

FIRE FIGHTER ADVISORY COMMITTEE MEETING
March 30, 2023, 10:00 A.M.
1701 N. Congress Ave., William B. Travis Bldg., Room 1-104, Austin, Texas

The meeting of the Fire Fighter Advisory Committee will be held in person at the physical location above.

- 1. Roll call and excuse of committee members.**
- 2. Adoption of the December 7, 2022, Fire Fighter Advisory Committee meeting minutes.**
- 3. Election of officers.**
- 4. Matters referred from Curriculum and Testing Committee:**
 - A. Fire Marshal Curriculum Manual.**
 - B. Fire Marshal Skills Manual.**
 - C. Investigator Curriculum Manual.**
- 5. Discussion and possible action on rule review for the following:**
 - A. 37 Texas Administrative Code (TAC), Chapter 459, Fire and Life Safety Educator.**
 - B. 37 TAC, Chapter 461, Incident Commander.**
 - C. 37 TAC, Chapter 491, Voluntary Regulation of State Agencies and State Agency Employees.**
 - D. 37 TAC, Chapter 493, Voluntary Regulation of Federal Agencies and Federal Fire Fighters.**
 - E. 37 TAC, Chapter 495, Regulation of Nongovernmental Departments.**
- 6. Subjects for future agenda items.**
- 7. Future meeting dates.**
- 8. Adjourn meeting.**

1. Roll call and excuse of committee members.

2. Adoption of the December 7, 2022, Fire Fighter Advisory Committee meeting minutes.

TEXAS COMMISSION ON FIRE PROTECTION

Presiding Officer Daniel DeYear called the December 7, 2022, meeting of the Fire Fighter Advisory Committee to order at 9:00 a.m. at the William B. Travis Building, 1701 N. Congress Ave., Room 1-104, in Austin, Texas.

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

Staff	Mike Wisko	Joyce Guinn	Amanda Khan	Cliff Grant	Grace Wilson
	Holden Wenger	Candace Barnett	Kenneth Barnett	Robert Reese	Sami Lepisto
	Rick Wallace	Jeff Aycock			

Attendees	Paul Hamilton	Rob Zimmerman	Chris Angerer	Mick Moffitt	J Pitts
	Ricardo Codillo	David Cella	Hank Jones	Rick Wall	Michael Hinojosa
	Lee Gleven				

1. Roll call Secretary, Keith Schmidt called roll and a quorum was present.

2. Adoption of Minutes A motion was made by Jason Collier and seconded by Daniel Anderson to approve the minutes from the September 15, 2022, Fire Fighter Advisory Committee meeting. The motion carried.

3. Chapter 427 Training Facility Certification A motion was made by Jason Collier and seconded by Jim Reidy to approve the amendments to 37 TAC, Chapter 427, Training Facility Certifications and move to the Commission with changes to 427.13(a) and 427.213(a). The motion minutes carried.

4. Chapter 449 Head of Fire Department A motion was made by Keith Schmidt and seconded by Daniel Buford to accept the review to 37 TAC, Chapter 449, Head of Fire Department and to forward to the commission without changes. The motion carried.

5. Chapter 451 Fire Officer A motion was made by Keith Schmidt and seconded by Antonio Ramos to accept the review to 37 TAC, Chapter 451, Fire Officer and to forward to the forward to the Commission without changes. The motion carried.

6. Chapter 453 Hazardous Materials A motion was made by Jason Collier and seconded by Keith Schmidt to accept the review to 37 TAC, Chapter 453, Hazardous Materials and to forward to the commission without changes. The motion carried.

7. Chapter 457 Minimum Standards for Incident Safety Officer Certification A motion was made by Keith Schmidt and seconded by Antonio Ramos to accept the amendments to 37 TAC, Chapter 437, Fees as proposed by the commission. The motion carried.
-
8. Subjects for Future Agendas There were no subjects for future agendas.
-
9. Future meeting Dates The committee set dates for future meetings March 30, 2023 and September 21, 2023. June and December dates are to be determined at another date.
-
10. Adjournment A motion was made by Jason Collier and seconded by Jim Reidy to adjourn. The motion carried.
-

Daniel DeYear
Presiding Officer

3. Election of officers.

4. Matters referred from Curriculum and Testing Committee:

A. Fire Marshal Curriculum Manual.

CERTIFICATION CURRICULUM MANUAL

CHAPTER FIFTEEN

FIRE MARSHAL

NFPA 1037 2016 Edition

Effective August 1, 2023



Texas Commission on Fire Protection
P.O. Box 2286 Austin, Texas 78768-2286 (512) 936-3838

OVERVIEW

Fire Marshal

The Fire Marshal is required to meet the Job Performance Requirements (JPRs) of chapters 4 and 5 of National Fire Protection Association (NFPA) 1037, *Standard on Fire Marshal Professional Qualifications*, 2016 edition.

The following items are included in the Fire Marshal section of Chapter 15 of the curriculum manual:

- Course Instructor Information
- Reference List (textbooks and other recommended course materials)
- Course Outline (establishes the recommended hours for teaching this course)

This is a voluntary (non-mandatory) certification; therefore, a formal “curriculum” is not provided. Please use chapters 4 and 5 of NFPA 1037 as a guide when creating your own course curriculum.

Performance skills are available in Chapter 15 of the Skills Manual.

All documents in this curriculum manual, and in the skills manual, are available free of charge to download, copy and distribute as necessary. The TCFP does not provide printed copies.

Definition of a Fire Marshal

A Fire Marshal is an individual who has met the requirements of chapter 4 and 5 of *NFPA 1037, Standard on Fire Marshal Professional Qualifications* and has the knowledge, skills, and abilities to perform as a Fire Marshal:

- A person designated to provide delivery, management, and/or administration of fire protection- and life safety-related codes and standards, investigation, education, and/or prevention services for local, county, state, provincial, federal, tribal, or private sector jurisdictions as adopted or determined by the entity.

COURSE INSTRUCTOR INFORMATION

Instructor Qualifications

Fire Marshal courses must be taught by a person meeting the requirements described in Chapter 427§307 of the TCFP Standards Manual.

Supplemental Information

Instructors are expected to provide supplemental information if the main reference text does not cover all of the knowledge requirements set forth in the NFPA standard.

Certification Testing

Testing for certification in the state of Texas will be based on the knowledge and skills requirements of National Fire Protection Association (NFPA) 1037, *Standard on Fire Marshal Professional Qualifications*, 2016 edition, Chapter 4 and 5. All training programs must strictly adhere to the NFPA standard.

All test questions and performance skills evaluations will be based on the NFPA Job Performance Requirements (JPRs), requisite knowledge objectives, and requisite skills objectives found in the NFPA standard. Additionally, questions and performance skill evaluations may include information found in, or derived from, the NFPA standard annex, particularly Annex A, which includes explanatory material that may further clarify JPRs. The following is an example from NFPA 1037, section 4.2.1:

NFPA Standard/Curriculum	Explanation
4.2.1 Administer jurisdictional requirements related to the roles and responsibilities of the Fire Marshal, given regulations and organizational goals and objectives pertaining to personnel and labor management, so that the Fire Marshal functions in a manner consistent with the organizational mission and complies with applicable personnel management laws and regulations.	NFPA JPR number 4.2.1
(A) Requisite Knowledge: Organizational structure; organizational mission; fundamental strategic planning processes; staffing positions, roles, and responsibilities; and intra- and inter- organizational relationships.	Requisite knowledge objectives for 4.2.1 Written test questions and/or performance skills will be used to test these knowledge components on the state certification exam.

<p>(B) Requisite Skills: The ability to use verbal and written communication skills; consolidate information and data from a variety of sources for short- and long-term planning purposes; forecast staffing, capital, and budgetary needs to support the roles and responsibilities of Fire Marshal; establish an organizational structure, to include both existing and future staffing positions, to implement the roles and responsibilities structure; and integrate relationships, functions, and needs of stakeholders.</p>	<p>Requisite skills objectives for 4.2.1</p> <p>Only performance skills will be used to test these objectives on the state certification exam.</p>
<p>A.4.2.1 Since there is an overlapping of administrative duties and functions based on jurisdictional issues, specific JPRs cannot be incorporated or developed. The intent of this subsection is to address a Fire Marshal's responsibilities related to general administrative duties, and to recognize that those duties can vary depending on the assignments and policies of a local jurisdiction.</p>	<p>Appendix A: Explanatory Material</p>

TCFP Standards Manual

It is critical that the Course Instructor review the chapters in the TCFP Standards Manual that apply to this curriculum. Of primary importance are the following chapters:

Chapter 421, *Standards for Certification*
 Chapter 427, *Training Facility Certification*
 Chapter 435, *Fire Fighter Safety*
 Chapter 437, *Fees*
 Chapter 467, *Minimum Standards for Fire Marshal*

These chapters do not address every issue that could impact this curriculum; therefore, the Course Instructor is encouraged to become familiar with the TCFP Standards Manual.

Descriptions of Certification Levels

For additional information, see Chapter 467 of the Texas Commission on Fire Protection Standards Manual for Fire Protection Personnel.

CHAPTER FIFTEEN
FIRE MARSHAL
CURRICULUM OUTLINE

BASIC FIRE MARSHAL CURRICULUM OUTLINE		
SECTION	SUBJECT	RECOMMENDED HOURS
CORE CURRICULUM OUTLINE		
1501-4.1	General	2
1501-4.2	Administrative Duties	16
1501-4.3	Community Risk Reduction	20
1501-4.4	Community Relations	10
1501-4.5	Professional Development	10
		58
MISSION SPECIFIC CURRICULUM OUTLINE		
1502-5.1	General	2
1502-5.2	Regulatory programs (Inspection)	16
1502-5.3	Fire and Life Safety Education	16
1502-5.4	Investigation	20
		54
	TOTAL RECOMMENDED HOURS	112

*Actual hours required will depend on the number of students, the number of examiners, availability of equipment, and the student skill level.

