    - Cal/OSHA Employer Sample Procedures for Heat Illness Prevention
    - Firefighter Exposure to Smoke Particulates
    - FIRESCOPE – ICS 910: Firefighter Incident Safety and Accountability Guidelines
    - Impact of Fire Attack Utilizing Interior and Exterior Steams on Firefighter Safety and Occupational Survival: Full Scale Experiments
    - Impact of Fire Attack Utilizing Interior and Exterior Streams on Firefighter Safety and Occupational Survival: Water Mapping
    - Impact of Ventilation on Fire Behavior in Legacy and Contemporary Residential Construction (section 9.11 Pushing Fire, page 203)
    - ILFT-FF - Live Fire Training Burn Plan Outline
    - Palmer Dollhouse Construction and Assembly Plans (v2017)
    - Single-Chamber Burn Prop Plans
- Videos
    - Art of Reading Smoke Vol1 Sample (Fire Engineering, November 2, 2016)
    - Christmas Tree Fire Safety (LinglestownFireCo35 / June 25, 2007)
    - New vs. Old Room Fire Final UL (jarhead 96 / December 17, 2010)
    - Normalisation of Deviance – IAFF – Part I (Mike Mullane)
    - Normalisation of Deviance – IAFF – Part II (Mike Mullane)
    - Oxidation: The Chemical Process of Fire (FireNerd / 2018)
    - Pyrolysis: Decomposition of Solid Substances with Heat (Fire Gear)
    - SFT Whoosh Box (State Fire Training / 2018)
    - SFT Single-Chamber Burn Prop (State Fire Training / 2018)
    - SFT Multi-Chamber Burn Prop (State Fire Training / 2018)
    - UL: Modern vs. Legacy Fuel (Firehouse / November 6, 2015)
    - What is Fire Pyrolysis? (Fire Training / June 6, 2015)
- Activities
    - Activity 6-4: Building Fuel Packages for Fire Behavior Evolutions
    - Activity 6-4: Building Fuel Packages for Fire Attack Evolutions

Student (Instructor Trainee) Resources

To participate in this course, all instructor trainees need:

- NFPA 1403: Standard on Live Fire Training Evolutions (current edition)
- *Live Fire Training: Principles and Practice*
  (Jones & Bartlett Learning, 1st Edition Revised, ISBN: 978-1-284-04123-1)
- A copy of his or her agency's heat and illness prevention plan
- Full structural PPE and SCBA

Instructor trainees participating in this course through their academy or agency in-house training will have all documentation, PPE, and SCBA verification provided by the AHJ.

Instructor trainees participating in this course through open enrollment must provide:

- Authorization to attend the training, including a statement of insurance for participant
    - Submit a letter verifying demonstrated competency in donning SCBA, donning PPE, and hose handling skills
    - If the class will be coordinated through a community college, the college may provide additional insurance for participants and instructional staff
- Current SCBA fit test documentation
- A minimum of Cal/OSHA compliant PPE in good repair (provided by the participant's agency)
- Release of liability

Facilities, Equipment, and Personnel

The following facilities, equipment, or personnel are required to deliver this course:

Equipment*

- **Apparatus**: A minimum of one fully outfitted NFPA compliant engine (type I or type 3)
- **Appliances and tools**: Thermal imager (optional); nozzle selection (determined by AHJ) capable of flowing a minimum 95 gallons per minute (GPM)
- **Extinguishers:** Pressurized water extinguisher; water-pressurized garden sprayer
- **Fuels:** Class A materials (non-gas-fired props); Class B fuel (gas-fired props) per manufacturer specifications
- **Hose**: 1", 1½", or 1¾" fire hose; 2½" or 3" fire hose
- **Hand tools**: Flat head axe; Halligan tool; hydrant wrench; pick head axe; long handle tool (pike pole, roof hook, rubbish hook); sledgehammer; flashlight
- **Ladders**: 10' folding ladder; 14' roof ladder; 24' extension ladder
- **Power tools**: Blower; chainsaw; generator; air compressor with fittings (or equivalent)
- **Props:** Scalable props adequate to demonstrate principles outlined in Unit 5: Fire Dynamics
- **Protective equipment/clothing**: Full set of protective clothing for structural fire fighting for each student, including: bunker pants, coat, and boots; gloves and helmet; flash hood; face piece; self-contained breathing apparatus (SCBA), two fully-charged air cylinders, and manufacturer-approved SCBA sanitizing agent and cleaning agent; personal alert safety system (PASS)
- **Salvage equipment/materials**: Salvage covers or Visqueen; brooms; scoop shovels; buckets; tubs
- **Simulation equipment/materials**: Live fire training structure compliant with NFPA 1403 (2018); smoke-generating equipment (synthetic/Class A); burn barrels (modified for smoke or crib set)

- **Other supplies/equipment**: Radios; fuel and supplies for power equipment; cleaning and decontamination supplies and equipment; handheld propane torch; dumpster; power cords; lights; hammer; nails; staple gun; nail gun (optional); circular saw; reciprocating saw; fuses/road flares; construction spray paint; tape measure; drill, bits, and screws
- **Rehabilitation:** Shade; water; chairs; SCBA refill capabilities (extra cylinders or refill as needed); decontamination body wipes; soap and water; brushes
- **Water supply**: Adequate water supply per NFPA 1403 (2018) requirements

* See NFPA 1403 (2018 or current edition) for additional equipment and tool requirements.

Facilities

- Standard classroom equipped for 20 students
- Whiteboards or easel pads with appropriate writing implements
- Projector with appropriate laptop connections
- Wi-Fi/Internet access (recommended)
- At least one of the following:
    - A non-gas-fired live fire training structure
    - A gas-fired live fire training structure
        - Must also have enough space to burn models (required when a gas-fired live training structure is the only available option)

Personnel*

- Two primary instructors at all times
- Additional requirements (per NFPA 1403)
    - One instructor for each functional crew of five students
    - One instructor for each backup line
    - One additional instructor for each additional functional assignment

* See NFPA 1403 (2018) paragraph 4.7 for additional information about required personnel.

Time Table

Segment	Lecture	Application	Unit Total
Unit 1: Introduction			
Topic 1-1: Orientation and Administration	0.5	0.0	
Unit 1 Totals	**0.5**	**0.0**	**0.5**
Unit 2: Introduction to Fire Control 3: Structural Fire Fighting			
Topic 2-1: Course Plan	0.25	0.0	
Topic 2-2: Instructor Requirements	0.25	0.0	
Topic 2-3: Student Requirements	0.25	0.0	
Unit 2 Totals	**0.75**	**0.0**	**0.75**
Unit 3: Introduction to Live Fire Training			
Topic 3-1: NFPA Standards and Legal Considerations	1.0	0.0	
Topic 3-2: Cardiovascular and Thermal Strain of Fire Fighting	0.25	0.0	
Topic 3-3: Developing and Incident Within an Incident (IWI) Plan	0.25	0.0	
Unit 3 Totals	**1.5**	**0.0**	**1.5**
Unit 4: Preburn Planning			
Topic 4-1: Conducting an Initial Site Evaluation	0.25	0.25	
Topic 4-2: Developing a Comprehensive Burn Plan (“Burn Book”)	0.5	0.5	
Topic 4-3: Conducting Preburn Preparations	0.5	0.5	
Topic 4-4: Preparing a Training Structure	0.5	0.5	
Topic 4-5: Operating and Maintaining Gas-Fired Props and Facilities	0.0	0.0	
Topic 4-6: Building Scalable Burn Props	0.0	3.0	
Unit 4 Totals	**1.75**	**4.75**	**6.5**
Unit 5: Fire Dynamics			
Topic 5-1: Fire Chemistry and Physics	1.0	1.0	
Topic 5-2: Fire Growth and Development	1.0	0.0	
Topic 5-3: Characteristics of Smoke	0.75	0.0	
Topic 5-4: Water as an Extinguishing Agent	0.75	0.0	
Topic 5-5: Fire Control 3 Classroom Instructor Demonstrations	0.0	0.75	
Topic 5-6: Fire Control 3 Fireground Instructor Demonstrations	1.25	0.0	
Unit 5 Totals	**4.75**	**1.75**	**6.5**
Unit 6: Set Up and Walk Through			
Topic 6-1: Implementing an Incident Action Plan	0.25	0.5	

