

**FIRE FIGHTER ADVISORY COMMITTEE
AGENDA**

December 10, 2020, 10:00 A.M.

1701 N. Congress Ave., William B. Travis Building, Room 1-104, Austin, Texas

This meeting of the Fire Fighter Advisory Committee will be held in-person at the physical location above. For all individuals entering the William B. Travis Building, masks are required in the facility, social distancing must be observed, and if you are not feeling well or were possibly exposed to COVID-19, please stay at home.

The Fire Fighter Advisory Committee will convene in open session to deliberate and possibly take formal action on any of the following agenda items:

- 1. Roll call and excuse of committee member absences.**
- 2. Adoption of September 17, 2020 Fire Fighter Advisory Committee meeting minutes.**
- 3. Report from the Curriculum and Testing Committee regarding possible changes to the Fire Investigator Curriculum Manual, Reference List, and Outline.**
- 4. Proposed amendments to 37 Tex. Administrative Code, Part 13, Chapter 421, Standards For Certification.**
- 5. Proposed amendments to 37 Tex. Administrative Code, Part 13, Chapter 429, Fire Inspector and Plan Examiner, Subchapter B, Minimum Standards For Plan Examiner, §429.201, Minimum Standard For Plan Examiner Personnel.**
- 6. Proposed amendments to 37 Tex. Administrative Code, Part 13, Chapter 435, Fire Fighter Safety.**
- 7. Proposed amendments to 37 Tex. Administrative Code, Part 13, Chapter 445, Administrative Inspections and Penalties.**
- 8. Public comments.**
- 9. Subjects for future agenda items.**
- 10. Future meeting dates.**
- 11. Adjourn meeting.**

1. Roll call and excuse of committee member absences.

2. Adoption of the September 17, 2020 Fire Fighter Advisory Committee meeting minutes.

TEXAS COMMISSION ON FIRE PROTECTION

Presiding Officer Daniel DeYear called the September 17, 2020 meeting of the Fire Fighter Advisory Committee to order at 9:00 a.m.

Member Attendance	Jim Reidy Jason Collier	Vince Abrigo Daniel DeYear	Ken Swindle* Daniel Buford*	Keith Schmidt Daniel Anderson	Vacant
				*absent entire meeting	
				**absent part of meeting	

Staff	Mike Wisko	Deborah Cowan	Cliff Grant	Tara Youngblood	Grace Wilson
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Attendees	Bryce Houlton Jason Blackmon	Nathan Mendenhall	Carroll Czichos	Javier Zapata	Tyler Shirley
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| 1. Roll call | Secretary, Keith Schmidt called roll and a quorum was present. |
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| 2. Adoption of Minutes | A motion was made by Jim Reidy and seconded by Jason Collier to approve the minutes of the June 11, 2020, fire fighter advisory committee meeting as discussed. The motion carried. |
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| 3. Curriculum & Testing Committee Report | A motion was made by Jason Collier and seconded by Keith Schmidt to approve and recommend to the commission the Basic Fire Inspector, Plan Examiner, Incident Safety Officer, and Basic Fire Suppression Curricula reference lists as well as the Incident Safety Officer Curriculum Skills and the Basic Wildland Skills Update. The motion carried. |
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| 4. Chapter 459 Fire & Life Safety Educator commission. | A motion was made by Jim Reidy and seconded by Jason Collier to accept the amendments to 37 TAC, Chapter 459, Fire and Life Safety Educator, Subchapter B, Minimum Standards for Fire and Life Safety Educator II, §459.201 as proposed by the commission. The motion carried. |
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| 5. Chapter 461 Incident Commander | A motion was made by Jason Collier and seconded by Jim Reidy to accept the new 37 TAC, Chapter 461, Incident Commander, new §461.1, §461.3, and §461.5 as proposed by the commission. The motion carried. |
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| 6. Report on Commission Decision | Presiding Officer, Daniel DeYear informed the committee members that the Commission at its August 3, 2020 meeting voted to allow the Health & Wellness Ad-Hoc Committee to use the annual injury report to identify CE training materials that can be used to assist in preventing fire fighter injuries. No action necessary. |
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| 7. Public Comments | There were no public comments. |
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| 8. Subjects for Future meetings | None identified. |
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| 9. Future meeting Dates | The next meeting was previously set for December 10, 2020 beginning at 9:00 a.m. |
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10. Adjournment A motion was made by Jim Reidy and seconded by Daniel Anderson to adjourn. The motion carried.

Daniel DeYear
Presiding Officer

- 3. Report from the Curriculum and Testing Committee regarding possible changes to the Fire Investigator Curriculum Manual, Reference List, and Outline.**

Fire Investigator

A Fire Investigator is an individual who has demonstrated the knowledge, skills, and abilities necessary to conduct, coordinate, and complete a fire investigation employing all the elements of the scientific method as the operating analytical process throughout the investigation. A Fire Investigator can competently determine the origin and cause of a fire and has mastered all the job performance requirements of NFPA 1033: *Standard for Professional Qualifications for Fire Investigator*.

SECTION 1

COMMISSION ON FIRE PROTECTION

RULES AND REGULATIONS

4.1 General

NFPA 1033 4.1.1 The fire investigator shall meet the job performance requirements defined in Sections 4.2 through 4.7.

References:

Certification Curriculum Manual
Standards Manual for Fire Protection Personnel

501-1.1 **The Investigator candidate shall describe the purpose of the NFPA standard and guide applicable to Fire Investigators.**

- 1.1.1 NFPA 1033 *Standard for Professional Qualifications for Fire Investigator*, 2014 edition.
- 1.1.2 NFPA 921 *Guide for Fire and Explosion Investigations*, 2021 edition.

501-1.2 **The Investigator candidate shall identify rules applicable to the Fire/Arson Investigator certification adopted by the Texas Commission on Fire Protection.**

- 1.2.1 The Investigator candidate shall identify the requirements for certification as a Fire Investigator as stated in the *Standards Manual for Fire Protection Personnel*, Chapter 431.
- 1.2.2 The Investigator candidate shall identify the requirements for certification as an Arson Investigator as stated in the *Standards Manual for Fire Protection Personnel*, Chapter 431.
- 1.2.3 The Investigator candidate shall identify the various levels of certification for Fire and/or Arson Investigator, as stated in the *Standards Manual for Fire Protection Personnel*, Chapter 431.
 - 1.2.3.1 Basic

- 1.2.3.2 Intermediate
- 1.2.3.3 Advanced
- 1.2.3.4 Master

SECTION 2

NFPA 1033

NFPA 1033 1.1* Scope. This standard shall identify the professional level of job performance requirements for fire investigators.

1.2* Purpose. The purpose of this standard shall be to specify the minimum job performance requirements for serving as a fire investigator in both the private and public sectors.

1.2.1 It is not the intent of this standard to restrict any jurisdiction from exceeding the minimum requirements.

1.2.2 Job performance requirements for each duty are the tasks an individual must be able to perform in order to successfully carry out that duty; however, they are not intended to measure a level of knowledge. Together, the duties and job performance requirements define the parameters of the job of fire investigator.

1.3 General.

1.3.1 The fire investigator shall be at least age 18.

1.3.2 The fire investigator shall have a high school diploma or equivalent.

1.3.3 The authority having jurisdiction shall conduct a thorough background and character investigation prior to accepting an individual as a candidate for certification as a fire investigator.

1.3.4 The job performance requirements for fire investigator shall be completed in accordance with established practices and procedures or as they are defined by law or by the authority having jurisdiction.

1.3.5* The job performance requirements found in this standard are not required to be mastered in the order they appear. Training agencies or authorities shall establish instructional priority and the training program content to prepare individuals to meet the job performance requirements of this standard.

1.3.6* Evaluation of job performance requirements shall be by individuals who are qualified and approved by the authority having jurisdiction.

1.3.7* The investigator shall have and maintain at a minimum an up-to-date basic knowledge of the following topics beyond the high school level:

- (1) Fire science
- (2) Fire chemistry
- (3) Thermodynamics
- (4) Thermometry
- (5) Fire dynamics
- (6) Explosion dynamics
- (7) Computer fire modeling
- (8) Fire investigation
- (9) Fire analysis
- (10) Fire investigation methodology
- (11) Fire investigation technology
- (12) Hazardous materials
- (13) Failure analysis and analytical tools
- (14) Fire protection systems
- (15) Evidence documentation, collection, and preservation
- (16) Electricity and electrical systems

1.3.8* The fire investigator shall remain current in the topics listed in 1.3.7 by attending formal education courses, workshops and seminars and/or through professional publications and journals.

4.1.1* The fire investigator shall meet the job performance requirements defined in Sections 4.2 through 4.7. (see below)

4.1.2* The fire investigator shall employ all elements of the scientific method as the operating analytical process throughout the investigation and for the drawing of conclusions.

4.1.3* Because fire investigators are required to perform activities in adverse conditions, site safety assessments shall be completed on all scenes and regional and national safety standards shall be followed and included in organizational policies and procedures.

4.1.4* The fire investigator shall maintain necessary liaison with other interested professionals and entities.

4.1.5* The fire investigator shall adhere to all applicable legal and regulatory requirements.

4.1.6 The fire investigator shall understand the organization and operation of the investigative team within an incident management system

28 Job Performance Requirements

- 1-Secure the fire ground (4.2.1)
- 2-Conduct an exterior survey (4.2.2)
- 3-Conduct an interior survey (4.2.3)
- 4-Interpret fire patterns (4.2.4)
- 5-Interpret and analyze fire patterns (4.2.5)
- 6-Examine and remove fire debris (4.2.6)
- 7-Reconstruct the area of origin (4.2.7)
- 8-Inspect the performance of building systems (4.2.8)
- 9-Discriminate the effects of explosions (4.2.9)
- 10-Diagram the Scene (4.3.1)
- 11-Photographically document the scene (4.3.2)
- 12-Construct investigative notes (4.3.3)
- 13-Utilize proper procedures for managing victims and fatalities (4.4.1)
- 14-Locate, document, collect, label, package, and store evidence (4.4.2)
- 15-Select evidence for analysis (4.4.3)
- 16-Maintain a chain of custody (4.4.4)
- 17-Dispose of evidence (4.4.5)
- 18-Develop an interview plan (4.5.1)
- 19-Conduct interviews (4.5.2)
- 20-Evaluate interview information (4.5.3)
- 21-Gather reports and records (4.6.1)
- 22-Evaluate the investigative file (4.6.2)
- 23-Coordinate expert resources (4.6.3)
- 24-Establish evidence as to motive and/or opportunity (4.6.4)
- 25-Formulate and opinion concerning origin, cause, or responsibility for the fire (4.6.5)
- 26-Prepare a written report (4.7.1)
- 27-Express investigative findings verbally (4.7.2)
- 28-Testify during legal proceedings (4.7.3)

SECTION 3**DEFINITIONS**

References:
NFPA 921 20210 edition

501-3.1 ***The Investigator candidate shall define the terms used in Chapter 3 of NFPA 921, Guide for Fire and Explosion Investigations (20210 Edition).***

SECTION 4

BASIC METHODOLOGY

4.1 General

NFPA 1033 4.1.2 The fire investigator shall employ all elements of the scientific method as the operating analytical process throughout the investigation and for the drawing of conclusions.

References:

J & B, chapter 2

Lentini, chapter 4

501-4.1 **The Investigator candidate shall describe the nature of fire investigations.**

501-4.2 **The Investigator candidate shall apply the principles of the systematic approach of the scientific method.**

501-4.3 **The Investigator candidate shall describe the steps of the scientific method relating to fire investigations.**

- 4.3.1 Recognize the Need
- 4.3.2 Define the Problem
- 4.3.3 Collect Data
- 4.3.4 Analyze the Data
- 4.3.5 Developing a Hypotheses (Inductive Reasoning)
- 4.3.6 Test the Hypotheses (Deductive Reasoning)
- 4.3.7 Select Final Hypotheses
- 4.3.8 Avoid Presumption
- 4.3.9 Expectation Bias
- 4.3.10 Confirmation Bias

501-4.4 **The Investigator candidate shall describe the basic method of fire investigation.**

- 4.4.1 Receiving the Assignment
- 4.4.2 Preparing for the Investigation
- 4.4.3 Conducting the Investigation

4.4.4 Collecting and Preserving Evidence

4.4.5 Analyzing the Incident

4.4.6 Conclusions

501-4.5 ***The Investigator candidate shall properly distinguish between the different levels of certainty.***

4.5.1 Probable versus Possible

4.5.2 Suspected

4.5.3 Expert Opinions

501-4.6 ***The Investigator candidate shall develop “review procedures.”***

4.6.1 Administrative Review

4.6.2 Technical Review

4.6.3 Peer Review

501-4.7 ***The Investigator candidate shall describe different reporting procedures.***

SECTION 5

BASIC FIRE SCIENCE

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene and/or conducting a comprehensive review of documentation generated during the examination(s) of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.4 Interpret fire patterns, given standard equipment and tools and some structural or content remains, so that each individual pattern is evaluated with respect to the burning characteristics of the material involved and in context and relationship with all patterns observed and the mechanisms of heat transfer that led to the formation of the pattern..

(A) Requisite Knowledge. Fire dynamics, fire development, and the interrelationship of heat release rate, form, and ignitibility of materials.

(B) Requisite Skills. Ability to interpret the effects of burning characteristics on different types of materials.

NFPA 1033 4.2.5 Interpret and analyze fire patterns, given standard equipment and tools and some structural or content remains, so that fire development is determined, methods and effects of suppression are evaluated, false origin area patterns are recognized, and all areas of origin are correctly identified.

(A) Requisite Knowledge. Fire behavior and spread based on fire chemistry, fire dynamics, and physics, fire suppression effects, building construction.

(B) Requisite Skills. Ability to interpret variations of fire patterns on different materials with consideration given to heat release rate, form, and ignitibility; distinguish impact of different types of fuel loads; evaluate fuel trails; and analyze and synthesize information.

NFPA 1033 4.2.6 Examine and remove fire debris, given standard equipment and tools, so that all debris is checked for fire cause evidence, potential ignition source(s) is identified, and evidence is preserved without investigator-inflicted damage or contamination.

(A) Requisite Knowledge. Basic understanding of ignition processes, characteristics of ignition sources, and ease of ignition of fuels; debris-layering techniques; use of tools and equipment during the debris search; types of fire cause evidence commonly found in various degrees of damage; and evidence-gathering methods and documentation.

(B) Requisite Skills. Ability to employ search techniques that further the discovery of fire cause evidence and ignition sources, use search techniques that incorporate documentation, and collect and preserve evidence.

References:

J&B, chapter 3

Kirk's, chapter 2

Lentini, chapter 1-2

501-5.1 The Investigator candidate shall define and describe fire science.

5.1.1 Fire and Energy

5.1.2 Energy

5.1.3 Power

- 5.1.4 Heat Flux
- 5.1.5 Identify and describe the elements of the fire tetrahedron.
 - 5.1.5.1 Define fuel and describe the three states in which fuel exists.
 - 5.1.5.2 Describe the action of oxidizing agents.
 - 5.1.5.3 Describe the relationship of heat in the combustion process.
 - 5.1.5.4 Describe the uninhibited chemical chain reaction of combustion.

501-5.2 ***The Investigator candidate shall be able to discuss fire chemistry as the study of chemical processes that occur in fires, including changes of state, decomposition, and combustion.***

- 5.2.1 Phase Changes and Thermal Decomposition
- 5.2.2 Combustion .

501-5.3 ***The Investigator candidate shall identify and describe products of combustion.***

501-5.4 ***The Investigator candidate shall identify and describe fluid flows generated by mechanical forces or by buoyant forces generated by temperature differences.***

- 5.4.1 General
- 5.4.2 Buoyant Flows
- 5.4.3 Fire Plumes
- 5.4.4 Ceiling Jets
- 5.4.5 Vent Flows

501-5.5 ***The Investigator candidate shall define and describe methods of heat transfer.***

- 5.5.1 General
- 5.5.2 Conduction
- 5.5.3 Convection
- 5.5.4 Radiation

- 5.5.5 Thermometry
 - 5.5.5.1 Different systems
 - 5.5.5.2 Empirical Temperature Scales
 - 5.5.5.3 Thermodynamic (Absolute) Temperature Scales

501-5.6 ***The Investigator candidate shall define and describe the fuel load, fuel packages, and properties of flame.***

- 5.6.1 Fuel Load
- 5.6.2 Fuel Items and Fuel Package
- 5.6.3 Heat Release Rate
- 5.6.4 Properties of Flames
- 5.6.5 Thermal Structure of a Flame
 - 5.6.5.1 Continuous Flaming Region
 - 5.6.5.2 Intermittent Flame Region
 - 5.6.5.3 Plume Region
- 5.6.6 Heat Fluxes from Flames
 - 5.6.6.1 Heat Fluxes from Flames to Contacted Surfaces
 - 5.6.6.2 Heat Fluxes from Flames to Remote Surfaces

501-5.7 ***The Investigator candidate shall describe the different forms and mechanisms of ignition.***

- 5.7.1 Ignition in General
- 5.7.2 Ignition of Flammable Gases
- 5.7.3 Ignition of Liquids
- 5.7.4 Ignition of Solids

501-5.8 ***The Investigator candidate shall describe the different flame spreads and their characteristics.***

- 5.8.1 General
 - 5.8.1.1 Counterflow Flame Spread
 - 5.8.1.2 Concurrent Flame Spread
 - 5.8.1.3 Fire Spread on Sloped Surfaces
- 5.8.2 Flame spread on Liquids
- 5.8.3 Flame spread on Solids

501-5.9 ***The Investigator candidate shall describe the different methods of fire spread in a compartment.***

- 5.9.1 General
- 5.9.2 Fire Spread
 - 5.9.2.1 Fire Spread by Flame Impingement
 - 5.9.2.2 Fire Spread by Remote Ignition

501-5.10 ***The Investigator candidate shall describe compartment fire development.***

- 5.10.1 General
- 5.10.2 Compartment Fire Phenomena
- 5.10.3 Compartment Vent Flows
- 5.10.4 Flashover
- 5.10.5 Fully developed Compartment Fires
- 5.10.6 Effects of Enclosures on Fire Growth
 - 5.10.6.1 Room Volume and Ceiling Height
 - 5.10.6.2 Location of the Fire in the Compartment

501-5.11 ***The Investigator candidate shall identify fire spread between compartments.***

- 5.11.1 Fire Spread via Openings
- 5.11.2 Fire Spread via Barriers

501-5.12 ***The Investigator candidate shall describe the paths of smoke spread in buildings.***

SECTION 6

FIRE EFFECTS AND FIRE PATTERNS

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene and/or conducting a comprehensive review of documentation generated during the examination(s) of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.4 Interpret fire patterns, given standard equipment and tools and some structural or content remains, so that each individual pattern is evaluated with respect to the burning characteristics of the material involved and in context and relationship with all patterns observed and the mechanisms of heat transfer that led to the formation of the pattern.

(A) Requisite Knowledge. Fire dynamics, fire development, and the interrelationship of heat release rate, form, and ignitability of materials.

(B) Requisite Skills. Ability to interpret the effects of burning characteristics on different types of materials.

NFPA 1033 4.2.5 Interpret and analyze fire patterns, given standard equipment and tools and some structural or content remains, so that fire development is determined, methods and effects of suppression are evaluated, false origin area patterns are recognized, and all areas of origin are correctly identified.

(A) Requisite Knowledge. Fire behavior and spread based on fire chemistry, fire dynamics, and physics, fire suppression effects, building construction.

(B) Requisite Skills. Interpret variations of fire patterns on different materials with consideration given to heat release rate, form, and ignitability; distinguish impact of different types of fuel loads; evaluate fuel trails; and analyze and synthesize information.

NFPA 1033 4.2.7 Reconstruct the area of origin, given standard and, if needed, special equipment and tools as well as sufficient personnel, so that all protected areas and fire patterns are identified and correlated to contents or structural remains, items potentially critical to cause determination and photo documentation are returned to their prefire location, and the area(s) or point(s) of origin is discovered.

(A) Requisite Knowledge. The effects of fire on different types of material and the importance and uses of reconstruction.

(B) Requisite Skills. Ability to examine all materials to determine the effects of fire, identify and distinguish among different types of fire-damaged contents, and return materials to their original position using protected areas and fire patterns.

References:

J&B, chapter 4

Kirk's, chapter 5

Lentini, chapter 3

501-6.1 **The Investigator candidate shall define fire effects and fire patterns.**

501-6.2 **The Investigator candidate shall be able to identify fire effects.**

6.2.1 Identify Fire Fire Effects

6.2.1.1 Deformation

6.2.1.2 Deposition

6.2.1.3 Discoloration

6.2.1.4 Mass Loss

6.2.2 Characteristics and in context of fire effects

501-6.3 **The Investigator candidate shall be able to analyze recognize the changes that have occurred in materials due to fire the following fire effects.**

6.3.1 Introduction

6.3.2 Char

- 6.3.2.1 Char Observations
- 6.3.2.2 Material Sciences – Surface Effect of Char
- 6.3.2.3 Pyrolysis
- 6.3.2.4 Analysis of Char
- 6.3.2.5 Depth of Char Diagram
- 6.3.2.6 Measuring Depth of Char
- 6.3.2.7 Measuring Depth of Char
- 6.3.2.8 Missing Wood
- 6.3.2.9 Depth of Char Surveys with fuel Gases
- 6.3.2.10 Appearance of Char
- 6.3.2.11 Limitations with Char
- 6.3.2.12 Rate of Wood Charring

6.3.3 Clean burn

- 6.3.3.1 Clean Burn Observations
- 6.3.3.2 Material Sciences Related to Clean Burn
- 6.3.3.3 Analysis of Clean Burn
- 6.3.3.4 Limitations

6.3.4 Color change

- 6.3.4.1 Color Changes Observations Material
- 6.3.4.2 Material Sciences Related to Color Changes
- 6.3.4.3 Fabric Dyes
- 6.3.4.4 Light
- 6.3.4.5 Analysis of Color Changes
- 6.3.4.6 Limitations

6.3.5 Deposition of smoke on surfaces

- 6.3.5.1 Deposition of Smoke on Surfaces Observations
- 6.3.5.2 Smoke Characteristics
- 6.3.5.3 Material Sciences for Deposition of Smoke
- 6.3.5.4 Analysis Related to Deposition of Smoke on Surfaces
- 6.3.5.5 Location of Objects
- 6.3.5.6 Position of Switches
- 6.3.5.7 Limitations

6.3.6 Distorted light bulbs

- 6.3.6.1 Observations for Distorted Lightbulbs
- 6.3.6.2 Material Science for Distorted Lightbulbs
- 6.3.6.3 Distorted Lightbulb Analysis
- 6.3.6.4 Limitations

- 6.3.7 Furniture Springs
 - 6.3.7.1 Furniture Springs Observations ~~Material~~
 - 6.3.7.2 Material Science Related to Furniture Springs
 - 6.3.7.3 Analysis of Furniture Springs
 - 6.3.7.4 Limitations

- 6.3.8 Gypsum wall board
 - 6.3.8.1 Gypsum Wallboard Observations
 - 6.3.8.2 Material Science related to Gypsum Wallboard
 - 6.3.8.3 Analysis of Gypsum Wallboard
 - 6.3.8.4 Mass Loss and Density
 - 6.3.8.5 General Indications of Calcination
 - 6.3.8.6 Depth of Calcination Survey
 - 6.3.8.7 Depth of Calcination Diagram
 - 6.3.8.8 Measuring Depth of Calcination
 - 6.3.8.9 Limitations

- 6.3.9 Mass loss of material
 - 6.3.9.1 Mass Loss Observations
 - 6.3.9.2 Fire-Damaged Materials and Exemplar Materials
 - 6.3.9.3 Material Science Related to Mass Loss
 - 6.3.9.4 Analysis of Mass Loss Observations
 - 6.3.9.5 Limitations
 - 6.3.9.6 Other conditions of nonuniformity

- 6.3.10 Melting of Materials
 - 6.3.10.1 Melting Observations
 - 6.3.10.2 Material Science Related to Melting
 - 6.3.10.3 Common Metals
 - 6.3.10.4 Thermoplastics
 - 6.3.10.5 Glass
 - 6.3.10.6 Alloying of Metals
 - 6.3.10.7 Analysis of Melting Effects in Fires
 - 6.3.10.8 Limitations

- 6.3.11 Oxidation
 - 6.3.11.1 Observations
 - 6.3.11.2 Galvanized Steel
 - 6.3.11.3 Uncoated Iron or Steel
 - 6.3.11.4 Oxidation Versus Melting
 - 6.3.11.5 Stainless Steel
 - 6.3.11.6 Copper
 - 6.3.11.7 Rocks and Soil
 - 6.3.11.8 Materials Science Related to Oxidation
 - 6.3.11.9 Analysis of Oxidation Observations

- 6.3.11.10 Limitations
- 6.3.12 Rainbow Effect
 - 6.3.12.1 Rainbow Effect Observations
 - 6.3.12.2 Material Science for Rainbow Effects
 - 6.3.12.3 Analysis of Rainbow Effect
 - 6.3.12.4 Limitations
- 6.3.13 Smoke Alarms - Enhanced Soot Deposition, or Acoustic Soot Agglomeration
 - 6.3.13.1 Smoke Alarm Observations
 - 6.3.13.2 Enhanced Soot Deposition, or Acoustic Agglomeration
 - 6.3.13.3 Analysis of Smoke Alarms
 - 6.3.13.4 Limitations
- 6.3.14 Spalling
 - 6.3.14.1 Observations
 - 6.3.14.2 Material Science Related to Spalling
 - 6.3.14.3 Analysis for Spalling
 - 6.3.14.4 Limitations
- 6.3.15 Thermal Expansion and Deformation of Materials
 - 6.3.15.1 Observations of Thermal Expansion and Deformation of Materials
 - 6.3.15.2 Material Science of Thermal Expansion and Deformation of Materials
 - 6.3.15.3 Bending and Buckling
 - 6.3.15.4 Metal Construction Elements
 - 6.3.15.5 Analysis of Thermal Expansion and Deformation
 - 6.3.15.6 Piping Systems
 - 6.3.15.7 Plastered Surfaces
 - 6.3.15.8 Limitations
 - 6.3.15.9 Collapse
- 6.3.16 Victim Injuries
 - 6.3.16.1 Victim Injuries Observations
 - 6.3.16.2 Material Science of Victim Injuries
 - 6.3.16.3 Skin
 - 6.3.16.4 The Body as Fuel
 - 6.3.16.5 Analysis of Victim Injuries
 - 6.3.16.6 Limitations
- 6.3.17 Window Glass
 - 6.3.17.1 Window Glass Observations
 - 6.3.17.2 Material Science of Glass
 - 6.3.17.3 Tempered Glass
 - 6.3.17.4 Analysis of Glass
 - 6.3.17.5 Limitations

- 6.3.18 Fire Patterns
 - 6.3.18.1 Introduction
 - 6.3.18.2 Location of Patterns
 - 6.3.18.3 Location of Objects
 - 6.3.18.4 Penetrations of Horizontal Surfaces
 - 6.3.18.5 Depth of Char Patterns with Fuel Gases

- 6.3.19 Fire Pattern Generation
 - 6.3.19.1 Plume-Generated Patterns
 - 6.3.19.2 Ventilation-Generated Patterns
 - 6.3.19.3 Hot Gas Layer-Generated Patterns
 - 6.3.19.4 Full Room Involvement-Generated Patterns
 - 6.3.19.5 Suppression-Generated Patterns
 - 6.3.19.6 Undetermined-Generated Patterns

- 6.3.20 Fire Pattern Geometry
 - 6.3.20.1 V Patterns on Vertical Surfaces
 - 6.3.20.2 Inverted Cone (Triangular) Patterns
 - 6.3.20.3 Hourglass Patterns
 - 6.3.20.4 U-Shaped Patterns
 - 6.3.20.5 Circular-Shaped Patterns
 - 6.3.20.6 Truncated Cone Patterns
 - 6.3.20.7 Irregular Patterns
 - 6.3.20.8 Doughnut-Shaped Patterns
 - 6.3.20.9 Linear Patterns
 - 6.3.20.10 Area Patterns

- 6.3.21 Arc Mapping
 - ~~6.3.21.1 Interpretation of Arc Damage~~
 - ~~6.3.21.2~~
 - ~~6.3.21.3~~
 - ~~6.3.21.4~~
 - ~~6.3.21.5~~
 - ~~6.3.21.6 Multiple Arc Site on One Circuit~~
 - ~~6.3.21.7~~
 - ~~6.3.21.8~~
 - ~~6.3.21.9~~
 - ~~6.3.21.10 Arc Mapping Procedure~~

- 6.3.22 Pointer and Error Patterns

501-6.4 The Investigator candidate shall be able to *identify and analyze fire patterns.*

- 6.4.1 Types of fire patterns
 - 6.4.1.1 Fire Spread (Movement) Patterns
 - 6.4.1.2 Heat (Intensity) Patterns
 - 6.4.1.3 Combination of Patterns

SECTION 7

BUILDING SYSTEMS

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.5 Interpret and analyze fire patterns, given standard equipment and tools and some structural or content remains, so that fire development is determined, methods and effects of suppression are evaluated, false origin area patterns are recognized, and all areas of origin are correctly identified.