EQUIPMENT LIST

DOCUMENTS:

- AHJ SOPs, budget, policies
- Report forms, templates, and example documents
- Supporting Documents
- Applicable codes and standards
- Local practices and procedures
- Official letterhead – if applicable
- Instructor developed scenarios – if applicable

EQUIPMENT:

- Personal computer with word processing and spreadsheet software
- The ability to print
- USB drive
- Pen
- Pencil
- Paper

If reports, supporting documents, and templates cannot be obtained by the candidate they may be provided by the instructor.

FIRE MARSHAL SKILLS LIST

Objective	Skill No.	Functional Name	NFPA JPR #
General	1	Core	4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5, 4.2.6, 4.3.2, 4.3.3, 4.3.4, 4.3.5, 4.3.6, 4.3.7, 4.3.8, 4.3.9, 4.3.10, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.5.2, 4.5.3, 4.5.4, 4.5.5, 4.5.6
Mission Specific	2	Regulatory (Inspection)	5.2.2, 5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.7, 5.2.8, 5.2.9, 5.2.10, 5.2.11, 5.2.12
Mission Specific	3	Fire & Life Safety Educator	5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.6, 5.3.7
Mission Specific	4	Investigation	5.4.2, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7

REFERENCE LIST FOR THE FIRE MARSHAL CURRICULUM

Purchase, D. (2019). Chief Officer: Principles and Practice, 3RD Ed., United States: Jones & Bartlett Learning. ISBN:9781284172478

Chief Officer, 4th Ed., (2019). International Fire Service Training Association (IFSTA). ISBN:978-0-87939-644-2 (Chapter 2-5)

Walker, B. (2021). Community Risk Reduction Principles and Practices. United States: Jones & Bartlett Learning. ISBN:9781284195057

Fire and Life Safety Educator: Principles and Practice, 2nd Ed., (2016). United States: Jones & Bartlett Learning. ISBN:1284041972

Fire and Life Safety Educator, 3rd Ed., (2011). International Fire Service Training Association (IFSTA). ISBN:978-0-87939-396-0

Fire Inspection and Code Enforcement, 8th Ed., (2017). International Fire Service Training Association (IFSTA). ISBN:978-0-87939-592-6

Fire Inspector: Principles and Practice. Revised 1st Ed., (2016). United States: Jones & Bartlett Learning. ISBN:1284137740

Fire Investigator: Principles and Practice, 6th Ed., (2022). United States: Jones & Bartlett Learning. ISBN:1284247724

National Fire Protection Association. *NFPA 921: Guide for Fire and Explosion Investigations*. Current Edition. NFPA. ISBN-13 978-1455926466

National Fire Protection Association. *NFPA 1033: Standards for Professional Qualification for Fire Investigator*. Current Edition. NFPA. ISBN- 978-1455928156

National Fire Protection Association. *NFPA 1037: Standard on Fire Marshal Professional Qualifications for the Minimum Core and Mission-specific*. Current Edition. NFPA. ISBN- 978-145591311-4

National Fire Protection Association. *NFPA 1300: Standard on Community Risk Assessment and Community Risk Reduction Plan Development*. Current Edition. NFPA. ISBN-13 978-1455923175

National Fire Protection Association. *NFPA 1730: Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation and Public Education Operations*. Current Edition. NFPA. ISBN-13 978-1455920846

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

4. Matters referred from Curriculum and Testing Committee:

B. Fire Marshal Skills Manual.

SKILLS MANUAL

CHAPTER FIFTEEN

FIRE MARSHAL

NFPA 1037 2016 Edition

Effective August 1, 2023



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P.O. Box 2286 Austin, Texas 78768-2286 (512) 936-3838

FIRE MARSHAL SKILLS LIST

Objective	Skill No.	Functional Name	NFPA JPR #
General	1	Core	4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5, 4.2.6, 4.3.2, 4.3.3, 4.3.4, 4.3.5, 4.3.6, 4.3.7, 4.3.8, 4.3.9, 4.3.10, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.5.2, 4.5.3, 4.5.4, 4.5.5, 4.5.6
Mission Specific	2	Regulatory (Inspection)	5.2.2, 5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.7, 5.2.8, 5.2.9, 5.2.10, 5.2.11, 5.2.12
Mission Specific	3	Fire & Life Safety Educator	5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.6, 5.3.7
Mission Specific	4	Investigation	5.4.2, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7

INSTRUCTION SHEET FIRE MARSHAL PERFORMANCE SKILLS

Format

Skill #1-4 of the Fire Marshal skills evaluation is evaluated as a written project-based assessment and oral presentation. It is recommended that the project-based assessment skills initially be completed as assignments during the course. The Course Instructor may then review the assignments, provide feedback, and recommend necessary changes. At the time of the scheduled TCFP performance skills evaluation, the final version of the randomly selected skills must be turned in for evaluation. The oral presentation should also be conducted at that time to evaluate the skills not included in the written project. It is recommended that the oral presentation skills be conducted in a role-playing format. The Course Instructor should specify time constraints as necessary.

Scoring Method

The scoring method is satisfactory (S) or unsatisfactory (U) for each grading criteria, and a Pass or Fail for the entire skill sheet. To successfully pass the Fire Marshal skills evaluation, the Fire Marshal candidate must receive satisfactory scores in all of the grading criteria. Any grading criteria marked unsatisfactory shall require the examiner to explain the reason for the failure in written form in the comments section of the skill sheet. The written project and the oral presentation will be evaluated independently. The candidate must retest only the failed component.

Preparation and Equipment

Many of the skills require the use of department policies. It is suggested that the Course Instructor use the policies and procedures from his/her department. If teaching this course at a non-departmental institution, acquire a fire department's policies and procedures, or modification thereof, to complete these skills. For optimal learning, scenario-based training and role-playing is recommended; however, based on departmental needs certain activities may be simulated by other means.

EQUIPMENT LIST

DOCUMENTS:

- AHJ SOPs, budget, policies
- Report forms, templates, and example documents
- Supporting Documents
- Applicable codes and standards
- Local practices and procedures
- Official letterhead – if applicable
- Instructor developed scenarios – if applicable

EQUIPMENT:

- Personal computer with word processing and spreadsheet software
- The ability to print
- USB drive
- Pen
- Pencil
- Paper

If reports, supporting documents, and templates cannot be obtained by the candidate they may be provided by the instructor.

Performance Standards Evaluation
Core – Skill Number 1
 Written Project and Oral Presentation

NFPA 1037 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5,
 4.2.6, 4.3.2, 4.3.3, 4.3.4, 4.3.5, 4.3.6, 4.3.7,
 4.3.8, 4.3.9, 4.3.10, 4.4.1, 4.4.2, 4.4.3, 4.4.4,
 4.4.5, 4.5.2, 4.5.3, 4.5.4, 4.5.5, 4.5.6

Fire Marshal

OBJECTIVES

The ability to administer jurisdictional requirements related to the roles and responsibilities of the Fire Marshal, given regulations and organizational goals and objectives pertaining to personnel and labor management, so that the Fire Marshal functions in a manner consistent with the organizational mission and complies with applicable personnel management laws and regulations. (4.2.1)

The ability to establish personnel assignments to maximize efficiency, given the knowledge, training, and experience of the members available, so that the organizational roles and responsibilities and legal requirements are met with the allocated resources and in accordance with jurisdictional requirements. (4.2.2)

The ability to establish a strategic and operational plan, given organizational goals and objectives, legal requirements, and available resources, so that the organizational roles and responsibilities and legal requirements are met with the allocated resources. (4.2.3)

The ability to establish a budget, given the available resources, so that the roles and responsibilities of the Fire Marshal can be implemented within organizational goals and objectives. (4.2.4)

The ability to monitor the condition of the approved budget during the budgeting period, given the available resources and budgetary requirements, so that the roles and responsibilities of the Fire Marshal can be implemented within organizational goals and objectives. (4.2.5)

Guide the development, maintenance, and evaluation of a department record and management system, given policies and procedures, so that completeness and accuracy are achieved. (4.2.6)

The ability to evaluate target risks and emergency incident data, given community profile levels of protection, occupancy types, percent of responses by occupancy type, perspectives of risk, and available data and information, including loss, so that a community risk profile can be developed based on an acceptable level of risk. (4.3.2)

Performance Standards Evaluation Core – Skill Number 1

The ability to manage a data and information management program, given identified inputs and outputs, data collection system, and personnel, so that data and information are collected, processed, stored, and maintained. (4.3.3)

The ability to interpret data and information, given output from a data/information management system, so that the data and information provide an adequate basis of knowledge to conduct risk analysis. (4.3.4)

The ability to conduct risk analysis, given data and information trends, target risks, community input, and available resources, so that a risk profile and management solutions are developed. (4.3.5)

The ability to evaluate risk management solutions, given the risk analysis, organizational and community constraints, regulatory requirements, available resources, and financial impacts, so that the most beneficial and cost-effective solution(s) can be established. (4.3.6)

The ability to integrate the risk management solutions with related organizational groups, given organizational structure and constraints, so that the analysis and solution(s) can be used for organizational planning, development, and implementation. (4.3.7)

The ability to integrate the risk management solution(s) with community stakeholders, given interface with community individuals and organizations, so that the risk management solution(s) can be used for community planning, development, and implementation. (4.3.8)

The ability to evaluate the risk management program, given the existing risk analysis, implemented solution(s), and data and information applications, so that continued improvement of the program goals and objectives can be monitored and achieved. (4.3.9)