Segment	Lecture	Application	Unit Total
Topic 6-2: Securing a Water Supply	0.25	0.0	
Topic 6-3: Conducting an Instructor Briefing and Preburn Walk Through	0.5	0.0	
Topic 6-4: Building Fuel Packages	0.0	1.0	
Topic 6-5: Conducting a Student Preburn Walk Through	0.25	0.25	
Unit 6 Totals	**1.25**	**1.75**	**3.0**
Unit 7: Delivering Live Fire Training Evolutions			
Topic 7-1: Operating as Instructor in Charge (Command and Control)	0.25	0.0	
Topic 7-2: Operating as Safety Officer	0.25	0.0	
Topic 7-3: Implementing Student Rotations	0.25	0.0	
Topic 7-4: Implementing the 2 In/2 Out or RIC Requirement	0.25	0.0	
Topic 7-5: Igniting Fuel Packages	0.25	0.0	
Topic 7-6: Executing and Evaluating Required Fire Control 3 Skills Exercises	0.0	2.0	
Topic 7-7: Executing and Evaluating Optional Fire Control 3 Skills Exercises	0.0	1.0	
Unit 7 Totals	**1.25**	**3.0**	**4.25**
Unit 8: Postburn Procedures			
Topic 8-1: Postburn Procedures	1.0	0.0	
Unit 8 Totals	**1.0**	**0.0**	**1.0**
Summative Assessment			
Determined by AHJ or educational institution	**TBD**	**TBD**	**TBD**
Skills Practice (Lab / Sets and Reps)			
Determined by AHJ or educational institution	**TBD**	**TBD**	**TBD**
Course Totals	**12.75**	**11.25**	**24.0**

Time Table Key

1. The Time Table documents the amount of time required to deliver the content included in the course plan.

2. Time is documented using the quarter system: 15 min. = .25 / 30 min. = .50 / 45 min. = .75 / 60 min. = 1.0.

3. The Course Totals do not reflect time for lunch (1 hour) or breaks (10 minutes per each 50 minutes of instruction or assessment). It is the instructor's responsibility to add this time based on the course delivery schedule.

4. Application (activities, skills exercises, and formative testing) time will vary depending on the number of students enrolled. The Application time documented is based on the maximum class size identified in the Course Details section.

5. Summative Assessments are determined and scheduled by the authority having jurisdiction. These are not the written or psychomotor State Fire Training certification exams. These are in-class assessments to evaluate student progress and calculate course grades.

Unit 1: Introduction

Topic 1-1: Orientation and Administration

Terminal Learning Objective

At the end of this topic an instructor trainee will be able to identify facility and classroom requirements and identify course objectives, events, requirements, assignments, activities, resources, evaluation methods, and participation requirements.

Enabling Learning Objectives

1. Identify facility requirements
    - Restroom locations
    - Food locations
    - Smoking locations
    - Emergency procedures
2. Identify classroom requirements
    - Start and end times
    - Breaks
    - Electronic device policies
    - Special needs and accommodations
    - Other requirements as applicable
3. Review course syllabus
    - Course objectives
    - Calendar of events
    - Course requirements
    - Student evaluation process
    - Assignments
    - Activities
    - Required student resources
    - Class participation requirements

Discussion Questions

1. Determined by instructor

Application

1. Determined by instructor

Instructor Notes

1. None

Unit 2: Introduction to Fire Control 3: Structural Fire Fighting

Topic 2-1: Course Plan

Terminal Learning Objective

At the end of this topic an instructor trainee, given a course plan, will be able to identify the goals and objectives for students enrolled in the State Fire Training (SFT) Fire Control 3: Structural Fire Fighting course.

Enabling Learning Objectives

1. Identify the Course Details
2. Identify the Required Resources
    - Textbooks and documents
    - Equipment
    - Personnel
        - NFPA 1403 requirements
        - Authority having jurisdiction (AHJ) requirements
3. Describe key terminology
    - Terminal learning objective
    - Enabling learning objective
    - Instructor Demonstration
    - Skills Exercise
4. Identify the Units and Topics
5. Identify the Props and Structures documents
6. Identify the Instructor Demonstrations
7. Identify the Skills Exercises
    - Required exercises
    - Recommended exercises

Discussion Questions

1. How does a terminal learning objective differ from an enabling learning objective?

Application

1. Determined by instructor

Instructor Notes

1. Distribute a copy of the Fire Control 3: Structural Fire Fighting course plan and all supporting documents to all instructor trainees.
2. Instructor Demonstrations are covered in more detail in Unit 5: Fire Dynamics.
3. Skills Exercises are covered in more detail in Unit 7: Delivering Live Fire Training Evolutions.

Topic 2-2: Instructor Requirements

Terminal Learning Objective

At the end of this topic an instructor trainee, given instructor requirements, will be able to identify the State Fire Training (SFT) requirements for becoming a registered SFT Fire Control 3: Structural Fire Fighting instructor.

Enabling Learning Objectives

1. Identify desirable traits of a live fire training instructor
    - Intrinsic motivation
    - Lifelong learner
    - Humility
    - Good listener
    - Respected by peers
    - Communication skills
    - Problem-solving skills
    - Aptitude for science
2. Identify SFT requirements for Fire Control 3: Structural Fire Fighting instructors
    - Certification
        - SFT certified Fire Fighter II
    - SFT primary instructor qualifications
        - *State Fire Training Procedures Manual*
    - Coursework
        - Fire Control 3: Structural Fire Fighting (2019) or Fire Control 3A (2009) or Fire Control 3B (2009)
        - S-404 Safety Officer or GEL-954 Safety Officer
            - From FEMA, NWCG, or SFT
        - ICS-300: Intermediate ICS for Expanding Incidents
        - Instructor: Live Fire Training - Fixed Facility
            - Required of all Fire Control 3: Structural Fire Fighting instructors
        - Instructor: Live Fire Training - Acquired Structure
            - Only required for those who wish to teach Fire Control 3: Structural Fire Fighting using an acquired structure for live fire training evolutions
    - Teaching
        - Teach Fire Control 3: Structural Fire Fighting (2019) two times under the supervision of a registered instructor
    - Instructor trainee task book
        - Initiated on the final day of Instructor: Live Fire Training - Fixed Facility
        - The mechanism through which instructor trainees demonstrate proficiency of the knowledge and skills identified and described in Instructor: Live Fire Training – Fixed Facility
        - Each task must be performed twice
            - The two instances must occur during two different courses
            - The same evaluator cannot sign off on the same task twice

  - Task books must be completed within three years of initiation
- Experience
  - Full-time paid fire fighter performing suppression duties within a recognized fire agency in California for a minimum of three years
  - Part-time/volunteer fire fighter performing suppression duties within a recognized fire agency in California for a minimum of six years
- Authority having jurisdiction (AHJ) verification
  - A letter from the instructor trainee's AHJ verifying the individual's qualifications to deliver live fire training

Discussion Questions

1. Determined by instructor

Application

1. Determined by instructor

Instructor Notes

1. See examples for correct and incorrect task book performance and signatures.

Correct: Task completed during two separate courses and evaluated by two separate individuals.

1. Build a fuel load that is sufficient in material, size, and scale for the prop or facility and meets the objectives of the live fire training evolution.	**1st Evaluation**			**2nd Evaluation**		
	Course Code	**Date**	**Initials**	**Course Code**	**Date**	**Initials**
a. Identify authorized fuel materials per NFPA 1403	AAA123	2/8/18	JAS	BBB123	5/15/18	CWJ

Incorrect: Task completed twice during one course but evaluated by two separate individuals.