(A) Requisite Knowledge. Fire behavior and spread based on fire chemistry, fire dynamics, and physics, fire suppression effects, building construction.

(B) Requisite Skills. Interpret variations of fire patterns on different materials with consideration given to heat release rate, form, and ignitability; distinguish impact of different types of fuel loads; evaluate fuel trails; and analyze and synthesize information.

NFPA 1033 4.2.8 Inspect the performance of building systems, including detection, suppression, HVAC, utilities, and building compartmentation, given standard and special equipment and tools, so that a determination can be made as to the need for expert resources, an operating system's impact on fire growth and spread is considered in identifying origin areas, defeated and/or failed systems are identified, and the system's potential as a fire cause is recognized.

(A) Requisite Knowledge. Different types of detection, suppression, HVAC, utility, and building compartmentation such as fire walls and fire doors; types of expert resources for building systems; the impact of fire on various systems; common methods used to defeat a system's functional capability; and types of failures.

(B) Requisite Skills. Ability to determine the system's operation and its effect on the fire; identify alterations to, and failure indicators of, building systems; and evaluate the impact of suppression efforts on building systems.

References:
J&B, chapter 5

501-7.1 ***The Investigator candidate shall recognize the reaction of buildings and building assemblies to fire.***

501-7.2 ***The Investigator candidate shall evaluate the features of design, construction and structural elements in evaluating fire development.***

7.2.1 General

7.2.2 Building design

7.2.2.1 General

7.2.2.2 Building Loads

7.2.2.3 Room Size

7.2.2.4 Compartmentation

7.2.2.5 Concealed and Interstitial Spaces

- 7.2.2.6 Planned Designs as Compared to “As-Built” Conditions
- 7.2.3 Materials
 - 7.2.3.1 Ignitability
 - 7.2.3.2 Flammability
 - 7.2.3.3 Thermal Inertia
 - 7.2.3.4 Thermal Conductivity
 - 7.2.3.5 Toxicity
 - 7.2.3.6 Physical State and Heat Resistance
 - 7.2.3.7 Orientation, Position and Placement
- 7.2.4 Occupancy
- 7.2.5 Computer Fire Model Survey of Building Component Variations
- 7.2.6 Explosion Damage

501-7.3 **The Investigator candidate shall identify the different types of building construction.**

****Note** (Only 501-7.3.1)**

The following section is not contained in NFPA 921, *Guide for Fire and Explosion Investigations*. ~~The reference for this material is found in IFSTA, *Fire Inspection and Code Enforcement and Fire Investigator*.~~

7.3.1 General

****Note** (Only 501-7.3.1)**

The following section is not contained in NFPA 921, *Guide for Fire and Explosion Investigations*. ~~The reference for this material is found in IFSTA, *Fire Inspection and Code Enforcement and Fire Investigator*.~~

- 7.3.1.1 Type I – fire resistive
- 7.3.1.2 Type II – non-combustible
- 7.3.1.3 Type III – ordinary
- 7.3.1.4 Type IV – heavy timber
- 7.3.1.5 Type V – wood frame
- 7.3.2 Wood Frame (Type V)
 - 7.3.2.1 Platform Frame Construction
 - 7.3.2.2 Balloon Frame
 - 7.3.2.3 Plank and Beam
 - 7.3.2.4 Post and Frame
 - 7.3.2.5 Heavy Timber
 - 7.3.2.6 Alternative Residential Construction
 - 7.3.2.6.1 Manufactured homes (Mobile Homes)
 - 7.3.2.6.2 Modular Homes
 - 7.3.2.6.3 Steel Frame Residential Construction
 - 7.3.2.7 Manufactured Wood Structural Elements

- 7.3.3 Ordinary Construction (Type III)
- 7.3.4 Mill Construction (Type IV)
- 7.3.5 Noncombustible Construction (Type II)
 - 7.3.5.1 General
 - 7.3.5.2 Metal Construction
 - 7.3.5.3 Concrete or Masonry Construction

501-7.4 ***The Investigator candidate shall identify the different construction assemblies.***

- 7.4.1 General
- 7.4.2 Floor/Ceiling/Roof Assemblies
- 7.4.3 Walls
- 7.4.4 Doors
- 7.4.5 Concealed Spaces

501-7.5 ***The Investigator candidate shall describe the different construction materials.***

- 7.5.1 Structural Steel
- 7.5.2 Reinforced Concrete
- 7.5.3 Wood

501-7.6 ***The Investigator candidate shall analyze the impact of passive fire protection systems on the investigation.***

501-7.7 ***The Investigator candidate should analyze the design and installation parameters when the passive fire protection system is determined to be a factor.***

501-7.8 ***The Investigator candidate should produce the additional documentation and data collection when the passive fire protection system is determined to be a factor.***

501-7.9 ***The Investigator candidate shall perform the required additional analysis.***

- 7.9.1 Code Analysis
- 7.9.2 Design Analysis

- 7.9.3 Installation Analysis
- 7.9.4 System Performance
- 7.9.5 Testing and Maintenance Analysis
- 7.9.6 Origin and Cause Determination

501-7.10 ***The Investigator candidate shall maintain a basic understanding of heating systems commonly encountered in residential and light commercial fire incidents .***

7.10.1 Systems components

- 7.10.1.1 Fuel Storage and Supply
- 7.10.1.2 Heat Producing Devices
- 7.10.1.3 Chimney/Vent
- 7.10.1.4 Control and Safety Devices

7.10.2 Installation

7.10.3 Operation and maintenance

7.10.4 Potential fire causes

- 7.10.4.1 Improper Installation of Fuel Delivery Systems
- 7.10.4.2 Improper Installation of Heat Producing Systems
- 7.10.4.3 Improper Installation of Control and Safety Devices
- 7.10.4.4 Improper Installation of Chimneys and Vents
- 7.10.4.5 Airspace Requirement Violations
- 7.10.4.6 Utilizing Non-listed Devices and Accessories
- 7.10.4.7 Circumvented or Failed Control and Safety

Components

- 7.10.4.8 Inadequate Maintenance or Cleaning
- 7.10.4.9 Improper Usage
- 7.10.4.10 Electrical Events

7.10.5 Documentation and Data Collection

7.10.6 Analysis of Origin and Causes

SECTION 8

ACTIVE FIRE PROTECTION SYSTEMS

4.2. Scene Examination

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire

NFPA 1033 4.2.8 Inspect the performance of building systems, including detection, suppression, HVAC, utilities, and building compartmentation, given standard and special equipment and tools, so that a determination can be made as to the need for expert resources, an operating system's impact on fire growth and spread is considered in identifying origin areas, defeated and/or failed systems are identified, and the system's potential as a fire cause is recognized.

(A) Requisite Knowledge. Different types of detection, suppression, HVAC, utility, and building compartmentation such as fire walls and fire doors; types of expert resources for building systems; the impact of fire on various systems; common methods used to defeat a system's functional capability; and types of failures.

(B) Requisite Skills. Ability to determine the system's operation and its effect on the fire; identify alterations to, and failure indicators of, building systems; and evaluate the impact of suppression efforts on building systems.

References:

J&B, chapter 6

IFSTA, Fire Inspection, chapter 12-14

501-8.1 ***The Investigator candidate shall develop basic understanding of active fire protection systems.***

501-8.2 ***The Investigator candidate shall develop basic understanding of documentation of fire protection systems.***

- 8.2.1 Design Documentation
- 8.2.2 Permit History
- 8.2.3 Invoices and Contracts
- 8.2.4 Installation Documentation
- 8.2.5 Inspection and Maintenance Records
- 8.2.6 Product Literature
- 8.2.7 Alarm / Activation History

501-8.3 ***The Investigator candidate shall identify the basic components and operation of a fire alarm system.***

- 8.3.1 General information
 - 8.3.1.1 Purpose of Systems
 - 8.3.1.2 System Components
 - 8.3.1.3 General System Operation

- 8.3.2 Key Components of Systems
 - 8.3.2.1 Fire Alarm Control Unit (FACU)
 - 8.3.2.2 Power Supply
 - 8.3.2.3 Initiating Devices
 - 8.3.2.4 Smoke Detection
 - 8.3.2.5 Heat Detection
 - 8.3.2.6 Other Types of Detectors
 - 8.3.2.7 Notification Appliances

- 8.3.3 Operations and Installation Parameters of the System
 - 8.3.3.1 FACU Features
 - 8.3.3.2 Location and Spacing of Devices
 - 8.3.3.3 Internal System Communication
 - 8.3.3.4 Means of Alarm Transmission
 - 8.3.3.5 Systems Monitored and Controlled

- 8.3.4 Analysis
 - 8.3.4.1 System Documentation and Data Collection
 - 8.3.4.2 Code Analysis
 - 8.3.4.3 Design Analysis
 - 8.3.4.4 Installation Analysis
 - 8.3.4.5 Testing and Maintenance Analysis
 - 8.3.4.6 System Performance
 - 8.3.4.7 Development of Timeline
 - 8.3.4.8 Thermal Damage
 - 8.3.4.9 Fire Alarm Effectiveness
 - 8.3.4.10 Impact on Human Behavior

501-8.4 ***The Investigator candidate shall identify the basic components and operation of a water-based fire suppression system.***

- 8.4.1 General Information
 - 8.4.1.1 Purpose of Systems
 - 8.4.1.2 General System Operation

- 8.4.2 Key Components of Water-Based Systems
 - 8.4.2.1 Sprinklers/Nozzles
 - 8.4.2.2 Piping
 - 8.4.2.3 Systems Valves
 - 8.4.2.4 Water Supply

- 8.4.3 Operations and Installation Parameters of the System

- 8.4.3.1 Location and Spacing of Sprinklers
- 8.4.3.2 Pipe Sizing and Arrangement
- 8.4.3.3 Sprinkler Coverage and Distribution
- 8.4.3.4 Water Flow Rate and Pressure
- 8.4.3.5 Activation Mechanisms and Criteria
- 8.4.3.6 Systems Monitored and Controlled

- 8.4.4 Analysis
 - 8.4.4.1 System Documentation and Data Collection
 - 8.4.4.2 Code Analysis
 - 8.4.4.3 Design Analysis
 - 8.4.4.4 Hazard Protected

501-8.5 ***The Investigator candidate shall identify the basic components and operation of a non-water-based fire suppression system.***

- 8.5.1 General information
 - 8.5.1.1 Purpose of Systems
 - 8.5.1.2 Method of Application
 - 8.5.1.3 Suppression Agents

- 8.5.2 Key Components of Systems
 - 8.5.2.1 Suppression Agent Supply
 - 8.5.2.2 Pressure Sources
 - 8.5.2.3 Distribution Piping
 - 8.5.2.4 Valves, Hoses, and Fittings
 - 8.5.2.5 Proportioners
 - 8.5.2.6 Distribution Nozzles
 - 8.5.2.7 Actuation System
 - 8.5.2.8 System Monitoring and control

- 8.5.3 Operations and Installation Parameters of the System
 - 8.5.3.1 Location and Spacing of Nozzles
 - 8.5.3.2 Pipe Sizing and Arrangement
 - 8.5.3.3 Nozzle Coverage and Distribution
 - 8.5.3.4 Activation Mechanisms and Criteria
 - 8.5.3.5 Systems Monitored and Controlled

- 8.5.4 Analysis
 - 8.5.4.1 General Information and Codes
 - 8.5.4.2 Design Analysis

501-8.6 ***The Investigator candidate shall identify spoliation issues regarding the documentation of the fire protection system.***

****Note****

The following sections (501-8.7 through 501-8.12) are not contained in NFPA 921, *Guide for Fire and Explosion Investigations*. The reference for this material is found in IFSTA, *Fire Inspection and Code Enforcement, chapter 12-14*.

501-8.7 **The Investigator candidate shall describe the types and characteristics of automatic sprinkler systems.**

- 8.7.1 Identify various types of automatic sprinkler systems
 - 8.7.1.1 Wet pipe
 - 8.7.1.2 Dry pipe
 - 8.7.1.3 Pre-action
 - 8.7.1.4 Deluge
 - 8.7.1.5 Residential
- 8.7.2 Identify reasons for unsatisfactory performance of an automatic sprinkler system.
- 8.7.3 Describe fire sprinkler components and operations.

501-8.8 **The Investigator candidate shall describe the types, operations, capabilities and the effects of proper application of "special agent" fire extinguishing systems.**

- 8.8.1 Dry chemical
- 8.8.2 Wet chemical
- 8.8.3 Halogenated agent
- 8.8.4 Carbon dioxide
- 8.8.5 Foam
- 8.8.6 Gaseous agent

501-8.9 **The Investigator candidate shall identify the classes and capabilities of standpipe and hose systems.**

- 8.9.1 Class I systems
- 8.9.2 Class II systems
- 8.9.3 Class III systems

501-8.10 **The Investigator candidate shall identify alarm-initiating devices.**

- 8.10.1 Local system
- 8.10.2 Auxiliary system
- 8.10.3 Remote station
- 8.10.4 Proprietary system

8.10.5 Central station system

501-8.11 ***The Investigator candidate shall identify fire detection systems.***

8.11.1 Smoke

8.11.2 Flame

8.11.3 Heat

8.11.4 Gas

501-8.12 ***The Investigator candidate shall describe Heating Ventilation and Air Conditioning (HVAC) system components and their relation to smoke and fire spread.***

8.12.1 Smoke dampers

8.12.2 Automatic shutoffs

8.12.3 Ductwork

8.12.4 Pipe and duct chases

SECTION 9

ELECTRICITY AND FIRE

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.8 Inspect the performance of building systems, including detection, suppression, HVAC, utilities, and building compartmentation, given standard and special equipment and tools, so that a determination can be made as to the need for expert resources, an operating system's impact on fire growth and spread is considered in identifying origin areas, defeated and/or failed systems are identified, and the system's potential as a fire cause is recognized.

(A) Requisite Knowledge. Different types of detection, suppression, HVAC, utility, and building compartmentation such as fire walls and fire doors; types of expert resources for building systems; the impact of fire on various systems; common methods used to defeat a system's functional capability; and types of failures.

(B) Requisite Skills. Ability to determine the system's operation and its effect on the fire; identify alterations to, and failure indicators of, building systems; and evaluate the impact of suppression efforts on building systems.

References:

J&B, chapter 7

Kirk's, chapter 3-4

Lentini, chapter 6

501-9.1 ***The Investigator candidate shall understand the basic principles of physics that relate to electricity and fire, including systems and equipment.***

501-9.2 ***The Investigator candidate shall describe basic electrical theory.***

- 9.2.1 General
- 9.2.2 Comparing Electricity to Hydraulics
- 9.2.3 Ampacity
- 9.2.4 Conductivity of Conductors
- 9.2.5 Ohm's Law
- 9.2.6 Electrical Power
- 9.2.7 Ohm's Law Wheel

9.2.8 Applying Ohm's Law

501-9.3 ***The Investigator candidate shall describe the typical building electrical systems and its components.***

9.3.1 General

9.3.2 Electrical Service

9.3.2.1 Single-Phase Service

9.3.2.2 Three-Phase Service

9.3.3 Meter and Base

9.3.4 Significance

501-9.4 ***The Investigator candidate shall identify the functions of service equipment.***

501-9.5 ***The Investigator candidate shall identify the principle of grounding.***

9.5.1 General

9.5.2 Floating Neutral (Open Neutral)

501-9.6 ***The Investigator candidate shall describe the components of overcurrent protection.***

9.6.1 General

9.6.2 Fuses

9.6.2.1 Operations

9.6.2.2 Plug Fuses

9.6.2.3 Type S Fuses

9.6.2.4 Time-Delay Fuses

9.6.2.5 Cartridge Fuses

9.6.3 Circuit Breakers

9.6.3.1 Operations

9.6.3.2 Main Breakers

9.6.3.3 Branch Circuit Breakers

9.6.3.4 Ground Fault Circuit Interrupters (GFCI)

9.6.3.5 Arc Fault Circuit Interrupters (AFCI)

9.6.4 Circuit Breaker Panels

501-9.7 ***The Investigator candidate shall describe a branch circuit and its components.***

9.7.1 Conductors

- 9.7.2 Size of Conductors
- 9.7.3 Copper Conductors
- 9.7.4 Aluminum Conductors
- 9.7.5 Insulation

501-9.8 ***The Investigator candidate shall identify and describe the different types of outlets and devices found in a branch circuit.***

- 9.8.1 Switches
- 9.8.2 Receptacles
- 9.8.3 Other Outlets, Devices, or Equipment

501-9.9 ***The Investigator candidate shall describe how the use of improper electrical components can create sufficient heat for ignition.***

- 9.9.1 General
- 9.9.2 Resistance Heating
- 9.9.3 Overcurrent and Overload
- 9.9.4 Arcs
 - 9.9.4.1 General
 - 9.9.4.2 High-Voltage Arcs
 - 9.9.4.3 Static Electricity
 - 9.9.4.4 Parting Arcs
 - 9.9.4.5 Arcing Across a Carbonized Path
- 9.9.5 Sparks
- 9.9.6 High-Resistance Faults

501-9.10 ***The Investigator candidate shall identify and describe types of damage encountered in electrical systems.***

- 9.10.1 General
- 9.10.2 Short-Circuit and Ground-Fault Parting Arcs
- 9.10.3 Arcing Through a Carbonized Path Due to Thermal Means (Arcing Through Char)
- 9.10.4 Overheating Connections

- 9.10.5 Overload
- 9.10.6 Effects Not Caused by Electricity
 - 9.10.6.1 Conductor Surface Colors
 - 9.10.6.2 Melting by Fire
 - 9.10.6.3 Alloying
 - 9.10.6.4 Mechanical Gouges
- 9.10.7 Insulation Damage

501-9.11 ***The Investigator candidate shall identify arc melting of electrical conductors.***

- 9.11.1 Melting Caused by Electrical Arcing
- 9.11.2 Melting Caused by Fire
- 9.11.3 Eutectic Melting
- 9.11.4 Extraneous Melting
- 9.11.5 Undersized Conductors
- 9.11.6 Nicked or Stretched Conductors
- 9.11.7 Deteriorated Insulation
- 9.11.8 Overdriven or Misdriven Staple
- 9.11.9 Short Circuit
- 9.11.10 Beaded Conductor

501-9.12 ***The Investigator candidate shall describe the role of static electricity in an ignition sequence.***

- 9.12.1 Introduction to Static Electricity
- 9.12.2 Generation of Static Electricity
 - 9.12.2.1 General
 - 9.12.2.2 Ignitable Liquids
 - 9.12.2.3 Charges on the Surface of a Liquid
 - 9.12.2.4 Switch Loading
 - 9.12.2.5 Spraying Operations
 - 9.12.2.6 Gases
 - 9.12.2.7 Dusts and Fibers
 - 9.12.2.8 Static Electric Discharge from the Human Body
 - 9.12.2.9 Clothing
- 9.12.3 Incendive Arc

- 9.12.4 Ignition Energy
- 9.12.5 Controlling Accumulations of Static Electricity
 - 9.12.5.1 Humidification
 - 9.12.5.2 Bonding and Grounding
- 9.12.6 Conditions Necessary for Static Arc Ignition
- 9.12.7 Investigating Static Electric Ignitions
- 9.12.8 Lightning
 - 9.12.8.1 General
 - 9.12.8.2 Lightning Characteristics
 - 9.12.8.3 Lightning Strikes
 - 9.12.8.4 Lightning Damage
 - 9.12.8.5 Lightning Detection Networks

501-9.13 ***The Investigator candidate shall describe characteristics common to most lithium ion batteries.***

SECTION 10

BUILDING FUEL GAS SYSTEMS

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.8 Inspect the performance of building systems, including detection, suppression, HVAC, utilities, and building compartmentation, given standard and special equipment and tools, so that a determination can be made as to the need for expert resources, an operating system's impact on fire growth and spread is considered in identifying origin areas, defeated and/or failed systems are identified, and the system's potential as a fire cause is recognized.

(A) Requisite Knowledge. Different types of detection, suppression, HVAC, utility, and building compartmentation such as fire walls and fire doors; types of expert resources for building systems; the impact of fire on various systems; common methods used to defeat a system's functional capability; and types of failures.

(B) Requisite Skills. Ability to determine the system's operation and its effect on the fire; identify alterations to, and failure indicators of, building systems; and evaluate the impact of suppression efforts on building systems.

References:

J&B, chapter 8

Kirk's, chapter 4

Lentini, chapter 6

501-10.1 *The Investigator candidate shall describe building fuel gas systems.*****

10.1.1 Impact of Fuel Gases on Fire and Explosions Investigations

10.1.2 Additional Fire Spread

501-10.2 *The Investigator candidate shall identify the different fuel gases.*****

10.2.1 Natural Gas

10.2.2 Commercial Propane

10.2.3 Other Fuel Gases

10.2.3.1 Commercial Butane

10.2.3.2 Propane HD5

10.2.3.3 Manufactured Gases

10.2.4 Odorization

501-10.3 *The Investigator candidate shall identify different natural gas systems.*****

10.3.1 Transmission Pipelines

10.3.2 Main Pipelines (Mains)

10.3.3 Service Lines

10.3.4 Metering

501-10.4 ***The Investigator candidate shall identify different LP-Gas Systems.***

10.4.1 LP-Gas Storage Containers

10.4.1.1 Tanks

10.4.1.2 Cylinders

10.4.2 Container Appurtenances

10.4.2.1 Pressure Relief Devices

10.4.2.2 Connections for Flow Control

10.4.2.3 Liquid Level Gauging Devices

10.4.2.4 Pressure Gauges

10.4.3 Pressure Regulation

10.4.4 Vaporizers

501-10.5 ***The Investigator candidate shall identify common fuel gas system components.***

10.5.1 Pressure Regulations (Reduction)

10.5.2 Service Piping Systems

10.5.3 Valves

10.5.4 Gas Burners

10.5.4.1 Manual Ignition

10.5.4.2 Pilot Lights

10.5.4.3 Pilotless Igniters

501-10.6 ***The Investigator candidate shall identify the common piping in buildings.***

10.6.1 Size of Piping

10.6.2 Piping Materials

10.6.3 Joints and Fittings

10.6.4 Piping Installation

10.6.5 Main Shutoff Valves

10.6.6 Prohibited Locations

10.6.7 Electrical Bonding and Grounding

501-10.7 ***The Investigator candidate shall identify common appliance and equipment requirements.***

10.7.1 Installation

10.7.2 Venting and Air Supply

10.7.3 Appliance Controls

501-10.8 ***The Investigator candidate shall identify common fuel gas utilization equipment.***

10.8.1 Air Heating

10.8.2 Water Heating

10.8.3 Cooking

10.8.4 Refrigeration and Cooling

10.8.5 Engines

10.8.6 Illumination

10.8.7 Incinerators, Toilets, and Exhaust Afterburners

501-10.9 ***The Investigator candidate shall explain investigating fuel gas systems.***

- 10.9.1 Recognize Limitations
- 10.9.2 Fuel Gas System Analysis
- 10.9.3 Compliance with Codes and Standards
- 10.9.4 Leakage
- 10.9.5 Pressure Testing
- 10.9.6 Locating Leaks
- 10.9.7 Testing Flow Rates and Pressures
- 10.9.8 Collection of Gas Piping
- 10.9.9 Underground Migration of Fuel Gases

SECTION 11

FIRE-RELATED HUMAN BEHAVIOR

4.4 Evidence Collection/Preservation

Duties shall include using proper physical and legal procedures to identify, document, collect, and preserve evidence required within the investigation.

NFPA 1033 4.4.1 Utilize proper procedures for managing victims and fatalities, given a protocol and appropriate personnel, so that all evidence is discovered and preserved and the protocol procedures are followed.

(A) Requisite Knowledge: Types of evidence associated with fire victims and fatalities and evidence preservation methods.

(B) Requisite Skills: Observational skills and the ability to apply protocols to given situations.

4.6 Post-Incident Investigation.

Duties shall include the investigation of all factors beyond the fire scene at the time of the origin and cause determination.

NFPA 1033 4.6.4: Establish evidence as to motive and/or opportunity, given an incendiary fire, so that the evidence is supported by documentation and meets the evidentiary requirements of the jurisdiction.

(A) Requisite Knowledge: Types of motives common to incendiary fires, methods used to discover opportunity, and human behavioral patterns relative to fire-setting.

(B) Requisite Skills: Financial analysis, records gathering and analysis, interviewing, and interpreting fire scene information and evidence for relationship to motive and/or opportunity.

NFPA 1033 4.6.5 Formulate an opinion concerning origin, cause, or responsibility for the fire, given all investigative findings, so that the opinion regarding origin, cause, or responsibility for a fire is supported by the data, facts, records, reports, documents, and evidence.

(A) Requisite Knowledge: Analytical methods and procedures (e.g., hypothesis development and testing, systems analysis, time lines, link analysis, fault tree analysis, and data reduction matrixing).

(B) Requisite Skills: Analytical and assimilation skills.

References:
J&B, chapter 9

501-11.1 **The Investigator candidate shall recognize that the analyses of fire related human behavior will often be an integral part of the investigation.**

501-11.2 **The Investigator candidate shall recall the history of research as related to fire related human behavior.**

501-11.3 **The Investigator candidate shall identify and describe general considerations of human response to fires.**

- 11.3.1 Individual
 - 11.3.1.1 Physical Limitations

- 11.3.1.2 Cognitive Comprehension Limitations
- 11.3.1.3 Familiarity and Physical Setting
- 11.3.2 Groups
 - 11.3.2.1 Group Size
 - 11.3.2.2 Group Structure
 - 11.3.2.3 Group Permanence
 - 11.3.2.4 Roles and Norms
- 11.3.3 Characteristics of the Physical Setting
 - 11.3.3.1 Location of Exits
 - 11.3.3.2 Number of Exits
 - 11.3.3.3 Height of the Structure
 - 11.3.3.4 Fire Alarm Systems
 - 11.3.3.5 Fire Suppression Systems
- 11.3.4 Characteristics of the Fire
 - 11.3.4.1 Presence of Flames
 - 11.3.4.2 Presence of Smoke
 - 11.3.4.3 Effects of Toxic Gases and Oxygen Depletion

501-11.4 ***The Investigator candidate shall identify and describe the factors related to fire initiation.***

- 11.4.1 Factors Involved in Accidental Fires
 - 11.4.1.1 Improper Maintenance and Operations
 - 11.4.1.2 Housekeeping
 - 11.4.1.3 Product Labels, Instructions, and Warnings
 - 11.4.1.4 Purpose of Labels
 - 11.4.1.5 Purpose of Instructions
 - 11.4.1.6 Purpose of Warnings
 - 11.4.1.7 Key Elements of a Proper Warning
 - 11.4.1.8 Standards on Labels, Instructions, and Warnings
- 11.4.2 Recalls
- 11.4.3 Other Considerations
- 11.4.4 Violations of Fire Safety Codes and Standards

501-11.5 ***The Investigator candidate shall identify and describe the factors related to youth fire-setting behavior .***

- 11.5.1 **Developmental Stages**
- 11.5.2 **Mental Health**

501-11.6 ***Incendiary fires – see SECTION 501-234.4 for additional information.***

501-11.7 ***The Investigator candidate shall identify and describe human factors related to fire spread.***

501-11.8 ***The Investigator candidate shall identify the basic concepts in recognition and response to fires.***

11.8.1 Perception of the Danger (Sensory Cues)

11.8.2 Decision to Act (Response)

11.8.3 Action Taken

11.8.4 Escape Factors

11.8.5 Information Received from Survivors

SECTION 12

LEGAL CONSIDERATIONS

4.1 General

NFPA 1033 4.1.5* The fire investigator shall adhere to all applicable legal and regulatory requirements.

4.3 Documenting the Scene

Duties shall include diagramming the scene, photographing, and taking field notes to be used to compile a final report.

NFPA 1033 4.3.3 Construct investigative notes, given a fire scene, available documents (e.g., prefire plans and inspection reports), and interview information, so that the notes are accurate, provide further documentation of the scene, and represent complete documentation of the scene findings.