The ability to design and implement a plan, given an identified fire safety problem, so that a new program, piece of legislation, or fire safety code is facilitated. (4.3.10)

The ability to develop relationships with community groups, given a description of local groups and organizational policies for relationships with community groups, attendance at community meetings, and participation at community events, so that a schedule is established for ongoing contacts. (4.4.1)

The ability to present safety proposals to community groups, given a list of groups with shared concerns, and an understanding of relevant safety measures, so that the

Performance Standards Evaluation Core – Skill Number 1

justification for the safety proposal is provided, issues are explained, and solutions, impacts, and benefits are stated. (4.4.2)

The ability to create media communication strategies and policies, given a list of media outlets such as newspaper, radio, web pages, and television; characteristics of local media including deadlines; and the resources to provide media with accurate information, so that consistent and accurate prevention information is disseminated in an understandable manner. (4.4.3)

The ability to participate in media interviews, given information about organizational goals and prevention practices and strategies; and knowledge of interview techniques, so that consistent and accurate information is disseminated in an understandable manner. (4.4.4)

The ability to identify and prioritize professional development needs, within the department given jurisdictional requirements, so that professional development requirements are established. (4.5.2)

The ability to prescribe professional development programs, given the results of a professional development needs analysis, so that the knowledge and skills are job-related, training is performance-based, adult learning principles are used, and the program meets organizational goals and requirements. (4.5.3)

The ability to implement professional development programs, given selected options and available resources, so that professional development programs meet organizational goals and objectives. (4.5.4)

The ability to evaluate organizational professional development programs, given organizational goals and objectives, so that professional development meets organizational goals and objectives. (4.5.5)

The ability to forecast organizational professional development needs, given professional trends, emerging technologies, and future organizational goals and objectives, so that future organizational and individual professional development needs are planned. (4.5.6)

INSTRUCTIONS - procedures for achieving the objective

You shall complete a written project for presentation. The project will include:

1. An administrative duties section that includes:
 - a. The candidate will create an organizational chart for the given organization. (4.2.1), (4.2.3)

**Performance Standards Evaluation
Core – Skill Number 1**

- b. The candidate will also create an organizational chart based on future predictions of community needs and individual staff productivity. (4.2.2)
 - c. The student will create a budget, including operational and capital expenditures, for the current organization and a budget for the long-term organization. (4.2.4)
 - d. The student will prepare a written report explaining the organizational structures, budgets, and decisions made related to the personnel and budget decisions. (4.2.4), (4.2.5), (4.2.6)
 - e. Given an organizational chart, employee training records, employee tenure, and the activities required to be conducted by the personnel reporting to the fire marshal, the candidate will prepare a report detailing how personnel will be used to meet the responsibilities and legal requirements of the fire marshal's responsibilities. (4.2.3)
 - f. Based on the student's jurisdiction, they shall create a budget for a single fiscal year that includes all capital expenditures and operating expenditures. (4.2.5)
 - g. Given an annual budget and a financial statement of their and balances halfway through the fiscal period, the student will identify budgetary trends and recommend the needed changes to finish the budget period at or below budgeted expenses. (4.2.5), (4.2.6)
 - h. Given inspection, investigation, or public education data, the student will evaluate the data, and identify trends in the data. (4.2.6)
2. A community risk reduction section that includes:
- a. Given data and a potential risk(s), the candidate will rank those risk(s) based on the effect to the community. (4.3.2),
 - b. Given data, the candidate will analyze the data and identify what additional information and data is needed to identify risk trends and develop programs to meet those risks. (4.3.3), (4.3.4)
 - c. Given facts, and data, the candidate will explain current and future trends of risk management problems. (4.3.5)

**Performance Standards Evaluation
Core – Skill Number 1**

- d. Given data, information, trends, target risks, community input, and available resources, the candidate will evaluate the identified risks, establish a perceived level of risk, and identify solutions for the perceived risks and identify the most beneficial and cost-effective means to implement the solution. (4.3.5), (4.3.6)
 - e. Given a proposed risk management solution, the candidate will identify other groups within the candidate's organization and jurisdiction and identify the other groups and stakeholder's roles and responsibilities in the proposed risk management solution. (4.3.7), (4.3.8), (4.3.9)
 - f. Given a fire safety problem the candidate will develop and justify the development of a life safety education program to address the fire safety problem. (4.3.10)
3. A community relations section that includes:
- a. Based on the candidate's jurisdiction, the candidate will identify local community groups, the purpose or mission of each organization, and prepare a one-year calendar for establishing and maintaining on-going contact with the organizations. (4.4.1)
 - b. The student will develop a policy regarding who may disseminate information to the media and how information will be disseminated to the media. The policy must identify resources the media may use to access the information and the situation which is appropriate to each type of information dissemination type. (4.4.3)
4. A professional development section that includes: (4.5.2), (4.5.3), (4.5.4), (4.5.5), (4.5.6)
- a. Given an organizational chart, employee training records, employee tenure, and current job assignments, the candidate will:
 - i. develop the required training for a one-year and three-year professional development plan for each employee in the Fire Marshal organization and explain how the professional development plan meets the needs of the organization.
 - ii. identify any professional development needs that are unmet and develop a plan to meet those needs.
 - iii. develop a three-year professional development plan for each employee in the Fire Marshal organization, based on professional trends, emerging technologies, and future needs of the organization.

Performance Standards Evaluation Core – Skill Number 1

After the completion of your written project, you will participate in **an oral evaluation** in which you will attend, participate in, and assume a leadership role in a press conference where you are required to present the findings of your written report and respond to questions from the media (instructor). (4.4.4), (4.4.2), (4.4.3), (4.5.3)

EXAMINER'S NOTE

It is suggested that you use the policies and procedures of your department. If you are teaching this course at a non-departmental institution, acquire a fire department's policies and procedures, or modification thereof, to complete the skill.

TCFP performance skill evaluation requires the Fire Marshal candidate to turn in the completed project and perform the oral presentation. The written project and the oral presentation will be evaluated independently. The candidate must retest only the failed component. The oral presentation will be conducted in a role-playing format to mimic a media interview.

PREPARATION & EQUIPMENT

AHJ SOPs, budget, policies

Report forms, templates, and example documents

Supporting Documents

Personal computer with word processing and spreadsheet software

The ability to print

USB drive

Instructor developed scenarios

**Performance Standards Evaluation
Core – Skill Number 1**

Candidate: _____ Notes: _____

Dept: _____

School: _____

Examiner(s) _____ / _____

Fire Marshal	<u>TEST</u>		<u>RETEST</u>	
Skill # 1	S	U	S	U
NFPA 1037: 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5, 4.2.6, 4.3.2, 4.3.3, 4.3.4, 4.3.5, 4.3.6, 4.3.7, 4.3.8, 4.3.9, 4.3.10, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.5.2, 4.5.3, 4.5.4, 4.5.5, 4.5.6				
Written Project				
The candidate demonstrates:	S	U	S	U
a) Demonstrated staffing and overall organizational structure				
b) Demonstrated written communication skills <ul style="list-style-type: none"> • Short – and long – term planning purposes • Forecast staffing • Capital • Budgetary needs • Responsibilities of Fire Marshal • Relationships • Functions • Needs of stakeholders 				
c) Demonstrated the ability to tack and analyze trends of financial data				
d) Demonstrated written communication skills related to record keeping and budgetary processes <ul style="list-style-type: none"> • Recognized principals involved in acquisition and implementation of related processes • Recognized capabilities and limitations of information management systems 				
e) Compared hazards, probability of occurrence, and consequences to establish risk and ranking of the risk to the community <ul style="list-style-type: none"> • Established data parameters • Collected information 				

<ul style="list-style-type: none"> • Analyze/ Interpreted data • Compared risk data to established level of risk • Identified potential solutions • Evaluate / identify internal and external influences • Interpreted / Analyzed data to determine impact of risk management program • Maintained data management 				
f) Recognized applicability of risk management solution(s) to other organizational groups / community stakeholders				
g) Used evaluative methods, consensus building techniques, written communication skills, and organized plans.				
h) Used written communication skills <ul style="list-style-type: none"> • Community demographics • Formal and informal community leaders • Community groups • Community and civic issues • Effective customer service methods • Organizational policies for community relations 				
i) Demonstrated ability to maintain constructive relationship with media groups <ul style="list-style-type: none"> • Provided written information to media 				
j) Conducted research <ul style="list-style-type: none"> • Ability to facilitate and conduct committee meetings • Ability to assign responsibility • Ability to organize information into functional groupings • Ability to analyze and evaluate data • Ability to evaluate trends, and forecast needs 				
Oral Presentation				
The candidate demonstrates:	S	U	S	U
a) Ability to communicate orally				
b) Ability to relate interpersonally				
c) Ability to articulate collected and evaluated data				
d) Demonstrate familiarity with media presentation techniques				

S = Satisfactorily completed/performed

U = Unsatisfactorily performed/failed to meet objective or grading step

All steps of the skill objective are mandatory and must be scored as “Satisfactory” to pass the skill.