1. Build a fuel load that is sufficient in material, size, and scale for the prop or facility and meets the objectives of the live fire training evolution.	**1st Evaluation**			**2nd Evaluation**		
	Course Code	**Date**	**Initials**	**Course Code**	**Date**	**Initials**
a. Identify authorized fuel materials per NFPA 1403	AAA123	2/8/18	JAS	AAA123	2/8/18	CWJ

Incorrect: Task completed during two separate courses but evaluated by the same individual.

1. Build a fuel load that is sufficient in material, size, and scale for the prop or facility and meets the objectives of the live fire training evolution.	**1st Evaluation**			**2nd Evaluation**		
	Course Code	**Date**	**Initials**	**Course Code**	**Date**	**Initials**
a. Identify authorized fuel materials per NFPA 1403	AAA123	2/8/18	JAS	BBB123	5/15/18	JAS

Topic 2-3: Student Requirements

Terminal Learning Objective

At the end of this topic an instructor trainee, given the State Fire Training (SFT) Fire Control 3: Structural Fire Fighting course plan, will be able to describe student enrollment requirements.

Enabling Learning Objectives

1. Identify requirements for student participation in Fire Control 3: Structural Fire Fighting
    - Authorization to attend training from fire agency or ALA/ARTP
    - Verification of meeting prerequisite requirements
        - SFT Fire Fighter I certification waives this requirement
    - Current SCBA fit test documentation
    - Cal/OSHA compliant structural PPE
        - Components
        - Required use
        - Capabilities and limitations
    - Completed release of liability form

Discussion Questions

1. Are there any circumstances under which you would let a student who does not meet the course prerequisites participate in live fire training?

Application

1. Determined by instructor

Instructor Notes

1. None

Unit 3: Introduction to Live Fire Training

Topic 3-1: NFPA Standards and Legal Considerations

Terminal Learning Objective

At the end of this topic an instructor trainee, given laws, standards, policies, and procedures, will be able to implement live fire training in accordance with NFPA 1403, Cal/OSHA, and authority having jurisdiction (AHJ) requirements.

Enabling Learning Objectives

1. Identify the significance of NFPA standards
2. Describe the contents of NFPA 1403
3. Describe how to apply NFPA 1403 to Fire Control 3: Structural Fire Fighting
    - Instructor preparation
    - Student qualifications
    - Site requirements
    - Safety requirements
    - Inspections and notifications
4. Identify legal requirements associated with live fire training
    - Cal/OSHA
    - Property owner
    - AHJ
    - Local air pollution control district (APCD) or air quality management district (AQMD)

Discussion Questions

1. How is the current edition of NFPA 1403 different from the previous edition?
2. What are the minimum staffing roles required by NFPA 1403 for live fire training?
3. What legal requirements need to be considered when conducting live fire training with:
    - Fixed facilities?
    - Acquired facilities?

Application

1. Given a copy of NFPA 1403 and a specific chapter assignment, have students break into small groups, review their assigned chapter, and report back to group on the key paragraphs.

Instructor Notes

1. Use the activity to have students direct the learning for ELO 2.

Topic 3-2: Cardiovascular and Thermal Strain of Fire Fighting

Terminal Learning Objective

At the end of this topic an instructor trainee, given PPE and a live fire training evolution, will be able to minimize thermal and cardiovascular strain during live fire training.

Enabling Learning Objectives

1. Describe why aerobic fitness is necessary to perform fire fighting activity
2. Describe cardiovascular and thermal responses to fire fighting
3. Describe how fire fighting activity and turnout gear impact cardiovascular and thermal strain
4. Describe how weather impacts cardiovascular and thermal strain
5. Describe warning signs for heat illnesses that may occur in live fire training and activity
6. Describe how to prevent injuries and heat illness during fire fighting training and activity
7. Describe the risk factors for cardiovascular disease
8. Describe the importance of modifiable risk factors for cardiovascular disease and ways to decrease those factors
9. Describe the goals of on-site rehabilitation
10. Describe the dangers associated with exposure to smoke and particulate matter
11. Describe the importance of proper on-site decontamination, hygiene, gear cleaning, and showers

Discussion Questions

1. What are some signs of rhabdomyolysis or other heat-related injuries/illnesses on the training ground?
2. What strategies can prevent thermal insult during live fire training?
3. What cooling activities can you perform to reduce thermal insult during live fire training?

Application

1. Determined by instructor

Instructor Notes

1. Standards to reference during this topic:
   - NFPA 1582: Standard on Comprehensive Occupational Medical Programs for Fire Departments
   - NFPA 1583: Standard on Health-Related Fitness Programs for Fire Department Members
   - NFPA 1584: Rehabilitation Process for Members During Emergency Operations and Training Exercises
   - Title 8 California Code of Regulations (T8 CCR) Section 3395 – Heat Illness Prevention Standard
2. Give students a copy of Cal/OSHA's Employer Sample Procedures for Heat Illness Prevention (current edition).
   - See Online Instructor Resources
3. Use instructor trainee agency heat and illness prevention plans as examples.

Topic 3-3: Developing an Incident Within an Incident (IWI) Plan

Terminal Learning Objective

At the end of this topic an instructor trainee, given a proposed live fire training evolution, will be able to develop and communicate an incident within an incident (IWI) plan for a live fire training evolution in accordance with NFPA standards and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Identify factors that contribute to an IWI, line of duty injury, or death during live fire training
2. Describe how to mitigate common factors that can lead to line of duty injury and death during live fire training
3. Describe the purpose of the IWI plan
4. Describe the relationship between the instructor and the AHJ hosting the live fire training when responding to an IWI
    - Consistent open communication
    - Instructor shall follow the AHJ's policies and procedures
    - Agree to and document IWI plan
    - Share IWI plan with all live fire training participants
5. Describe how respond to an IWI, serious injury, or line of duty death
    - Broadcast "emergency traffic"/"mayday" and stop training
    - Initiate notifications
        - Emergency services
        - AHJ
    - Secure the scene
    - Secure and document evidence
        - PPE
        - Ignition material
        - Fuel package
        - Applicable equipment
    - Collect personal statements
    - Prohibit participants from leaving training site
    - Activate Critical Incident Stress Debriefing/Management (CISD)
    - Initiate notifications
        - Cal/OSHA (Occupational Health and Safety Administration)
        - Law enforcement
        - AHJ's risk management program
        - Serious Accident Review Team (SART)
    - Control information flow
        - Request public information officer (PIO) support
        - Release only pertinent information
        - Control information release (public, press, social media)
    - Document everything

Discussion Questions

1. How has a line of duty injury or death impacted you or your agency?
2. Why is it important to have an IWI plan in place before live fire training?
3. How does your agency handle cell phones and helmet cameras during an IWI?
4. What actions and events need to be documented during and after an IWI?

Application

1. Given a line of duty injury or death report from *Live Fire Training: Principles and Practice*, NIOSH, or another source, have instructor trainees work in small groups to analyze the report and identify the factors that contributed to the injury or death. Have instructor trainees create a presentation to share with the group (on that day or as a homework assignment to present the next day).

Instructor Notes

1. Have instructor trainee watch all or portions of the following videos to demonstrate why avoiding complacency and lowered standards is crucial to safety:
   - Normalisation of Deviance – IAFF - Part I (Mike Mullane)
   - Normalisation of Deviance – IAFF – Part II (Mike Mullane)
2. Supporting documentation for ELO 5
   - FIRESCOPE – ICS 910: Firefighter Incident Safety and Accountability Guidelines

Unit 4: Preburn Planning

Topic 4-1: Conducting an Initial Site Evaluation

Terminal Learning Objective

At the end of this topic an instructor trainee, given a proposed live fire training evolution, will be able to evaluate fixed facility training sites in order to select a site that fulfills the training objectives with minimal mitigation requirements in accordance with NFPA 1403 and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Identify the requirements of a viable live fire training site
    - Water supply
    - Structural integrity of building or prop
        - Maintenance and five-year inspection records
        - Visual damage inspection
    - Site preparation and cleanup
    - Space for logistics
        - Staging area
        - Burn area
        - Rehabilitation area
        - Parking
2. Describe conditions that could impact site use
    - Inadequate water supply
    - Exposure concerns
    - Hazards
    - Weather
    - Public or political impact
    - Environmental impact
        - Smoke mitigation
        - Run off plan
    - Location or proximity
        - Sensitive populations
        - Protected buildings
        - Transportation corridors
3. Identify site evaluation communication and notification needs
    - Determined by AHJ
    - Vary by prop and facility type
4. Identify site evaluation documentation needs
    - Determined by AHJ
    - Vary by prop and facility type

Discussion Questions

1. Why is it important to conduct an initial site evaluation?
2. What conditions might deter you from using a live fire training site?