(A) Requisite Knowledge. Relationship between notes, diagrams, and photos, how to reduce scene information into concise notes, and the use of notes during report writing and legal proceedings.

(B) Requisite Skills. Data-reduction skills, note-taking skills, and observational and correlating skills.

4.4 Evidence Collection/Preservation.

Duties shall include using proper physical and legal procedures to identify, document, collect and preserve evidence required within the investigation.

NFPA 1033 4.4.2 Locate, document, collect, label, package and store evidence, given standard or special tools and equipment and evidence collection materials, so that evidence is identified, preserved, collected, packaged and stored for use in testing, legal, or other proceedings and examinations, ensuring cross-contamination and investigator-inflicted damage and the chain of custody is established.

(A) Requisite Knowledge. Types of evidence, authority requirements, impact of removing evidentiary items on civil or criminal proceedings (exclusionary or fire-cause supportive evidence), types, capabilities, and limitations of standard and special tools used to locate evidence, types of laboratory tests available, packaging techniques and materials, and impact of evidence collection on the investigation.

(B) Requisite Skills. Ability to recognize different types of evidence and determine whether evidence is critical to the investigation.

NFPA 1033 4.4.4 Maintain a chain of custody, given standard investigative tools, marking tools, and evidence tags or logs, so that written documentation exists for each piece of evidence and evidence is secured.

(A) Requisite Knowledge. Rules of custody and transfer procedures, types of evidence (e.g., physical evidence obtained at the scene, photos, and documents), and methods of recording the chain of custody.

(B) Requisite Skills. Ability to execute the chain of custody procedures and accurately complete necessary documents.

4.6 Post-Incident Investigation.

Duties shall include the investigation of all factors beyond the fire scene at the time of the origin and cause determination.

NFPA 1033 4.6.3 Coordinate expert resources, given the investigative file, reports, and documents, so that the expert's competencies are matched to the specific investigation needs, financial expenditures are justified, and utilization clearly furthers the investigative goals of determining cause or affixing responsibility.

(A) Requisite Knowledge. How to assess one's own expertise, qualification to be called for expert testimony, types of expert resources (e.g., forensic, CPA, polygraph, financial, human behavior disorders, and engineering), and methods to identify expert resources.

(B) Requisite Skills. Ability to apply expert resources to further the investigation by networking with other investigators to identify experts, questioning experts relative to their qualifications, and developing a utilization plan for use of expert resources.

4.7 Presentations.

Duties shall include the presentation of findings to those individuals not involved in the actual investigations.

NFPA 1033 4.7.3 Testify during legal proceedings, given investigative findings, contents of reports, and consultation with legal counsel, so that all pertinent investigative information and evidence are presented clearly and accurately and the investigator's demeanor and attire are appropriate to the proceedings.

(A) Requisite Knowledge. Types of investigative findings, types of legal proceedings, professional demeanor requirements, and an understanding of due process and legal proceedings.

(B) Requisite Skills. Communication and listening skills and ability to differentiate facts from opinion and determine accepted procedures, practices, and etiquette during legal proceedings.

References:

J&B, chapter 10

501-12.1 ***The Investigator candidate shall recognize the legal consideration impact on every phase of the fire investigation.***

501-12.2 ***The Investigator candidate shall ensure that constitutional considerations are observed.***

12.2.1 Amendment Four

12.2.2 Amendment Five

12.2.3 Amendment Six

501-12.3 ***The Investigator candidate shall observe all legal considerations during the investigation.***

12.3.1 Authority to Conduct the Investigation

12.3.2 Right of Entry

12.3.3 Method of Entry

12.3.3.1 Consent

12.3.3.2 Exigent Circumstance

12.3.3.3 Administrative Search Warrant

12.3.3.4 Criminal Search Warrant

12.3.4 The Questioning of Suspects

- 12.3.5 Spoliation of Evidence
 - 12.3.5.1 Responsibility
 - 12.3.5.2 Documentation
 - 12.3.5.3 Remedies for Spoliation
 - 12.3.5.4 Notification to Interested Parties
 - 12.3.5.5 Documentation Prior to Alteration
 - 12.3.5.6 Alteration and Movement of Evidence
 - 12.3.5.7 Notification Prior to Destructive Testing

501-12.4 ***The Investigator candidate shall recognize pretrial legal considerations.***

- 12.4.1 Introduction
- 12.4.2 Forms of Discovery
 - 12.4.2.1 Request to Produce
 - 12.4.2.2 Interrogatories
 - 12.4.2.3 Depositions
 - 12.4.2.3.1 Procedure
 - 12.4.2.3.2 Discovery Depositions
 - 12.4.2.3.3 Trial Depositions
 - 12.4.2.4 Reports
- 12.4.3 Motions

501-12.5 ***The Investigator candidate shall identify the trial procedures in criminal and civil cases.***

- 12.5.1 Rules of Evidence
- 12.5.2 Types of Evidence
 - 12.5.2.1 Demonstrative Evidence
 - 12.5.2.1.1 Photographs/Illustrative Forms of Evidence
 - 12.5.2.1.2 Samples
 - 12.5.2.2 Documentary Evidence
 - 12.5.2.3 Testimonial Evidence
 - 12.5.2.3.1 Fact Witnesses
 - 12.5.2.3.2 Expert Witnesses
 - 12.5.2.3.3 Admissibility of Expert Testimony
 - 12.5.2.3.4 Relevance
 - 12.5.2.3.5 Qualifications of Expert
 - 12.5.2.3.6 Reliability of Opinion
- 12.5.3 Forms of Examination
 - 12.5.3.1 Direct Examination
 - 12.5.3.2 Cross-Examination
- 12.5.4 Forms of Testimony
 - 12.5.4.1 Affidavits

- 12.5.4.2 Answers to Interrogatories
- 12.5.4.3 Depositions and Trial Testimony
- 12.5.5 Burden of Proof
- 12.5.6 Criminal Prosecution
 - 12.5.6.1 Arson
 - 12.5.6.2 Arson Statutes
 - 12.5.6.3 Factors to be Considered
 - 12.5.6.4 Other Fire-Related Criminal Acts
 - 12.5.6.5 Arson-Reporting/Immunity Statutes
- 12.5.7 Civil Litigation
 - 12.5.7.1 Negligence
 - 12.5.7.2 Codes, Regulations, and Standards
 - 12.5.7.3 Product Liability
 - 12.5.7.4 Strict Liability

SECTION 13

SAFETY

4.1 General

NFPA 1033 4.1.3* Because fire investigators are required to perform activities in adverse conditions, site safety assessments shall be completed on all scenes and regional and national safety standards shall be followed and included in organizational policies and procedures.

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene and/or conducting a comprehensive review of documentation generated during the examination(s) of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.2* Conduct an exterior survey, given standard equipment and tools, so that evidence is identified and preserved, fire damage is interpreted, hazards are identified to avoid injuries, accessibility to the property is determined, and all potential means of ingress and egress are discovered.

(A) Requisite Knowledge. The types of building construction and the effects of fire on construction materials, types of evidence commonly found in the perimeter, evidence preservation methods, the effects of fire suppression, fire behavior and spread, fire patterns, and a basic awareness of the dangers of hazardous materials.

(B) Requisite Skills. Ability to assess fire ground and structural condition, observe the damage from and effects of the fire, and interpret fire patterns.

References:

J&B, chapter 11

Journal of Occupational and Environmental Hygiene, "Contamination of Firefighter Personal Protective Equipment and Skin and the Effectiveness of Decontamination Procedures"

The Bureau of Alcohol, Tobacco and Firearms, HETA 96-0171-2692, Health Hazard Evaluation Report

501-13.1 **The Investigator candidate shall describe the safety issues as they relate to the fire investigation.**

- 13.1.1 General Injury/Health Statistics
- 13.1.2 Health and Safety Programs
 - 13.1.2.1 Five Critical Elements of Safety and Health Programs
 - 13.1.2.1.1 Management Commitment and Employee Participation
 - 13.1.2.1.2 Hazard and Risk Assessment
 - 13.1.2.1.3 Hazard Prevention and Control
 - 13.1.2.1.4 Safety and Health Training and Education
 - 13.1.2.1.5 Long-Term Commitment

501-13.2 **The Investigator candidate shall describe factors that have an influence on general fire scene safety.**

- 13.2.1 Investigating the Scene Alone

- 13.2.2 Investigator Fatigue
- 13.2.3 Working Above or Below Grade Level
- 13.2.4 Working Around Mechanized Equipment
- 13.2.5 Safety of Bystanders
- 13.2.6 Status of Suppression
- 13.2.7 First Aid Kit and Emergency Notification Numbers
- 13.2.8 Emergency Notification Signal

501-13.3 ***The Investigator candidate shall describe general and particular hazards dangers of the fire scene.***

- 13.3.1 Physical Hazards
- 13.3.2 Structural Stability Hazards
- 13.3.3 Electrical Hazards
- 13.3.4 Chemical Hazards
- 13.3.5 Biological Hazards
- 13.3.6 Mechanical Hazards
- 13.3.7 Miscellaneous Hazards
 - 13.3.7.1 Radiological Hazards
 - 13.3.7.2 Utilities
 - 13.3.7.3 Mechanized Equipment Hazards

501-13.4 ***The Investigator candidate shall describe safety plans that may be part of the investigative process.***

- 13.4.1 Hazard and Risk Assessment
 - 13.4.1.1 Identify the Hazards
 - 13.4.1.2 Determine the Risk of the Hazard
 - 13.4.1.3 Control the Hazard
 - 13.4.1.3.1 Engineering Controls
 - 13.4.1.3.2 Administrative Controls
 - 13.4.1.3.3 Proper Selection and Use of Personal Protective Equipment PPE
- 13.4.2 Site-Specific Safety Plans
 - 13.4.2.1 Hazard Communication Site Plan (HazCom Plan)
 - 13.4.2.2 Confined Space Program

13.4.3 Management of Plans and Site Safety

13.4.4 Safety Meetings and Briefings

501-13.5 ***The Investigator candidate shall describe factors associated with chemical and contaminant exposure.***

13.5.1 Types of Exposure Effects

13.5.1.1 Local Effects

13.5.1.2 Systemic Effects

13.5.2 Routes of Exposure

13.5.2.1 Inhalation

13.5.2.2 Cutaneous

13.5.2.3 Ingestion

13.5.2.4 Injection

13.5.2.5 Ocular Exposure Route

13.5.3 Toxicity Exposure Levels

13.5.3.1 Acute Exposure

13.5.3.2 Chronic Exposure

13.5.3.3 Cumulative Exposure

13.5.3.4 Latency Period

501-13.6 ***The Investigator candidate shall understand the utilization of personal protective equipment on fire and explosion scenes.***

13.6.1 Proper Selection and Use of Personal Protective Equipment (PPE)

13.6.1.1 Safety Clothing and Equipment

13.6.1.2 PPE Use

13.6.1.3 Decontamination

13.6.2 Examples of Personal Protective Equipment (PPE)

13.6.2.1 Respiratory Protection

13.6.2.2 Hand Protection

13.6.2.3 Other Specialized Equipment

501-13.7 ***The Investigator candidate shall describe the potential emergency situations that could occur while processing a fire scene and the different types of emergency action plans needed.***

13.7.1 Emergency Evacuation Plans

13.7.2 Medical Emergency Plans

13.7.3 Severe Weather Plans

13.7.4 Fire Emergency Plan

13.7.5 Additional Emergency Action Plans

501-13.8 ***The Investigator candidate shall describe post-scene safety activities.***

13.8.1 Decontamination

13.8.2 Medical Screening

501-13.9 ***The Investigator candidate shall describe safety considerations in off-scene investigation activities.***

501-13.10 ***The Investigator candidate shall identify the special hazards associated with investigating the fire scene.***

13.10.1 Criminal Acts or Acts of Terrorism
13.10.1.1 Secondary Devices

13.10.2 Residue Chemicals

13.10.3 Biological and Radiological Terrorism

13.10.4 Drug Labs

****Note****

The following part of Section 13 (501-13.11 through 501-13.15) is not contained in NFPA 921, *Guide for Fire and Explosion Investigations*. The reference for this material is found in IFSTA, *Fire Inspection and Code Enforcement*. See also the *Emergency Response Guidebook (ERG)*.

501-13.11 ***The Investigator candidate shall demonstrate knowledge of safety principles applicable to hazardous materials response.***

501-13.12 ***The Investigator candidate shall identify the difference between hazardous materials incidents and other emergencies.***

501-13.13 ***The Investigator candidate, utilizing the Emergency Response Guidebook, shall:***

- 1) Identify the Three Methods for Determining the Appropriate Guide Page for a Specific Hazardous Material.
 - a) Locate UN Number in the Yellow-Bordered Pages.
 - b) Locate Name of Material in the Alphabetic Listing in the Blue-Bordered Pages.
 - c) Locate a Matching Placard in the Table of Placards and Consult the Two-Digit Guide Number Located Next to the Similar Placard.
- 2) Identify Two General Types of Hazards Found on each Guide Page.
 - a) Fire/Explosive

- b) Health

501-13.14 **The Investigator candidate, given an example of an NFPA 704 marking, shall identify the significance of the following components.**

- 1) Three Categories of Hazard
 - a) Health - Blue Color
 - b) Flammability - Red Color
 - c) Instability - Yellow Color
- 2) Special Hazards that may be Indicated
 - a) W
 - b) OX (or OXY)
 - c) COR
 - d) ALK
 - e) ACID
- 3) Numerical rating system of hazards

501-13.15 **The Investigator candidate shall identify the following information from safety data sheets (SDS).**

- 1) The Investigator Candidate Shall List Four Organizations from Which to Obtain a Safety Data Sheet (SDS)
 - a) Manufacturer of the Material
 - b) Supplier
 - c) Facility Hazard and Communication Plan
 - d) Local Emergency Planning Committee (LEPC)
- 2) The Investigator Candidate Shall be Familiar with the Different SDS Chapters

SECTION 14

SOURCES OF INFORMATION

4.1 General

NFPA 1033 4.1.4 The fire investigator shall maintain necessary liaison with other interested professionals and entities.

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.8 Inspect the performance of building systems, including detection, suppression, HVAC, utilities, and building compartmentation, given standard and special equipment and tools, so that a determination can be made as to the need for expert resources, an operating system's impact on fire growth and spread is considered in identifying origin areas, defeated and/or failed systems are identified, and the system's potential as a fire cause is recognized.

(A) Requisite Knowledge. Different types of detection, suppression, HVAC, utility, and building compartmentation such as fire walls and fire doors; types of expert resources for building systems; the impact of fire on various systems; common methods used to defeat a system's functional capability; and types of failures.

(B) Requisite Skills. Determine the system's operation and its effect on the fire; identify alterations to, and failure indicators of, building systems; and evaluate the impact of suppression efforts on building systems.

4.4 Evidence Collection/Preservation.

Duties shall include using proper physical and legal procedures to identify, document, collect, and preserve evidence required within the investigation.

NFPA 1033 4.4.3 Select evidence for analysis given all information from the investigation, so that items for analysis support specific investigation needs.

(A) Requisite Knowledge. Purposes for submitting items for analysis, types of analytical services available, and capabilities and limitations of the services performing the analysis.

(B) Requisite Skills. Evaluate the fire incident to determine forensic, engineering, or laboratory needs.

4.5 Interview.

Duties shall include obtaining information regarding the overall fire investigation from others through verbal communication.

NFPA 1033 4.5.1 Develop an interview plan, given no special tools or equipment, so that the plan reflects a strategy to further determine the fire cause and affix responsibility and includes a relevant questioning strategy for each individual to be interviewed that promotes the efficient use of the investigator's time.

(A) Requisite Knowledge. Persons who can provide information that furthers the fire cause determination or the affixing of responsibility, types of questions that are pertinent and efficient to ask of different information sources (first responders, neighbors, witnesses, suspects, and so forth), and pros and cons of interviews versus document gathering.

(B) Requisite Skills. Planning skills, development of focused questions for specific individuals, and evaluation of existing file data to help develop questions and fill investigative gaps

NFPA 1033 4.5.2 Conduct interviews, given incident information, so that pertinent information is obtained, follow-up questions are asked, responses to all questions are elicited, and the response to each question is documented accurately.

(A) Requisite Knowledge. Types of interviews, personal information needed for proper documentation or follow-up, documenting methods and tools, and types of nonverbal communications and their meaning.

(B) Requisite Skills. Adjust interviewing strategies based on deductive reasoning, interpret verbal and nonverbal communications, apply legal requirements applicable, and exhibit strong listening skills.

NFPA 1033 4.5.3 Evaluate interview information, given interview transcripts or notes and incident data, so that all interview data is individually analyzed and correlated with all other interviews, corroborative and conflictive information is documented, and new leads are developed.

(A) Requisite Knowledge. Types of interviews, report evaluation methods, and data correlation methods.

(B) Requisite Skills. Data correlation skills and the ability to evaluate source information (e.g., first responders and other witnesses).

4.6 Post-Incident Investigation.

Duties shall include the investigation of all factors beyond the fire scene at the time of the origin and cause determination.

NFPA 1033 4.6.1 Gather reports and records, given no special tools, equipment, or materials, so that all gathered documents are applicable to the investigation, complete, and authentic; the chain of custody is maintained; and the material is admissible in a legal proceeding.

(A) Requisite Knowledge: Types of reports needed that facilitate determining responsibility for the fire (e.g. police reports, insurance policies, financial records, deeds, private investigator reports, outside photos, and videos) and location of these reports.

(B) Requisite Skills: Identify the reports and documents necessary for the investigation, implement the chain of custody, and organizational skills.

NFPA 1033 4.6.3 Coordinate expert resources, given the investigative file, reports, and documents, so that the expert's competencies are matched to the specific investigation needs, financial expenditures are justified, and utilization clearly furthers the investigative goals of determining cause or affixing responsibility.

(A) Requisite Knowledge: How to assess one's own expertise, qualification to be called for expert testimony, types of expert resources (e.g., forensic, CPA, polygraph, financial, human behavior disorders, and engineering), and methods to identify expert resources.

(B) Requisite Skills: Apply expert resources to further the investigation by networking with other investigators to identify experts, questioning experts relative to their qualifications, and developing a utilization plan for use of expert resources.

References:

J&B, chapter 12

ASTM E678

ASTM E860

ASTM 1188

501-14.1 ***The Investigator candidate shall identify sources of information and assistance available to the Investigator during a fire investigation.***

14.1.1 Purpose of Obtaining Information

14.1.2 Number and Diversity of Informational Sources

14.1.3 Data Relevance, Accuracy, and Reliability

501-14.2 ***The Investigator candidate shall describe the legal considerations on sources of information.***

14.2.1 Freedom of Information Act

14.2.2 Privileged Communications

14.2.3 Confidential Communications

14.2.4 Privacy Considerations

14.2.5 Authorizations for Release of Information

501-14.3 ***The Investigator candidate shall identify the ASTM standards for collecting, preserving and evaluating data .***

501-14.4 ***The Investigator candidate shall distinguish differing forms of information.***

14.4.1 Verbal Information

14.4.2 Written and Printed Information

14.4.3 Visual Information

14.4.4 Digital Information

501-14.5 ***The Investigator candidate shall identify sources of non-scene data. be able to gather both useful and accurate information through the process of interviewing.***

14.5.1 Witness Data

14.5.2 Property Data

14.5.3 Electronically Stored Information

14.5.4 Existing Research and Publications

- 14.5.5 Experimentation and Testing
- 14.5.6 Governmental Sources of Information
- 14.5.7 Federal Government
- 14.5.8. Other Federal Agencies

501-14.6 **The Investigator candidate shall identify private sources of information useful during a fire investigation.**

- 14.6.1 National Fire Protection Association (NFPA)
- 14.6.2 Society of Fire Protection Engineers (SFPE)
- 14.6.3 American Society for Testing and Materials (ASTM)
- 14.6.4 American National Standards Institute (ANSI)
- 14.6.5 National Association of Fire Investigators (NAFI)
- 14.6.6 International Association of Arson Investigators (IAAI)
- 14.6.7 Regional Fire Investigation Organizations
- 14.6.8 Real Estate Industry
- 14.6.9 Abstract and Title Companies
- 14.6.10 Financial Institutions
- 14.6.11 Insurance Industry
- 14.6.12 Educational Institutions
- 14.6.13 Utility Companies
- 14.6.14 Trade Organizations
- 14.6.15 News Organizations ~~Local television stations~~
- 14.6.16 Lightning Detection Networks

SECTION 15

PLANNING THE INVESTIGATION

4.1 General

NFPA 1033 4.1.3 Because fire investigators are required to perform activities in adverse conditions, site safety assessments shall be completed on all scenes and regional and national safety standards shall be followed and included in organizational policies and procedures.

NFPA 1033 4.1.4 The fire investigator shall maintain necessary liaison with other interested professionals and entities.

NFPA 1033 4.1.6 The fire investigator shall understand the organization and operation of the investigative team within an incident management system.

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.1 Secure the fire ground, given marking devices, sufficient personnel, and special tools and equipment, so that unauthorized persons can recognize the perimeters of the investigative scene and are kept from restricted areas and all evidence or potential evidence is protected from damage or destruction.

(A) Requisite Knowledge. Fire ground hazards, types of evidence, and the importance of fire scene security, evidence preservation, and issues relating to spoliation.

(B) Requisite Skills. Use of marking devices.

4.6 Post-Incident Investigation

Duties shall include the investigation of all factors beyond the fire scene at the time of the origin and cause determination.

NFPA 1033 4.6.3 Coordinate expert resources, given the investigative file, reports, and documents, so that the expert's competencies are matched to the specific investigation needs, financial expenditures are justified, and utilization clearly furthers the investigative goals of determining cause or affixing responsibility.

(A) Requisite Knowledge. How to assess one's own expertise, qualifications to be called for expert testimony, types of expert resources (e.g. forensic, CPA, polygraph, financial, human behavior disorders, an engineering), and methods to identify expert resources.

(B) Requisite Skills. Apply expert resources to further the investigation by networking with other investigators to identify experts, questioning experts relative to their qualifications, and developing a utilization plan for use of expert resources.

References:

J&B, chapter 13

Kirk's, chapters 1 and 5

Lentini, chapter 4

501-15.1 ***The Investigator candidate shall identify basic considerations of concern prior to beginning the incident scene investigation.***

- 15.1.1 Number of Investigators
- 15.1.2 Resources
- 15.1.3 "Team Concept"

501-15.2 ***The Investigator candidate shall identify basic incident information necessary to plan and conduct an investigation.***

- 15.2.1 Location
- 15.2.2 Date and Time of Incident
- 15.2.3 Weather Conditions
- 15.2.4 Size and Complexity of the Incident
- 15.2.5 Type and Use of Structure
- 15.2.6 Nature and Extent of Damage
- 15.2.7 Security of the Scene
- 15.2.8 Purpose of the Investigation

501-15.3 ***The Investigator candidate shall be able to organize the basic investigation functions that are commonly performed in each investigation.***

501-15.4 ***The Investigator candidate shall identify the goals of a pre-investigation team meeting.***

- 15.4.1 Equipment and Facilities
- 15.4.2 Personal Safety Equipment
- 15.4.3 Tools and Equipment

501-15.5 ***The Investigator candidate shall identify the specialized personnel and technical consultants that may be needed to provide technical assistance.***

501-15.6 ***The Investigator candidate shall identify a method to organize information generated throughout the investigation and coordinate the efforts of the various people involved.***

SECTION 16

DOCUMENTATION OF THE INVESTIGATION

4.3 Documenting the Scene.

Duties shall include diagramming the scene, photographing, and taking field notes to be used to compile a final report.

NFPA 1033 4.3.1 Diagram the scene, given standard tools and equipment, so that the scene is accurately represented and evidence, pertinent contents, significant patterns, and area(s) or point(s) of origin are identified.

(A) Requisite Knowledge. Commonly used symbols and legends that clarify the diagram, types of evidence and patterns that need to be documented, and formats for diagramming the scene.

(B) Requisite Skills. Ability to sketch the scene, basic drafting skills, and evidence recognition and observational skills.

NFPA 1033 4.3.2 Photographically document the scene, given standard tools and equipment, so that the scene is accurately depicted and the photographs support scene findings.

(A) Requisite Knowledge. Working knowledge of high-resolution camera and flash, the types of film, media, and flash available, and the strengths and limitations of each.

(B) Requisite Skills. Ability to use a high-resolution camera, flash, and accessories.

NFPA 1033 4.3.3 Construct investigative notes, given a fire scene, available documents (e.g., prefire plans and inspection reports), and interview information, so that the notes are accurate, provide further documentation of the scene, and represent complete documentation of the scene findings.

(A) Requisite Knowledge. Relationship between notes, diagrams, and photos, how to reduce scene information into concise notes, and the use of notes during report writing and legal proceedings.

(B) Requisite Skills. Data-reduction skills, note-taking skills, and observational and correlating skills.

4.6 Post-Incident Investigation.

Duties shall include the investigation of all factors beyond the fire scene at the time of the origin and cause determination.

NFPA 1033 4.6.1 Gather reports and records, given no special tools, equipment, or materials, so that all gathered documents are applicable to the investigation, complete, and authentic; the chain of custody is maintained; and the material is admissible in a legal proceeding.

(A) Requisite Knowledge. Types of reports needed that facilitate determining responsibility for the fire (e.g., police reports, fire reports, insurance policies, financial records, deeds, private investigator reports, outside photos, and videos) and location of these reports.

(B) Requisite Skills. Ability to identify the reports and documents necessary for the investigation, implement the chain of custody, and organizational skills.

NFPA 1033 4.6.2 Evaluate the investigative file, given all available file information, so that areas for further investigation are identified, the relationship between gathered documents and information is interpreted, and corroborative evidence and information discrepancies are discovered.

(A) Requisite Knowledge. File assessment and/or evaluation methods, including accurate documentation practices, and requisite investigative elements.

(B) Requisite Skills. Information assessment, correlation, and organizational skills.

4.7 Presentations

Duties shall include the presentation of findings to those individuals not involved in the actual investigations.

NFPA 1033 4.7.1 Prepare a written report, given investigative findings, documentation, and a specific audience, so that the report accurately reflects the investigative findings, is concise, expresses the investigator's opinion, contains facts and data that the investigator relies on in rendering an opinion, contains the reasoning of the investigator by which each opinion was reached, and meets the needs or requirements of the intended audience(s).

(A) Requisite Knowledge. Elements of writing, typical components of a written report, and types of audiences and their respective needs or requirements.

(B) Requisite Skills. Writing skills, ability to analyze information and determine the reader's needs or requirements.

References:

J&B, chapter 14

Kirk's, chapter 6

Lentini, chapter 4

ASTM E860

ASTM E620

501-16.1 **The Investigator candidate shall describe the purpose of recording the fire scene.**

501-16.2 **The Investigator candidate shall describe the purpose of fire scene photography and the importance of timing.**

- 16.2.1 General
- 16.2.2 Timing
- 16.2.3 Basics
 - 16.2.3.1 Types of Cameras
- 16.2.4 Understanding the Parts of a Camera
 - 16.2.4.1 Lenses
 - 16.2.4.2 Focal Length
 - 16.2.4.3 Depth of Field
 - 16.2.4.4 Filters
 - 16.2.4.5 Shutter Speed
- 16.2.5 Lighting
- 16.2.6 Special Types of Photography
 - 16.2.6.1 Composition and Techniques
 - 16.2.6.2 Sequential Photographs
 - 16.2.6.3 Mosaic Photographs
 - 16.2.6.4 Photo Diagram
 - 16.2.6.5 Assisting Photographer
 - 16.2.6.6 Photography and the Courts

- 16.2.7 Video
- 16.2.8 Suggested Activities to Be Documented
 - 16.2.8.1 During the Fire
 - 16.2.8.2 Overhaul
 - 16.2.8.3 Bystander Photographs
 - 16.2.8.4 Exterior Photographs
 - 16.2.8.5 Structural Photographs
 - 16.2.8.6 Interior Photographs
 - 16.2.8.7 Utility Photographs
 - 16.2.8.8 Evidence Photographs
 - 16.2.8.9 Victim Photographs
 - 16.2.8.10 Witness Viewpoint Photographs
 - 16.2.8.11 Aerial Photographs
 - 16.2.8.12 Satellite Imagery
- 16.2.9 Photography Tips
- 16.2.10 Presentation of Photographs

501-16.3 ***The Investigator candidate shall describe the importance of note taking.***

- 16.3.1 Forms of Incident Field Notes
- 16.3.2 Forms for Collecting Data
- 16.3.3 Dictation of Field Notes

501-16.4 ***The Investigator candidate shall explain the importance of diagrams and drawings.***

- 16.4.1 Types of Drawings
 - 16.4.1.1 Sketches
 - 16.4.1.2 Diagrams
- 16.4.2 Selection of Drawings
- 16.4.3 Drawing Tools and Equipment
- 16.4.4 Diagram Elements
 - 16.4.4.1 General Information
 - 16.4.4.2 Identification of Compass Orientation
 - 16.4.4.3 Scale
 - 16.4.4.4 Symbols
 - 16.4.4.5 Legend
- 16.4.5 Drawings
 - 16.4.5.1 Site or Area plans

- 16.4.5.2 Floor Plans
- 16.4.5.3 Elevations
- 16.4.5.4 Details and Sections
- 16.4.5.5 Exploded View Diagrams
- 16.4.5.6 Three-Dimensional (3D) Representations
- 16.4.5.7 Specialized Fire Investigation Diagrams

- 16.4.6 Prepared Design and Construction Drawings
 - 16.4.6.1 General
 - 16.4.6.2 Architectural and Engineering Drawings
 - 16.4.6.3 Architectural and Engineering Schedules
 - 16.4.6.4 Specifications
 - 16.4.6.5 Appliance and Building Equipment

501-16.5 ***The Investigator candidate must understand the purpose of the report to effectively communicate the observations analyses and conclusions made during an investigation.***

- 16.5.1 Purpose
- 16.5.2 Report Organization
- 16.5.3 Descriptive Information
- 16.5.4 Opinions and Conclusions
- 16.5.5 Pertinent Facts
- 16.5.6 Reference to Methodology

****Note: The following part of Section 16 does not come from NFPA 921** There reference for this material is found in ASTM E620 *Standard Practice for Reporting Opinions of Scientific or Technical Experts* (current ed.)**

501-16.6 ***The Investigator candidate shall identify and describe the process of preparing and completing a final, accurate and concise report.***

SECTION 17

PHYSICAL EVIDENCE

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene if the scene, and/or conducting a comprehensive review of documentation generated during the examination(s) of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought the ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.1 Secure the fire ground, given marking devices, sufficient personnel, and special tools and equipment, so that unauthorized persons can recognize the perimeters of the investigative scene and are kept from restricted areas and all evidence or potential evidence is protected from damage or destruction.