Examiner/Candidate Comments:

Certifying Examiner

Date

Re-Test Certifying Examiner

Date

Overall Skill Sheet Score
Pass <input type="checkbox"/> Fail <input type="checkbox"/>
Overall Skill Sheet Re-Test Score
Pass <input type="checkbox"/> Fail <input type="checkbox"/>

Regulatory (Inspection)- Skill Number 2 Performance Standards Evaluation

NFPA 1037: 5.2.2, 5.2.3, 5.2.4, 5.2.5, 5.2.6,
5.2.7, 5.2.8, 5.2.9, 5.2.10, 5.2.11, 5.2.12

Fire Marshal

OBJECTIVE

The ability to manage a process for the adoption, modification, and maintenance of codes, standards, and jurisdictional requirements, given fire loss data and/or a demonstrated need or deficiency, so that the code, standard, or jurisdictional requirement is written and addresses the identified need or deficiency. (5.2.2)

The ability to manage a process for conducting compliance inspections, given applicable codes, standards, and jurisdictional requirements and/or an identified issue, so that the applicable codes, standards, and jurisdictional requirements are identified, deficiencies are identified and documented, and compliance determined. (5.2.3)

The ability to manage a process for plan reviews, given the policies of the jurisdiction requiring plan reviews, so that requirements for plan reviews are completed in accordance with the policies of the jurisdiction. (5.2.4)

The ability to manage an appeals process, given the codes, standards, and jurisdictional requirements, so that appeals can be resolved in compliance with the intent of the applicable codes, standards, and jurisdictional requirements. (5.2.5)

The ability to manage a process for record keeping, given the need to document the processes of the regulatory program, so that there is a record of the regulatory actions. (5.2.6)

The ability to manage a process for administering, evaluating, and issuing permits, licenses, and/or certificates of fitness, given the applicable jurisdictional requirements, so that applicable codes, standards, and jurisdictional requirements are met. (5.2.7)

The ability to manage the compliance interpretation process for prescriptive codes, standards, and jurisdictional requirements, given complex issues related to codes, standards, and jurisdictional requirements, so that a resolution of the issue meets the intent of the prescriptive codes, standards, and jurisdictional requirements. (5.2.8)

The ability to manage a program for alternative compliance measures, given the submittal of equivalencies, alternative methods, and performance-based design, so that the final design meets the intent of the codes, standards, and jurisdictional requirements. (5.2.9)

The ability to manage the process for reconciling complaints, given the report of a situation or condition, so that complaints are resolved, and appropriate action is taken. (5.2.10)

TEXAS COMMISSION ON FIRE PROTECTION

FIRE MARSHAL

Regulatory (Inspection) - Skill Number 2 Performance Standards Evaluation

The ability to generate jurisdictional requirements for administering the regulatory management program, given management objectives, so that the requirements are defined, concise, and in accordance with the legal obligations of the jurisdiction. (5.2.11)

The ability to manage a program to coordinate with other agencies, given that other agencies' requirements can overlap the local jurisdictions, so that conflicts are eliminated, and clear lines of responsibility are developed. (5.2.12)

INSTRUCTIONS - procedures for achieving the tasks

The fire marshal candidate shall perform all the following tasks. The candidate's work product will meet the following objectives.

- a. Given a code deficiency and fire loss data, identify the needed code modification and prepare the code modification using an analysis of the data to support the modification. (5.2.2)
- b. Given an organizational chart, fire loss data, and number and type of occupancies in the jurisdiction, the candidate will develop a fire inspection program based on the requirements of the jurisdiction. (5.2.3)
- c. Given an organizational chart and permit application data, the candidate will develop a plan review program and policy based on the requirements of the jurisdiction. (5.2.4)
- d. Given the administrative and legal requirements of the jurisdiction, the candidate will develop a policy or procedure for accepting, processing, and managing a code appeal. (5.2.5)
- e. The candidate shall write a policy or procedure detailing how fire inspection reports will be created, maintained, updated, and available for review. The plan must include record retention policies in accordance with local. (5.2.6)
- f. The candidate shall write a policy, in accordance with their AHJ, on the process for receiving, reviewing, and approving/denying a permit application. (5.2.7)
- g. Given a fire code dispute, the student will apply the code and standards of the AHJ to evaluate the dispute. The student will prepare a written response to the submitter of the dispute. The student will inform their supervisor of the dispute and outcome in a 3–5-minute presentation. (5.2.8)
- h. The student will prepare a policy, procedure, or amendment to the locally adopted fire code detailing the process and requirements for the acceptance of a performance-based alternative. (5.2.9)

Regulatory (Inspection) - Skill Number 2 Performance Standards Evaluation

- i. Provided a complex complaint, the candidate shall identify the facts of the complaint, the applicable codes, standards, policies and/or procedures of the AHJ, and explain a resolution based on the AHJ requirements. The candidate will respond in writing to the person who submitted the complaint. (5.2.10)
- j. Given a fire inspection policy, the candidate shall review the policy, make suggestions for improvement to the policy, and prepare a draft of the updated policy. (5.2.11)
- k. Given a regulatory issue, the candidate will identify the role of the AHJ, identify other agencies that have regulatory jurisdiction, and explain the roles and responsibilities of the AHJ and the other agencies. The candidate will explain potential conflicts between the AHJ and other regulatory agencies and how they can be resolved or mitigated. (5.2.12)

EXAMINER'S NOTE

The candidate must meet the objectives by writing or typing their work product to meet the requirements of the above objectives. Students are encouraged to use data and their given communities when completing the objectives above. If a student does not have available data, or is not currently employed with an AHJ, scenarios or data may be supplied by the examiner.

PREPARATION & EQUIPMENT

Most skills require the use of a pen or pencil, paper, applicable codes and standards, local practices and procedures, and a computer with a printer or typewriter and official letterhead if applicable. Additional preparation and equipment information is located with the specific performance skill.

**Regulatory (Inspection) - Skill Number 2
Performance Standards Evaluation**

Candidate: _____ Notes: _____

Dept: _____

School: _____

Examiner(s) _____ / _____

Fire Marshal				
Performance Standards Evaluation - Skill # 2 NFPA 1037: 5.2.2, 5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.7, 5.2.8, 5.2.9, 5.2.10 5.2.10, 5.2.11, 5.2.12	<u>TEST</u>		<u>RETEST</u>	
Regulatory	S	U	S	U
a) Developed and modified code				
b) Developed jurisdictional requirements fire inspections				
c) Developed jurisdictional requirements for plan review				
d) Managed appeals				
e) Managed records				
f) Managed permit application				
g) Evaluated prescriptive codes				
h) Evaluated non prescriptive designs and alternative compliance				
i) Evaluated and resolved complaints				
j) Interpreted and formulated jurisdictional requirements				
k) Evaluated and negotiated conflicts				
Oral Presentation				
The candidate demonstrates:	S	U	S	U
a) Ability to communicate orally				
b) Ability to relate interpersonally				
c) Ability to articulate collected and evaluated data				
d) Demonstrate familiarity with media presentation techniques				

S = Satisfactorily completed/performed

U = Unsatisfactorily performed/failed to meet objective or grading step

All steps of the skill objective are mandatory and must be scored as "Satisfactory" to pass the skill.

Examiner/Candidate Comments:

Certifying Examiner

Date

Re-Test Certifying Examiner

Date

Overall Skill Sheet Score
Pass <input type="checkbox"/> Fail <input type="checkbox"/>
Overall Skill Sheet Re-Test Score
Pass <input type="checkbox"/> Fail <input type="checkbox"/>

Fire and Life Safety Educator - Skill Number 3 Performance Standards Evaluation

NFPA 1037: 5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.6, 5.3.7

Fire Marshal

OBJECTIVE

Manage a comprehensive fire and life safety education strategy, given a planning process and relevant information, so that program goals, design, resources, implementation, and evaluation methods are included. (5.3.2)

The ability to create a collaborative fire and life safety education partnership, given a description of local community groups, a list of fire and injury priorities, and organizational policies for community partnerships, so that a specific fire or injury priority is mitigated by the partnership. (5.3.3)

Develop an awareness campaign, within the organization, given fire and life safety education goals and policies, so that members are informed of their role within the organization's fire and life safety education strategy. (5.3.4)

Manage the fire and life safety education report(s) for policy makers, given relevant information, so that educational strategies, goals, objectives, activities, impact, budgets, and outcomes are described. (5.3.5)

The ability to evaluate fire and life safety programs, given data to indicate risk reduction and loss reduction, so that measurable interpretation of educational efforts can be reported. (5.3.6)

The ability to implement a comprehensive fire and life safety program, given a systematic development process, so that program goals, objectives, design, resources, and evaluation methods are included. (5.3.7)

INSTRUCTIONS - procedures for achieving the objectives

The fire marshal candidate shall perform all the following tasks. The candidate's work product will meet the following objectives.

- a. The candidate will develop a public education initiative and identify community group and partnerships that will improve outcomes of the initiative and explain the role each group or partner will have in increasing the effectiveness of the initiative. (5.3.2)
- b. Given a public education initiative, the candidate will identify local community groups that can improve the outcomes. The candidate will

Fire and Life Safety Educator - Skill Number 3 Performance Standards Evaluation

- develop a meeting agenda to discuss the partnership. (5.3.3)
- c. The candidate will develop an awareness campaign, identify the audience for the campaign, and provide in writing the plan for disseminating the campaign material. (5.3.3)
 - d. Given data for a specific public education campaign, the candidate will develop a plan to increase the outcomes while determining the financial impact of the new strategies, goal, and objectives. (5.3.4)
 - e. Given data for a specific public education campaign, the candidate will evaluate the data to determine the effectiveness of the campaign. The candidate will make recommendations in writing, if appropriate, to modify the program for improved outcomes. (5.3.5)
 - f. The candidate will develop an awareness campaign, identify the audience for the campaign, identify local community groups that can improve the outcomes, describe how the community groups can participate, and provide in writing the plan for disseminating the campaign material. The candidate will identify methods for evaluating the effectiveness of the program. (5.3.6)

EXAMINER'S NOTE

The candidate must meet the objectives by writing or typing their work product to meet the requirements of the above objectives.

Students are encouraged to use data and their given communities when completing the objectives above.

If a student does not have available data, or is not currently employed with an AHJ, scenarios or data may be supplied by the examiner.