- What solutions might mitigate these conditions?

3. In your jurisdiction, who needs to notified before you conduct a live fire training evolution?

Application

1. Given a potential site (physical location or by video) and a proposed training assignment, have students conduct a site evaluation to answer the following questions.
   - Does it meet the requirements of a viable live fire training site for the assignment?
   - Are there any concerns?
   - What solutions could mitigate these concerns?

Instructor Notes

1. ELO 1: NFPA 1403 has a “Live Structural Fire Training Facility Inspection” document to use for evaluating a building’s structural integrity.
2. The proposed training assignments for the instructor trainee activity should come from the Instructor Demonstrations or Skills Exercises from Fire Control 3: Structural Fire Fighting.

Topic 4-2: Developing a Comprehensive Burn Plan ("Burn Book")

Terminal Learning Objective

At the end of this topic an instructor trainee, given a live fire training evolution, will be able to assemble a comprehensive burn plan (often referred to as a "burn book") that contains all documentation necessary to conduct a live fire training evolution in accordance with NFPA standards and the policies and procedures of State Fire Training (SFT) and the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Describe the purpose of a live fire burn plan
    - Ensures that no part of the training process is overlooked
    - Promotes fire and life safety
    - Fulfills NFPA, SFT, and AHJ requirements
    - Demonstrates due diligence
    - Limits liability
2. Identify the components of a live fire burn plan ("burn book")
    - SFT course-related documents
    - Burn information
    - Written plans
        - Incident Action Plan (IAP)
        - Incident Within an Incident (IWI) (emergency plan)
        - Preburn
        - Smoke
        - Rehabilitation
    - Visual plans
        - Property/site
        - Building
        - Prop
    - Permits
    - Notifications
    - Insurance
    - Permissions/approvals
    - Checklists
    - Maps
    - Policies
    - Reports
    - Critical correspondence
3. Identify records-retention requirements for burn plans
    - SFT policies
    - AHJ policies
    - Exposure
        - Time of employment + 30 years (Title 8 CCR Section 3204)
        - Medical records = 30 years (OSHA)

- Injury / Line of duty death
    - Cal/OSHA 300 Log = 5 years
    - Cal/OSHA 301 Incident Report = 5 years
    - Medical records = 30 years (OSHA)

Discussion Questions

1. What is the purpose of a comprehensive burn plan?
2. What should you include in a burn plan?
3. How long are you required to keep the burn plan after training?

Application

1. Determined by instructor

Instructor Notes

1. Use the Live Fire Training Burn Plan Outline document as an example. Distribute it to the students to use as a checklist when developing their own burn book.
2. ELO 3: OSHA recordkeeping requirements (29 CFR 1904)
3. Bring sample burn books for instructor trainees to review.

Topic 4-3: Conducting Preburn Preparations

Terminal Learning Objective

At the end of this topic an instructor trainee, given a live fire training evolution, will be able to develop a preburn plan and conduct preburn planning requirements in accordance with NFPA 1403 and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Identify basic components of a preburn plan
    - Site plan drawings including all exposures
    - Floor plan detailing all rooms, hallways, exterior openings
    - Command post location
    - Apparatus positions
    - Hose and backup line positions
    - Emergency escape route locations
    - Emergency evacuation assembly area location
    - Ingress and egress routes for emergency vehicles
2. Describe preburn planning requirements
    - Develop preburn plan
    - Identify required number of instructors
    - Identify proper fuel loads
    - Determine available water supply
        - Additional requirements per NFPA 1142
            - Percentage involved
            - Exposure calculation
            - Additional floors
    - Determine required fire flow for the training prop or facility and exposure buildings
        - National Fire Academy (NFA) fire flow calculation = (length x width)/3 x percent involvement
        - Iowa rate of flow formula = (length x width x height)/100
    - Determine required reserve flow (50 percent of fire flow)
    - Obtain apparatus pumps that meet or exceed required fire flow for building and exposures
    - Establish separate water sources for attack and backup hose lines
    - Obtain periodic weather reports
    - Designate and mark parking areas
    - Establish communication plan and obtain radios
    - Establish medical plan
    - Establish decontamination plan
    - Complete any other AHJ requirements

Discussion Questions

1. How do you determine appropriate water supply?
2. How do you determine the appropriate instructor numbers for a live fire training evolution?

Application

1. Determined by instructor

Instructor Notes

1. Most of the ELO content comes from “Preburn Planning” on the “Live Fire Evolution Sample Checklist” from NFPA 1403.

Topic 4-4: Preparing a Training Structure

Terminal Learning Objective

At the end of this topic an instructor trainee, given a live fire training evolution, will be able to prepare a training prop or structure for live fire training in order to fulfill training objectives in accordance with NFPA standards and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Describe how to prepare a training structure for live fire training
    - Complete visual damage inspection
    - Secure utilities
    - Check and operate windows and doors, open or close as needed
    - Check and operate other training structure components
    - Implement Cal/OSHA fall protection requirements
    - Remove unnecessary interior and exterior debris
    - Eliminate or mitigate hazards
        - Toxic materials
        - Hives and vermin
        - Trees, brush, and surrounding vegetation
        - Any other exterior and interior hazards
    - Prepare fuel package
    - Initiate startup procedures (gas-fired props)
    - Complete any other AHJ requirements
    - Complete required documentation

Discussion Questions

1. How much time does it take to prepare the training facilities or props in your AHJ?
2. Who approves fuel packages in your AHJ?
    - How do you document a fuel package?
3. What type of structural integrity issues need to be mitigated before qualifying a fixed facility?

Application

1. Determined by instructor

Instructor Notes

1. Most of the ELO content comes from “Training Structure Preparation” on the “Live Fire Evolution Sample Checklist” from NFPA 1403.

Topic 4-5: Operating and Maintaining Gas-Fired Props and Facilities

Terminal Learning Objective

At the end of this topic an instructor trainee, given a gas-fired prop or facility, will be able to describe how to operate and maintain a gas-fired prop in accordance with NFPA 1403, manufacturer specifications, and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Describe how to operate gas-fired props or facilities
   - NFPA requirements
   - AHJ requirements
   - Manufacturer specifications
2. Describe the burning characteristics of gas-fired props or facilities
3. Identify common safety features of gas-fired props or facilities
4. Identify logistical needs of using gas-fired props or facilities for live fire training
   - Personnel
   - Fuel requirements
   - Calibration procedures
5. Describe how to maintain gas-fired props or facilities

Discussion Questions

1. How do you become authorized to operate a gas-fired prop or facility?
2. What are the benefits and limitations of gas-fired props or facilities?

Application

1. Determined by instructor

Instructor Notes

1. None

Topic 4-6: Building Scalable Burn Props

Terminal Learning Objective

At the end of this topic an instructor trainee, given plans, tools, and materials, will be able to build single-chamber and multi-chamber scalable burn props suitable for demonstrating fire dynamics and behavior in accordance with the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Describe how to build a single-chamber scalable burn prop
2. Describe how to build a multi-chamber scalable burn prop
3. Build a single-chamber scalable burn prop (optional)
4. Build a multi-chamber scalable burn prop (required)

Discussion Questions

1. Determined by instructor

Application

1. Given plans, tools, and materials, have instructor trainees work in groups to build a scalable burn prop.

Instructor Notes

1. To build a multi-chamber prop:
   - See Palmer's Dollhouse Construction and Assembly Plans (v2017) for instructions, tools, and materials
   - See video: SFT Multi-Chamber Burn Prop
2. To build a single-chamber prop:
   - See Single-Chamber Burn Prop Plans for instructions, tools, and materials
   - See video: SFT Single-Chamber Burn Prop

Unit 5: Fire Dynamics

Topic 5-1: Fire Chemistry and Physics

Terminal Learning Objective

At the end of this topic an instructor trainee, given terminal and enabling learning objectives, will be able to teach students how to identify, define, and describe fire science concepts and appropriately apply them to interior structural fire fighting activities in accordance with content identified in the State Fire Training (SFT) Fire Control 3: Structural Fire Fighting course plan.