(A) Requisite Knowledge. Fire ground hazards, types of evidence, and the importance of fire scene security, evidence preservation, and issues relating to spoliation.

(B) Requisite Skills. Use of marking devices.

NFPA 1033 4.2.6 Examine and remove fire debris, given standard equipment and tools, so that all debris is checked for fire cause evidence, potential ignition source(s) is identified, and evidence is preserved without investigator-inflicted damage or contamination.

(A) Requisite Knowledge. Basic understanding of ignition processes, characteristics of ignition sources, and ease of ignition of fuels; debris-layering techniques; use of tools and equipment during the debris search; types of fire cause evidence commonly found in various degrees of damage; and evidence-gathering methods and documentation.

(B) Requisite Skills. Employ search techniques that further the discovery of fire cause evidence and ignition sources, use search techniques that incorporate documentation, and collect and preserve evidence.

4.3 Documenting the Scene.

Duties shall include diagramming the scene, photographing, and taking field notes to be used to compile a final report.

NFPA 1033 4.3.1 Diagram the scene, given standard tools and equipment, so that the scene is accurately represented and evidence, pertinent contents, significant patterns, and area(s) or point(s) of origin are identified.

(A) Requisite Knowledge. Commonly used symbols and legends that clarify the diagram, types of evidence and patterns that need to be documented, and formats for diagramming the scene.

(B) Requisite Skills. Ability to sketch the scene, basic drafting skills, and evidence recognition and observational skills.

4.4 Evidence Collection/Preservation.

Duties shall include using proper physical and legal procedures to retain evidence required within the investigation.

NFPA 1033 4.4.1 Utilize proper procedures for managing victims and fatalities, given a protocol and appropriate personnel, so that all evidence is discovered and preserved and the protocol procedures are followed.

(A) Requisite Knowledge. Types of evidence associated with fire victims and fatalities and evidence preservation methods.

(B) Requisite Skills. Observational skills and the ability to apply protocols to given situations.

NFPA 1033 4.4.2* Locate, collect, and package evidence, given standard or special tools and equipment and evidence collection materials, so that evidence is identified, preserved, collected, and packaged to avoid contamination and investigator-inflicted damage and the chain of custody is established.

(A) Requisite Knowledge. Types of evidence, authority requirements, impact of removing evidentiary items on civil or criminal proceedings (exclusionary or fire-cause supportive evidence), types, capabilities, and limitations of standard and special tools used to locate evidence, types of laboratory tests available, packaging techniques and materials, and impact of evidence collection on the investigation.

(B) Requisite Skills. Ability to recognize different types of evidence and determine whether evidence is critical to the investigation.

NFPA 1033 4.4.3 Select evidence for analysis given all information from the investigation, so that items for analysis support specific investigation needs.

(A) Requisite Knowledge. Purposes for submitting items for analysis, types of analytical services available, and capabilities and limitations of the services performing the analysis.

(B) Requisite Skills. Evaluate the fire incident to determine forensic, engineering, or laboratory needs.

NFPA 1033 4.4.4 Maintain a chain of custody, given standard investigative tools, marking tools, and evidence tags or logs, so that written documentation exists for each piece of evidence and evidence is secured.

(A) Requisite Knowledge. Rules of custody and transfer procedures, types of evidence (e.g., physical evidence obtained at the scene, photos, and documents), and methods of recording the chain of custody.

(B) Requisite Skills. Ability to execute the chain of custody procedures and accurately complete necessary documents.

NFPA 1033 4.4.5 Dispose of evidence, given jurisdictional or agency regulations and file information, so that the disposal is timely, safely conducted, and in compliance with jurisdictional or agency requirements.

(A) Requisite Knowledge. Disposal services available and common disposal procedures and problems.

(B) Requisite Skills. Documentation skills.

References:

J&B, chapter 15

Kirk's, chapter 7

Lentini, chapter 4

ASTM E1188

ASTM E1459

501-17.1 ***The Investigator candidate shall describe the recommended and accepted methods of processing physical evidence.***

501-17.2 ***The Investigator candidate shall define physical evidence.***

501-17.3 ***The Investigator candidate shall describe the importance of preservation of the fire scene and physical evidence.***

17.3.1 General

- 17.3.2 Fire Patterns as Physical Evidence
- 17.3.3 Artifact Evidence
- 17.3.4 Protecting Evidence
- 17.3.5 Role and Responsibilities of Fire Suppression Personnel in Preserving the Fire Scene
 - 17.3.5.1 General
 - 17.3.5.2 Preservation
 - 17.3.5.3 Caution in Fire Suppression Operations
 - ~~17.3.5.3.1 Use of water lines and hose streams~~
 - ~~17.3.5.3.2 Overhaul~~
 - ~~17.3.5.3.3 Salvage~~
 - ~~17.3.5.3.4 Movement of knobs and switches~~
 - ~~17.3.5.3.5 Use of power tools~~
 - ~~17.3.5.3.6 Limiting access of firefighters and other emergency personnel~~
- 17.3.6 Roles and Responsibilities of the Fire Investigator
- 17.3.7 Practical Considerations

501-17.4 ***The Investigator candidate shall describe contamination of physical evidence.***

- 17.4.1 Contamination of Evidence Containers
- 17.4.2 Contamination During Collection
- 17.4.3 Contamination by Fire Fighters

501-17.5 ***The Investigator candidate shall describe methods of collection.***

- 17.5.1 General
- 17.5.2 Documenting the Collection of Physical Evidence
- 17.5.3 Collection of Traditional Forensic Physical Evidence
- 17.5.4 Collection of Evidence for Accelerant Testing
 - 17.5.4.1 Liquid Accelerant Characteristics
 - 17.5.4.2 Canine-Handler Teams
 - 17.5.4.3 Collection of Liquid Samples for Ignitable Liquid Testing
 - 17.5.4.4 Collection of Liquid Evidence Absorbed by Solid Materials
 - 17.5.4.5 Collection of Solid Samples for Accelerant Testing
 - 17.5.4.6 Comparison Samples

- 17.5.5 Collection of Gaseous Samples
- 17.5.6 Collection of Electrical Equipment and System Components
- 17.5.7 Collection of Appliances or Small Electrical Equipment

501-17.6 **The Investigator candidate shall identify and describe different types of evidence containers.**

- 17.6.1 General
- 17.6.2 Liquid and Solid Accelerant Evidence Containers
 - 17.6.2.1 Metal Cans
 - 17.6.2.2 Glass Jars
 - 17.6.2.3 Special Evidence Bags
 - 17.6.2.4 Common Plastic Bags

501-17.7 **The Investigator candidate shall understand the benefits and limitations of utilizing Canine-Handler Teams. describe the methods of identifying physical evidence.**

17.7.1 Preferred Designation

17.7.2 Other Designations for IGL Canines

17.7.3 Investigators' Discretion

17.7.4 Handlers' Expertise

17.7.5 Canine-Handler Teams

17.7.6 Purposes of Canine-Handler Teams

17.7.7 Limitations on the use of Alerts by Canine-Handler Teams

17.7.8 Canine-Handler Teams and Accelerant Detection

17.7.9 Coordinating the Investigation with the Handler

17.7.10 Safety of Canine, Handler, and Others

501-17.8 **The Investigator candidate shall identify the ASTM standards related to physical evidence.**

501-17.9 **The Investigator candidate shall describe the proper methods of transportation and storage of physical evidence.**

- 17.9.1 Hand Delivery
- 17.9.2 Shipment

17.9.3 Storage of Evidence

501-17.10 ***The Investigator candidate shall identify and describe the evidence chain of custody of physical evidence.***

501-17.11 ***The Investigator candidate shall identify types of analytical methods and tests applicable to certain fire investigations, and the capabilities and limitations of the services that perform the analysis.***

17.11.1 Evidence Collection or Inspections Involving Alteration Without Changes to the Evidentiary Value of the Artifacts

17.11.2 Test Methods

17.11.3 Sufficiency of Samples

17.11.4 Comparative Examination and Testing

501-17.12 ***The Investigator candidate shall describe the proper procedure for evidence disposition.***

SECTION 18

ORIGIN DETERMINATION

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene and/or conducting a comprehensive review of documentation generated during the examination(s) of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought the ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.2* Conduct an exterior survey, given standard equipment and tools, so that evidence is identified and preserved, fire damage is interpreted, hazards are identified to avoid injuries, accessibility to the property is determined, and all potential means of ingress and egress are discovered.

(A) Requisite Knowledge. The types of building construction and the effects of fire on construction materials, types of evidence commonly found in the perimeter, evidence preservation methods, the effects of fire suppression, fire behavior and spread, fire patterns, and a basic awareness of the dangers of hazardous materials.

(B) Requisite Skills. Assess fire ground and structural condition, observe the damage from and effects of the fire, and interpret fire patterns.

NFPA 1033 4.2.3 Conduct an interior survey, given standard equipment and tools, so that areas of potential evidentiary value requiring further examination are identified and preserved, the evidentiary value of contents is determined, and hazards are identified in order to avoid injuries.

(A) Requisite Knowledge. The types of building construction and interior finish and the effects of fire on those materials, the effects of fire suppression, fire behavior and spread, evidence preservation methods, fire patterns, effects of building contents on fire growth, the relationship of building contents to the overall investigation, weather conditions at the time of the fire, and fuel moisture.

(B) Requisite Skills. Assess structural conditions, observe the damage and effects of the fire, discover the impact of fire suppression efforts on fire flow and heat propagation, and evaluate protected areas to determine the presence and/or absence of contents.

NFPA 1033 4.2.5 Interpret and analyze fire patterns, given standard equipment and tools and some structural or content remains, so that fire development is determined, methods and effects of suppression are evaluated, false origin area patterns are recognized, and all areas of origin are correctly identified.

(A) Requisite Knowledge. Fire behavior and spread based on fire chemistry, fire dynamics, and physics, fire suppression effects, building construction.

(B) Requisite Skills. Ability to interpret variations of fire patterns on different materials with consideration given to heat release rate, form, and ignitability; distinguish impact of different types of fuel loads; evaluate fuel trails; and analyze and synthesize information.

4.6 Post-Incident Investigation.

Duties shall include the investigation of all factors beyond the fire scene at the time of the origin and cause determination.

NFPA 1033 4.6.5* Formulate an opinion concerning origin, cause, or responsibility for the fire, given all investigative findings, so that the opinion regarding origin, cause, or responsibility for a fire is supported by the data, facts, records, reports, documents, and evidence.

(A) Requisite Knowledge: Analytical methods and procedures (e.g., hypothesis development and testing, systems analysis, time lines, link analysis, fault tree analysis, and data reduction matrixing).

(B) Requisite Skills: Analytical and assimilation skills.

References:
 J&B, chapter 16
 Kirk's, chapters 1 and 5
 Lentini, chapter 4

501-18.1 ***The Investigator candidate shall identify witness information and/or electronic data, fire patterns, and fire dynamics used in origin determination.***

501-18.2 ***The Investigator candidate shall identify and describe the overall methodology of conducting a scene assessment.***

- 18.2.1 Scientific Method
- 18.2.2 Sequence of Activities
- 18.2.3 Sequential Pattern Analysis
- 18.2.4 Systematic Procedure
- 18.2.5 Recommended Methodology

501-18.3 ***The Investigator candidate shall identify the data collection process for origin determination.***

- 18.3.1 Initial Scene Assessment
 - 18.3.1.1 Safety Assessment
 - 18.3.1.2 Scope of the Examination
 - 18.3.1.3 Order of the Examination
 - 18.3.1.4 Surrounding Areas
 - 18.3.1.5 Structure Exterior
 - 18.3.1.6 Structure Interior
 - 18.3.1.7 Post-Fire Alterations
 - 18.3.1.8 Determination of the Safety of the Fire Scene
- 18.3.2 Excavation and Reconstruction
 - 18.3.2.1 Scope of Excavation and Reconstruction
 - 18.3.2.2 Safety
 - 18.3.2.3 Excavation
 - 18.3.2.4 Heavy Equipment
 - 18.3.2.5 Avoiding Spoliation
 - 18.3.2.6 Avoiding Contamination
 - 18.3.2.7 Washing Floors
 - 18.3.2.8 Contents
- 18.3.3 Additional Data Collection Activities for Origin Determination
 - 18.3.3.1 Pre-Fire Conditions
 - 18.3.3.2 Description of Fuels

- 18.3.3.3 Structure Dimensions
- 18.3.3.4 Weather Conditions
- 18.3.3.5 Electrical Systems
- 18.3.3.6 Electrical Loads
- 18.3.3.7 HVAC Systems
- 18.3.3.8 Fuel Gas Systems
- 18.3.3.9 Liquid Fuel Systems
- 18.3.3.10 Fire Protection Systems
- 18.3.3.11 Fire Protection Systems Data
- 18.3.3.12 Security Cameras
- 18.3.3.13 Intrusion Alarm Systems
- 18.3.3.14 Witness Observations

501-18.4 ***The Investigator candidate shall recognize the importance of analyzing the following data.***

- 18.4.1 Fire Patterns Analysis
 - 18.4.1.1 Consideration of All Patterns
 - 18.4.1.2 Sequence of Patterns
 - 18.4.1.3 Pattern Generation
 - 18.4.1.4 Ventilation
 - 18.4.1.5 Movement and Intensity Patterns
 - 18.4.1.6 Evaluation of Every Pattern

- 18.4.2 Heat and Flame Vector Analysis
 - 18.4.2.1 Complementary Vectors
 - 18.4.2.2 Heat Source
 - 18.4.2.3 Additional Tools for Pattern Visualization

- 18.4.3 Analysis of Sequential Events

- 18.4.4 Fire Dynamics

- 18.4.5 Origin Matrix Analysis

501-18.5 ***The Investigator candidate shall identify the process of developing an origin hypotheses.***

- 18.5.1 Initial Hypothesis

- 18.5.2 Modifying the Initial Hypothesis

501-18.6 ***The Investigator candidate shall identify means and methods for testing the validity of the origin hypothesis.***

- 18.6.1 Means of Hypothesis Testing

- 18.6.2 Analytical Techniques and Tools
 - 18.6.2.1 Time Line Analysis

- 18.6.2.2 Fire Modeling
- 18.6.2.3 Experimental Testing

501-18.7 ***The Investigator candidate shall select a final hypothesis.***

- 18.7.1 Defining the Area of Origin
- 18.7.2 Inconsistent Data
- 18.7.3 Case File Review

501-18.8 ***The Investigator candidate shall identify when there is insufficient data to define the origin.***

- 18.8.1 Large Area Adequate for Determination
- 18.8.2 Justification of a Large Area of Origin
- 18.8.3 Eyewitness Evidence of Origin Area

SECTION 19

FIRE CAUSE DETERMINATION

4.6 Post-Incident Investigation.

Duties shall include the investigation of all factors beyond the fire scene at the time of the origin and cause determination.

NFPA 1033 4.6.5* Formulate an opinion concerning origin, cause, or responsibility for the fire, given all investigative findings, so that the opinion regarding origin, cause, or responsibility for a fire is supported by the data, facts, records, reports, documents, and evidence.

(A) Requisite Knowledge. Analytical methods and procedures (e.g., hypothesis development and testing, systems analysis, time lines, link analysis, fault tree analysis, and data reduction matrixing).

(B) Requisite Skills. Analytical and assimilation skills.

References:

J&B, chapter 17

Kirk's, chapters 1 and 5

501-19.1 The Investigator candidate shall define fire cause and identify fire cause factors.

19.1.1 Fire Cause Factors

19.1.2 First Fuel Ignited

19.1.3 Ignition Source

19.1.4 Oxidant

19.1.5 Ignition Sequence

501-19.2 The Investigator candidate shall utilize the scientific method as the overall methodology.

19.2.1 Consideration of Data

19.2.2 Sequence of Activities

19.2.3 Point and Area of Origin

501-19.3 The Investigator candidate shall identify the data that needs to be collected for fire cause determination.

19.3.1 Identify Fuels in the Area of Origin

19.3.2 Identify Source and Form of the Heat of Ignition

19.3.3 Identify Items and Activities in Area of Origin

- 19.3.4 Identify the Oxidant
- 19.3.5 Identify Ignition Sequence Data

501-19.4 ***The Investigator candidate shall demonstrate the proper use of the scientific method to analyze the data.***

- 19.4.1 Fuel Analysis
 - 19.4.1.1 Geometry and Orientation
 - 19.4.1.2 Ignition Temperature
 - 19.4.1.3 Quantity of Fuel
- 19.4.2 Ignition Source Analysis
- 19.4.3 Oxidant
- 19.4.4 Ignition Sequence

501-19.5 ***The Investigator candidate shall develop cause hypotheses.***

501-19.6 ***The Investigator candidate shall test the cause hypothesis for validity.***

- 19.6.1 ~~Using the~~ Scientific Method
- 19.6.2 Deductive Reasoning
- 19.6.3 Hypotheses Testing Questions
- 19.6.4 Means of Hypothesis Testing
 - 19.6.4.1 Scientific Literature
 - 19.6.4.2 Fundamental Principles of Science
 - 19.6.4.3 Physical Experiments or testing
 - 19.6.4.4 Cognitive Experiments
 - 19.6.4.5 Time Lines
 - 19.6.4.6 Fault Trees
 - 19.6.4.7 Additional Techniques
- 19.6.5 Appropriate Use of the Process of Elimination
 - 19.6.5.1 Cause Undetermined
 - 19.6.5.2 Ignition Source vs. Fire Cause

501-19.7 ***The Investigator candidate shall demonstrate the proper selection of a final hypothesis.***

- 19.7.1 Establishing the Cause
- 19.7.2 Inconsistent Data
- 19.7.3 Safety Devices and Features

19.7.4 Undetermined Fire Cause

501-19.8 ***The Investigator candidate shall use a set of prescribed incident classification system when classification is required of the investigator.***

SECTION 20

ANALYZING THE INCIDENT FOR CAUSE AND RESPONSIBILITY

4.6 Post-Incident Investigation.

Duties shall include the investigation of all factors beyond the fire scene at the time of the origin and cause determination.

NFPA 1033 4.6.1 Gather reports and records, given no special tools, equipment, or materials, so that all gathered documents are applicable to the investigation, complete, and authentic; the chain of custody is maintained; and the material is admissible in a legal proceeding.

(A) Requisite Knowledge. Types of reports needed that facilitate determining responsibility for the fire (e.g., police reports, fire reports, insurance policies, financial records, deeds, private investigator reports, outside photos, and videos) and location of these reports.

(B) Requisite Skills. Ability to identify the reports and documents necessary for the investigation, implement the chain of custody, and organizational skills.

NFPA 1033 4.6.2 Evaluate the investigative file, given all available file information, so that areas for further investigation are identified, the relationship between gathered documents and information is interpreted, and corroborative evidence and information discrepancies are discovered.

(A) Requisite Knowledge. File assessment and/or evaluation methods, including accurate documentation practices, and requisite investigative elements.

(B) Requisite Skills. Information assessment, correlation, and organizational skills.

NFPA 1033 4.6.3 Coordinate expert resources, given the investigative file, reports, and documents, so that the expert's competencies are matched to the specific investigation needs, financial expenditures are justified, and utilization clearly furthers the investigative goals of determining cause or affixing responsibility.

(A) Requisite Knowledge. How to assess one's own expertise, qualification to be called for expert testimony, types of expert resources (e.g., forensic, CPA, polygraph, financial, human behavior disorders, and engineering), and methods to identify expert resources.

(B) Requisite Skills. Ability to apply expert resources to further the investigation by networking with other investigators to identify experts, questioning experts relative to their qualifications, and developing a utilization plan for use of expert resources.

NFPA 1033 4.6.4 Establish evidence as to motive and/or opportunity, given an incendiary fire, so that the evidence is supported by documentation and meets the evidentiary requirements of the jurisdiction.

(A) Requisite Knowledge. Types of motives common to incendiary fires, methods used to discover opportunity, and human behavioral patterns relative to fire-setting

(B) Requisite Skills. Financial analysis, records gathering and analysis, interviewing, and interpreting fire scene information and evidence for relationship to motive and/or opportunity.

NFPA 1033 4.6.5 Formulate an opinion concerning origin, cause, or responsibility for the fire, given all investigative findings, so that the opinion regarding origin, cause, or responsibility for a fire is supported by the data, facts, records, reports, documents, and evidence.

(A) Requisite Knowledge. Analytical methods and procedures (e.g., hypothesis development and testing, systems analysis, time lines, link analysis, fault tree analysis, and data reduction matrixing).

(B) Requisite Skills. Analytical and assimilation skills.

References:

J&B, chapter 19

Kirk's, chapters 1 and 5

501-20.1 **The Investigator candidate shall describe methods for analyzing the incident for cause and responsibility.**

- 20.1.1 (1) The cause of the fire or explosion.
- (2) The cause of damage to property resulting from the incident.
- (3) The cause of bodily injury or loss of life.
- (4) The degree to which human fault contributed to any one or more of the causal issues described in 20.1.1(1), 20.1.1(2), and 20.1.1(3).
- 20.1.2 **Based on the scope of the assignment, an individual investigator may not have responsibility or be required to address all of the aspects of this chapter.**
- 20.1.3 The cause of a fire or the causes of damage or casualties may be grouped in broad categories for general discussion, for assignment of legal responsibility or culpability, or for reporting purposes.

501-20.2 **The Investigator candidate shall identify the competent ignition source, the fuel first ignited, and the events that brought them together. use a set of prescribed classification system when classification is required of the investigator. .**

501-20.3 **The Investigator candidate shall describe the causes of damage to property resulting from the Incident.**

- 20.3.1 Considerations
- 20.3.2 Fire/Smoke Spread
- 20.3.2.1 Compartmentation
- 20.3.2.2 Change of occupancy/hazard
- 20.3.2.3 Detection/alarm systems
- 20.3.2.4 Human behavior
- 20.3.2.5 Fire suppression
- 20.3.2.6 Fuel loads
- 20.3.2.7 Housekeeping
- 20.3.2.8 Ventilation
- 20.3.2.9 Code violations
- 20.3.2.10 Structural failure
- 20.3.3 Other consequential damage

501-20.4 **The Investigator candidate shall describe the causes of bodily injury or loss of life. See Chapters 11 and 24.**

- 20.4.1 Fire/Smoke Spread

- 20.4.1.1 Toxicity
- 20.4.1.2 Hazardous materials
- 20.4.1.3 Compartmentation
- 20.4.1.4 Change of occupancy/hazard
- 20.4.1.5 Detection/alarm systems
- 20.4.1.6 Human behavior
- 20.4.1.7 Fire suppression
- 20.4.1.8 Housekeeping
- 20.4.1.9 Fuel loads
- 20.4.1.10 Ventilation
- 20.4.1.11 Code violations
- 20.4.1.12 Means of egress/refuge
- 20.4.1.13 Structural failure
- 20.4.1.14 Intentional acts

20.4.2 Emergency Preparedness

501-20.5 ***The Investigator candidate shall describe the determination of responsibility.***

- 20.5.1 Nature of Responsibility
- 20.5.2 Definition of Responsibility
- 20.5.3 Assessing of Responsibility
- 20.5.4 Degrees of Responsibility

SECTION 21

FAILURE ANALYSIS AND ANALYTICAL TOOLS

4.6 Post-Incident Investigation.

Duties shall include the investigation of all factors beyond the fire scene at the time of the origin and cause determination.

NFPA 1033 4.6.1 Gather reports and records, given no special tools, equipment, or materials, so that all gathered documents are applicable to the investigation, complete, and authentic; the chain of custody is maintained; and the material is admissible in a legal proceeding.

(A) Requisite Knowledge. Types of reports needed that facilitate determining responsibility for the fire (e.g., police reports, fire reports, insurance policies, financial records, deeds, private investigator reports, outside photos, and videos) and location of these reports.

(B) Requisite Skills. Ability to identify the reports and documents necessary for the investigation, implement the chain of custody, and organizational skills.

NFPA 1033 4.6.2 Evaluate the investigative file, given all available file information, so that areas for further investigation are identified, the relationship between gathered documents and information is interpreted, and corroborative evidence and information discrepancies are discovered.

(A) Requisite Knowledge. File assessment and/or evaluation methods, including accurate documentation practices, and requisite investigative elements.

(B) Requisite Skills. Information assessment, correlation, and organizational skills.

NFPA 1033 4.6.3 Coordinate expert resources, given the investigative file, reports, and documents, so that the expert's competencies are matched to the specific investigation needs, financial expenditures are justified, and utilization clearly furthers the investigative goals of determining cause or affixing responsibility.

(A) Requisite Knowledge. How to assess one's own expertise, qualification to be called for expert testimony, types of expert resources (e.g., forensic, CPA, polygraph, financial, human behavior disorders, and engineering), and methods to identify expert resources.

(B) Requisite Skills. Ability to apply expert resources to further the investigation by networking with other investigators to identify experts, questioning experts relative to their qualifications, and developing a utilization plan for use of expert resources.

NFPA 1033 4.6.4 Establish evidence as to motive and/or opportunity, given an incendiary fire, so that the evidence is supported by documentation and meets the evidentiary requirements of the jurisdiction.

(A) Requisite Knowledge. Types of motives common to incendiary fires, methods used to discover opportunity, and human behavioral patterns relative to fire-setting.

(B) Requisite Skills. Financial analysis, records gathering and analysis, interviewing, and interpreting fire scene information and evidence for relationship to motive and/or opportunity.

NFPA 1033 4.6.5 Formulate an opinion concerning origin, cause, or responsibility for the fire, given all investigative findings, so that the opinion regarding origin, cause, or responsibility for a fire is supported by the data, facts, records, reports, documents, and evidence.

(A) Requisite Knowledge. Analytical methods and procedures (e.g., hypothesis development and testing, systems analysis, time lines, link analysis, fault tree analysis, and data reduction matrixing).

(B) Requisite Skills. Analytical and assimilation skills.