PREPARATION & EQUIPMENT

Most skills require the use of a pen or pencil, paper, applicable codes and standards, local practices and procedures, and a computer with a printer or typewriter and official letterhead if applicable. Additional preparation and equipment information is located with the specific performance skill.

**Fire and Life Safety Educator - Skill Number 3
Performance Standards Evaluation**

Candidate: _____ Notes: _____

Dept: _____

School: _____

Examiner(s) _____ / _____

Fire Marshal				
Performance Standards Evaluation - Skill # 3 NFPA 1037: 5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.6, 5.3.7	<u>TEST</u>		<u>RETEST</u>	
Fire & Life Safety Educator	S	U	S	U
a) Designed and applied program strategies				
b) Facilitated meetings, maintained teamwork, and goals				
c) Developed and disseminated awareness campaign				
d) Generated and interpreted reports and data				
e) Applied evaluation practices and procedures				
f) Selected program components, stimulated interest, and established partnerships				
Oral Presentation				
The candidate demonstrates:	S	U	S	U
a) Ability to communicate orally				
b) Ability to relate interpersonally				
c) Ability to articulate collected and evaluated data				
d) Demonstrate familiarity with media presentation techniques				

S = Satisfactorily completed/performed

U = Unsatisfactorily performed/failed to meet objective or grading step

All steps of the skill objective are mandatory and must be scored as "Satisfactory" to pass the skill.

Examiner/Candidate Comments:

Certifying Examiner

Date

Re-Test Certifying Examiner

Date

Overall Skill Sheet Score
Pass <input type="checkbox"/> Fail <input type="checkbox"/>
Overall Skill Sheet Re-Test Score
Pass <input type="checkbox"/> Fail <input type="checkbox"/>

Investigations - Skill Number 4 Performance Standards Evaluation

NFPA 1037: 5.4.2, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7

Fire Marshal

OBJECTIVE

The ability to administer applicable codes, standards, and jurisdictional requirements for investigations, given applicable codes, standards, and jurisdictional requirements for investigations, so that investigators are knowledgeable and operate within the organizational policies. (5.4.2)

The ability to review and assess investigation reports and data to be submitted in anticipation of litigation or resolution, given details of an investigation including evidence collected, reports, scene sketches, photographs, other related information, and data relevant to the investigation, so that complete, accurate documents are submitted for possible legal action. (5.4.3)

The ability to conduct investigative analysis given reports compiled from investigation data, to recommend action, so that fire prevention and other programs can be enhanced. (5.4.4)

The ability to manage technical resources needed to perform investigations, given personnel, protective equipment, jurisdictional requirements, and other necessary equipment, including investigation tools and resources for investigations so that investigators are protected and equipped, and investigations are conducted according to safety requirements. (5.4.5)

The ability to develop and manage a comprehensive investigation program given reference materials and laws related to investigations, including due process, so that legal mandates are met, and jurisdictional requirements are formulated for required investigations that are consistent, complete, and safe. (5.4.6)

The ability to construct a resource plan for investigations with allied groups to adapt to incident needs, given knowledge of the capabilities of available groups and resources, so that response to various types of incidents can be investigated. (5.4.7)

INSTRUCTIONS - procedures for achieving the objectives

The fire marshal candidate shall perform all the following tasks. The candidate's work product will meet the following objectives.

- a. Given investigative data, the candidate will evaluate the cause, trends

Investigations - Skill Number 4 Performance Standards Evaluation

and outcomes of the results and will make recommendations for policies related to the investigate process to improve outcomes. (5.4.2), (5.4.4)

- b. Given an investigation file the candidate will assess the data to ensure the file is complete and accurate for possible legal action, based on jurisdictional requirements. (5.4.3)
- c. The candidate will determine an equipment or training deficiency within their department, write a proposal to remedy the deficiency, and prepare a written policy for implementation of the proposed remedy. (5.4.5)
- d. The candidate will prepare a written investigative policy, in accordance with the laws and policies of the AHJ, which upon implementation will ensure more consistent and complete investigations. The candidate will present the policy to their employees in a 3-5 minute presentation. (5.4.6)
- e. The candidate will prepare a 5-10 minute presentation on investigative resources available to the AHJ, dependent on the type or complexity of the investigations. (5.4.7)

EXAMINER'S NOTE

The candidate must meet the objectives by writing or typing their work product to meet the requirements of the above objectives. Students are encouraged to use data and their given communities when completing the objectives above. If a student does not have available data, or is not currently employed with an AHJ, scenarios or data may be supplied by the examiner.

PREPARATION & EQUIPMENT

Most skills require the use of a pen or pencil, paper, applicable codes and standards, local practices and procedures, and a computer with a printer or typewriter and official letterhead if applicable. Additional preparation and equipment information is located with the specific performance skill.

**Investigations - Skill Number 4
Performance Standards Evaluation**

Candidate: _____ Notes: _____

Dept: _____

School: _____

Examiner(s) _____ / _____

Fire Marshal				
Performance Standards Evaluation - Skill # 4 NFPA 1037: 5.4.2, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7	<u>TEST</u>		<u>RETEST</u>	
Investigation	S	U	S	U
a) Managed the investigative process and evaluated the results				
b) Formulated technical reports and compiled/ analyzed data				
c) Demonstrate the ability to utilize resources to coordinate tasks and people				
d) Demonstrate the ability to use verbal and written communication skills when utilizing: <ul style="list-style-type: none"> a. Policy issues b. Law and legal aspects c. Code and standards d. Jurisdictional requirements e. Local, state, federal, tribal, and provincial resources 				
Oral Presentation				
The candidate demonstrates:	S	U	S	U
a) Ability to communicate orally				
b) Ability to relate interpersonally				
c) Ability to articulate collected and evaluated data				
d) Demonstrate familiarity with media presentation techniques				

S = Satisfactorily completed/performed

U = Unsatisfactorily performed/failed to meet objective or grading step

All steps of the skill objective are mandatory and must be scored as "Satisfactory" to pass the skill.

Examiner/Candidate Comments:

Certifying Examiner

Date

Re-Test Certifying Examiner

Date

Overall Skill Sheet Score

Pass Fail

Overall Skill Sheet Re-Test Score

Pass Fail

4. Matters referred from Curriculum and Testing Committee:

C. Investigator Curriculum Manual.

CERTIFICATION CURRICULUM MANUAL

CHAPTER FIVE

FIRE INVESTIGATOR

**NFPA 921, 2021 Edition
NFPA 1033, 2022 Edition**

Effective June 1, 2022



Texas Commission on Fire Protection
P.O. Box 2286 Austin, Texas 78768-2286 (512) 936-3838

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 (6th ed.) (2022). Burlington, MA: Jones and Bartlett Learning. ISBN:1284247724

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 (2022 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 5/06/21 this publication was available online at <https://nist.gov/system/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. <https://txdpslabs.qualtraxcloud.com/showdocument.aspx?ID=67707>

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 5/06/21 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 5/06/21 this publication was available online at <https://www.nwcg.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 5/06/21 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 5/06/21 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 5/06/21, this information was available online at <http://www.txcourts.gov/rules-forms/rules-standards.aspx>).

Strengthening Fire and Explosion Investigation in the United States: A Strategic Vision for Moving Forward. 1 Apr. 2021, <https://doi.org/10.29325/OSAC.TG.0005>. Accessed 27 Apr. 2021.

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 5/06/21 this publication was available online at <https://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf>)

Texas Code of Criminal Procedure, latest edition. (On 5/06/21, this information was available online at <http://www.statutes.legis.state.tx.us/>).

Texas Family Code, current ed. (On 5/06/21, this information was available online at <http://www.statutes.legis.state.tx.us/>).

Texas Insurance Code, current ed. (On 5/06/21, this information was available online at <http://www.statutes.legis.state.tx.us/>).

Texas Penal Code, current ed. (On 5/06/21, this information was available online at <http://www.statutes.legis.state.tx.us/>).

Texas Public Information Act Handbook, current ed. (On 5/06/21, 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 5/06/21, 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
501-6	Fire Effects and Fire Patterns	20
501-7	Building Systems	2
501-8	Active Fire Protection Systems	4
501-9	Electricity and Fire	8
501-10	Building Fuel Gas Systems	4
501-11	Fire-Related Human Behavior	4
501-12	Legal Considerations	12
501-13	Safety	4
501-14	Sources of Information	6
501-15	Planning the Investigation	2
501-16	Documentation of the Investigation	12
501-17	Physical Evidence	12
501-18	Origin Determination	8
501-19	Fire Cause Determination	4
501-20	Analyzing the Incident for Cause and Responsibility	4
501-21	Failure Analysis and Analytical Tools	8
501-22	Explosions	8
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

* The recommended hours includes 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.