Enabling Learning Objectives

1. Define terminology associated with fire chemistry
    - Fire
    - Energy
    - Pyrolysis
    - Smoldering
    - Flaming combustion
    - Conservation of mass
2. Describe differences between energy and temperature
    - British Thermal Unit (BTU)/joule
    - Celsius, Fahrenheit, Kelvin
3. Describe the concept of power
    - Joule/second = watt
    - Heat release rate (HRR)
4. Describe how physical states of matter influence fire behavior
    - All matter is made of atoms
    - States of matter
        - Gases
            - No fixed volume
            - Atoms spaced far apart and not fixed (can be compressed)
            - Heated gases expand, cooled gases contract
            - Flammable range
                - Too lean (lower explosive and flammability limit)
                - Too rich (upper explosive and flammability limit)
            - Vapor density
        - Solids
            - Fixed volume
            - Atom spaced very close to each other and fixed
            - Pyrolysis
            - Surface area to mass ratio
            - Physical arrangement of fuel
                - Types
                - Physical orientation and proximity

    - Liquids
        - Fixed volume
        - Atoms spaced very close, but not fixed
        - Flashpoint
        - Fire point
        - Ignition
            - Piloted
            - Auto
        - Vaporization
5. Identify products of combustion
    - Heat
    - Smoke
        - Vapors
        - Particles
        - Gases
            - "Toxic twins"
                - Hydrogen cyanide
                - Carbon monoxide
6. Identify methods of heat transfer
    - Conduction
    - Convection
    - Radiation
7. Describe the impact of oxygen concentration on life safety and fire growth
8. Identify the components of the fire triangle and fire tetrahedron

Discussion Questions

1. What is the difference between temperature and energy?
2. How does heat transfer affect turnouts?
3. What actions can you take to minimize heat transfer?
4. How does opening a door affect the flammability of smoke?

Application

1. Determined by instructor

Instructor Notes

1. Use the following demonstrations from the Fire Control 3: Structural Fire Fighting course plan to illustrate fire science concepts. Engage instructor trainees in individual demonstrations as appropriate. Instructor trainees will have a chance to replicate these demonstrations in Topic 5-5: Fire Control 3 Classroom Instructor Demonstrations.
    - Solids
        - Instructor Demonstration 1: Dust Explosion
        - Instructor Demonstration 3: Pyrolysis
        - Pyrolysis videos:
            - What is Fire Pyrolysis? (Fire Training / June 6, 2015)
            - Pyrolysis: Decomposition of Solid Substances with Heat (Fire Gear)
            - Christmas Tree Fire Safety (LinglestownFireCo35 / June 25, 2007)

- Gases
    - Video: SFT Whoosh Box (State Fire Training / May 2018)
- Combustion
    - Instructor Demonstration 2: Combustion
    - Video: Oxidation: The Chemical Process of Fire (FireNerd / 2018)

Topic 5-2: Fire Growth and Development

Terminal Learning Objective

At the end of this topic an instructor trainee, given terminal and enabling learning objectives, will be able to teach students how to identify and describe fire growth and development concepts and appropriately apply them to interior structural fire fighting activities in accordance with content identified in the State Fire Training (SFT) Fire Control 3: Structural Fire Fighting course plan.

Enabling Learning Objectives

1. Describe the stages of fire
    - Traditional/legacy (time vs. temperature curve)
        - Ignition
        - Incipient stage
            - Fire plume
            - "Mushrooming" (ceiling jet)
            - Hot gas layer
            - Thermal layering
            - Relative underpressure
                - Inlet/intake
            - Relative overpressure
                - Outlet/exhaust
            - Neutral plane
        - Growth stage
            - Thermal radiation (radiant heat flux to the ground)
            - Rollover/flameover
            - Possible flashover
        - Fully developed
        - Decay
    - Ventilation-limited (time vs. temperature curve)
        - Ignition
        - Incipient
        - Growth
        - Early decay
            - Oxygen depleted
        - Ventilation event (usually fire fighter intervention)
        - Rapid fire growth
        - Fully developed
        - Decay
            - Fuel depleted
2. Identify factors that influence fire behavior
    - Fuel
        - Amount
        - Type
        - Arrangement

- Air
    - Available oxygen
    - Wind velocity
- Weather
    - Temperature
    - Humidity
    - Wind
- Fire compartment
    - Construction
        - Thermal properties of the enclosure
        - Energy efficiency
    - Building design/floor plans
        - Square footage and cubic footage
        - Ceiling height
        - Size, number, and arrangement of ventilation openings
    - Fuel type
        - Carbohydrates (cellulosics)
        - Hydrocarbons
        - Heat of combustion
    - Fuel loading
        - Contents vs. structure fire
- Burn regime
    - Vent limited / air controlled / air limited
    - Fuel limited / fuel controlled

3. Describe hostile fire events
    - Fire gas ignition
        - Rollover
        - Flashover
            - Thermal radiation feedback
        - Smoke explosion
        - Backdraft
            - Gravity current
    - Black fire

Discussion Questions

1. How do different construction techniques, materials, furnishings, and interiors impact fire behavior?
2. How does a vent-limited fire growth curve differ from a traditional/legacy fire growth curve?
    - How would you reduce the heat-release rate for each type of fire growth curve?

Application

1. Determined by instructor

Instructor Notes

1. Demonstrate the fire growth and development principles introduced in this topic using a scalable burn prop, Class A container, or fixed facility. Engage instructor trainees in individual demonstrations as appropriate. See the following props and structures documents for overviews and guidelines:
   - Props and Structures Matrix
   - Container (Class A)
   - Fixed Facility (Class A)
   - Gas-Fired Prop
   - Scalable Burn Prop
2. ELO 2 – Recommended videos
   - New vs. Old Room Fire Final UL (jarhead 96 / December 17, 2010)
   - UL: Modern vs. Legacy Fuel (Firehouse / November 6, 2015)

Topic 5-3: Characteristics of Smoke

Terminal Learning Objective

At the end of this topic an instructor trainee, given terminal and enabling learning objectives, will be able to teach students how to read smoke emanating from a structure and use that reading to identify pre-phenomena conditions, fire location, and spread during interior structural fire fighting activities, in accordance with content identified in the State Fire Training (SFT) Fire Control 3: Structural Fire Fighting course plan.

Enabling Learning Objectives

1. Describe the composition of smoke
   - Particulates
   - Gases
   - Aerosols
2. Describe the attributes of smoke
   - Volume
   - Velocity
     - Turbulent vs. laminar
   - Density
   - Color
3. Identify the hazards of smoke
   - Cold smoke
   - Black fire
   - Smoke as fuel
     - Flammability range
   - Smoke as poison
     - Carbon monoxide (CO)
     - Hydrogen cyanide (HCN)

Discussion Questions

1. How can recognizing the attributes of smoke assist in tactical decision making?
2. What impact do CO and HCN have on fire fighters and occupants?
3. How do you avoid exposure to CO and HCN?

Application

1. Determined by instructor

Instructor Notes

1. Recommended resources
   - Video: Art of Reading Smoke Vol1 Sample (Fire Engineering, November 2, 2016)
   - DVD: The Art of Reading Smoke
     - Dave Dodson / DVD or streaming video / PennWell (www.pennwellbooks.com)
   - Article: Firefighters Exposure to Smoke Particulates
     - See Online Instructor Resources
2. Reference the characteristics of smoke during demonstrations using a scalable burn prop, Class A container, or fixed facility. Engage instructor trainees in individual demonstrations as appropriate.