References:

J&B, chapter 20

Kirk's, chapters 1 and 5

501-21.1 ***The Investigator candidate shall describe failure analysis and the use of analytical tools.***

501-21.2 ***The Investigator candidate shall describe time lines available for use in analyzing fire cause.***

21.2.1 General

21.2.2 Hard Time (Actual)

21.2.3 Soft Time (Estimated)

21.2.4 Benchmark Events

21.2.5 Multiple Time Lines

501-21.3 ***The Investigator candidate shall describe system analysis techniques.***

21.3.1 Fault Trees

21.3.2 Failure Mode and Effects Analysis (FMEA)

501-21.4 ***The Investigator candidate shall describe the purpose for mathematical modeling.***

21.4.1 General and Limitations of Mathematical Modeling

21.4.2 Heat Transfer Analysis

21.4.3 Flammable Gas Concentrations

21.4.4 Hydraulic Analysis

21.4.5 Thermodynamic Chemical Equilibrium Analysis

21.4.6 Structural Analysis

21.4.7 Egress Analysis

21.4.8 Fire Dynamics Analysis

21.4.9 Guidelines for Selection and Use of a Fire Model

501-21.5 ***The Investigator candidate shall describe the role of fire testing.***

21.5.1 Role of Fire Testing

21.5.2 Fire Test Methods

21.5.3 Limitations of Fire Testing

501-21.6 ***The Investigator candidate shall identify the data required for modeling and testing.***

21.6.1 Materials and Contents

21.6.2 Ventilation

SECTION 22

EXPLOSIONS

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene, and/or conducting a comprehensive review of documentation generated during the examination(s) of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought the ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.9 Discriminate the effects of explosions from other types of damage, given standard equipment and tools, so that an explosion is identified and its evidence is preserved.

(A) Requisite Knowledge. Different types of explosions and their causes, characteristics of an explosion, and the difference between low- and high-order explosions.

(B) Requisite Skills. Identify explosive effects on glass, walls, foundations, and other building materials; distinguish between low- and high-order explosion effects; and analyze damage to document the blast zone and origin.

References:

J&B, chapter 21

Kirk's, chapter 3

501-22.1 **The Investigator candidate shall define the term "explosion".**

501-22.2 **The Investigator candidate shall identify the different types of explosions.**

22.2.1 Mechanical Explosions

22.2.2 Boiling Liquid Expanding Vapor Explosion (BLEVE)

22.2.3 Chemical Explosions

22.2.4 Electrical Explosions

22.2.5 Nuclear Explosions

501-22.3 **The Investigator candidate shall distinguish between the characterization of explosion damage.**

22.3.1 Low-Order Damage

22.3.2 High-Order Damage

501-22.4 **The Investigator candidate shall be able to describe the effects of explosions.**

22.4.1 Blast Overpressure and Wave Effect

22.4.1.1 General

22.4.1.2 Positive Pressure Phase

- 22.4.1.3 Negative Pressure Phase
- 22.4.1.4 Shape of Blast Wave (Front)
- 22.4.1.5 Rate of Pressure Rise Versus Maximum Pressure

22.4.2 Shrapnel Effect (Projectiles)

22.4.3 Thermal Effect

22.4.4 Seismic Effect (Ground Shock)

501-22.5 ***The Investigator candidate shall identify the factors controlling explosion effects.***

22.5.1 Fuel

22.5.2 Turbulence

22.5.3 Nature of Confining Space

22.5.4 Location and Magnitude of Ignition Source

22.5.5 Venting

22.5.6 Blast Pressure Wave (Blast Pressure Front) Modification by Reflection

22.5.7 Blast Pressure Front Modification by Refraction and Blast Focusing

501-22.6 ***The Investigator candidate shall be able to identify a seated explosion.***

22.6.1 General

22.6.2 Explosives

22.6.3 Boiler and Pressure Vessels

22.6.4 Confined Fuel Gas and Liquid Vapor

22.6.5 Boiling Liquid Expanding Vapor Explosion (BLEVE)

501-22.7 ***The Investigator candidate shall be able to identify a non-seated explosion.***

22.7.1 Fuel Gases

22.7.2 Pool Flammable/Combustible Liquids

22.7.3 Dusts

22.7.4 Backdraft (Smoke Explosion)

501-22.8 ***The Investigator candidate shall be able to describe the characteristics of gas/vapor combustion explosions.***

22.8.1 Ignition of Gases and Vapors

22.8.2 Interpretation of Explosion Damage

22.8.2.1 Fuel-to-Air Ratio

22.8.2.2 Specific Gravity (air) (vapor density)

22.8.3 Underground Migration of Fuel Gases

22.8.4 Multiple Explosions

501-22.9 ***The Investigator candidate shall describe the characteristics of dust explosions.***

22.9.1 General

22.9.2 Particle Size

22.9.3 Concentration

22.9.4 Turbulence in Dust Explosions

22.9.5 Moisture

22.9.6 Minimum Temperature and Ignition Energy for Dust

22.9.7 Multiple Explosions

501-22.10 ***The Investigator candidate shall be able to describe backdraft (smoke explosions).***

501-22.11 ***The Investigator candidate shall be able to identify an unconfined vapor cloud explosion.***

501-22.12 ***The Investigator candidate shall be able to distinguish the two types of explosives.***

22.12.1 Low Explosives

22.12.2 High Explosives

501-22.13 ***The Investigator candidate shall describe the complexity of the investigation of explosive incidents.***

501-22.14 *The Investigator candidate shall be able to investigate the explosion scene.*

- 22.14.1 General
- 22.14.2 Securing the Scene
 - 22.14.2.1 Establishing the Scene
 - 22.14.2.2 Obtain Background Information
 - 22.14.2.3 Establish the Scene Search Pattern
 - 22.14.2.4 Safety at the Explosion Scene
- 22.14.3 Initial Scene Assessment
 - 22.14.3.1 General
 - 22.14.3.2 Identify Explosion or Fire
 - 22.14.3.3 Document Damage
 - 22.14.3.4 Seated or Nonseated Explosion
 - 22.14.3.5 Identify Type of Explosion
 - 22.14.3.6 Identify Potential General Fuel Type
 - 22.14.3.7 Establish the Origin
 - 22.14.3.8 Establish Ignition Source
- 22.14.4 Detailed Scene Assessment
 - 22.14.4.1 Identify Damage Effects of Explosion
 - 22.14.4.2 Identify Pre-Blast and Post-Blast Fire Damage
 - 22.14.4.3 Locate and Identify Articles of Evidence
 - 22.14.4.4 Identify Force Vectors

501-22.15 *The Investigator candidate shall analyze the origin (epicenter) of an explosion scene.*

501-22.16 *The Investigator candidate shall analyze a fuel source.*

501-22.17 *The Investigator candidate shall analyze the ignition source.*

501-22.18 *The Investigator candidate shall analyze to establish cause.*

- 22.18.1 General
- 22.18.2 Time Line Analysis
- 22.18.3 Damage Pattern Analysis
 - 23.18.3.1 Debris Analysis
 - 23.18.3.2 Relative Structural Damage Analysis
- 22.18.4 Correlation of Explosion Type and Energy with Damage Incurred
- 22.18.5 Analysis of Damaged Items and Structures
- 22.18.6 Correlation of Thermal Effects

SECTION 23

INCENDIARY FIRES

4.6 Post-Incident Investigation.

Duties shall include the investigation of all factors beyond the fire scene at the time of the origin and cause determination.

NFPA 1033 4.6.4 Establish evidence as to motive and/or opportunity, given an incendiary fire, so that the evidence is supported by documentation and meets the evidentiary requirements of the jurisdiction.

(A) Requisite Knowledge. Types of motives common to incendiary fires, methods used to discover opportunity, and human behavioral patterns relative to fire-setting.

(B) Requisite Skills. Financial analysis, records gathering and analysis, interviewing, and interpreting fire scene information and evidence for relationship to motive and/or opportunity.

NFPA 1033 4.6.5 Formulate an opinion concerning origin, cause, or responsibility for the fire, given all investigative findings, so that the opinion regarding origin, cause, or responsibility for a fire is supported by the data, facts, records, reports, documents, and evidence.

(A) Requisite Knowledge: Analytical methods and procedures (e.g., hypothesis development and testing, systems analysis, time lines, link analysis, fault tree analysis, and data reduction matrixing).

(B) Requisite Skills: Analytical and assimilation skills.

References:

J&B, chapter 21
Kirk's, chapter 11
Lentini, chapter 8

501-23.1 **The Investigator candidate shall define "incendiary" fires.**

501-23.2 **The Investigator candidate shall identify and describe indicators of incendiary fires.**

23.2.1 Multiple Fires

23.2.2 Trailers

23.2.3 Lack of Expected Fuel Load and Ignition Sources

23.2.4 Unusual Fuel Load or Configuration

23.2.5 Burn Injuries

23.2.6 Incendiary Devices

23.2.7 **Assessment of Fire Growth and Fire Damage**

501-23.3 **The Investigator candidate shall identify and explain potential indicators of incendiary fires not directly related to combustion.**

- 23.3.1 Remote Locations with View Blocked or Obscured
- 23.3.2 Forced Entry
- 23.3.3 Fires Near Service Equipment and Appliances
- 23.3.4 Removal or Replacement of Contents Prior to the Fire
 - 23.3.4.1 Replacement
 - 23.3.4.2 Removal
 - 23.3.4.3 Absence of Personal Items Prior to the Fire
- 23.3.5 Entry Blocked or Obstructed
- 23.3.6 Sabotage to the Structure or Fire Protection Systems
 - 23.3.6.1 Definition of Sabotage
 - 23.3.6.2 Damage to Fire-Resistive Assemblies
 - 23.3.6.3 Damage to Fire Protection Systems
- 23.3.7 Open Windows and Exterior Doors

501-23.4 ***The Investigator candidate shall identify and describe other evidentiary factors associated with incendiary fires.***

- 23.4.1 Evidentiary Factors that should be recorded and examined
- 23.4.2 Analysis of Confirmed Incendiary Fires
 - 23.4.2.1 Geographic Areas, or Clusters
 - 23.4.2.2 Temporal Frequency
 - 23.4.2.3 Materials and Method
- 23.4.3 Evidence of Other Crimes, Crime Concealment
- 23.4.4 Indications of Financial Stress
- 23.4.5 Existing or History of Code Violations
- 23.4.6 Owner with Fires at Other Properties
- 23.4.7 Overinsurance
- 23.4.8 Timed Opportunity
 - 23.4.8.1 Fires During Severe Natural Conditions
 - 23.4.8.2 Fires During Civil Unrest
 - 23.4.8.3 Fire Department Unavailable
- 23.4.9 Motives for Firesetting Behavior
 - 23.4.9.1 Define "Motive"
 - 23.4.9.2 Motive Versus Intent
 - 23.4.9.3 Classifications of Motive

- 23.4.9.3.1** Introduction
- 23.4.9.3.2** Vandalism
 - 23.4.9.3.2.1** Willful and Malicious Mischief
 - 23.4.9.3.2.2** Peer or Group Pressure
- 23.4.9.3.3** Excitement
 - a. Thrill Seeking
 - b. Attention Seeking
 - c. Recognition
 - d. Sexual Gratification or Perversion
- 23.4.9.3.4** Revenge
 - a. Personal Retaliation
 - b. Societal Retaliation
 - c. Institutional Retaliation
 - d. Group Retaliation
- 23.4.9.3.5** Crime Concealment
 - a. Murder Concealment
 - b. Burglary Concealment
 - c. Destruction of Records or Documents
- 23.4.9.3.6** Profit
- 23.4.9.3.7** Extremism
 - a. Terrorism
 - b. Riot/Civil Disturbance

SECTION 24

FIRE AND EXPLOSION DEATHS AND INJURIES

4.4 Evidence Collection/Preservation.

Duties shall include using proper physical and legal procedures to identify, document, collect and preserve evidence required within the investigation.

NFPA 1033 4.4.1 Utilize proper procedures for managing victims and fatalities, given a protocol and appropriate personnel, so that all evidence is discovered and preserved and the protocol procedures are followed.

(A) Requisite Knowledge. Types of evidence associated with fire victims and fatalities and evidence preservation methods.

(B) Requisite Skills. Observational skills and the ability to apply protocols to given situations.

References:

J&B, chapter 23

Kirk's, chapter 12

Konefal, Fire Death Scene Investigation

ASTM E678

501-24.1 **The Investigator candidate shall demonstrate the ability to utilize specialized skills associated with death and injuries from fire and explosions.**

501-24.2 **The Investigator candidate shall identify the mechanisms of death and injury.**

24.2.1 Carbon Monoxide

24.2.2 Cyanide

24.2.3 Other Toxic Gases

24.2.4 Hyperthermia

24.2.5 Skin Burns

24.2.6 Inhalation of Hot Gases

24.2.7 Soot and Smoke

24.2.8 Hypoxia

24.2.9 Sublethal Inhalation Exposure Effects on the Individual

24.2.9.1 Narcotic Gases

24.2.9.2 Irritant Gases

24.2.9.3 Smoke

- 24.2.10 Explosion-Related Injuries
 - 24.2.10.1 Blast Pressure Injuries
 - 24.2.10.2 Shrapnel Injuries
 - 24.2.10.3 Thermal Injuries
 - 24.2.10.4 Building Collapse Injuries

501-24.3 ***The Investigator candidate shall describe the consumption of the body by fire.***

- 24.3.1 Skin
- 24.3.2 Muscle
- 24.3.3 Bone
- 24.3.4 Fat

501-24.4 ***The Investigator candidate shall describe the postmortem changes that a deceased body will undergo when exposed to heat and to death.***

- 24.4.1 Lividity
- 24.4.2 Rigor Mortis

501-24.5 ***The Investigator candidate shall describe the considerations to be made before the investigation of a fatal fire.***

- 24.5.1 Notifications
- 24.5.2 The Fire Department
- 24.5.3 Team Investigation
- 24.5.4 Safety
- 24.5.5 Scene Documentation
- 24.5.6 Victim Documentation
- 24.5.7 Recovery of Bodies and Evidence
 - 24.5.7.1 Layering of Debris
 - 24.5.7.2 Sifting of Debris
 - 24.5.7.3 Body Removal
 - 24.5.7.4 Victim Clothing
- 24.5.8 Collection of Other Physical Evidence

501-24.6 ***The Investigator candidate shall describe the steps of investigating fire scenes with injuries.***

- 24.6.1 Notification Laws
- 24.6.2 Scene Documentation
- 24.6.3 Victim Documentation
- 24.6.4 Victim Timeline
- 24.6.5 Physical Evidence

501-24.7 ***The Investigator candidate shall describe the documentation of an explosion incident where injury and/or death has occurred.***

- 24.7.1 Collecting Physical Evidence from Explosions

501-24.8 ***The Investigator candidate shall describe post scene investigation of injuries.***

- 24.8.1 Burns
 - 24.8.1.1 Degree of Burns
 - 24.8.1.2 Body Area (Distribution)
- 24.8.2 Inhalation Medical Evidence
- 24.8.3 Hospital Tests and Documentation
- 24.8.4 Access to Medical Evidence

501-24.9 ***The Investigator candidate shall describe the fire death pathological and toxicological examination.***

- 24.9.1 The Coroner or Medical Examiner
- 24.9.2 Identifying the Remains
 - 24.9.2.1 Human vs. Animal Remains
 - 24.9.2.2 Visual Identification
 - 24.9.2.3 Identification by Clothing and Personal Effects
 - 24.9.2.4 Fingerprint Identification
 - 24.9.2.5 X-ray Identification
 - 24.9.2.6 DNA Identification
- 24.9.3 X-ray Examination
- 24.9.4 Carbon Monoxide Levels
- 24.9.5 Cyanide Levels
- 24.9.6 Presence of Other Toxicants

- 24.9.7 Smoke and Soot Exposure
- 24.9.8 Burns
- 24.9.9 Physical Trauma and Wounds
- 24.9.10 Stomach Contents
- 24.9.11 Internal Body Temperature
- 24.9.12 Pre-Existing Medical Conditions
- 24.9.13 Death Pre-Fire
- 24.9.14 Death from a Medical Condition

501-24.10 ***The Investigator candidate shall describe how to analyze the data developed from the death or injury investigation and correlate it with the other data from the investigation.***

- 24.10.1 Timeline Development
- 24.10.2 Victim Activity
- 24.10.3 Pre-Fire Victim Impairment
- 24.10.4 Medical History
- 24.10.5 Fire Patterns
- 24.10.6 Burns
- 24.10.7 Clothing
- 24.10.8 Applications of Toxicology in Fire Investigation
 - 24.10.8.1 Toxicological Analysis Techniques
 - 24.10.8.2 Physiological Models
 - 24.10.8.2.1 The Steward Equation
 - 24.10.8.2.2 The Colburn Forster Kane (CFK) Equation

SECTION 25

APPLIANCES

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene, and/or conducting a comprehensive review of documentation generated during the examination(s) of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought the ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.8 Inspect the performance of building systems, including detection, suppression, HVAC, utilities, and building compartmentation, given standard and special equipment and tools, so that a determination can be made as to the need for expert resources, an operating system's impact on fire growth and spread is considered in identifying origin areas, defeated and/or failed systems are identified, and the system's potential as a fire cause is recognized.

(A) Requisite Knowledge. Different types of detection, suppression, HVAC, utility, and building compartmentation such as fire walls and fire doors; types of expert resources for building systems; the impact of fire on various systems; common methods used to defeat a system's functional capability; and types of failures.

(B) Requisite Skills. Determine the system's operation and its effect on the fire; identify alterations to, and failure indicators of, building systems; and evaluate the impact of suppression efforts on building systems.

References:

J&B, chapter 24

Kirk's, chapter 4

Lentini, chapter 6

501-25.1 **The Investigator candidate shall analyze appliances as it relates to investigation of the cause of fires.**

501-25.2 **The Investigator candidate shall record the scene involving an appliance.**

25.2.1 Recording Specific Appliances

25.2.2 Measurements of the Location of the Appliances

25.2.3 Positions of Appliance Controls

25.2.4 Document Appliance Information

25.2.5 Gathering All of the Parts from the Appliance

501-25.3 **The Investigator candidate shall analyze the origin of fires involving appliances.**

25.3.1 Relationship of the Appliance to the Origin

25.3.2 Fire Patterns

25.3.3 Plastic Appliance Components

25.3.4 Reconstruction of the Area of Origin

501-25.4 ***The Investigator candidate shall analyze the cause of fires involving appliances.***

25.4.1 How the Appliance Generated Heat

25.4.2 The Use and Design of the Appliance

25.4.3 Electrical Appliances as Ignition Sources

25.4.4 Photographing Appliance Disassembly

25.4.5 Obtaining Exemplar Appliances

25.4.6 Testing Exemplar Appliances

501-25.5 ***The Investigator candidate shall describe each of the common parts or components that might be found in various appliances.***

25.5.1 Appliance Housings

25.5.2 Power Sources

25.5.2.1 Power Cords

25.5.2.2 Voltages Less than 120

25.5.2.3 Batteries

25.5.2.4 Overcurrent Protection

25.5.3 Switches

25.5.3.1 Manual Switches

25.5.3.2 Automatic Switches

25.5.4 Solenoids and Relays

25.5.5 Transformers

25.5.6 Motors

25.5.7 Heating Elements

25.5.8 Lighting

25.5.8.1 Fluorescent Lighting Systems

25.5.8.2 High Intensity Discharge Lighting Systems

25.5.9 Miscellaneous Components

501-25.6 ***The Investigator candidate shall describe the operation and components of common residential appliances.***

- 25.6.1 Range or Oven
- 25.6.2 Coffee Maker
- 25.6.3 Toaster
- 25.6.4 Electric Can Opener
- 25.6.5 Refrigerator
- 25.6.6 Dishwasher
- 25.6.7 Microwave Oven
- 25.6.8 Portable Space Heater
- 25.6.9 Electric Blanket
- 25.6.10 Window Air Conditioner Unit
- 25.6.11 Hair Dryer and Hair Curler
- 25.6.12 Clothes Iron
- 25.6.13 Clothes Dryer
- 25.6.14 Consumer Electronics
- 25.6.15 Lighting

SECTION 26

MOTOR VEHICLE FIRES

Annex A Explanatory Material

NFPA 1033 A.1.1 The intent of this standard applies to all fire investigation, including outside, wildland, vehicle, and structural fires.

4.1 General

NFPA 1033 4.1.3 Because fire investigators are required to perform activities in adverse conditions, site safety assessments shall be completed on all scenes and regional and national safety standards shall be followed and included in organizational policies and procedures.

4.2 Scene Examination.

Duties shall include inspecting and evaluating the fire scene, or evidence of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited, and act or activity that brought ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.4 Interpret fire patterns, given standard equipment and tools and some structural or content remains, so that each individual pattern is evaluated with respect to the burning characteristics of the material involved and in context and relationship with all patterns observed in the mechanisms of heat transfer that lead to the formation of the pattern.

(A) Requisite Knowledge. Fire dynamics, fire development, and the interrelationship of heat release rate, form, and ignitability of materials.

(B) Requisite Skills. Ability to interpret the effects of burning characteristics on different types of materials.

NFPA 1033 4.2.5 Interpret and analyze fire patterns, given standard equipment and tools and some structural or content remains, so that fire development is determined, methods and effects of suppression are evaluated, false origin area patterns are recognized, and all areas of origin are correctly identified.

(A) Requisite Knowledge. Fire behavior and spread based on fire chemistry, fire dynamics, and physics, fire suppression effects, building construction.

(B) Requisite Skills. Interpret variations of fire patterns on different materials with consideration given to heat release rate, form, and ignitability; distinguish impact of different types of fuel loads; evaluate fuel trails; and analyze and synthesize information.

NFPA 1033 4.2.6 Examine and remove fire debris, given standard equipment and tools, so that all debris is checked for fire cause evidence, potential ignition source(s) is identified, and evidence is preserved without investigator-inflicted damage or contamination.

(A) Requisite Knowledge. Basic understanding of ignition processes, characteristics of ignition sources, and ease of ignition of fuels; debris-layering techniques; use of tools and equipment during the debris search; types of fire cause evidence commonly found in various degrees of damage; and evidence-gathering methods and documentation.

(B) Requisite Skills. Employ search techniques that further the discovery of fire cause evidence and ignition sources, use search techniques that incorporate documentation, and collect and preserve evidence.

References:

J&B, chapter 25

Kirk's, chapter 7

501-26.1 ***The Investigator candidate shall describe the factors related to the investigation of fires involving motor vehicles.***

501-26.2 ***The Investigator candidate shall describe the differences, in safety related concerns, that burned vehicles pose as compared to those found in structure fires.***

501-26.3 ***The Investigator candidate shall describe and identify the different types of fuels that may be involved in vehicle fires.***

26.3.1 Ignitable Liquids
27.3.1.1 Hot Surface Ignition

26.3.2 Gaseous Fuels

26.3.3 Solid Fuels

501-26.4 ***The Investigator candidate shall describe and identify the different ignition sources that can be present in vehicle fires.***

26.4.1 Open Flames

26.4.2 Electrical Sources

26.4.2.1 Recreational Vehicles

26.4.2.2 Overloaded Wiring

26.4.2.3 Electrical High Resistance Connections

26.4.2.4 Electrical Short Circuits and Arcs - Electric Discharge

26.4.2.5 Arc, Carbon, (~~carbon~~) Tracking

26.4.2.6 Lamp Bulbs and Filaments

26.4.2.7 External Electrical Sources Used in Vehicles

26.4.3 Hot Surfaces

26.4.4 Mechanical Sparks

26.4.5 Smoking Materials

501-26.5 ***The Investigator shall identify the different types of systems that a motor vehicle may possess and their respective functions.***

26.5.1 Fuel System

26.5.1.1 Vacuum/Low-Pressure Carbureted Systems

26.5.1.2 High-Pressure Fuel-Injected Systems

26.5.1.3 Diesel Fuel System

26.5.1.4 Natural Gas

26.5.1.5 Propane Fuel

26.5.1.6 Turbochargers

26.5.2 Emission Control System

- 26.5.3 Motor Vehicle Electrical Systems
- 26.5.4 Mechanical Power Systems
- 26.5.5 Mechanical Power Distribution (~~transmissions~~)
- 26.5.6 Accessories to the Mechanical Power System
- 26.5.7 Hydraulic Braking System
- 26.5.8 Windshield Washer Systems

501-26.6 ***The Investigator candidate shall identify the different body systems that can be found within or upon motor vehicles.***

- 26.6.1 Interior Finishes and Accessories
- 26.6.2 Cargo Areas

501-26.7 ***The Investigator candidate shall identify and employ the proper technique for investigating motor vehicle fires.***

- 26.7.1 Vehicle Identification
- 26.7.2 Vehicle Fire Scene History
- 26.7.3 Vehicle Particulars
- 26.7.4 Documenting the Vehicle at the Fire Scene
- 26.7.5 Documenting the Vehicle Away from the Scene

501-26.8 ***The Investigator candidate shall identify factors related to the examination of motor vehicles after they have burned.***

- 26.8.1 General
- 26.8.2 Examination of Vehicle Systems
- 26.8.3 Switches, Handles, and Levers

501-26.9 ***The Investigator candidate shall define total burns as it relates to motor vehicle fires and describe the actions that should be taken when these types of fires are encountered.***

501-26.10 ***The Investigator candidate shall identify factors related to incendiary vehicle fires.***

501-26.11 ***The Investigator shall identify components of the vehicle's ignition system as they relate to the fire investigation.***

501-26.12 **The Investigator candidate shall identify factors concerning vehicle fires in structures and evaluate them as a potential source of fire ignition.**

501-26.13 **The Investigator candidate shall identify and describe the factors relative to the investigation of recreational vehicle fires.**

501-26.14 **The Investigator candidate shall identify the factors related to fire investigations involving heavy equipment.**

26.14.1 Medium- and Heavy-Duty Trucks, and Buses

26.14.2 Mass Transit Vehicles

26.14.3 Earth-Moving Equipment

26.14.4 Forestry/Logging Equipment

26.14.5 Landfill Equipment

26.14.6 Agricultural Equipment

501-26.15 **The Investigator candidate shall identify the factors related to fire investigations involving self-propelled agricultural equipment and drawn implements.**

26.15.1 Agricultural Equipment Investigation Safety

26.15.2 Equipment Classification and Description

26.15.3 Unique Safety Concerns

26.15.4 Unique Fire Cause Concerns

26.15.5 Fuels

26.15.6 Ignition Sources

501-26.16 **The Investigator candidate shall identify factors related to the investigation of fires involving hybrid vehicles.**

26.16.1 Hybrid Vehicle Investigation Safety

26.16.2 Hybrid Vehicle Technology

26.16.3 Investigation of Hybrid Vehicle Fires

501-26.17 **The Investigator candidate shall identify factors related to towing or vehicle transport as it relates to fire investigations.**

501.26.18 ***The Investigator candidate shall identify factors related to the investigation of fires involving hydrogen fueled vehicles.***

SECTION 27

WILDFIRE INVESTIGATIONS

Annex A Explanatory Material

NFPA 1033 A.1.1 The intent of this standard applies to all fire investigation, including outside, wildland, vehicle, and structural fires.

References:

J&B, chapter 26

Kirk's, chapter 7

501-27.1 ***The Investigator candidate shall identify the specialized techniques, practices, equipment, and terminology associated with the investigation of wildfires.***

501-27.2 ***The Investigator candidate shall identify and describe wildfire fuels.***

27.2.1 Fuel Condition Analysis

27.2.2 Ground Fuels

27.2.2.1 Duff

27.2.2.2 Roots

27.2.3 Surface Fuels

27.2.3.1 Fine Dead Wood

27.2.3.2 Dead Leaves and Coniferous Litter

27.2.3.3 Grass

27.2.3.4 Downed logs, Stumps, and Large Limbs

27.2.3.5 Low Brush and Reproduction

27.2.4 Aerial Fuels

27.2.4.1 Tree Branches and Crowns

27.2.4.2 Tree Moss

27.2.4.3 High Brush

27.2.5 Species

27.2.6 Fuel Size

27.2.7 Fuel Moisture Content

27.2.8 Oil Content

501-27.3 ***The Investigator candidate shall identify and describe the effects of weather on fire spread.***

27.3.1 Weather History

- 27.3.2 Temperature
- 27.3.3 Relative Humidity
- 27.3.4 Wind Influences
 - 27.3.4.1 Meteorological Winds
 - 27.3.4.2 Diurnal Winds
 - 27.3.4.3 Foehn Winds
 - 27.3.4.4 Fire Winds

501-27.4 ***The Investigator candidate shall identify, describe and interpret the effect of topography on fire spread.***

- 27.4.1 Slope
- 27.4.2 Aspect

501-27.5 ***The Investigator candidate shall be able to describe fire shape.***

- 27.5.1 Fire Head
- 27.5.2 Fire Flanks
- 27.5.3 Fire Heel
- 27.5.4 Factors Affecting Fire Spread
 - 27.5.4.1 Lateral Confinement
 - 27.5.4.2 Fuel Influence
 - 27.5.4.3 Suppression
- 27.5.5 Other Natural Mechanisms of Fire Spread
 - 27.5.5.1 Embers and Firebrands
 - 27.5.5.2 Fire Storms
 - 27.5.5.3 Animals

501-27.6 ***The Investigator candidate shall identify and describe indicators of a wildfire.***

- 27.6.1 Wildfire V-Shaped Patterns
- 27.6.2 Degree of Damage
- 27.6.3 Grass Stems
- 27.6.4 Angle of Char
- 27.6.5 White Ash Deposit
- 27.6.6 Cupping

- 27.6.7 Die-Out Pattern
- 27.6.8 Exposed and Protected Fuels
- 27.6.9 Staining and Sooting
- 27.6.10 Depth of Char
- 27.6.11 Spalling
- 27.6.12 Foliage Freeze
- 27.6.13 Curling

501-27.7 ***The Investigator candidate shall identify the area of origin of a wildfire.***

- 27.7.1 Initial Area of Investigation
- 27.7.2 General Origin Area
- 27.7.3 General Origin Investigation Techniques
- 27.7.4 Specific Origin Investigation Techniques
- 27.7.5 Search Equipment

501-27.8 ***The Investigator shall determine the cause of a wildfire.***

- 27.8.1 Natural Causes
- 27.8.2 Human Fire Causes

501-27.9 ***The Investigator candidate shall recognize that evidence protection, preservation, collection, and documentation at wildfires are similar to other fires.***

501-27.10 ***The Investigator candidate shall identify special safety considerations associated with investigation of wildfires.***

501-27.11 ***The Investigator candidate shall identify sources of information as prescribed in Annex B and Section B.11. .***

SECTION 28

MANAGEMENT OF COMPLEX INVESTIGATIONS

NFPA 1033 4.1 General

NFPA 1033 4.1.6 The fire investigator shall understand the organization and operation of the investigative team within an incident management system.