NFPA 1033 MATRIX

2014 Objective	LOCATION IN CURRICULUM	SKILL
4.1	GENERAL	
4.1.1	1	None
4.1.2	4	None
4.1.3	13, 15, 26	None
4.1.4	14, 15	None
4.1.5	12	None
4.1.6	15, 28	None
4.1.7	4,5,7,8,9,10,13,16,17,20,21,22	None
4.2	SCENE EXAMINATION	
4.2.1	15, 17	1
4.2.2	13, 18	2, 26
4.2.3	18,	3
4.2.4	5, 6, 26	4, 5
4.2.5	5, 6, 7, 18, 26	5
4.2.6	5, 17, 26	6
4.2.7	6	7
4.2.8	7, 8, 9, 10, 14, 25	8
4.2.9	22	6
4.3	DOCUMENTING THE SCENE	
4.3.1	16, 17	9
4.3.2	16	10
4.3.3	12, 16	11
4.4	EVIDENCE COLLECTION/PRESERVATION	
4.4.1	11, 17, 24	12
4.4.2	12, 17	12
4.4.3	14, 17	12
4.4.4	12, 17	13
4.4.5	17	14
4.5	INTERVIEW	
4.5.1	14	15
4.5.2	14	16
4.5.3	14	17
4.6	POST-INCIDENT INVESTIGATION	
4.6.1	14, 16, 20, 21	18
4.6.2	16, 20, 21	19
4.6.3	12, 14, 15, 20, 21	20
4.6.4	11, 20, 21, 23	21
4.6.5	11, 18, 19, 20, 21, 23	22
4.7	PRESENTATIONS	
4.7.1	16, 30	23
4.7.2	30	24
4.7.3	12, 30	25
Annex A	EXPLANATORY MATERIAL	
A.1.1	26, 27, 29	

Course Instructor Information

Fire Investigator

Overview

The Fire Investigator curriculum is designed to provide clear guidance that ensures adequate presentation of the information required to meet the Job Performance Requirements (JPRs) of National Fire Protection Association (NFPA) 1033, *Standard for Professional Qualifications for Fire Investigator*, 2022 edition.

The Fire Investigator curriculum is Chapter 5 of the Texas Commission on Fire Protection (TCFP) Curriculum Manual.

Certification Level	TCFP Chapter Number	NFPA 1033 Chapter
Fire Investigator	5	4

Layout

The NFPA numbering sequence is mirrored to allow easy correlation between this document and the NFPA Standard. For example, 501-5.5.1 identifies the section in Fire Investigator that corresponds to *NFPA 921, Guide for Fire and Explosion Investigation (2021 Edition)* section 5.5.1.

TCFP Standards Manual

It is critical that the Course Instructor review the chapters in the TCFP Standards Manual that apply to this curriculum. Of primary importance are the following chapters: Chapter 421, Standards for Certification; Chapter 437, Fees; Chapter 431, Fire Investigator Certification; Chapter 439, Examinations for Certification; Chapter 449.5, Certification as Head of a Prevention Only Department. These chapters do not address every issue that could impact this curriculum; therefore, the Course Instructor is encouraged to become familiar with the TCFP Standards Manual.

Supplemental Information

Instructors are expected to provide supplemental information if the main reference text does not provide adequate information to ensure successful completion of the Job Performance Requirements as listed in the curriculum.

Components of the Curriculum

Each section of the curriculum identifies the NFPA JPR in NFPA 1033, *Standard for Professional Qualifications for Fire Investigator*, 2022 Edition and knowledge components in *NFPA 921, Guide for Fire and Explosion Investigations, 2021 Edition* and subdivides them into learning components.

For example:

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.

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.***

19.1.1 *Consideration of Data*

19.1.2 *Sequence of Activities*

19.1.3 *Point and Area of Origin*

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

Skills

NFPA's "Requisite Skills" requirements are addressed in the corresponding Skill Sheets and are based on the JPRs in National Fire Protection Association (NFPA) 1033, *Standard for Professional Qualifications for Fire Investigator*, 2022 edition.

Descriptions of Certification Levels

A Fire Investigator is an individual who has demonstrated the skills and knowledge necessary to conduct, coordinate, and complete a fire investigation.

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*, 2022 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. This standard shall specify the minimum JPRs for serving as a fire investigator in both the private and public sectors.

1.2.1 This standard shall define the fire investigator position.

1.2.2 The intent of this standard shall be to ensure that individuals who serve as fire investigators are qualified to do so.

1.2.3 It shall not be the intent of this standard to restrict any jurisdiction from exceeding or combining these minimum requirements.

1.2.4 JPRs for each duty are the tasks personnel shall be able to perform to successfully carry out that duty.

1.2.5 Fire investigators who perform or support fire investigations shall remain current with the general knowledge, skills, and JPRs.

1.2.6 Fire investigators who perform or support fire investigations shall remain current with practices and applicable standards.

1.3 Application.

The application of this standard shall be to specify the JPRs that shall apply to specific personnel who perform and support fire investigations.

1.3.1 The JPRs shall be accomplished in accordance with the requirements of the AHJ and all applicable NFPA and other standards development organization (SDO) standards.

1.3.2 Priority.

1.3.2.1 * It shall not be required that the JPRs be mastered in the order in which they appear.

1.3.2.2 The AHJ shall establish instructional priority and the training program content to prepare personnel to meet the JPRs of this standard.

1.3.2.3 * The performance of each requirement of this chapter shall be evaluated by personnel approved by the AHJ.

1.3.2.4 The JPRs for fire investigators shall be completed in accordance with recognized practices and procedures or as defined by law or by the AHJ.

1.3.2.5 Fire investigators who perform or support fire investigations shall meet the requirements of this standard for each fire investigation performed.

1.3.2.6 The AHJ shall provide the necessary personal protective equipment (PPE), force protection, and clothing to conduct assignments.

1.3.2.7 JPRs involving exposure to products of combustion shall be performed in approved PPE.

1.3.2.8 Prior to training to meet the requirements of this standard, personnel shall meet the following requirements:

- (1) Be at least age 18
- (2) Have a high school diploma or equivalent
- (3) Be subjected to a thorough background and character investigation by the AHJ prior to being accepted as an individual candidate for certification as a fire investigator

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.

4.1.7 * In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following:

- (1) Fire science:
 1. Fire chemistry
 2. Thermodynamics
 3. Fire dynamics
 4. Explosion dynamics
- (2) Fire investigation:
 5. Fire analysis
 6. Fire investigation methodology
 7. Fire investigation technology
 8. Evidence documentation, collection, and preservation
 9. Failure analysis and analytical tools
- (3) Fire scene safety:
 10. Hazard recognition, evaluation, and basic mitigation procedures
 11. Hazardous materials
 12. Safety regulations
- (4) Building systems:
 13. Types of construction
 14. Fire protection systems
 15. Electricity and electrical systems
 16. Fuel gas systems

4.1.7.1 The fire investigator shall remain current in the subjects listed as “requisite knowledge” for the JPRs and as summarized in 4.1.7.

4.1.7.2 The fire investigator shall remain current by attending formal education courses, workshops, in-person or online seminars, and/or through professional publications, journals, and treatises.

4.1.7.3 The fire investigator shall complete and document a minimum of 40 hours of continuing education training every five years by attending formal education courses, workshops, and seminars.

28 Job Performance Requirements (Annex C, Table C.1)

- 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 an 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 2021 edition

501-3.1 ***The Investigator candidate shall define the terms used in Chapter 3 of NFPA 921, Guide for Fire and Explosion Investigations (2021 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.

4.1.7 In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following: (2)(b) Fire Investigation Methodology.

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 Develop a Hypotheses (Inductive Reasoning)

4.3.6 Test the Hypotheses (Deductive Reasoning)

4.3.7 Select Final Hypothesis

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

NFPA 1033 4.1.7 In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following: (1)(a) Fire Chemistry, (b) Thermodynamics, (c) Fire Dynamics.

4.2 Scene Examination.

Duties shall include inspecting, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action or activity that brought the ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.4 Interpret and analyze fire patterns, given standard equipment and tools and some structural or content remains, so that each pattern is identified and analyzed with respect to the burning characteristics of the material involved, the stage of fire development, the effects of ventilation within the context of the scene, the relationship with all patterns observed, and the understanding of the methods of heat transfer that led to the formation of the patterns identified and analyzed, and the sequence in which the patterns were produced is determined.

(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, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action 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. Interpret and analyze fire patterns, given standard equipment and tools and some structural or content remains, so that each pattern is identified and analyzed with respect to the burning characteristics of the material involved, the stage of fire development, the effects of ventilation within the context of the scene, the relationship with all patterns observed, and the understanding of the methods of heat transfer that led to the formation of the patterns identified and analyzed, and the sequence in which the patterns were produced is determined.

(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. 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 4.2.7 Reconstruct potential area(s) 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; and items potentially critical to cause determination are returned to their prefire location as a means of hypothesis testing, such that 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 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 context of fire effects

501-6.3 **The Investigator candidate shall be able to analyze 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

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 Lightbulbs
 - 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
 - 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 Wallboard
 - 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

- 6.3.22 Pointer and Arrow Patterns

501-6.4 ***The Investigator candidate shall be able to 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

NFPA 1033 4.1.7 In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following: (4)(a) Types of Construction, (b) Fire Protection Systems, (c) Electricity and Electrical Systems, (d) Fuel Gas Systems.

4.2 Scene Examination.

Duties shall include inspecting, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action or activity that brought the ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.5 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 and analyze the performance of building systems, including fire protection, detection and suppression systems, HVAC, electricity and electrical systems, fuel gas systems, 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 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” Condition
- 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
 - 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.*

- 7.3.6 General

- 7.3.7 Floor/Ceiling/Roof Assemblies

- 7.4.1 Walls
- 7.4.2 Doors
- 7.4.3 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

NFPA 1033 4.1.7 In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following: (4)(b) Fire Protection Systems.

4.2. Scene Examination

Duties shall include inspecting, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action 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 and analyze the performance of building systems, including fire protection, detection and suppression systems, HVAC, electricity and electrical systems, fuel gas systems, 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 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 Operation 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 Operation 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

NFPA 1033 4.1.7 In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following: (4)(c) Electricity and Electrical Systems.

4.2 Scene Examination.

Duties shall include inspecting, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action 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 and analyze the performance of building systems, including fire protection, detection and suppression systems, HVAC, electricity and electrical systems, fuel gas systems, 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 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 Interrupter (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

NFPA 1033 4.1.7 In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following: (4)(d) Fuel Gas Systems.