Topic 5-4: Water as an Extinguishing Agent

Terminal Learning Objective

At the end of this topic an instructor trainee, given terminal and enabling learning objectives, will be able to teach students how to identify and describe concepts related to water as an extinguishing agent and apply them to interior structural fire fighting activities in accordance with content identified in the State Fire Training (SFT) Fire Control 3: Structural Fire Fighting course plan.

Enabling Learning Objectives

1. Identify concepts associated with water as an extinguishing agent
    - Heat
        - Latent heat of vaporization
        - Sensible heat
    - Specific heat of water
    - Specific heat of steam
2. Describe how water and steam impact the fire tetrahedron
    - Removes (transfers) heat (heat)
    - Stops pyrolysis (fuel)
    - Reduces oxygen percentage (oxygen)
    - Interrupts chemical chain reaction (chemical chain reaction)
3. Describe gas cooling
    - Droplet size
    - Hang time
    - Flow rate
    - Attack angle
    - Cone angle
    - Application duration
4. Describe surface cooling
    - Stop pyrolysis
    - Extinguish smoldering combustion
5. Describe cooling capacity
    - Raising water to vaporization temperature
    - Vaporization of water
6. Describe gas expansion and contraction
    - Fire gas/smoke
    - Steam

Discussion Questions

1. Can you push fire with water application?
    - Why or why not?
2. What value does steam production have in fire attack?
3. Why is it important to achieve full extinguishment?

Application

1. Determined by instructor

Instructor Notes

1. Recommended resources for Discussion Question 1
   - Video: Scientific Research for the Development of More Effective Tactics: Governors Island Experiments (July 2012) (https://ulfirefightersafety.org/resources.html#training/scientific-research-for-the-development-of-more-effective-tactics-governors-island-experiments)
   - Document: Impact of Ventilation on Fire Behavior in Legacy and Contemporary Residential Construction (section 9.11 Pushing Fire, page 203)
     - See Online Instructor Resources
   - Fire Safety Research Institute (FSRI) Study: Impact of Fire Attack Utilizing Interior and Exterior Steams on Firefighter Safety and Occupational Survival: Full Scale Experiments
     - See Online Instructor Resources
   - Fire Safety Research Institute (FSRI) Study: Impact of Fire Attack Utilizing Interior and Exterior Streams on Firefighter Safety and Occupational Survival: Water Mapping
     - See Online Instructor Resources
2. Reference using water as an extinguishing agent during demonstrations using a scalable burn prop, Class A container, gas-fired prop or fixed facility. Engage instructor trainees in individual demonstrations as appropriate.

Topic 5-5: Fire Control 3 Classroom Instructor Demonstrations

Terminal Learning Objective

At the end of this topic an instructor trainee, given the Fire Control 3: Structural Fire Fighting course plan Instructor Demonstrations and associated equipment and materials, will be able to demonstrate principles of fire dynamics in accordance with NFPA 1403 and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Describe how to set up and demonstrate Instructor Demonstration 1: Dust Explosion
2. Describe how to set up and demonstrate Instructor Demonstration 2: Combustion
3. Describe how to set up and demonstrate Instructor Demonstration 3: Pyrolysis

Discussion Questions

1. Determined by instructor

Application

1. Divide instructor trainees into groups. Have different groups set up and demonstrate/teach the Fire Control 3: Structural Fire Fighting course plan Instructor Demonstrations to the class.
    - Instructor Demonstration 1: Dust Explosion
    - Instructor Demonstration 2: Combustion
    - Instructor Demonstration 3: Pyrolysis

Instructor Notes

1. None

Topic 5-6: Fire Control 3 Fireground Instructor Demonstrations

Terminal Learning Objective

At the end of this topic an instructor trainee, given the Fire Control 3: Structural Fire Fighting course plan and associated equipment and materials, will be able to demonstrate principles of fire dynamics in accordance with NFPA 1403 and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Describe how to set up and demonstrate the principles taught in Topic 2-2: Fire Growth and Development
2. Describe how to set up and demonstrate the principles taught in Topic 2-3: Characteristics of Smoke
3. Describe how to set up and demonstrate the principles taught in Topic 2-4: Water as an Extinguishing Agent
4. Describe how to set up and demonstrate the principles taught in Topic 3-4: Identify Flow Paths and Manage Air Tracks

Discussion Questions

1. Determined by instructor

Application

1. Determined by instructor

Instructor Notes

1. The topic numbers and titles listed in the ELOs above correspond to the Fire Control 3: Structural Fire Fighting course plan, not this course plan.
2. Use scalable props on the fireground to teach the instructor trainees how to demonstrate these principles when teaching the Fire Dynamics unit of Fire Control 3: Structural Fire Fighting. Allow time for a question and answer session after each demonstration.
    - Video Resources
        - SFT Whoosh Box (State Fire Training / 2018)
        - SFT Single-Chamber Burn Prop (State Fire Training / 2018)
        - SFT Multi-Chamber Burn Prop (State Fire Training / 2018)

Unit 6: Set Up and Walk Through

Topic 6-1: Implementing an Incident Action Plan

Terminal Learning Objective

At the end of this topic an instructor trainee, given ICS forms and live fire training evolutions, will be able to develop and implement an incident action plan (IAP) for a live fire training course in accordance with the policies and the procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Describe how to complete the ICS forms that make up an IAP
    - ICS 201: Incident Briefing
    - ICS 204: Assignment List
    - ICS 205: Incident Radio Communications Plan
    - ICS 206: Medical Plan
    - ICS 215: Operational Planning Worksheet
    - ICS 215A: Incident Action Plan Safety Analysis

Discussion Questions

1. How does the complexity of a live fire training course impact an IAP?
2. How does the IAP differ from the comprehensive burn plan (“burn book”)

Application

1. Given a proposed live fire training course with multiple evolutions, divide the class into groups and have each group complete one ICS form. Have students share their results with the group.

Instructor Notes

1. None

Topic 6-2: Securing a Water Supply

Terminal Learning Objective

At the end of this topic an instructor trainee, given a prop or facility and a live fire training evolution, will be able to secure a water supply with sufficient rate and duration for control and extinguishment of the training fire, backup lines to protect personnel, and protection of exposed property.

Enabling Learning Objectives

1. Describe minimum water supply requirements for live fire training evolutions including water for:
   - Control and extinguishment of training fire
   - Backup line(s) to protect personnel
   - Protecting exposed property
2. Identify hose line placement for live fire training evolutions based on:
   - Training objectives
   - Fuel package
   - Number of evolutions/training stations running simultaneously
   - Exposure protection
   - Unforeseen situations
3. Identify conditions that allow for a single source water supply

Discussion Questions

1. Who is responsible for the ensuring adequate water supply?

Application

1. Determined by instructor

Instructor Notes

1. None

Topic 6-3: Conducting an Instructor Briefing and Preburn Walk Through

Terminal Learning Objective

At the end of this topic an instructor trainee, given a live fire training evolution, will be able to conduct an instructor briefing and a preburn walk through with all instructors and personnel supporting the live fire training evolution in accordance with NFPA 1403 and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Describe the instructor walkthrough process
    - Identify crew and instructor assignments
        - Incident commander
        - Safety officer
            - Medical team
            - "2 in/2 out"
        - Instructor in charge
            - Instructor(s)
            - Instructor trainee(s)
        - Fire control team
            - Ignition officer
        - Water supply officer
            - Pump operator(s)
        - Logistics
    - Instructor in charge briefs all participating instructors
        - Incident action plan (IAP)
        - Incident within an incident plan (IWI)
        - Training structure/prop layout
        - Crew and instructor assignments
        - Participant rotations
    - Safety officer briefs all participating instructors
        - Safety plan
        - Current and anticipated weather
        - Evacuation signal and procedures
        - Review final "Go/No-Go Checklist"
        - Check PPE
        - Check training communications channels
        - Review decontamination plan
    - Initiate site plan
        - Command post
        - Logistics
            - Food/water
            - SCBA air
            - Restrooms/hand washing
        - Apparatus
            - Position vehicles

        - Deploy hose lines
    - Rehabilitation/medical
        - Shade/hydration
    - Decontamination
- Issue final notifications and approvals
    - Communications center
    - Adjoining jurisdictions (if applicable)
    - Law enforcement (if applicable)
    - Impacted populations

Discussion Questions

1. What types of weather would impact the decision to burn?
2. When do you make the final “go/no-go” decision?

Application

1. Determined by instructor

Instructor Notes

1. None

Topic 6-4: Building Fuel Packages

Terminal Learning Objective

At the end of this topic an instructor trainee, given fuel materials, a prop or facility, and a live fire training evolution, will be able to build a fuel load that is sufficient in material, size, and scale for the prop or facility and meets the objectives of the live fire training evolution.