References:

J&B, chapter 27

501-28.1 ***The Investigator candidate shall distinguish those issues that are unique to managing investigations that are complex due to size, scope, or duration.***

28.1.1 Governmental Inquiry

28.1.2 Intent

28.1.3 Purpose

28.1.4 Interested Parties

28.1.5 Chapter Definitions

501-28.2 ***The Investigator candidate shall describe the basic information and documents associated with complex investigations.***

501-28.3 ***The Investigator candidate shall recognize the importance of communications among interested parties.***

28.3.1 Notice to Interested Parties

28.3.1.1 Entity in Control

28.3.1.2 All Interested Parties

28.3.1.3 Roster of Interested Parties

28.3.1.4 Notification of Changes

28.3.1.5 Making Notification

28.3.1.6 Content of Notification

28.3.1.7 Subsequent Notifications

28.3.2 Meetings

28.3.2.1 Preliminary Meeting

28.3.2.2 Meetings as the Investigation Progresses

28.3.2.3 Website

28.3.2.4 Additional Dissemination of Information

501-28.4 ***The Investigator candidate shall recognize the complexity of the investigation and ensure that all known interested parties are***

afforded an opportunity to investigate the incident and protect their respective interests, understandings or agreements.

- 28.4.1 Purposes
- 28.4.2 Scheduling
- 28.4.3 Cost Sharing
- 28.4.4 Nondisclosure Agreements
- 28.4.5 Protocols
- 28.4.6 Information Sharing
- 28.4.7 Interviews
- 28.4.8 Amendments to Agreements
- 28.4.9 Disagreements

501-28.5 The Investigator candidate shall identify and describe the components of managing a complex investigation.

- 28.5.1 Organizational Models
- 28.5.2 Control of the Site and Scene
 - 28.5.2.1 Securing the Site and Scene
 - 28.5.2.2 Delegation of Control
 - 28.5.2.3 Transfer of Control
 - 28.5.2.4 Site and Scene Access
 - 28.5.2.5 Site-Specific Restrictions or Requirements
 - 28.5.2.6 Scene Integrity
 - 28.5.2.7 Release of Information

501-28.6 The Investigator candidate shall recognize the unique components of handling evidence of a complex investigation.

- 28.6.1 Evidence Control
 - 29.6.1.1 Evidence Custodian
 - 29.6.1.2 Interested Party Responsibility
- 28.6.2 Evidence Removal from the Scene
- 28.6.3 Evidence Storage
- 28.6.4 Evidence Inspections
 - 28.6.4.1 Nondestructive Inspections
 - 28.6.4.2 Destructive Inspections
 - 28.6.4.3 Testing of Evidence

501-28.7 ***The Investigator candidate shall identify logistical support needs involving the complex investigation.***

- 28.7.1 Transportation
- 28.7.2 Equipment
- 28.7.3 Investigation Site Security
- 28.7.4 Decontamination
- 28.7.5 Environmental
- 28.7.6 Communications
- 28.7.7 Sanitary and Comfort Needs
- 28.7.8 Trash Disposal and Removal
- 28.7.9 Snow and Ice Removal
- 28.7.10 Lighting
- 28.7.11 Evidence Storage

501-28.8 ***The Investigator candidate shall distinguish the unique characteristics of safety at the complex investigation site.***

SECTION 29**MARINE FIRE INVESTIGATION****Annex A Explanatory Material**

NFPA 1033 A.1.1 The intent of this standard applies to all fire investigation, including outside, wildland, vehicle, and structural fires.

References:

J&B, chapter 28

Kirk's, chapter 7

501-29.1 ***The Investigator candidate shall identify the factors related to the investigations of fires involving recreational boats.***

501-29.2 ***The Investigator candidate shall define the following terms as they relate to Power Boat and Sailboat terminology.***

29.2.1 Accommodation space

29.2.2 Adrift

29.2.3 Afloat

29.2.4 Aft

29.2.5 Aground

29.2.6 Beam

29.2.7 Below

29.2.8 Bilge

29.2.9 Boat

29.2.10 Bulkhead

29.2.11 Cabin

29.2.12 Capsize

29.2.13 Chain plate

29.2.14 Deck

29.2.15 Dock

29.2.16 Dorade vent

- 29.2.17 Fender
- 29.2.18 Forward
- 29.2.19 Freeboard
- 29.2.20 Galley
- 29.2.21 Gear
- 29.2.22 Gunwale
- 29.2.23 Hatch
- 29.2.24 Hold
- 29.2.25 Hull
- 29.2.26 Inboard
- 29.2.27 Inboard/Out-Drive (I/O)
- 29.2.28 Outboard
- 29.2.29 Overboard
- 29.2.30 Port
- 29.2.31 Rub Rail
- 29.2.32 Shore power
- 29.2.33 Shroud
- 29.2.34 Sole
- 29.2.35 Starboard
- 29.2.36 Superstructure
- 29.2.37 Topside
- 29.2.38 Transom
- 29.2.39 Underway
- 29.2.40 Vessel
- 29.2.41 Waterline

501-29.3 ***The Investigator candidate shall recognize the importance of boat investigation safety.***

- 29.3.1 Safety Assessment
- 29.3.2 Inspection of Boats on Land
- 29.3.3 Inspection of Boats Afloat
- 29.3.4 Underwater Inspections
- 29.3.5 Specific Safety Concerns
 - 29.3.5.1 Confined Spaces
 - 29.3.5.1.1 Automatic Fire Suppression Systems Inactive/Deactivated
 - 29.3.5.2 Airborne Particulates
 - 29.3.5.3 Identify and Assess Energy Sources
 - 29.3.5.3.1 Batteries
 - 29.3.5.3.2 Inverters
 - 29.3.5.3.3 Shore Power
 - 29.3.5.4 Fuel Leaks
 - 29.3.5.5 Sewage Holding Tank
 - 29.3.5.6 Hydrogen Gas
 - 29.3.5.7 Other Hydrocarbon Contaminants
 - 29.3.5.8 Stability
 - 29.3.5.9 Damage to the Structure of the Boat
 - 29.3.5.10 Wharves, Docks, and Jetties
 - 29.3.5.11 Submerged Boat
 - 29.3.5.12 Visual Distress Signals and Pyrotechnics
- 29.3.6 Openings

501-29.4 ***The Investigator candidate shall identify the different marine systems and functions.***

- 29.4.1 Fuel Systems: Propulsion and Auxiliary
 - 29.4.1.1 Vacuum/Low Pressure Carbureted
 - 29.4.1.2 High-Pressure/Marine Fuel Injection Systems, Including Return Systems
 - 29.4.1.3 Diesel
- 29.4.2 Fuel Systems: Cooking and Heating
 - 29.4.2.1 Liquefied Petroleum Gases
 - 29.4.2.2 Compressed Natural Gas
 - 29.4.2.3 Alcohol
 - 29.4.2.4 Solid Fuels
 - 29.4.2.5 Diesel
- 29.4.3 Turbochargers/Super Chargers

- 29.4.4 Exhaust System
 - 29.4.4.1 Dry Exhaust Systems
 - 29.4.4.2 Wet Exhaust Systems
 - 29.4.4.3 De-watered Exhaust Systems
- 29.4.5 Electrical System
 - 29.4.5.1 Alternating Current (AC)
 - 29.4.5.2 Direct Current (DC)
- 29.4.6 Engine Cooling Systems
- 29.4.7 Ventilation
- 29.4.8 Transmissions
 - 29.4.8.1 Mechanical Gear Transmissions
 - 29.4.8.2 Hydraulic-Geared Transmissions
- 29.4.9 Accessories

501-29.5 ***The Investigator candidate shall identify the exterior construction of the vessel.***

- 29.5.1 Hull Construction
- 29.5.2 Superstructure Construction Material
- 29.5.3 Deck
- 29.5.4 Exterior Accessories

501-29.6 ***The Investigator candidate shall identify the interior construction of the vessel.***

- 29.6.1 Construction Materials
- 29.6.2 Finishes
 - 29.6.2.1 Accommodation Furnishings
 - 29.6.2.2 Interior Accessories
 - 29.6.2.3 Engine/Machinery Compartments
 - 29.6.2.4 Flammable/Explosive Vapor Detectors
 - 29.6.2.5 Storage and Holds
 - 29.6.2.6 Fuel Tanks

501-29.7 ***The Investigator candidate shall identify the propulsion system of the vessel.***

- 29.7.1 Electric Systems
- 29.7.2 Fuels for Boats with Motorized Propulsion Systems

- 29.7.2.1 Fuel Systems
 - 29.7.2.1.1 Engines
 - 29.7.2.1.1.1 Outboard Engines (Outboard Motors)
 - 29.7.2.1.1.2 Inboard Gasoline Engines
 - 29.7.2.1.1.3 Diesel Engines
 - 29.7.2.1.1.4 Propulsion System Fluids
 - 29.7.2.2 Appliance Fuel Systems
 - 29.7.2.3 Electric Generators
- 29.7.3 Other Fuel Systems Used for Propulsion

501-29.8 ***The Investigator candidate shall identify common ignition sources found in marine vessels.***

- 29.8.1 Open Flames
- 29.8.2 Electrical Sources
 - 29.8.2.1 Overloaded Wiring
 - 29.8.2.2 Electrical Short Circuiting and Arcs
 - 29.8.2.3 Electrical Connections
 - 29.8.2.4 Lightning
 - 29.8.2.5 Static Electricity and Incendive Arcs
- 29.8.3 Hot Surfaces
 - 29.8.3.1 Manifolds
 - 29.8.3.2 Exhaust Systems
 - 29.8.3.3 Cooking Surfaces
 - 29.8.3.4 Heating Systems
- 29.8.4 Mechanical
 - 29.8.4.1 Bearing Failures
 - 29.8.4.2 Friction
- 29.8.5 Smoking Materials

501-29.9 ***The Investigator candidate shall describe proper documentation of the boat fire scene.***

- 29.9.1 On Land
- 29.9.2 In Water
 - 29.9.2.1 Moored
 - 29.9.2.2 Anchored and Underway
 - 29.9.2.3 Underwater
- 29.9.3 Boat Identification
 - 29.9.3.1 Hull Identification Number (HIN)
 - 29.9.3.2 Registration Numbers
 - 29.9.3.3 U.S. Coast Guard Documentation Numbers

- 29.9.3.4 Boat Name and Hailing Port
- 29.9.3.5 Boat History
- 29.9.3.6 Fire Scene History
 - 29.9.3.6.1 Actions Before the Fire
 - 29.9.3.6.2 Actions During the Fire
 - 29.9.3.6.3 Actions After the Fire

29.9.4 Boat Particulars

501-29.10 ***The Investigator candidate shall identify the steps of a proper boat examination.***

29.10.1 General

29.10.2 Examination of Boat Systems

501-29.11 ***The Investigator candidate shall describe marine fire investigations of boats in structures.***

501-29.12 ***The Investigator candidate shall describe legal considerations related to marine fire investigations.***

SECTION 30

PRACTICAL EXERCISES

4.7 Presentations.

Duties shall include the presentation of findings to those individuals not involved in the actual investigations.

NFPA 1033 4.7.1 Prepare a written report, given investigative findings, documentation, and a specific audience, so that the report accurately reflects the investigative findings, is concise, expresses the investigator's opinion, contains facts and data that the investigator relies on in rendering an opinion, contains the reasoning of the investigator by which each opinion was reached, and meets the needs or requirements of the intended audience(s).

(A) Requisite Knowledge. Elements of writing, typical components of a written report, and types of audiences and their respective needs or requirements.

(B) Requisite Skills. Writing skills, ability to analyze information and determine the reader's needs or requirements.

NFPA 1033 4.7.2 Express investigative findings verbally, given investigative findings, notes, a time allotment, and a specific audience, so that the information is accurate, the presentation is completed within the allotted time, and the presentation includes only need-to-know information for the intended audience.

(A) Requisite Knowledge. Types of investigative findings, the informational needs of various types of audiences, and the impact of releasing information.

(B) Requisite Skills. Communication skills and ability to determine audience needs and correlate findings.

NFPA 1033 4.7.3 Testify during legal proceedings, given investigative findings, contents of reports, and consultation with legal counsel, so that all pertinent investigative information and evidence are presented clearly and accurately and the investigator's demeanor and attire are appropriate to the proceedings.

(A) Requisite Knowledge. Types of investigative findings, types of legal proceedings, professional demeanor requirements, and an understanding of due process and legal proceedings.

(B) Requisite Skills. Communication and listening skills and ability to differentiate facts from opinion and determine accepted procedures, practices, and etiquette during legal proceedings.

501-30.1 ***The Investigator candidate shall demonstrate proficiency in all required skills in the TCFP Fire Investigator Skills Manual.***

REFERENCE LIST FOR THE FIRE INVESTIGATOR CURRICULUM

This Reference List is provided as a general guide for both instructors and students to locate information pertaining to the specific objectives in the TCFP Curriculum. This list is **not** all-inclusive and does not in any way limit TCFP development and use of questions to test the objectives of the curriculum.

Required References

Certification Curriculum Manual. Austin, TX: Texas Commission on Fire Protection.

Emergency Response Guidebook, (Current ed.) U.S. Department of Transportation Research and Special Programs Administration, Office of Hazardous Materials Initiatives and Training.

Fire Inspection and Code Enforcement (8th ed.) (2016). Stillwater, OK: Fire Protection Publications. International Fire Service Training Association.

Fire Investigator: Principles and Practice (5th ed.) (2019). Burlington, MA: Jones and Bartlett Learning.

Icove, David J., *Kirk's Fire Investigation*, (8th ed.) (2018). New York, NY: Pearson Education, Inc.

Lentini, John J., *Scientific Protocols for Fire Investigation* (3rd ed.) (2019). Boca Raton, FL: CRC Press.

NFPA 921: Guide for Fire and Explosion Investigations (2021 ed.) Quincy, MA: National Fire Protection Association. NFPA Publications.

NFPA 1033: Standard for Professional Qualifications for Fire Investigator (2014 ed.) Quincy, MA: National Fire Protection Association. NFPA Publications.

Standards Manual for Fire Protection Personnel. Austin, TX: Texas Commission on Fire Protection.

ASTM E620 *Standard Practice for Reporting Opinions of Scientific or Technical Experts* (current ed.)

ASTM E678 *Standard Practice for Evaluation of Scientific or Technical Data* (current ed.)

ASTM E860 *Standard Practice for Examining and Preparing Items That Are Or May Become Involved in Criminal or Civil Litigation* (current ed.)

ASTM E1188 *Standard Practice for Collection and Preservation of Information and Physical Items by a Technical Investigator* (current ed.)

ASTM E1459 *Standard Guide for Physical Evidence Labeling and Related Documentation* (current ed.)

Recommended References

The most current edition of the following publications and media are recommended (not required) supplemental material for program use.

ASTM E1020 *Standard Practice for Reporting Incidents that May Involve Criminal or Civil Litigation* (current ed.)

ASTM E1492 *Standard Practice for Receiving, Documenting, Storing, and Retrieving Evidence in a Forensic Science Laboratory* (current ed.)

ASTM E2917 *Standard Practice for Forensic Science Practitioner Training, Continuing Education, and Professional Development Programs* (current ed.)

Building Construction Related to the Fire Service (4th ed.) (2016). Stillwater, OK: Fire Protection Publications. International Fire Service Training Association.

Cole, Lee S., *Investigation of Motor Vehicles*, (current ed.). Lee Books.

Crime Scene Investigation: A Guide for Law Enforcement (current ed.). Largo, FL: National Forensic Science Technology Center. (On 1/30/18 this publication was available online at <https://www.nist.gov/sites/default/files/documents/forensics/Crime-Scene-Investigation.pdf>)

Emergency Field Guide, (current ed.). NFPA. <https://catalog.nfpa.org/Emergency-Field-Guide-P13872.aspx>

***Crime Laboratory Service Manual Part II: Handbook.* Texas Department of Public Safety. Current edition. <http://www.dps.texas.gov/CrimeLaboratory/Pubs.htm>**

Fent, Kenneth. “Contamination of firefighter personal protective equipment and skin and the effectiveness of decontamination procedures.” *Journal of Occupational and Environmental Hygiene.* (2017).

Fire and Arson Scene Evidence: A Guide for Public Safety Personnel, (current ed.). Washington, DC: US Department of Justice, Office of Justice Programs. (On 1/30/18 this publication was available online at <https://www.ncjrs.gov/pdffiles1/nij/181584.pdf>)

Fire Protection, Detection, and Suppression Systems (5th ed.)(2016). Stillwater, OK: Fire Protection Publications. International Fire Service Training Association (IFSTA).

Fire Protection Handbook (current ed.). National Fire Protection Association.

Fires in Texas, Annual Fire Statistics report (current ed.) Texas State Fire Marshals Office. Department of Insurance, TEXFIRS section. A link to the report can be found on their website: www.tdi.texas.gov/fire/

Gorbett, Gregory E. *Fire Dynamics* (2nd ed.) (2016). Boston: Pearson.

Guide to Wildland Fire Origin and Cause Determination (PMS 412)(current ed.), National Wildfire Coordinating Group. (On 1/30/18 this publication was available online at <https://www.nwccg.gov/sites/default/files/publications/pms412.pdf>)

***Health Hazard Evaluation Report 96-0171-2692*. Bureau of Alcohol, Tobacco, and Firearms. Washington D.C. May 1988.**

Konefal, Joseph and Edward Nordskog. *Fire Death Scene Investigation*. (2019). Self-published. www.arsonprofiler.com.

Munday, James W., *Safety at Scenes of Fire and Related Incidents* (current ed.). London: The Fire Protection Association.

NFPA 170: Standard for Fire Safety and Emergency Symbols (current ed.) Quincy, MA: National Fire Protection Association. NFPA Publications.

NFPA 472: Standard for Professional Competence of Responders to Hazardous Materials Incidents (current ed.). Quincy, MA: National Fire Protection Association. NFPA Publications.

NFPA 556: Guide on Methods for Evaluating Fire Hazard to Occupants of Passenger Road Vehicles (current ed.) Quincy, MA: National Fire Protection Association. NFPA Publications.

NFPA 1037: Standard on Fire Marshal Professional Qualifications (current ed.). Quincy, MA: National Fire Protection Association. NFPA Publications.

NFPA 1730: Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operations (current ed.). Quincy, MA: National Fire Protection Association. NFPA Publications.

NIJ Research Report: *Death Investigation: A Guide for the Scene Investigator* (current ed.). US Department of Justice, Office of Justice Programs, National Institute of Justice. (On 1/30/18 this publication was available online at <https://www.ncjrs.gov/pdffiles1/nij/234457.pdf>)

Passenger Vehicle Identification Manual (current ed.) National Insurance Crime Bureau, 1111 E. Touhy Avenue, Suite 400, Des Plaines, IL 60018-2805.

Physical Evidence Handbook (current ed.). Texas Department of Public Safety. (On 1/30/18 this publication was available online at <https://www.dps.texas.gov/CrimeLaboratory/documents/PEHmanual.pdf>)

Pocket Guide to Fire and Arson Investigation (P7923) (current ed.). Factory Mutual Global.

Rules of Criminal Evidence, latest edition. (On 1/30/18, this information was available online at <http://www.txcourts.gov/rules-forms/rules-standards.aspx>).

Strengthening Forensic Science in the United States: A Path Forward, (current ed.) (Committee on Identifying the Needs for the Forensic Sciences Community. National Research Council. (On 1/30/18 this publication was available online at <https://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf>)

Texas Code of Criminal Procedure, latest edition. (On 1/30/18, this information was available online at <http://www.statutes.legis.state.tx.us/>).

Texas Family Code, current ed. (On 1/30/18, this information was available online at <http://www.statutes.legis.state.tx.us/>).

Texas Insurance Code, current ed. (On 1/30/18, this information was available online at <http://www.statutes.legis.state.tx.us/>).

Texas Penal Code, current ed. (On 1/30/18, this information was available online at <http://www.statutes.legis.state.tx.us/>).

Texas Public Information Act Handbook, current ed. (On 1/30/18, this information was available online at http://www.oag.state.tx.us/AG_publications/pdfs/publicinfo_hb.pdf. It is available through the Texas Attorney General's office.)

United States Constitution. (On 1/30/18, this information was available online at <http://www.archives.gov/exhibits/charters/charters.html>).

**CHAPTER FIVE
FIRE INVESTIGATOR
COURSE OUTLINE**

SECTION	SUBJECT	RECOMMENDED HOURS
501-1	Commission on Fire Protection Rules and Regulations	2
501-2	NFPA 1033 - Administration	
501-3	Definitions	
501-4	Basic Methodology	2
501-5	Basic Fire Science	16 8
501-6	Fire Effects and Fire Patterns	20 12
501-7	Building Systems	2
501-8	Active Fire Protection Systems	4 2
501-9	Electricity and Fire	8
501-10	Building Fuel Gas Systems	4
501-11	Fire-Related Human Behavior	4 2
501-12	Legal Considerations	12 8
501-13	Safety	4
501-14	Sources of Information	6
501-15	Planning the Investigation	2
501-16	Documentation of the Investigation	12 8
501-17	Physical Evidence	12 8
501-18	Origin Determination	8
501-19	Fire Cause Determination	4 3
501-20	Classification of Fire Cause	4
501-20	Analyzing the Incident for Cause and Responsibility	4
501-21	Failure Analysis and Analytical Tools	8 4
501-22	Explosions	8 4
501-23	Incendiary Fires	8
501-24	Fire and Explosion Deaths and Injuries	4
501-25	Appliances	2
501-26	Motor Vehicle Fires	8
501-27	Wildfire Investigations	8
501-28	Management of Complex Investigations	2
501-29	Marine Fire Investigations	2
501-30	Practical Exercises	24
	TOTAL HOURS RECOMMENDED	200 160

* The recommended hours include time for skills evaluation and is based on 12 students. Actual hours needed will depend on the number of students, the number of examiners, availability of equipment, and the student skill level.

4. Proposed amendments to 37 Tex. Administrative Code, Part 13, Chapter 421, Standards For Certification.

CHAPTER 421

STANDARDS FOR CERTIFICATION

§421.1. Procedures for Meetings.

- (a) Time and place. The Fire Fighter Advisory Committee and the Curriculum and Testing Committee shall meet at such time and place in the State of Texas as they deem proper. The Fire Fighter Advisory Committee shall meet at least twice each calendar year.
- (b) Meeting called. Meetings shall be called by the chairman, by the Commission, or upon the written request of five members.
- (c) Quorum. A majority of members shall constitute a quorum.
- (d) Members. The Fire Fighter Advisory Committee shall consist of nine members appointed by the Commission. The Curriculum and Testing Committee shall consist of members appointed by the Commission upon the recommendation of the Fire Fighter Advisory Committee. Committee members serve at the will of the Commission.
- (e) Officers. Officers of the Fire Fighter Advisory Committee and the Curriculum and Testing Committee shall consist of a chairman, vice-chairman, and secretary. Each committee shall elect its officers from the appointed members at its first meeting and thereafter at its first meeting following January 1 of each year or upon the vacancy of an office.
- (f) Responsibility. The Fire Fighter Advisory Committee shall review Commission rules relating to fire protection personnel and fire departments and recommend changes in the rules to the Commission.
- (g) Effective Date. Rules shall become effective no sooner than 20 days after filing with the Texas Register for final adoption. The committee or Commission may recommend a later effective date.
- (h) Removal. It is a ground for removal from an advisory committee appointed by the Commission if a member is absent from more than half of the regularly scheduled committee meetings that the member is eligible to attend during a calendar year unless the absence is excused by a majority vote of the committee.

§421.3. Minimum Standards Set by the Commission.

- (a) General statement. It shall be clearly understood that the specified minimum standards described in this section are designated as a minimum program. Employing entities are encouraged to exceed the minimum program wherever possible. Continuous in-service training beyond the minimum standards for fire protection personnel is strongly recommended. Nothing in these regulations shall limit or be construed as limiting the powers of the Civil Service Commission, or the employing entity, to enact rules and regulations which establish a higher standard of training than the minimum specified, or which provides for the termination of the services of unsatisfactory employees during or upon completion of the prescribed probationary period.
- (b) Functional position descriptions.
- (1) Structural Fire Protection personnel. The following general position description for structural fire protection personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the fire fighter operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. Successfully complete a commission approved course; achieve a passing score on written and performance certification examinations; must be at least 18 years of age; generally, the knowledge and skills required show the need for a high school education or equivalent; ability to communicate verbally, via telephone and radio equipment; ability to lift, carry, drag, and balance weight equivalent to the average human weight; ability to interpret in English, written and oral instructions; ability to work effectively in high stress situations; ability to work effectively in an environment with loud noises and flashing lights; ability to function through an entire work shift; ability to calculate weight and volume ratios; ability to read and understand English language manuals including chemical, medical and technical terms, and road maps; ability to accurately discern street signs and address numbers; ability to document in English, all relevant information in prescribed format in light of legal ramifications of such; ability to converse in English with coworkers and other emergency response personnel. Good manual dexterity with ability to perform all tasks related to the protection of life and property; ability to bend, stoop, and crawl on uneven surfaces; ability to withstand varied environmental conditions such as extreme heat, cold, and moisture; and ability to work in low or no light, confined spaces, elevated heights and other dangerous environments.

(B) Competency. A basic fire fighter must demonstrate competency handling emergencies utilizing equipment and skills in accordance with the objectives in Chapter 1 of the commission's Certification Curriculum Manual.

(2) Aircraft Rescue Fire Fighting personnel. The following general position description for aircraft rescue fire fighting personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of aircraft rescue fire fighting personnel operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. In addition to the qualifications for basic structural fire protection personnel: familiarity with geographic and physical components of an airport; ability to use and understand communication equipment, terminology, and procedures utilized by airports; ability and knowledge in the application of fire suppression agents; and ability to effectively perform fire suppression and rescue operations.

(B) Competency. Basic fire fighting and rescue personnel must demonstrate competency handling emergencies utilizing equipment and skills in accordance with the objectives in Chapter 2 of the commission's Certification Curriculum Manual.

(3) Marine Fire Protection personnel. The following general position description for marine fire protection personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the marine fire fighter operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. In addition to the qualifications for basic structural fire protection personnel: familiarity with geographic and physical components of a navigable waterway; ability to use and understand communication equipment, terminology, and procedures used by the maritime industry; and knowledge in the operation of fire fighting vessels.

(B) Competency. A marine fire fighter must demonstrate competency in handling emergencies utilizing equipment and skills in accordance with the objectives in Chapter 3 of the commission's Certification Curriculum Manual.