4.2 Scene Examination.

Duties shall include inspecting, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action 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 and analyze the performance of building systems, including fire protection, detection and suppression systems, HVAC, electricity and electrical systems, fuel gas systems, 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 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 Locations of Exits
 - 11.3.3.2 Number of Exits
 - 11.3.3.3 Height of 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 501-23.4 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 Opinions
- 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.

NFPA 1003 4.1.7

4.2 Scene Examination.

Duties shall include inspecting, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action 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. 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 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 Effect
 - 13.5.1.2 Systemic Effect
- 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) OX (or OXY)
- b) COR
- c) ALK
- d) 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, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action 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. Inspect and analyze the performance of building systems, including fire protection, detection and suppression systems, HVAC, electricity and electrical systems, fuel gas systems, 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 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. Ability to adjust interviewing strategies based on deductive reasoning, interpret, and analyze verbal, and nonverbal communications, apply appropriate legal requirements, 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.***

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 Investigations 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
- 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, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action 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.

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

501-15.3 **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

NFPA 1033 4.1.7 In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following: (2)(c) Fire Investigation Technology.

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.

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, so that the report accurately reflects the facts, data, and scientific principles on which the investigator relied; clearly identifies and expresses the investigator's opinions and conclusions; and contains the reasoning by which each opinion or conclusion was reached in order to meet the 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.

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.

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 Photographs
 - 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 Appliances 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**
The 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

NFPA 1033 4.1.7 In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following: (2)(d) Evidence Documentation, Collection, and Preservation.

4.2 Scene Examination.

Duties shall include inspecting, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action 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

(C) 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.

Lentini, chapter
4 ASTM E1188
ASTM E1459

References:
J&B, chapter 15
Kirk's, chapter 7

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

17.3.6 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.***

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 Purpose of Canine-Handler Team

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, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action 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 ignitibility; 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 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 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.***

- (1) NFIRS - National Fire Incident Reporting System
- (2) NFPA 901 – Standard Classifications for Fire and Emergency Services Incident Reporting
- (3) BATS – Bombs Arson Tracking System
- (4) UCR – Uniform Crime Reporting Program
- (5) The Canadian Code Structure
- (6) NIBRS – National Incident Based Reporting System

SECTION 20

ANALYZING THE INCIDENT FOR CAUSE AND RESPONSIBILITY

NFPA 1033 4.1.7 In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following: (2)(a) Fire Analysis, (e) 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.

References:

J&B, chapter 19

Kirk's, chapters 1 and 5

(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.

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.**

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

NFPA 1033 4.1.7 In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following: (2)(e) 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

NFPA 1033 4.1.7 In order to successfully complete the tasks identified in the JPRs of Sections 4.2 through 4.7, the fire investigator shall remain current in the subjects listed as “requisite knowledge” as they relate to fire investigations, which include the following: (1)(e) Explosion Dynamics.

4.2 Scene Examination.

Duties shall include inspecting, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action 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
- 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 Notification

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 Pattern
- 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, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action 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 and analyze the performance of building systems, including fire protection, detection and suppression systems, HVAC, electricity and electrical systems, fuel gas systems, 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 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 Makers
- 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, evaluating, and analyzing the fire scene or evidence of the scene, and 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 action or activity that brought the ignition source and materials together and to assess the subsequent progression, extinguishment, and containment of the fire.

NFPA 1033 4.2.4 Interpret and analyze fire patterns, given standard equipment and tools and some structural or content remains, so that each pattern is identified and analyzed with respect to the burning characteristics of the material involved, the stage of fire development, the effects of ventilation within the context of the scene, the relationship with all patterns observed, and the understanding of the methods of heat transfer that led to the formation of the patterns identified and analyzed, and the sequence in which the patterns were produced is determined.

(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
26.3.1.1 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, 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 Systems
 - 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
- 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 candidate shall determine the cause of a wildfire.***

- 27.8.1 Natural Fire Cause
- 27.8.2 Human Fire Cause

- 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

28.3.3 Website

28.3.4 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 Systems
 - 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, so that the report accurately reflects the facts, data, and scientific principles on which the investigator relied; clearly identifies and expresses the investigator's opinions and conclusions; and contains the reasoning by which each opinion or conclusion was reached in order to meet the 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.***

5. Discussion and possible action on rule review for the following:

- A. 37 Texas Administrative Code (TAC), Chapter 459, Fire and Life Safety Educator.**

CHAPTER 459

FIRE AND LIFE SAFETY EDUCATOR

SUBCHAPTER A

MINIMUM STANDARDS FOR FIRE AND LIFE SAFETY EDUCATOR I

§459.1. Fire and Life Safety Educator I Certification.

(a) A Fire and Life Safety Educator I is defined as an individual who performs professional work in the coordination and delivery of public fire and life safety education, and fire prevention programs.

(b) All individuals holding a Fire and Life Safety Educator I certification shall be required to comply with the continuing education requirements in Chapter 441 of this title (relating to Continuing Education).

(c) A regulated entity that employs an individual certified as Fire and Life Safety Educator I must report the individual's employment via the commission's online data management system (FIDO system).

Source Note: The provisions of this §459.1 adopted to be effective February 28, 2019, 44 TexReg 869; amended to be effective August 14, 2019, 44 TexReg 4194

§459.3. Minimum Standards for Fire and Life Safety Educator I Certification.

In order to be certified as a Fire and Life Safety Educator I, an individual must:

(1) possess valid documentation of accreditation from the International Fire Service Accreditation Congress as a Fire and Life Safety Educator I; or

(2) complete a commission approved Fire and Life Safety Educator I program and successfully pass the commission examination as specified in Chapter 439 of this title (relating to Examinations for Certification). An approved Fire and Life Safety Educator I program must consist of one of the following:

(A) completion of an in-state Fire and Life Safety Educator I program meeting the requirements of the applicable NFPA standard and conducted by a commission certified training provider that was submitted and approved through the commission's training prior approval system; or

(B) completion of an out-of-state educational institution of higher education, and/or military training program that has been submitted to the commission for evaluation and found to meet the requirements of the applicable NFPA standard.

Source Note: The provisions of this §459.3 adopted to be effective February 28, 2019, 44 TexReg 869

§459.5. Examination Requirement

Examination requirements in Chapter 439 of this title (relating to Examinations for Certification) must be met to receive Fire and Life Safety Educator I certification.

Source Note: The provisions of this §459.5 adopted to be effective February 28, 2019, 44 TexReg 869

§459.7. International Fire Service Accreditation Congress (IFSAC) Seal.

Individuals completing a commission-approved Fire and Life Safety Educator I program may be granted an IFSAC seal for Fire and Life Safety Educator I by making application to the commission for the IFSAC seal and paying applicable fees. Individuals must submit the fee for the seal prior to the expiration of the examination to qualify for the IFSAC seal.

Source Note: The provisions of this §459.7 adopted to be effective August 14, 2019, 44 TexReg 4194

CHAPTER 459
FIRE AND LIFE SAFETY EDUCATOR
SUBCHAPTER B
MINIMUM STANDARDS FOR FIRE AND LIFE SAFETY EDUCATOR II

§459.201. Fire and Life Safety Educator II Certification.

(a) A Fire and Life Safety Educator II is defined as an individual who performs professional work in the coordination and delivery of public fire and life safety education, and fire prevention programs.

(b) All individuals holding a Fire and Life Safety Educator II certification shall be required to comply with the continuing education requirements in Chapter 441 of this title (relating to Continuing Education).

Source Note: The provisions of this §459.201 adopted to be effective February 28, 2019, 44 TexReg 869, the provisions of this §459.201 adopted to be effective December 3, 2020, 45 TexReg 8528

§459.203 Minimum Standards for Fire and Life Safety Educator II Certification.

In order to be certified as a Fire and Life Safety Educator II, an individual must:

- (1) hold as a prerequisite Fire and Life Safety Educator I certification; and
- (2) possess valid documentation of accreditation from the International Fire Service Accreditation Congress as a Fire and Life Safety Educator II; or
- (3) complete a commission approved Fire and Life Safety Educator II program and successfully pass the commission examination as specified in Chapter 439 of this title (relating to Examinations for Certification). An approved Fire and Life Safety Educator II program must consist of one of the following:
 - (A) completion of an in-state Fire and Life Safety Educator II program meeting the requirements of the applicable NFPA standard and conducted by a commission certified training provider, that was submitted and approved through the commission's training prior approval system; or
 - (B) completion of an out-of-state, educational institution of higher education, and/or military training program that has been submitted to the commission for evaluation and found to meet the requirements of the applicable NFPA standard.

Source Note: The provisions of this §459.203 adopted to be effective February 28, 2019, 44 TexReg 869

§459.205. Examination Requirement.

Examination requirements in Chapter 439 of this title (relating to Examinations for Certification) must be met to receive Fire and Life Safety Educator II certification.

Source Note: The provisions of this §459.205 adopted to be effective February 28, 2019, 44 TexReg 869

§459.207. International Fire Service Accreditation Congress (IFSAC) Seal.

Individuals completing a commission-approved Fire and Life Safety Educator II program may be granted an IFSAC seal for Fire and Life Safety Educator II by making application to the commission for the IFSAC seal and paying applicable fees. Individuals must submit the fee for the seal prior to the expiration of the examination to qualify for the IFSAC seal.

Source Note: The provisions of this §459.207 adopted to be effective August 14, 2019, 44 TexReg 4194

5. Discussion and possible action on rule review for the following:

B. 37 TAC, Chapter 461, Incident Commander.

CHAPTER 461
INCIDENT COMMANDER
MINIMUM STANDARDS FOR INCIDENT COMMANDER

§461.1. Incident Commander Certification.

(a) An Incident Commander is defined as an individual responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources, who has overall authority and responsibility for conducting and managing all incident operations at the incident site.