Enabling Learning Objectives

1. Identify authorized fuel materials per NFPA 1403
2. Identify unauthorized fuel materials per NFPA 1403
3. Identify factors (openings, building materials, room size, etc.) that impact fire growth development and spread
    - Select fuel loads to avoid uncontrolled flashover or backdraft conditions
4. Identify appropriate locations for fuel packages
5. Describe how to build fuel packages that are the appropriate type, orientation, and size to meet live fire training evolution objectives

Discussion Questions

1. What are the impacts of placing fuel packages near entrances or exits?
2. What factors impact the type and size of fuels used to make fuel packages?

Application

1. Activity 6-4: Building Fuel Packages for Fire Behavior Evolutions
2. Activity 6-4: Building Fuel Packages for Fire Attack Evolutions

Instructor Notes

1. For ELO 5, consider breaking the class into groups to address fuel packages appropriate for different types of props and facilities using photos and examples.

Topic 6-5: Conducting a Student Preburn Walk Through

Terminal Learning Objective

At the end of this topic an instructor trainee, given a live fire training evolution, will be able to conduct a preburn walk through with all students participating the live fire training evolution in accordance with NFPA 1403 and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Describe preburn "walkthrough" procedures
    - Brief all participants
        - Training objectives
        - Training structure/prop layout
            - Demonstrate door and window operations
        - Crew and instructor assignments
        - Participant rotations
        - Safety briefing
            - Evacuation signal and procedures
            - Decontamination procedures
    - Check all hose lines
        - Sufficient size for area of fire involvement
        - Adequate number for personnel
        - Charged and test flowed
        - Supervised by qualified instructors
    - Position necessary tools and equipment
    - Check participants
        - All equipment properly worn
        - SCBA with adequate volume
    - Communications check per communications plan
2. Identify NFPA 1403 standards related to playing the role of a victim during live fire training
    - No person shall be a victim
    - Rescue mannequins in fire fighter PPE shall be specially marked

Discussion Questions

1. Who is responsible for performing PPE checks on Fire Control 3: Structural Fire Fighting students prior to entry into a live fire area?
2. Under what circumstances can you use people as victims during live fire training?
3. What is your AHJ's evacuation signal?

Application

1. Determined by instructor

Instructor Notes

1. Most of the ELO content comes from "Preburn Procedures" on the "Live Fire Evolution Sample Checklist" from NFPA 1403.

Unit 7: Delivering Live Fire Training Evolutions

Topic 7-1: Operating as Instructor in Charge (Command and Control)

Terminal Learning Objective

At the end of this topic an instructor trainee, given an incident action plan and live fire training evolutions, will be able to operate as the "instructor in charge" of a live fire training course, supervising instructors and maintaining unity of command and span of control.

Enabling Learning Objectives

1. Describe the qualifications of an instructor in charge
    - NFPA 1403
2. Describe the roles and responsibilities of an instructor in charge
    - Assign instructors to functional crews, backup lines, and functional assignments
    - Rest and rehabilitation of participants and instructors
    - Medical monitoring of participants and instructors
    - Instructor assignments and rotation schedule
    - Verify instructor qualifications to deliver live fire training
    - Assign extra instructors to mitigate extreme weather, large class size, or long class duration
    - Maintain awareness of weather conditions
    - Perform final weather check before ignition
    - Additional requirements for conducting live fire training evolutions with flow path and ventilation-controlled conditions
3. Describe the roles and responsibilities of an instructor
    - Verify PPE is worn according to manufacturers instructions
    - Monitor and supervise students during live fire evolutions

Discussion Questions

1. What are the roles and responsibilities of the instructor in charge?
2. Is the instructor in charge also the incident commander?
3. What is the difference between an instructor and an instructor in charge?

Application

1. Determined by instructor

Instructor Notes

1. None

Topic 7-2: Operating as Safety Officer

Terminal Learning Objective

At the end of this topic an instructor trainee, given an incident action plan and live fire training evolutions, will be able to operate as the safety officer for a live fire training course so that hazards and associated risks are identified, unsafe acts are prevented, and unsafe conditions are mitigated.

Enabling Learning Objectives

1. Describe the qualifications of a safety officer
   - NFPA 1403
2. Describe the roles and responsibilities of a safety officer
   - Review the comprehensive burn plan (“burn book”)
   - Review the IAP
   - Review the IWI plan
   - Review the medical plan
   - Review the personnel rehabilitation plan
   - Review the decontamination plan
   - Ensure accountability of personnel
   - Prevent unsafe acts
   - Eliminate unsafe conditions
3. Describe specialized training required for a live fire training safety officer
   - Gas-fired props
   - Flow path and ventilation-controlled conditions

Discussion Questions

1. Can a safety officer have other assignments during live fire training?
2. When would it be appropriate to have more than one safety officer during live fire training?

Application

1. Determined by instructor

Instructor Notes

1. Although there is no formal activity for this learning objective, the instructor trainees can practice operating as a safety officer during any live fire activities or demonstrations conducted as part of this course.

Topic 7-3: Implementing Student Rotations

Terminal Learning Objective

At the end of this topic an instructor trainee, given a live fire training evolution, will be able to plan, communicate, and oversee student rotations for a live fire training evolution in a manner that provides the greatest opportunity for meeting objectives while minimizing student risk.

Enabling Learning Objectives

1. Describe how to plan student rotations
   - Impacted by number of students
   - Impacted by training objectives
   - Impacted by prop or facility
2. Describe when to communicate rotations with students
   - Prior to IDLH conditions
3. Describe what to communicate to students
   - Timing
   - Tasks
   - Travel routes
   - Primary and secondary egress
   - Order of operations
   - Emergency plans
   - Emergency assembly point
   - Hazards and risks
   - Postburn procedures
     - Meeting location
     - Decontamination
4. Describe conditions to watch for during a live fire training evolution
   - Panic
   - PPE malfunction or failure
   - Low air alarms
   - Excessive heat release
   - Unintended fire conditions

Discussion Questions

1. Under what conditions should an instructor interrupt a live fire training evolution?
2. What procedures does your agency follow for PPE or SCBA malfunction or failure?

Application

1. Determined by instructor

Instructor Notes

1. Although there is no formal activity for this learning objective, the instructor trainees can practice implementing student rotations during any live fire activities or demonstrations conducted as part of this course.

Topic 7-4: Implementing the “2 In/2 Out” or RIC Requirement

Terminal Learning Objective

At the end of this topic an instructor trainee, given laws, regulations, and a live fire training evolution, will be able to implement the “2 in/2 out” or rapid intervention crew/company (RIC) requirement during a live fire training evolution.

Enabling Learning Objectives

1. Identify legislation that sets “2 in/2 out” requirements
   - 29 CFR 1910.134(g)(4)(i)
2. Identify conditions that require a “2 out” team
3. Describe the roles and responsibilities of the “2 out” team
4. Identify the type of PPE worn by the “2 out” team
5. Identify appropriate staging locations for the “2 out” team

Discussion Questions

1. Under what conditions would you activate the “2 out” team?
2. How are RIC and “2 out” teams similar or different?

Application

1. Determined by instructor

Instructor Notes

1. Although there is no formal activity for this learning objective, the instructor trainees can practice to implement the “2 in/2 out” or rapid intervention crew/company (RIC) requirement during any live fire activities or demonstrations conducted as part of this course.