(4) Fire Inspection personnel. The following general position description for fire inspection personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the fire inspector operating in the State of Texas. It is

ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. Successfully complete a commission approved course; achieve a passing score on certification examinations; must be at least 18 years of age; generally, the knowledge and skills required to show the need for a high school education or equivalent; ability to communicate verbally, via telephone and radio equipment; ability to lift, carry, and balance weight equivalent to weight of common tools and equipment necessary for conducting an inspection; ability to interpret written and oral instructions; ability to work effectively with the public; ability to work effectively in an environment with potentially loud noises; ability to function through an entire work shift; ability to calculate area, weight and volume ratios; ability to read and understand English language manuals including chemical, construction and technical terms, building plans and road maps; ability to accurately discern street signs and address numbers; ability to document, in writing, all relevant information in a prescribed format in light of legal ramifications of such; ability to converse in English with coworkers and other personnel. Demonstrate knowledge of characteristics and behavior of fire, and fire prevention principles. Good manual dexterity with the ability to perform all tasks related to the inspection of structures and property; ability to bend, stoop, and crawl on uneven surfaces; ability to climb ladders; ability to withstand varied environmental conditions such as extreme heat, cold, and moisture; and the ability to work in low light, confined spaces, elevated heights, and other dangerous environments.

(B) Competency. A fire inspector must demonstrate competency in conducting inspections utilizing equipment and skills in accordance with the objectives in Chapter 4 of the commission's Certification Curriculum Manual.

(5) Fire Investigator personnel. The following general position description for fire investigator personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the fire investigator operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. Successfully complete a commission approved course; achieve a passing score on certification examinations; be at least 18 years of age; generally, the knowledge and skills required to show the need for a high school education or equivalent; ability to communicate verbally, via telephone and radio equipment; ability to lift, carry, and balance weight equivalent to weight of common tools and equipment necessary for conducting an investigation; ability to interpret written and oral instructions; ability to work effectively with the public; ability to work effectively in a hazardous environment; ability to function through an entire work shift; ability to calculate area, weight and volume ratios; ability to read and understand English language manuals including chemical, legal and technical terms, building plans and road maps; ability to accurately discern street signs and address numbers; ability to document, in writing, all relevant information in a prescribed format in light of legal ramifications of such; ability to converse in English with coworkers and other personnel. Good manual dexterity with the ability to perform all tasks related to fire investigation; ability to bend, stoop, and walk on uneven surfaces; ability to climb ladders; ability to withstand varied environmental conditions such as extreme heat, cold and moisture; and the ability to work in low light, confined spaces, elevated heights, and other potentially dangerous environments.

(B) Competency. A fire investigator or arson investigator must demonstrate competency in determining fire cause and origin utilizing equipment and skills in accordance with the objectives in Chapter 5 of the commission's Certification Curriculum Manual.

(6) Hazardous Materials Technician personnel. The following general position description for hazardous materials personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the hazardous materials technician operating in

the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. In addition to the qualifications for basic structural fire protection personnel: successfully complete a commission approved course; achieving a passing score on the certification examination; the ability to analyze a hazardous materials incident, plan a response, implement the planned response, evaluate the progress of the planned response, and terminate the incident.

(B) Competency. A hazardous materials technician must demonstrate competency handling emergencies resulting from releases or potential releases of hazardous materials, using specialized chemical protective clothing and control equipment in accordance with the objectives in Chapter 6 of the commission's Certification Curriculum Manual.

(7) Hazardous Materials Incident Commander personnel. The following general position description for Hazardous Materials Incident Commander serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the Hazardous Materials Incident Commander operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. In addition to the qualifications for awareness and operations level personnel, the Hazardous Materials Incident Commander is an individual who has met all the job performance requirements of Hazardous Materials Incident Commander as defined in Chapter 8 of NFPA 472, Competence of Responders to Hazardous Materials Incidents/Weapons of Mass Destruction. The individual should demonstrate knowledge in the policies, plans, and procedures regarding hazardous materials response as adopted by the local jurisdiction; and all components of the incident command system and their proper utilization.

(B) Competency. In addition to the competencies of awareness and operations level personnel, a Hazardous Materials Incident Commander must demonstrate competency in such areas as: analyzing an incident via the collection of information and an estimation of potential outcomes; planning appropriate response operations; implementing a planned response; evaluating the progress of a planned response and revising as necessary; terminating an incident; conducting a post-incident critique; and reporting and documenting an incident in a manner consistent with local, state, and federal requirements.

(8) Driver/Operator-Pumper personnel. The following general position description for driver/operator-pumper personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the driver/operator-pumper of a fire department pumper operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. In addition to the qualifications for basic structural fire protection personnel: ability to perform specified routine test, inspection, and maintenance functions; ability to perform practical driving exercises; ascertain the expected fire flow; ability to position a fire department pumper to operate at a fire hydrant; ability to produce effective streams; and supply sprinkler and standpipe systems.

(B) Competency. A driver/operator-pumper must demonstrate competency operating a fire department pumper in accordance with the objectives in Chapter 7 of the commission's Certification Curriculum Manual.

(9) Fire Officer I personnel. The following general position description for Fire Officer I personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the Fire Officer I operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. In addition to the qualifications for basic structural fire protection and Fire Instructor I personnel: the ability to supervise personnel, and assign tasks at emergency operations; the ability to direct personnel during training activities; the ability to recommend action for member-related problems; the ability to coordinate assigned tasks and projects, and deal with inquiries and concerns from members of the community; the ability to implement policies; the ability to perform routine administrative functions, perform preliminary fire investigation, secure an incident scene and preserve evidence; the ability to develop pre-incident plans, supervise emergency operations, and develop and implement action plans; the ability to deploy assigned resources to ensure a safe work environment for personnel, conduct initial accident investigation, and document an incident.

(B) Competency. A Fire Officer I must demonstrate competency in handling emergencies and supervising personnel utilizing skills in accordance with the objectives in Chapter 9 of the commission's Certification Curriculum Manual.

(10) Fire Officer II personnel. The following general position description for Fire Officer II personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the Fire Officer II operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. In addition to the qualifications for Fire Officer I and Fire Instructor I personnel: the ability to motivate members for maximum job performance; the ability to evaluate job performance; the ability to deliver life safety and fire prevention education programs; the ability to prepare budget requests, news releases, and policy changes; the ability to conduct pre-incident planning, fire inspections, and fire investigations; the ability to supervise multi-unit emergency operations, identify unsafe work environments or behaviors, review injury, accident, and exposure reports.

(B) Competency. A Fire Officer II must demonstrate competency in supervising personnel and coordinating multi-unit emergency operations utilizing skills in accordance with the objectives in Chapter 9 of the commission's Certification Curriculum Manual.

(11) Fire Officer III personnel. The following general position description for Fire Officer III personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the Fire Officer III operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. A Fire Officer III is a midlevel supervisor who performs both supervisory and first-line managerial functions. In addition to the qualifications and competency for Fire Officer II, the Fire Officer III is an individual who has met all the job performance requirements of Fire Officer III as defined in Chapter 6 of NFPA 1021, Standard for Fire Officer Professional Qualifications. Typical duties of an individual at the Fire Officer III level include: establishing procedures for hiring, assignment, and professional development of personnel; developing public service/partnership and programs; preparing budgets and budget management systems; planning for organizational resource management; evaluating inspection and public safety programs and plans; managing multi-agency plans and operations; serving as Incident Commander at expanding emergency incidents for all hazard types; and developing and managing a departmental safety program.

(B) Competency. A Fire Officer III must demonstrate competency doing research; analyzing data and using evaluative techniques; developing proposals; developing, preparing, and implementing various procedures and programs within an organization; managing personnel resources; preparing and managing budgets; utilizing techniques to encourage personnel participation and development; and working in top-level positions within the incident command system.

(12) Fire Officer IV personnel. The following general position description for Fire Officer IV personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the Fire Officer IV operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. A Fire Officer IV is an upper level supervisor who performs both supervisory and managerial functions. In addition to the qualifications and competency for Fire Officer III, the Fire Officer IV is an individual who has met all the job performance requirements of Fire Officer IV as defined in Chapter 7 of NFPA 1021, Standard for Fire Officer Professional Qualifications. Typical duties of an individual at the Fire Officer IV level include: administering job performance requirements; evaluating and making improvements to department operations; developing long-range plans and fiscal projections; developing plans for major disasters; serving as Incident Commander at major incidents for all hazard types; and administering comprehensive risk management programs.

(B) Competency. A Fire Officer IV must demonstrate competency in appraising and evaluating departmental programs to ensure adherence to current laws and best practices; developing medium and long-range plans for organizations; and assuming a top-level leadership role in both the organization and community.

(13) Fire Service Instructor I personnel. The following general position description for Fire Service Instructor I personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the Fire Service Instructor I operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. In addition to successfully completing a commission approved course and achieving a passing score on the certification examination: must have the ability to deliver instructions effectively from a prepared lesson plan; the ability to use instructional aids and evaluation instruments; the ability to adapt to lesson plans to the unique requirements of both student and the jurisdictional authority; the ability to organize the learning environment to its maximum potential; the ability to meet the record-keeping requirements of the jurisdictional authority.

(B) Competency. A Fire Service Instructor I must demonstrate competency in delivering instruction in an environment organized for efficient learning while meeting the record-keeping needs of the authority having jurisdiction, utilizing skills in accordance with the objectives in Chapter 8 of the commission's Certification Curriculum Manual.

(14) Fire Service Instructor II personnel. The following general position description for Fire Service Instructor II personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the Fire Service Instructor II operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. In addition to successfully completing a commission approved course, achieving a passing score on the certification examination, and meeting the qualifications for Fire Service Instructor I: the ability to develop individual lesson plans for a specific topic, including learning objectives, instructional aids, and evaluation instruments; the ability to schedule training sessions based on the overall training plan of the jurisdictional authority; the ability to supervise and coordinate the activities of other instructors.

(B) Competency. A Fire Service Instructor II must demonstrate competency in developing individual lesson plans; scheduling training sessions; and supervising other instructors, utilizing

skills in accordance with the objectives in Chapter 8 of the commission's Certification Curriculum Manual.

(15) Fire Service Instructor III personnel. The following general position description for Fire Service Instructor III personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the Fire Service Instructor III operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. In addition to successfully completing a commission approved course, achieving a passing score on the certification examination, and meeting the qualifications for Fire Service Instructor II: the ability to develop comprehensive training curricula and programs for use by single or multiple organizations; the ability to conduct organizational needs analysis; and the ability to develop training goals and implementation strategies.

(B) Competency. A Fire Service Instructor III must demonstrate competency in developing comprehensive training curricula and programs; conducting organizational needs analysis; and developing training goals and implementation strategies, utilizing skills in accordance with the objectives in Chapter 8 of the commission's Certification Curriculum Manual.

(16) Incident Safety Officer personnel. The following general position description for Incident Safety Officer personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the Incident Safety Officer operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. An Incident Safety Officer is an individual who has met the requirements of Fire Officer Level I specified in NFPA 1021, Standard for Fire Officer Professional Qualifications and Chapter 6 of NFPA 1521, Standard for Fire Department Safety Officer and has the knowledge, skill, and abilities to manage incident scene safety. Typical Incident Safety Officer duties include risk and resource evaluation; hazard identification and communication; action plan reviews; safety briefings; accident investigation; post incident analysis; and participation in safety committee activities.

(B) Competency. An Incident Safety Officer must demonstrate competency in management of incident scene safety through a working knowledge of the various emergency operations as prescribed by the local jurisdiction; an understanding of building construction; fire science and fire behavior; managing an organization's personnel accountability system; and incident scene rehabilitation methodology.

(17) Basic Wildland Fire Protection personnel. The following general position description for Basic Wildland Fire Protection personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the Basic Wildland Fire Fighter operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. A Basic Wildland Fire Fighter is an individual who has met the requirements of Chapter 5 of NFPA 1051, Standard for Wildland Fire Fighter Professional qualifications, and should demonstrate knowledge in: wildland fire behavior; fireline safety and use; limitations of personal protective equipment; fire shelter use; fire suppression tactics and techniques in wildland settings; and have an understanding of the fire fighter's role within the local incident management system.

(B) Competency. A Basic Wildland Fire Fighter must demonstrate competency in such areas as: maintaining personal protective equipment and assigned fire suppression tools and equipment; the ability to quickly prepare for a response when notified; recognizing hazards and unsafe situations

in a wildland fire; securing a fire line; mopping up a fire area; and patrolling a fire area so as to ensure fire control.

(18) Intermediate Wildland Fire Protection personnel. The following general position description for Intermediate Wildland Fire Protection personnel serves as a guide for anyone interested in understanding the qualifications, competencies, and tasks required of the Intermediate Wildland Fire Fighter operating in the State of Texas. It is ultimately the responsibility of an employer to define specific job descriptions within each jurisdiction.

(A) Qualifications. In addition to the qualifications and competency for the Basic Wildland Fire Fighter, the Intermediate Wildland Fire Fighter is an individual who has met the requirements of Chapter 6 of NFPA 1051, Standard for Wildland Fire Fighter Professional qualifications, and should demonstrate knowledge in: basic map reading; use of a locating device such as a compass; radio procedures as adopted by the local jurisdiction; and record keeping.

(B) Competency. An Intermediate Wildland Fire Fighter must demonstrate competency in such areas as: the ability to lead a team of fire fighters in the performance of assigned tasks while maintaining the safety of personnel; implementing appropriate fireline construction methods and other techniques for protection of exposed property; operation of water delivery equipment; securing an area of suspected fire origin and associated evidence; and serving as a lookout in a wildland fire.

§421.5. Definitions.

The following words and terms, when used in the Standards Manual, shall have the following meanings, unless the context clearly indicates otherwise.

(1) Admission to employment--An entry level full-time employee of a local government entity in one of the categories of fire protection personnel.

(2) Appointment--The designation or assignment of a person to a discipline regulated by the commission. The types of appointments are:

(A) permanent appointment--the designation or assignment of certified fire protection personnel or certified part time fire protection employees to a particular discipline (See Texas Government Code, Chapter 419, §419.032); and

(B) probationary or temporary appointment--the designation or assignment of an individual to a particular discipline, except for head of a fire department, for which the individual has passed the commission's certification and has met the medical requirement of §423.1(c) of this title (relating to Minimum Standards for Structure Fire Protection Personnel), if applicable, but has not yet been certified. (See Texas Government Code, Chapter, §419.032.)

(3) Approved training--Any training used for a higher level of certification must be approved by the commission and assigned to either the A-List or the B-List. The training submission must be in a manner specified by the commission and contain all information requested by the commission. The commission will not grant credit twice for the same subject content or course. Inclusion on the A-List or B-List does not preclude the course approval process as stated elsewhere in the Standards Manual.

(4) Assigned/work--A fire protection personnel or a part-time fire protection employee shall be considered "assigned/working" in a position, any time the individual is receiving compensation and performing the duties that are regulated by the commission and has been permanently appointed, as defined in this section, to the particular discipline.

(5) Assistant fire chief--The officer occupying the first position subordinate to the head of a fire department.

(6) Auxiliary fire fighter--A volunteer fire fighter.

(7) Benefits--Benefits shall include, but are not limited to, inclusion in group insurance plans (such as health, life, and disability) or pension plans, stipends, free water usage, and reimbursed travel expenses (such as meals, mileage, and lodging).

(8) Chief Training Officer--The individual, by whatever title he or she may be called, who coordinates the activities of a certified training facility.

(9) Class hour--Defined as not less than 50 minutes of instruction, also defined as a contact hour; a standard for certification of fire protection personnel.

(10) Code--The official legislation creating the commission.

(11) College credits--Credits earned for studies satisfactorily completed at an institution of higher education accredited by an agency recognized by the U.S. Secretary of Education and including National Fire Academy (NFA) open learning program colleges, or courses recommended for college credit by the American Council on Education (ACE) or delivered through the National Emergency Training Center (both EMI and NFA) programs. A course of study satisfactorily completed and identified on an official transcript from a college or in the ACE National Guide that is primarily related to Fire Service, Emergency Medicine, Emergency Management, or Public Administration is defined as applicable for Fire Science college credit, and is acceptable for higher levels of certification. A criminal justice course related to fire and or arson investigation that is satisfactorily completed and identified on an official transcript from a college or in the ACE National Guide may be used to qualify for Master Arson Investigator certification.

(12) Commission--Texas Commission on Fire Protection.

(13) Commission-recognized training--A curriculum or training program which carries written approval from the commission, or credit hours that appear on an official transcript from an accredited college or university, or any fire service training received from a nationally recognized source, i.e., the National Fire Academy.

(14) Compensation--Compensation is to include wages, salaries, and "per call" payments (for attending drills, meetings or answering emergencies).

(15) Expired--Any certification that has not been renewed on or before the end of the certification period.

(16) Federal fire fighter--A person as defined in Texas Government Code, Chapter 419, §419.084(h).

(17) Fire chief--The head of a fire department.

(18) Fire department--A department of a local government that is staffed by one or more fire protection personnel or part-time fire protection employees.

(19) Fire protection personnel--Any person who is a permanent full-time employee of a fire department or governmental entity and who is appointed duties in one of the following categories/disciplines: fire suppression, fire inspection, fire and arson investigation, marine fire fighting, aircraft rescue fire fighting, fire training, fire education, fire administration and others employed in related positions necessarily or customarily appertaining thereto.

- (20) Fire Code Inspection—Also called Fire Safety Inspection as referenced in Texas Government Code, Chapter 419, §419.909. An inspection performed for the purpose of determining and enforcing compliance with an adopted fire code.
- (21) Fire suppression duties--Engaging in the controlling or extinguishment of a fire of any type or performing activities which are required for and directly related to the control and extinguishment of fires or standing by on the employer's premises or apparatus or nearby in a state of readiness to perform these duties.
- (22) Full-time--An officer or employee is considered full-time if the employee works an average of 40 hours a week or averages 40 hours per week or more during a work cycle in a calendar year. For the purposes of this definition paid leave will be considered time worked.
- (23) Government entity--The local authority having jurisdiction as employer of full-time fire protection personnel in a state agency, incorporated city, village, town or county, education institution or political subdivision.
- (24) High school--A school accredited as a high school by the Texas Education Agency or equivalent accreditation agency from another jurisdiction.
- (25) Immediately dangerous to life or health (IDLH)--An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.
- (26) Incipient stage fire--A fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers, Class II standpipe or small hose systems without the need for protective clothing or breathing apparatus.
- (27) Instructor:
- (A) Lead Instructor--Oversees the presentation of an entire course and assures that course objectives are met in accordance with the applicable curriculum or course material. The lead instructor should have sufficient experience in presenting all units of the course so as to be capable of last-minute substitution for other instructors.
 - (B) Instructor (also Unit Instructor for wildland courses)--Responsible for the successful presentation of one or more areas of instruction within a course, and should be experienced in the lesson content they are presenting.
 - (C) Guest Instructor--An individual who may or may not hold Instructor certification but whose special knowledge, skill, and expertise in a particular subject area may enhance the effectiveness of the training in a course. Guest instructors shall teach under the endorsement of the lead instructor.
- (28) Interior structural fire fighting--The physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage. (See 29 CFR §1910.155.)
- (29) Military active duty (or active duty)-Current full-time military service in the armed forces of the United States, or full-time military service as a member of the Texas military forces or a similar service of another state.
- (30) Military service member-A person who is on active duty.
- (31) Military spouse-A person who is married to a military service member.

(32) Military veteran--A person who has served on active duty and who was discharged or released from active duty.

(33) Municipality--Any incorporated city, village, or town of this state and any county or political subdivision or district in this state. Municipal pertains to a municipality as defined in this section.

(34) National Fire Academy semester credit hours--The number of hours credited for attendance of National Fire Academy courses is determined as recommended in the most recent edition of the "National Guide to Educational Credit for Training Programs," American Council on Education (ACE).

(35) National Fire Protection Association (NFPA)--An organization established to provide and advocate consensus codes and standards, research, training, and education for fire protection.

(36) National Wildfire Coordinating Group (NWCG)--An operational group designed to establish, implement, maintain, and communicate policy, standards, guidelines, and qualifications for wildland fire program management among participating agencies.

(37) Non-self-serving affidavit--A sworn document executed by someone other than the individual seeking certification.

(38) Participating volunteer fire fighter--An individual who voluntarily seeks certification and regulation by the commission under the Texas Government Code, Chapter 419, Subchapter D.

(39) Participating volunteer fire service organization--A fire department that voluntarily seeks regulation by the commission under the Texas Government Code, Chapter 419, Subchapter D.

(40) Part-time fire protection employee--An individual who is appointed as a part-time fire protection employee and who receives compensation, including benefits and reimbursement for expenses. A part-time fire protection employee is not full-time as defined in this section.

(41) Personal alert safety system (PASS)--Devices that are certified as being compliant with NFPA 1982 and that automatically activates an alarm signal (which can also be manually activated) to alert and assist others in locating a fire fighter or emergency services person who is in danger.

(42) Political subdivision--A political subdivision of the State of Texas that includes, but is not limited to the following:

- (A) city;
- (B) county;
- (C) school district;
- (D) junior college district;
- (E) levee improvement district;
- (F) drainage district;
- (G) irrigation district;
- (H) water improvement district;

(I) water control and improvement district;

(J) water control and preservation district;

(K) freshwater supply district;

(L) navigation district;

(M) conservation and reclamation district;

(N) soil conservation district;

(O) communication district;

(P) public health district;

(Q) river authority;

(R) municipal utility district;

(S) transit authority;

(T) hospital district;

(U) emergency services district;

(V) rural fire prevention district; and

(W) any other governmental entity that:

(i) embraces a geographical area with a defined boundary;

(ii) exists for the purpose of discharging functions of the government; and

(iii) possesses authority for subordinate self-government through officers selected by it.

(43) Pre-fire Planning—Also called a Pre-fire Survey. A walk-through performed by fire fighters for the purpose of gaining familiarity with a building, its contents, and its occupancy.

(44) Reciprocity for IFSAC seals and TEEEX Pro Board certificates--Valid documentation of accreditation from the International Fire Service Accreditation Congress and the National Board on Fire Service Professional Qualifications issued by the Texas A&M Engineering Extension Service used for commission certification may only be used for obtaining an initial certification.

(45) Recognition of training--A document issued by the commission stating that an individual has completed the training requirements of a specific phase level of the Basic Fire Suppression Curriculum.

(46) School--Any school, college, university, academy, or local training program which offers fire service training and included within its meaning the combination of course curriculum, instructors, and facilities.

(47) Structural fire protection personnel--Any person who is a permanent full-time employee of a government entity who engages in fire fighting activities involving structures and may perform other emergency activities typically associated with fire fighting activities such as rescue, emergency medical response, confined space rescue, hazardous materials response, and wildland fire fighting.

(48) Trainee--An individual who is participating in a commission approved training program.

(49) Volunteer fire protection personnel--Any person who has met the requirements for membership in a volunteer fire service organization, who is assigned duties in one of the following categories: fire suppression, fire inspection, fire and arson investigation, marine fire fighting, aircraft rescue fire fighting, fire training, fire education, fire administration and others in related positions necessarily or customarily appertaining thereto.

(50) Volunteer fire service organization--A volunteer fire department or organization not under mandatory regulation by the commission.

(51) Years of experience--For purposes of higher levels of certification or fire service instructor certification:

(A) Except as provided in subparagraph (B) of this paragraph, years of experience is defined as full years of full-time, part-time or volunteer fire service while holding:

(i) a commission certification as a full-time, or part-time employee of a government entity, a member in a volunteer fire service organization, and/or an employee of a regulated non-governmental fire department; or

(ii) a State Firemen's and Fire Marshals' Association advanced fire fighter certification and have successfully completed, as a minimum, the requirements for an Emergency Care Attendant (ECA) as specified by the Department of State Health Services (DSHS), or its successor agency, or its equivalent; or

(iii) an equivalent certification as a full-time fire protection personnel of a governmental entity from another jurisdiction, including the military, or while a member in a volunteer fire service organization from another jurisdiction, and have, as a minimum, the requirements for an ECA as specified by the DSHS, or its successor agency, or its equivalent; or

(iv) for fire service instructor eligibility only, a State Firemen's and Fire Marshals' Association Level II Instructor Certification, received prior to June 1, 2008 or Instructor I received on or after June 1, 2008 or an equivalent instructor certification from the DSHS or the Texas Commission on Law Enforcement. Documentation of at least three years of experience as a volunteer in the fire service shall be in the form of a non self-serving sworn affidavit.

(B) For fire service personnel certified as required in subparagraph (A) of this paragraph on or before October 31, 1998, years of experience includes the time from the date of employment or membership to date of certification not to exceed one year.

§421.9. Designation of Fire Protection Duties.

(a) An individual who performs one or more fire protection duties, listed in the Texas Government Code, §419.021(3)(C), for a fire department of local government entity shall be designated to only one of the following categories:

- (1) fire protection personnel;
- (2) a part-time fire protection employee; or
- (3) a volunteer fire fighter or other auxiliary fire fighter.

(b) A fire department regulated by the Commission may not designate the same person under more than one category under this section. The designation shall be made on the records of the department and the designation shall be made available for inspection by the Commission or sent to the Commission on request.

(c) A fire department regulated by the Commission shall report the appointment of fire protection personnel to a regulated discipline via the Commission's online management program, or the appropriate form if available. Fire protection personnel who are assigned to a regulated discipline as part of their regularly assigned duties shall be appointed to that discipline with the Commission. No individual may be appointed to a discipline without approval by the Commission. The Commission shall not approve an initial appointment to a regulated discipline until it has reviewed and approved a person's fingerprint-based criminal history record. Termination of fire protection personnel or part-time fire protection employees shall be reported to the Commission via the Commission's online management program, or the appropriate form if available within 14 calendar days of the action. In the case of termination, the employing entity shall report an individual's last known home address to the Commission. A Removal from Appointment form may be submitted without the employee's signature.

(d) A fire department may not in a calendar year compensate, reimburse, or provide benefits to a person the department has designated as a volunteer or other auxiliary fire fighter in an amount that is equal to or more than what a person receives working 2,080 hours at the federal minimum wage.

(e) A person certified as fire protection personnel in one fire department may be employed and designated as a part-time fire protection employee in another fire department without additional certification as a part-time fire protection employee.

§421.11. Requirement To Be Certified Within One Year.

(a) Except for subsection (c) and (d) of this section, fire protection personnel or part-time fire protection employees of a fire department who are appointed duties identified as fire protection personnel duties must be certified by the commission in the discipline(s) to which they are assigned within one year of their appointment to the duties or within two years of successfully passing the applicable commission examination, whichever is less. The commission shall not approve an initial certification for a regulated discipline until it has reviewed and approved a person's fingerprint-based criminal history record. An individual who accepts appointment(s) in violation of this section shall be removed from the appointment(s) and will be subject to administrative penalties. A department or local government that appoints an individual in violation of this section will also be subject to administrative penalties.

(b) An individual who has been removed from appointment to duties identified as fire protection personnel duties for violation of this section must petition the commission in writing for permission to be reappointed to the duties from which they were removed. The petition will be considered only if the individual has obtained all appropriate certification(s) applicable to the duties to which the individual seeks reappointment.

(c) A military spouse may be appointed to fire protection personnel duties with a regulated fire department without being required to obtain the applicable certification, provided the military spouse submits the following to the commission prior to appointment and has received confirmation of approval from the commission:

- (1) notification to the commission of intent to perform regulated fire protection duties;
- (2) documentation of equivalent certification from another jurisdiction;
- (3) a fingerprint-based criminal history record using the commission approved system;
- (4) proof of residency in Texas; and
- (5) a copy of the individual's military identification card.

(d) A military spouse appointed to fire protection duties under this section may engage in those duties only for the period in which the military service member to whom the spouse is married is stationed at a military installation in Texas, but not to exceed three years from the date the military spouse receives approval from the commission to engage in those duties.

§421.13. Individual Certificate Holders.

(a) Employment is not mandatory for certification. An individual may hold or renew any certificate issued by the commission for which they maintain their qualifications.

(b) An individual certificate holder must notify the commission of a change of his or her home address within 14 calendar days of a change of address.

§421.15. Extension of Training Period.

A fire department may apply to the commission for an extension of the one-year training period, identified in §419.032(c) of the Government Code, for a time period not exceeding two years from the date of original appointment as follows:

- (1) the request for extension shall be placed on the Fire Fighter Advisory Committee's (FFAC's) agenda to be heard at its next regular or special called meeting after submission of the request;
- (2) after review by the FFAC, the application along with the FFAC's recommendations will be sent to the commission to be heard at its next regular meeting. If the request for extension is approved by the commission, the extension shall become effective immediately; and
- (3) the one-year extension of training time, if granted, shall run from the date of forfeiture and removal or, at the latest, from one year after the original date training began, whichever occurs first.

§421.17. Requirement to Maintain Certification.

(a) All full-time or part-time employees of a fire department or local government assigned duties identified as fire protection personnel duties must maintain certification by the commission in the discipline(s) to which they are assigned for the duration of their assignment.

(b) In order to maintain the certification required by this section, the certificate(s) of the employees must be renewed annually by complying with §437.5 of this title (relating to Renewal Fees) and Chapter 441 of this title (relating to Continuing Education) of the commission standards manual.