(b) All individuals holding an Incident Commander certification shall be required to comply with the continuing education requirements in Chapter 441 of this title (relating to Continuing Education).

(c) Special temporary provision. Individuals are eligible to take the commission examination for Incident Commander by:

- (1) holding as a minimum, Fire Officer II certification through the commission; and
- (2) providing documentation of completion of the National Incident Management System courses 100, 200, 700 and 800; and
- (3) providing documentation acceptable to the commission that the individual has successfully completed Incident Commander training that meets the minimum requirements of the National Fire Protection Association Standard 1026; or
- (4) providing documentation acceptable to the commission, in the form of an affidavit from the individuals Head of Department or Chief Training Officer, that the individual has met the departments requirements to perform as an Incident Commander and has demonstrated proficiency as an Incident Commander.
- (5) This subsection will expire on January 1, 2022.

Source Note: The provisions of this §461.1 adopted to be effective December 3, 2020, 45 TexReg 8528.

§461.3 Minimum Standards for Incident Commander Certification.

In order to be certified as an Incident Commander, an individual must:

- (1) provide documentation of completion of the National Incident Management System courses 100, 200, 700, and 800; and
- (2) possess valid documentation of accreditation from the International Fire Service Accreditation Congress as an Incident Commander; or

(3) complete a commission approved Incident Commander program and successfully pass the commission examination as specified in Chapter 439 of this title (relating to Examinations for Certification). An approved Incident Commander program must consist of one of the following:

- (A) completion of an in-state Incident Commander program meeting the requirements of the applicable NFPA standard and conducted by a commission certified training provider, that was submitted and approved through the commission's training prior approval system; or
- (B) completion of an out-of-state, educational institution of higher education, and/or military training program that has been submitted to the commission for evaluation and found to meet the requirements of the applicable NFPA standard.

Source Note: The provisions of this §461.1 adopted to be effective December 3, 2020, 45 TexReg 8528.

§461.5. Examination Requirement.

Examination requirements in Chapter 439 of this title (relating to Examinations for Certification) must be met to receive Incident Commander certification.

Source Note: The provisions of this §461.1 adopted to be effective December 3, 2020, 45 TexReg 8528.

5. Discussion and possible action on rule review for the following:

C. 37 TAC, Chapter 491, Voluntary Regulation of State Agencies and State Agency Employees.

CHAPTER 491

VOLUNTARY REGULATION OF STATE AGENCIES AND STATE AGENCY EMPLOYEES

§491.1. Election of Components for Voluntary Regulation.

A state agency or state employee eligible for regulation under the Texas Government Code, §419.083, may apply to the Commission for regulation. The agency or individual must submit an application to the Commission for regulation under one or more components of the Commission's regulatory authority.

Source Note: The provisions of this §491.1 adopted to be effective September 9, 1992, 17 TexReg 5799; amended to be effective July 14, 1993, 18 TexReg 4330; amended to be effective January 1, 1999, 23 TexReg 11963; amended to be effective November 28, 2007, 32 TexReg 8533

§491.3. Documentation.

(a) The state agency or state agency employee seeking regulation or certification under this chapter must provide written documentation from the administrative head of the department providing fire protection, fire prevention, fire instruction, or fire training evaluation describing the duties, responsibilities, and work schedule of the state agency or state employee seeking regulation.

(b) State agency employees who are employed in the field of fire instruction or fire training evaluation who receive certification under this chapter must be full-time employees.

Source Note: The provisions of this §491.3 adopted to be effective September 9, 1992, 17 TexReg 5799; amended to be effective March 23, 1994, 19 TexReg 1681

§491.5. Notification.

If the applicant meets the requirements of the Texas Government Code, §419.083, the commission shall notify in writing the applying agency or agency employee of its decision. The applicant has one year from the date of notification to comply with all regulations applicable to the components elected by the applicant.

Source Note: The provisions of this §491.5 adopted to be effective September 9, 1992, 17 TexReg 5799.

5. Discussion and possible action on rule review for the following:

D. 37 TAC, Chapter 493, Voluntary Regulation of Federal Agencies and Federal Fire Fighters.

CHAPTER 493

VOLUNTARY REGULATION OF FEDERAL AGENCIES AND FEDERAL FIRE FIGHTERS

§493.1. Election of Components for Voluntary Regulation.

A federal agency or federal fire fighter eligible for regulation under the Texas Government Code, §419.084, may apply to the Commission for regulation. The agency or individual must submit an application to the Commission for regulation under one or more components of the Commission's regulatory authority.

Source Note: The provisions of this §493.1 adopted to be effective September 9, 1992, 17 TexReg 5800; amended to be effective July 14, 1993, 18 TexReg 4331; amended to be effective March 23, 1994, 19 TexReg 1681; amended to be effective January 1, 1999, 23 TexReg 11963; amended to be effective November 28, 2007, 32 TexReg 8534

§493.3. Documentation.

The federal agency or federal fire fighter seeking regulation or certification under this chapter must provide written documentation from the administrative head of the department providing fire protection or prevention describing the duties, responsibilities, description, or nature of federal property protected, and work schedule of the federal agency or federal fire fighter seeking regulation.

Source Note: The provisions of this §493.3 adopted to be effective September 9, 1992, 17 TexReg 5800; amended to be effective March 23, 1994, 19 TexReg 1681

§493.5. Notification.

If the applicant meets the requirements of the Texas Government Code, §419.084, the commission shall notify in writing the applying agency or federal fire fighter of its decision. The applicant has one year from the date of notification to comply with all regulations applicable to the components elected by the applicant.

Source Note: The provisions of this §493.5 adopted to be effective September 9, 1992, 17 TexReg 5800; amended to be effective March 23, 1994, 19 TexReg 1681.

5. Discussion and possible action on rule review for the following:

E. 37 TAC, Chapter 495, Regulation of Nongovernmental Departments.

CHAPTER 495
REGULATION OF NONGOVERNMENTAL DEPARTMENTS
SUBCHAPTER A
VOLUNTARY REGULATION OF NONGOVERNMENTAL DEPARTMENTS

§495.1. Application Procedures.

A nongovernmental entity may apply to the commission for voluntary regulation pursuant to the Texas Government Code, 419.085. A nongovernmental entity seeking voluntary regulation shall inform the commission in writing of its request and must provide the following documentation:

- (1) a letter from the Texas Department of Insurance verifying that the area protected constitutes a rating of one through eight assigned by Insurance Services Organization;
- (2) documentation from the United States Census Bureau verifying the population of the protected area;
- (3) written verification from the administrative head of the department that the entity provides fire protection to an unincorporated area; and
- (4) written documentation of the duties, responsibilities, and work schedules of the fire protection personnel employed by the entity.

Source Note: The provisions of this §495.1 adopted to be effective March 23, 1994, 19 TexReg 1681; amended to be effective March 1, 1999, 24 TexReg 793; amended to be effective December 24, 2002, 27 TexReg 12008

§495.3. Notification.

If the entity meets the requirements of the Texas Government Code, §419.085, the commission shall notify in writing the applying entity and the affected fire protection employees of its decision. Once the entity has been notified, the entity and affected employees have one year after notification to comply with all rules and regulations applicable to fire protection personnel.

Source Note: The provisions of this §495.3 adopted to be effective March 23, 1994, 19 TexReg 1681.

§495.5. Nongovernmental Fire Protection Employees.

A full-time fire protection employee of a nongovernmental entity that meets the requirements of the Texas Government Code, §419.085, is eligible for certification under the same rules as full-time fire protection personnel employed by local governments. Work experience at the nongovernmental department meeting the requirements for voluntary regulation shall be recognized toward certification.

Source Note: The provisions of this §495.5 adopted to be effective March 23, 1994, 19 TexReg 1681

CHAPTER 495
REGULATION OF NONGOVERNMENTAL DEPARTMENTS
SUBCHAPTER B
REGULATION OF NONGOVERNMENTAL ORGANIZATIONS AND PERSONNEL

§495.201. Nongovernmental Organizations.

An organization that is not a local governmental entity or a department of a local government entity is subject to all rules and regulations of the commission as if the organization were a local government if:

(1) the organization provides fire protection to a local governmental entity for profit under a contract or any other agreement with the local governmental entity; and

(2) the organization would be a fire department if the organization were a department of a local governmental entity.

Source Note: The provisions of this §495.201 adopted to be effective March 23, 1994, 19 TexReg 1682.

§495.203. Nongovernmental Organization Employees.

An employee of a nongovernmental organization that is subject to regulation by the commission who would be a fire protection personnel if employed by a local governmental entity is subject to all rules and regulations of the commission pertaining to fire protection personnel.

Source Note: The provisions of this §495.203 adopted to be effective March 23, 1994, 19 TexReg 1682.

§495.205. Nongovernmental Personnel.

An individual that is not employed by a local governmental entity is subject to all rules and regulations of the commission pertaining to fire protection personnel if the individual would be a fire protection personnel if the person was employed by a local governmental entity and:

(1) provides fire protection to a local governmental entity under a contract or other agreement between the individual and the local governmental entity; or

(2) provides fire protection to a local governmental entity under a contract or other agreement between a governmental entity and a nongovernmental organization regulated under §495.201 of this title (relating to Nongovernmental Organizations).

Source Note: The provisions of this §495.205 adopted to be effective March 23, 1994, 19 TexReg 1682.

§495.207. Regulation and Certification.

A nongovernmental organization that is subject to regulation under this chapter on September 1, 1993, is subject to all rules and regulations of the commission effective immediately.

Source Note: The provisions of this §495.207 adopted to be effective March 23, 1994, 19 TexReg 1682; amended to be effective December 24, 2002, 27 TexReg 12008

6. Subjects for future agenda items.

7. Future meeting dates.

8. Adjourn meeting.