Topic 7-5: Igniting Fuel Packages

Terminal Learning Objective

At the end of this topic an instructor trainee, given NFPA 1403, fuel materials, and an ignition source, will be able to ignite, maintain, and control a live fire and verbally describe the roles and responsibilities of an ignition officer.

Enabling Learning Objectives

1. Identify the members of a fire control team
2. Describe the role and responsibilities of an ignition officer
3. Describe the roles and responsibilities of the other members of a fire control team
4. Describe required PPE for the fire control team
5. Describe hose line requirements for the fire control team
6. Identify the makes the decision to ignite
7. Identify who ignites the fuel package
8. Describe how to light fuel packages based on:
    - Fuel type
    - Physical arrangement
    - Lighting sequence
    - Training objectives
9. Identify safety considerations associated with ignition
    - Ensure flame area is clear of personnel prior to ignition
    - Alternate ignition officer responsibilities after each ignition

Discussion Questions

1. To whom does the ignition officer report?
2. What is the minimum number of members for a fire control team?

Application

1. Have students practice ignition using the fuel packages developed during Activity 6-4: Building Fuel Packages for Fire Behavior Evolutions and Activity 6-4: Building Fuel Packages for Fire Attack Evolutions.

Instructor Notes

1. None

Topic 7-6: Executing and Evaluating Required Fire Control 3 Skills Exercises

Terminal Learning Objective

At the end of this topic an instructor trainee, given demonstrations of Fire Control 3: Structural Fire Fighting course plan Skills Exercises and associated equipment and materials, will be able to set up and evaluate students completing the required Fire Control 3: Structural Fire Fighting Skills Exercises in accordance with NFPA 1403 and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Identify the objectives a student must meet in order to successfully complete Skills Exercise 2: Risk Assessment and Door Entry
2. Describe how to set up Skills Exercise 2: Risk Assessment and Door Entry
3. Identify the objectives a student must meet in order to successfully complete Skills Exercise 3: Stretching, Flaking, and Advancing an Attack Line
4. Describe how to set up Skills Exercise 3: Stretching, Flaking, and Advancing an Attack Line
5. Identify the objectives a student must meet in order to successfully complete Skills Exercise 4: Water Application
6. Describe how to set up Skills Exercise 4: Water Application
7. Identify the objectives a student must meet in order to successfully complete Skills Exercise 5: Fire Attack
8. Describe how to set up Skills Exercise 5: Fire Attack

Discussion Questions

1. Determined by instructor

Application

1. Determined by instructor

Instructor Notes

1. Demonstrate how to set up and teach each required Fire Control 3: Structural Fire Fighting student skills exercise.
2. Allow time for a questions and answer session after each demonstration.

Topic 7-7: Executing and Evaluating Optional Fire Control 3 Skills Exercises

Terminal Learning Objective

At the end of this topic an instructor trainee, given demonstrations of Fire Control 3: Structural Fire Fighting course plan Skills Exercises and associated equipment and materials, will be able to set up and evaluate students completing the optional Fire Control 3: Structural Fire Fighting Skills Exercises in accordance with NFPA 1403 and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Identify the objectives a student must meet in order to successfully complete Skills Exercise 6: Transitional Fire Attack
2. Describe how to set up Skills Exercise 6: Transitional Fire Attack
3. Identify the objectives a student must meet in order to successfully complete Skills Exercise 7: Interior Attic Fire Attack
4. Describe how to set up Skills Exercise 7: Interior Attic Fire Attack
5. Identify the objectives a student must meet in order to successfully complete Skills Exercise 8: Below Grade (Basement) Fire Attack
6. Describe how to set up Skills Exercise 8: Below Grade (Basement) Fire Attack
7. Identify the objectives a student must meet in order to successfully complete Skills Exercise 9: VEIS
8. Describe how to set up Skills Exercise 9: VEIS
9. Identify the objectives a student must meet in order to successfully complete Skills Exercise 10: Ventilation
10. Describe how to set up Skills Exercise 10: Ventilation
11. Identify the objectives a student must meet in order to successfully complete Skills Exercise 11: Portable Water Extinguisher Attack
12. Describe how to set up Skills Exercise 11: Portable Water Extinguisher Attack

Discussion Questions

1. Determined by instructor

Application

1. Determined by instructor

Instructor Notes

1. Demonstrate how to set up and teach each optional Fire Control 3: Structural Fire Fighter student skills exercise.
2. Allow time for a questions and answer session after each demonstration.

Unit 8: Postburn Procedures

Topic 8-1: Postburn Procedures

Terminal Learning Objective

At the end of this topic an instructor trainee, given a live fire training evolution, will be able to conduct postburn procedures in accordance with NFPA 1403 and the policies and procedures of the authority having jurisdiction (AHJ).

Enabling Learning Objectives

1. Describe postburn procedures
    - Account for all personnel
    - Overhaul remaining fires
    - Decontaminate, inspect, and rehabilitate
        - Personnel
        - PPE
        - Equipment
    - Inspect training facilities for stability and hazards
    - Secure training facilities
    - Conduct training critique (after action review/AAR)
    - Complete records and reports
    - Demobilize resources and personnel
    - Complete any other AHJ requirements
    - Release property to owner
    - Close out notifications

Discussion Questions

1. Why is it important to check the students' gear before and after live fire training?
2. How do you document an injury acquired during training?
3. What steps can you take to minimize exposure during decontamination?
4. What records and reports are required after a burn?

Application

1. Determined by instructor

Instructor Notes

1. Most of the ELO content comes from "Postburn Procedures" on the "Live Fire Evolution Sample Checklist" from NFPA 1403.

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How to Read a Course Plan

A course plan identifies the details, logistics, resources, and training and education content for an individual course. Whenever possible, course content is directly tied to a national or state standard. SFT uses the course plan as the training and education standard for an individual course. Individuals at fire agencies, academies, and community colleges use course plans to obtain their institution's consent to offer course and provide credit for their completion. Instructors use course plans to develop syllabi and lesson plans for course delivery.

Course Details
The Course Details segment identifies the logistical information required for planning, scheduling, and delivering a course.

Required Resources
The Required Resources segment identifies the resources, equipment, facilities, and personnel required to delivery the course.

Unit
Each Unit represents a collection of aligned topics. Unit 1 is the same for all SFT courses. An instructor is not required to repeat Unit 1 when teaching multiple courses within a single instructional period or academy.

Topics
Each Topic documents a single Terminal Learning Objective and the instructional activities that support it.

Terminal Learning Objective
A Terminal Learning Objective (TLO) states the instructor's expectations of student performance at the end of a specific lesson or unit. Each TLO includes a task (what the student must be able to do), a condition (the setting and supplies needed), and a standard (how well or to whose specifications the task must be performed). TLOs target the performance required when students are evaluated, not what they will do as part of the course.

Enabling Learning Objectives
The Enabling Learning Objectives (ELO) specify a detailed sequence of student activities that make up the instructional content of a lesson plan. ELOs cover the cognitive, affective, and psychomotor skills students must master in order to complete the TLO.

Discussion Questions
The Discussion Questions are designed to guide students into a topic or to enhance their understanding of a topic. Instructors may add to or adjust the questions to suit their students.

Application
The Application segment documents experiences that enable students to apply lecture content through cognitive and psychomotor activities, skills exercises, and formative testing. Application experiences included in the course plan are required. Instructors may add additional application experiences to suit their student population if time permits.

Instructor Notes
The Instructor Notes segment documents suggestions and resources to enhance an instructor's ability to teach a specific topic.

CTS Guide Reference
The CTS Guide Reference segment documents the standard(s) from the corresponding Certification Training Standard Guide upon which each topic within the course is based. This segment is eliminated if the course is not based on a standard.

Skill Sheet
The Skill Sheet segment documents the skill sheet that tests the content contained within the topic. This segment is eliminated if the course does not have skill sheets.