(c) Except for subsection (d) of this section, an individual whose certificate has been expired for one year or longer may not renew the certificate previously held. To obtain a new certification, an individual must meet the requirements in Chapter 439 of this title (relating to Examinations for Certification).

(d) A military service member whose certificate has been expired for three years or longer may not renew the certificate previously held. To obtain a new certification, the person must meet the

requirements in Chapter 439 of this title (relating to Examinations for Certification). In order to qualify for this provision, the individual must have been a military service member at the time the certificate expired and continued in that status for the duration of the three year period.

(e) The commission will provide proof of current certification to individuals whose certification has been renewed.

~~[(f) All certificate holders are subject to the requirements of §57.491 of the Texas Education Code regarding license renewal and default on student loans.]~~

5. **Proposed amendments to 37 Tex. Administrative Code, Part 13, Chapter 429, Fire Inspector and Plan Examiner, Subchapter B, Minimum Standards For Plan Examiner, §429.201, Minimum Standard For Plan Examiner Personnel.**

CHAPTER 429

FIRE INSPECTOR AND PLAN EXAMINER

SUBCHAPTER B

MINIMUM STANDARDS FOR PLAN EXAMINER

§429.201. Minimum Standards for Plan Examiner Personnel.

~~[(a)]~~ Plan examiner duties are defined as the review of building or other structure plans for the purpose of determining compliance with adopted fire codes and standards.

~~[(b) Special temporary provision. Individuals are eligible to apply for Plan Examiner certification if they hold an active Fire Inspector certification and any of the following criteria is met:~~

~~———— (1) the individual passed the Plan Examiner section of a Fire Inspector exam at any time; or~~

~~———— (2) the individual is or has been assigned to plan review duties with a local jurisdiction. Verification of plan review duties must be in the form of a letter from the head of the department for the jurisdiction; or~~

~~———— (3) the individual is or has served as an instructor for a Fire Inspector training program approved by the commission for Fire Inspector certification. Verification of instructor duties must be in the form of a letter from the head of the department if the training program is part of a suppression or prevention department, or the chief training officer if the program is not a part of a suppression or prevention department.~~

~~———— (4) This subsection will expire on September 1, 2020.]~~

§429.203. Minimum Standards for Plan Examiner I Certification.

In order to be certified as a Plan Examiner I, an individual must:

(1) possess valid documentation as a Plan Examiner I from either:

(A) the International Fire Service Accreditation Congress; or

(B) the National Board on Fire Service Professional Qualifications issued by the Texas A&M Engineering Extension Service using the 2009 or later edition of the NFPA standard applicable to this discipline and meeting the requirements as specified in §439.1(a)(2) of this title (relating to Requirements—General); or

(2) complete a commission approved Plan Examiner I training program and successfully pass the commission examination as specified in Chapter 439 of this title (relating to Examinations for Certification). An approved training program shall consist of one of the following:

(A) completion of the commission approved Plan Examiner I Curriculum, as specified in the commission's Certification Curriculum Manual; or

(B) successful completion of an out-of-state, NFA, and/or military training program which has been submitted to the commission for evaluation and found to meet the minimum requirements as

listed in the commission approved Plan Examiner I Curriculum as specified in the commission's Certification Curriculum Manual; or

(C) documentation of the receipt of a Plan Examiner I certificate issued by the State Firemen's and Fire Marshals' Association of Texas that is deemed equivalent to a commission approved Plan Examiner I curriculum.

§429.205. International Fire Service Accreditation Congress (IFSAC) Seal.

(a) Individuals who pass the state examination may be granted an IFSAC seal for Plan Examiner I by making application to the commission for the IFSAC seal and paying the associated fee.

(b) In order to qualify for an IFSAC seal, an individual must submit the application for the seal prior to the expiration of the examination.

6. **Proposed amendments to 37 Tex. Administrative Code, Part 13, Chapter 435, Fire Fighter Safety.**

CHAPTER 435**FIRE FIGHTER SAFETY****§435.1. Protective Clothing.**

(a) A regulated fire department shall:

(1) purchase, provide, and maintain a complete set of protective clothing for all fire protection personnel who would be exposed to hazardous conditions from fire or other emergencies or where the potential for such exposure exists. A complete set of protective clothing shall consist of garments including bunker coats, bunker pants, boots, gloves, helmets, and protective hoods, worn by fire protection personnel in the course of performing fire-fighting operations;

(2) ensure that all protective clothing which are used by fire protection personnel assigned to fire suppression duties comply with the minimum standards of the National Fire Protection Association suitable for the tasks the individual is expected to perform. The National Fire Protection Association standard applicable to protective clothing is the standard in effect at the time the entity contracts for new, rebuilt, or used protective clothing; and

(3) maintain, provide to the commission [~~annually and/or~~] upon request, and comply with a departmental standard operating procedure regarding the use, selection, care, and maintenance of protective clothing which complies with NFPA 1851, Standard on Selection, Care, and Maintenance of Structural Fire Fighting Protective Ensembles.

(b) [~~(4)~~]To ensure that protective clothing for fire protection personnel continues to be suitable for assigned tasks, risk assessments conducted in accordance with NFPA 1851 shall be reviewed and revised as needed, but in any case, not more than five years following the date of the last risk assessment.

§435.3. Self-Contained Breathing Apparatus.

The employing entity shall:

(1) purchase, provide, and maintain a complete self-contained breathing apparatus for each on-duty fire protection personnel who engage in operations where IDLH atmospheres may be encountered, where the atmosphere is unknown or would be exposed to hazardous atmospheres from fire or other emergencies or where the potential for such exposure exists;

(2) ensure that all self-contained breathing apparatus used by fire protection personnel complies with the minimum standards of the National Fire Protection Association identified in NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters;

(A) the National Fire Protection Association standard applicable to a self-contained breathing apparatus is the standard in effect at the time the entity contracts for new, rebuilt, or used self-contained breathing apparatus;

(B) an entity may continue to use a self-contained breathing apparatus in use or contracted for before a change in the National Fire Protection Association standard, unless the commission determines that the continued use of the self-contained breathing apparatus constitutes an undue risk to the wearer, in which case the commission shall order that the use be discontinued and shall set an appropriate date for compliance with the revised standard;

(3) develop an air quality program that complies with the most recent edition of the NFPA 1989 Standard on Breathing Air Quality for Emergency Services Respiratory Protection;

(4) maintain and supply upon request by the commission, records and reports documenting compliance with commission requirements concerning self-contained breathing apparatus and breathing air. Records of all tests shall be made and the records shall be retained for a period of no less than three years;

(5) maintain and provide upon request by the commission, a departmental standard operating procedure regarding the use of self-contained breathing apparatus; and

(6) maintain and provide upon request by the commission, a department standard operating procedure regarding the selection, care, and maintenance of self-contained breathing apparatus that complies with the most recent edition of the NFPA 1852 Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA).

§435.5. Commission Recommendations.

The commission recommends that all employing entities use as a guide the following publications:

(1) NFPA 1403 "Live Fire Training Evolutions";

(2) NFPA 1500 "Fire Department Occupational Safety and Health Program;"

(3) IAFF/IAFC - "Fire Service Joint Labor Management Wellness-Fitness Initiative."

§435.7. Fire Department Staffing Studies.

(a) Section 419.022(a)(4) Texas Government Code provides that the commission may on request, assist in performing staffing studies of fire departments. Staffing studies must take into consideration all the objectives and missions of the fire department. Many staffing studies have been developed that can be used to assist in evaluating the needs of a fire department.

(b) A city should ultimately decide on the level of fire protection it is willing to provide to its citizens. The city and fire department should, as a minimum, address the needs of prevention, investigation and suppression as outlined in the appropriate National Fire Protection Association Standards. That decision should be based on facts, the safety of its citizens, and the safety of the fire fighters providing that protection.

(c) The commission will assist by maintaining information pertinent to fire department staffing. The information shall be maintained in the Ernest A. Emerson Fire Protection Resource Library at the commission. Copies shall be made available, free of charge, to anyone requesting such information to the extent permitted by copyright laws.

§435.9. Personal Alert Safety System (PASS).

The employing entity shall:

(1) purchase, provide, and maintain a PASS device for each on duty fire protection personnel who engage in operations where IDLH atmospheres may be encountered, or where the atmosphere is unknown, or where hazardous conditions from fire or other emergencies exist, or where the potential for such exposure exists;

(2) ensure that all PASS devices used by fire protection personnel comply with the minimum standards of the National Fire Protection Association identified in NFPA 1982, Standard on Personal Alert Safety Systems (PASS) for Fire Fighters:

(A) the National Fire Protection Association standard applicable to a PASS device is the standard in effect at the time the entity contracts for new, rebuilt, or used PASS devices;

(B) an entity may continue to use a PASS device that meets the requirements of an earlier edition of NFPA 1982, unless the commission determines that the continued use of the PASS device constitutes an undue risk to the wearer, in which case the commission shall order that the use be discontinued and shall set an appropriate date for compliance with the revised standard;

(3) ensure that the PASS device assigned to an individual user be inspected at the beginning of each duty period and before each use.

(4) maintain and provide upon request by the commission, a departmental standard operating procedure regarding the proper use, selection, care and maintenance of PASS devices.

§435.11. Incident Management System (IMS).

(a) The fire department shall develop, maintain and use an incident management system.

(b) The incident management system shall:

(1) include a written operating procedure for the management of emergency incidents;

(2) require that the IMS be used at all emergency incidents;

(3) require operations to be conducted in a manner that recognizes hazards and assists in the prevention of accidents and injuries;

(4) require that all fire protection personnel be trained in the use of the IMS; and

(5) require that the IMS be applied to all drills, exercises and all other situations that involve hazards similar to those encountered at an actual emergency.

(c) The IMS shall meet the requirements of the applicable sections of the NFPA 1561, Standard on Fire Department Incident Management System.

(d) The commission recommends departments follow the National Incident Management System (NIMS) when developing their incident management system.

§435.13. Personnel Accountability System.

(a) The fire department shall develop, maintain and use a personnel accountability system that provides for a rapid accounting of all personnel at an emergency incident.

(b) The accountability system shall:

(1) require all fire protection personnel be trained in the use of the accountability system;

(2) require that the fire protection personnel accountability system be used at all incidents;

(3) require that all fire protection personnel operating at an emergency incident to actively participate in the personnel accountability system; and

(4) require that the incident commander be responsible for the overall personnel accountability system for the incident.

(c) The fire department shall be responsible for developing the system components required to make the personnel accountability system effective.

(d) The personnel accountability system shall meet the minimum standards required by the National Fire Protection Association 1561, Standard on Fire Department Incident Management System. If the standard is revised, the fire department shall have one (1) year from the effective date of the new standard to comply.

§435.15. Operating At Emergency Incidents.

(a) The fire department shall develop, maintain and use a standard operating procedure for fire protection personnel operating at emergency incidents.

(b) The standard operating procedure shall:

- (1) specify an adequate number of personnel to safely conduct emergency scene operations;
- (2) limit operations to those that can be safely performed by personnel at the scene;
- (3) require all personnel to be trained in and use the standard operating procedures; and
- (4) comply with §435.17 (Procedures for Interior Structural Fire Fighting).

(c) The fire department may use standards established by the National Fire Protection Association for fire protection personnel operating at an emergency incident.

§435.17. Procedures for Interior Structural Fire Fighting (2-In /2-Out Rule).

(a) The fire department shall develop written procedures that comply with the Occupational Safety and Health Administration's Final Rule, 29 CFR Section 1910.134(g)(4) by requiring:

(1) a team of at least four fire protection personnel must be assembled before an interior fire attack can be made when the fire has progressed beyond the incipient stage;

(2) at least two fire protection personnel to enter the IDLH atmosphere and remain in visual or voice (not radio) contact with each other;

(A) Visual means that the fire protection personnel must be close enough to see each other.

(B) Voice means that the fire protection personnel of the entry team must be close enough to speak to one another without the use of radios.

(3) at least two fire protection personnel remain located outside the IDLH atmosphere to perform rescue of the fire protection personnel inside the IDLH atmosphere;

(4) all fire protection personnel engaged in interior structural fire fighting use self-contained breathing apparatus and be clothed in a complete set of protective clothing as identified in Chapter 435;

(5) all fire protection personnel located outside the IDLH atmosphere be equipped with appropriate retrieval equipment where retrieval equipment would contribute to the rescue of the fire protection personnel that have entered the IDLH atmosphere;

(6) one of the outside fire protection personnel must actively monitor the status of the inside fire protection personnel and not be assigned other duties. The second outside fire protection personnel may be assigned to an additional role, including, but not limited to, incident commander, safety officer, driver-operator, command technician or aide, or fire fighter/EMS personnel, so long as this individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any fire protection personnel working at the scene;

(7) the fire protection personnel outside the IDLH atmosphere must remain in communication (including, but not limited to, radio) with the fire protection personnel in the IDLH atmosphere. Use of a signal line (rope) as a communications instrument for interior fire fighting is not permitted by the commission. This does not preclude the use of rescue guide ropes (guide line or lifeline or by what ever name they may be called) used during structural searches; and

(8) each outside fire protection personnel must have a complete set of protective clothing and self-contained breathing apparatus, as identified in Chapter 435, immediately accessible for use if the need for rescue activities inside the IDLH atmosphere is necessary.

(b) The fire department shall comply with the 2-in/2-out rule as described in this section except in an imminent life-threatening situation when immediate action could prevent the loss of life or serious injury before the team of four fire protection personnel are assembled.

§435.19. Enforcement of Commission Rules.

(a) The commission shall enforce all commission rules at any time, including, but not limited to, commission investigations, fire department inspections, or upon receiving a written complaint from an identified person or entity of an alleged infraction of a commission rule.

(b) The commission shall not provide prior notification of an inspection to a fire department.

(c) Upon receipt of a signed complaint alleging a violation of a commission rule, the commission shall have 30 days to initiate an investigation and report back to the complainant its progress.

(d) Upon substantiating the validity of a written complaint, the commission shall follow the procedures outlined in Texas Government Code, Chapter 419, §419.011(b) and (c).

§435.21. Fire Service Joint Labor Management Wellness-Fitness Initiative.

(a) A fire department shall assess the wellness and fitness needs of the personnel in the department. The procedure used to make this assessment shall be written and made available for Commission inspection.

(b) A fire department shall develop and maintain a standard operating procedure to address those needs.

(c) The approach to the fitness needs of the department shall be based on the local assessment and local resources.

(d) The standard operating procedure shall be made available to the Commission for inspection.

§435.23. Fire Fighter Injuries.

(a) A fire department shall report all Texas Workers' Compensation Commission reportable injuries that occur to on-duty regulated fire protection personnel on the Commission form.

(b) Minor injuries are those injuries that do not result in the fire fighter missing more than one duty period or does not involve the failure of personal protective equipment. Minor injuries shall be reported within 30 business days of the injury event.

(c) Major injuries are those that require the fire fighter to miss more than one duty period. Major injuries shall be reported within five business days of the injury event.

(d) Investigatable injuries are those resulting from the malfunction of personal protective equipment, failure of personal protective equipment to protect the fire fighter from injury, or

injuries sustained from failure to comply with any provision of Commission mandated department SOPs. Investigatable injuries shall be reported within five business days of the injury event.

(e) The regulated entity shall secure any personal protective equipment involved in a fire fighter injury and shall be made available to the Commission for inspection.

§435.25. Courage to be Safe So Everyone Goes Home Program.

(a) In an effort to improve firefighter safety in the State of Texas, all regulated entities will ensure that the National Fallen Firefighters Foundation's "Courage to be Safe So Everyone Goes Home" program be completed as part of the continuing education required for certified fire protection personnel by. Individuals will be credited with four hours of continuing education credit for completing this program.

(b) All fire protection personnel will be required to complete the National Fallen Firefighters Foundation's "Courage to be Safe So Everyone Goes Home" program training within one year following appointment to a fire department if the individual has not previously completed the program.

(c) Departments will report the completion of training through the commission's web based reporting system.

(d) Failure to complete the National Fallen Firefighters Foundation's "Courage to be Safe So Everyone Goes Home" program before the required deadlines will be considered a violation of continuing education rules found in Chapter 441 of this title (relating to Continuing Education).

§435.27. Live Fire Training Structure Evolutions.

The most current edition of NFPA 1403, Standard on Live Fire Training Evolutions, shall be used as a guide when developing standard operating procedures for conducting live fire training. The following requirements shall apply for all Live Fire Training Structure Evolutions conducted.

(1) The officer in charge or instructor will ensure that the water supply rate and duration for each individual Live Fire Training Structure Evolution is adequate to control and extinguish the training fire, the supplies necessary for backup lines to protect personnel, and any water needed to protect exposed property.

(2) The instructor-in-charge shall assign the following personnel:

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

(B) One instructor to each backup line.

(C) Additional personnel to backup lines to provide mobility.

(D) One additional instructor for each additional functional assignment.

(3) The officer in charge or instructor will ensure that the buildings or props being utilized for live fire training are in a condition that would not pose an undue safety risk.

(4) A safety officer shall be appointed for all Live Fire Training Structure Evolutions. The safety officer shall have the authority, regardless of rank, to alter, suspend or control any aspect of the operations when, in his or her judgment, a potential or actual danger, accident, or unsafe condition exists. The safety officer shall not be assigned other duties that interfere with safety responsibilities.

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

(6) Prior to the ignition of any fire, instructors shall ensure that all personal protective clothing and/or self contained breathing apparatus are NFPA compliant and being worn in the proper manner.

(7) Prior to conducting any live fire training, a pre-burn briefing session shall be conducted. All participants shall be required to conduct a walk-through of the structure in order to have a knowledge of, and familiarity with, the layout of the building and to be able to facilitate any necessary evacuation of the building.

(8) A standard operating procedure shall be developed and utilized for Live Fire Training Structure Evolutions. The standard operating procedure shall include, but not be limited to:

(A) a Personal Alert Safety System (PASS). A PASS device shall be provided for all participating in live fire training and shall meet the requirements in §435.9 of this title (relating to Personal Alert Safety System (PASS));

(B) a Personnel Accountability System that complies with §435.13 of this title (relating to Personnel Accountability System) shall be utilized;

(C) an Incident Management System;

(D) use of personal protective clothing and self-contained breathing apparatus;

(E) an evacuation signal and procedure; and

(F) pre-burn, burn and post-burn procedures.

§435.29. Federal Highway Administration Traffic Incident Management Program.

(a) In an effort to improve firefighter safety in the State of Texas, all regulated entities will ensure that the Federal Highway Administration Traffic Incident Management program or an equivalent course that is approved by the commission be completed as part of the continuing education required for certified fire protection personnel by December 1, 2020. Individuals will be credited with four hours of continuing education credit for completing this program.

(b) All regulated fire protection personnel must complete the Federal Highway Administration Traffic Incident Management program or an equivalent course that is approved by the commission prior to December 1, 2020.

(c) All fire protection personnel appointed after December 1, 2020 will be required to complete the Federal Highway Administration Traffic Incident Management program training or an equivalent course that is approved by the commission within one year of appointment to a fire department.

(d) Departments will report the completion of training through the commission's web based reporting system.

(e) Failure to complete the Federal Highway Administration Traffic Incident Management program or an equivalent course that is approved by the commission before the required deadline will be considered a violation of continuing education rules found in Chapter 441 of this title (relating to Continuing Education).

**7. Proposed amendments to 37 Tex. Administrative Code, Part 13, Chapter 445,
Administrative Inspections and Penalties.**

CHAPTER 445

ADMINISTRATIVE INSPECTIONS AND PENALTIES

§445.1. Entity Inspections.

- (a) The Commission shall conduct at least biennial inspections of the entities that fall under the regulatory authority of the Commission~~;~~ and may perform risk-based inspections of entities the Commission determines to be at risk.
- (b) The purpose of these inspections shall be to promote safety and proficiency in the fire service by ensuring compliance with state law and Commission rules pertaining to minimum standards for fire protection personnel education, protective clothing, self-contained breathing apparatus, personal alert safety systems, standard operating procedures, or any other aspect of the fire service regulated by the Commission.
- (c) This shall include inspections of volunteer fire fighters and fire departments that participate in the voluntary regulation program pursuant to §419.071 of the Texas Government Code in one or more of the component areas.

§445.3. Right of Access.

- (a) A duly authorized representative of the commission may enter the premises of any entity regulated by the commission at any time during normal working hours and in such manner as to minimize interference with the operations of the entity to determine whether or not the entity is in compliance with the Code and the rules of the commission.
- (b) No person shall refuse to permit~~;~~ or interfere with an inspection authorized by the Code or commission rules.
- (c) Interference with, or refusal to permit an inspection under the Code or commission rules is grounds for discipline.
- (d) The commission's right of access will be enforced through either administrative or judicial procedures as is necessary or required.

§445.5. Duty To Comply; Enforcement.

- (a) An entity regulated by the commission shall have the duty to implement and maintain compliance with the rules and the Code.
- (b) Every regulated entity under the Code shall be given an inspection covering the categories established by the commission. An entity found to be in noncompliance with the Code or rules of the commission shall be subject to warnings, administrative penalties, and other discipline as appropriate.

§445.7 Procedures.

- (a) The inspector shall, if possible, notify the current or acting, on duty and available, department head of the inspector's presence at the department and his intention to conduct a departmental inspection.

- (b) During the course of the inspection, any noncompliance with state law or commission rule shall be noted. Violations shall be determined to be either minor or major violations based upon the following guidelines.
- (1) Minor violations shall be defined as those violations which the inspector determines do not pose a serious threat to personnel safety due to lack of personnel protection equipment or training, are not widespread, or are not repeat violations of the same nature for which the entity was cited within the previous five years.
 - (2) Major violations shall be defined as those violations which in the inspector's opinion constitute **higher potential** ~~[an immediate]~~ threat to personnel safety, flagrant or repeated violations in the same or similar areas, fraud, or obvious attempts to circumvent state law or commission rule. ~~[A major violation may be as follows but not limited to a deficiency or safety issue involving protective clothing, a self-contained breathing apparatus, personal alert safety systems, breathing air, or other matter that in the inspector's judgment presents an immediate and significant risk of injury.]~~
- (c) In order to determine compliance with commission requirements pertaining to a particular item, the inspector may examine as many items of protective clothing and equipment deemed necessary by the inspector.

§445.9 Minor ~~[Procedure for]~~ Violations.

~~[(a) Findings of only minor violations.]~~ If during the course of a departmental inspection the inspector determines the department has committed ~~[only]~~ minor violations, the following **procedures shall apply.** ~~[procedure applies.]~~

- (1) The inspector shall issue **a notice of alleged violations identifying** ~~[an inspectors report which will identify]~~ the findings from the compliance inspection. ~~[The inspector's report is a written summary of an inspector's findings that is given to an inspected entity after an inspection. In cases of minor violations, the inspector's report may identify deficiencies and prescribe corrective action within specific timeframes.]~~
 - (2) The department then has 30 calendar days from the date the **notice of alleged violations** ~~[inspector's report]~~ is received to provide the commission with **an acceptable corrective action plan** ~~[a written schedule of actions]~~ that will be taken to correct the **minor** violations. The schedule of actions **in the plan** will allow necessary amounts of time for such things as obtaining items through city requisitions and bid processes, when necessary. Lack of funds is not an acceptable reason for delay.
 - (3) If the department fails to ~~[timely]~~ provide an acceptable **plan for obtaining compliance or does not request a hearing, the department may be:** ~~[written schedule of actions for obtaining compliance, the inspector or compliance officer may issue a notice of alleged violation. The notice of alleged violation is a written document that briefly summarizes the alleged violation(s), and requires the person to correct the violation(s). The notice may also prescribe a specific time period to rectify the matter and achieve compliance, and assess an administrative penalty. If an administrative penalty is assessed, the notice shall state the amount of the penalty. The notice shall also inform the person of the person's right to an informal staff conference and that if the person fails to timely correct the alleged violation or fails to request a preliminary staff conference before the 61st day after receipt of the notice, the commission may issue a default order. In addition, the notice of alleged violation may:]~~
- (A) **allowed** ~~[allow]~~ extra time to come into compliance;

(B) **assessed appropriate penalties**~~[assess administrative penalties]~~, which may be **probated or prorated and may include suspension of certificates, administrative penalties, hearing costs, and attorneys fees;**~~[-prorated;]~~

(C) **required to furnish proof of compliance.**~~[suspend or revoke licenses or certificates; and]~~

~~[(D) require proof of compliance.]~~

~~[(b) Findings of major violations. If during the course of a departmental inspection the inspector determines the department has committed a major violation, the following procedure applies.]~~

~~[(1) The inspector or compliance officer shall issue a notice of alleged violation. The notice shall identify the violations and require the department or provider to correct the violation. In addition, the notice of alleged violation may:]~~

~~—— [(A) specify a time period to achieve compliance;]~~

~~—— [(B) assess administrative penalties;]~~

~~—— [(C) suspend or revoke licenses or certificates; and]~~

~~—— [(D) require proof of compliance.]~~

~~[(2) In addition to any of the above, the commission may also temporarily suspend a person's or regulated entity's certificate on a determination by a panel of the commission that continued activity by the person or entity would present an immediate threat to the public, regulated personnel, or fire service trainees; and seek an injunction in a district court in Travis County along with civil penalties, court costs, and attorney's fees. See Tex. Gov't Code §419.906(a), (d).]~~

~~[(e) If a fire department or training provider fails to correct the alleged violation in a timely manner or fails to request a preliminary staff conference (information settlement conference) before the 61st day after the date it receives a notice of alleged violation, the commission through its executive director may issue a default order.]~~

~~[(d) When determining administrative penalties for a notice of alleged violation or default order the following factors shall be considered:]~~

~~—— [(1) compliance history;]~~

~~—— [(2) seriousness of the violation;]~~

~~—— [(3) the safety threat to the public or fire personnel;]~~

~~—— [(4) any mitigating factors; and]~~

~~—— [(5) any other factors the commission considers appropriate.]~~

~~[(e) If the fire department or training provider timely requests a preliminary staff conference (informal settlement conference), the procedures in Chapter 401, Subchapter E apply, and if the preliminary staff conference does not result in approval of a consent order the matter shall be referred for a contested case hearing.]~~

§445.11 Major Violations

If during the course of a departmental inspection the inspector determines the department has committed major violations involving protective clothing, self-contained breathing apparatus, personal alert safety systems or breathing air, the following procedures shall apply:

- (1) The inspector shall issue a notice of alleged violations identifying the violations and the corrective measures to be taken by the department to correct the listed violations.
- (2) The department has 30 calendar days from the date of receipt of the formal notice of noncompliance to correct the violations, and to provide the Commission with proof of compliance or submit written notice of appeal.
- (3) If the department fails to come into compliance in the required time frame an administrative penalty of up to \$500 per day may be assessed from the first day of formal notice of violation for each violation. If it is determined that the department was assessed administrative penalties for the same or similar violations within the previous five years, the administrative penalty of up to \$1,000 per violation may be assessed.
- (4) The department then has 30 calendar days from formal notice of administrative penalties assessed to pay the administrative penalty or submit written notice of appeal.
- (5) Upon receipt of a written appeal concerning administrative action or penalty a hearing will be scheduled. Chapter 154 of the Texas Civil Practice and Remedies Code shall be used as a procedural guide.

§445.13 Disciplinary Hearings.

A complaint case shall be opened no later than the 30th day after formal notice to the fire department, training provider or individual, concerning unresolved major violations found during an inspection. A hearing will be scheduled with the fire department, training provider or individual to determine administrative actions or penalties. The Commission shall consider the following factors when determining administrative penalties:

- (1) compliance history;
- (2) seriousness of the violation;
- (3) the safety threat to the public or fire personnel;
- (4) any mitigating factors; and
- (5) any other factors the commission considers appropriate.

§445.15 Judicial Enforcement.

The Commission may enter a default order if a fire department or training provider fails to take action to correct a violation found during an inspection conducted under this

chapter, or to request an informal settlement conference before the 61st day after the date the Commission provides to the department or provider notice requiring the department or provider to correct the violations.

§445.17 Liability for Violations.

The issuance of violation notices, administrative penalties, order, and the permitting of a regulated entity to correct deficiencies in no way relieves the entity from the duty to, at all times, remain in complete compliance with the Code or commission rules or from the liability it could incur from failing to fulfill its statutory and regulatory duties.

§445.19 Inspection Forms.

The executive director, or his designee, shall develop forms for the inspection of records, equipment, clothing, and facilities which shall be on file at the commission office and available for public inspections.

8. Public comments.

9. Subjects for future agenda items.

10. Future meeting dates.

11. Adjourn meeting.