

**BASIC FIRE
INVESTIGATION
TRAINING
100**



Course Outline



OREGON STATE FIRE MARSHAL BASIC FIRE INVESTIGATION 100 COURSE OUTLINE

BASIC FIRE INVESTIGATION COURSE

The Basic Fire Investigation 100 level course is a 3-4 hour course for ‘first in’ firefighters and fire officers. The lesson is for volunteer and career fire service and is based on the current editions of NFPA 1001, NFPA 921, and the Oregon DPSST Task Book objectives.

Goal: After completing this lesson, the student shall be able to assist in the investigation of a suspicious fire and protect and preserve evidence after a fire. The student should use the policies and procedures set forth by the authority having jurisdiction.

Scope: The Basic Fire Investigation 100 course provides a basic framework for fire personnel who have little experience in conducting fire investigations. The course is designed to provide basic understanding of the need for scene preservation, legal authority, the determination of fire patterns, fire origin and cause, and the various steps in the investigation process.

COURSE OVERVIEW

Lesson 1: Introduction to Fire Investigation provides introduction to determining cause, fire investigator responsibilities, rules of fire investigation, fire cause elements, ignition factors, and fire cause classifications.

Lesson 2: Fire Dynamics Refresher provides a review of fire behavior enabling fire fighters better control to suppress fire. Knowledge of fire behavior and fire science assists firefighters and investigators with the ability to “read” how the fire spreads, and fire behavior and intensity. In addition this lesson reviews the chain of events leading to the cause and origin of the fire.

Lesson 3: Initial Observations and Reading Fire Indicators provides fundamental training about the responsibility of suppression personnel in observing evidence.

Lesson 4: Determining Fire Origin and Cause provides basic training in identifying the area and point (s) of origin and the fire cause classifications.

Lesson 5: Securing the Fire Scene and Preserving and Protecting Evidence provides information on securing and protecting the area until further investigation can be conducted. After the area of origin has been identified or located it must be secured against tampering or destruction by suppression efforts.

Lesson 6: Firefighter Professionalism and Documentation provides basic understanding of firefighter conduct and reporting writing.



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Objectives:

- Participants will develop a basic understanding of firefighter roles and responsibilities when investigating a fire scene and understand the need to collect pertinent information while en route, upon arrival, and during fire scenes.
- Participants will review fire science and how it relates to fire investigations.
- Participants will develop a basic understanding of the need to select facts about preserving and protecting evidence.
- Participants will develop a basic understanding of fire indicators and fire patterns.
- Participants will develop a basic understanding of the method of assessing fire origin and fire cause.
- Participants will develop a basic understanding of firefighter responsibilities through documenting and reporting fire investigations.

Estimated total time: 3 -4 hours (including test) plus the Skills Evaluation Checklist

Evaluation:

1. Skills Evaluation Checklist ~ Is a reference for the PRACTICAL portion of the NFPA-DPSST taskbook that should be completed by a Training Officer.
2. Online test ~ must pass with 80% accuracy

References:

- NFPA 921 Guide for Fire and Explosion Investigation
- NFPA 1001 Standard for Fire Fighter Professional Qualifications
- Oregon DPSST Task Book objectives
- IFSTA Essentials 5th edition

ACCREDITATION

This course is accredited through Oregon Department of Safety Standards and Training (DPSST). Upon completion of the classroom portion of this course, certain requisite knowledge boxes may be signed off at the discretion of your department fire instructor. In order to receive DPSST accreditation for this course, the Skills Evaluation Checklist should be signed by the agency Training Officer, Fire Investigator, Fire Chief or designate, after successful practical demonstration of each job performance requirements on an actual fire investigation.

THE FORM IS A CHECK LIST ONLY. IT IS FOR YOUR RECORDS AND TO USE AS A REFERENCE WHEN FILLING OUT THE DPPST TASKBOOKS.



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Job Performance Requirements: Following the lesson portion of this class and the practical check off sheet; the following job performance requirements may be checked off in the NFPA –DPSST task books

NFPA Firefighter 1

5.3.12 Overhaul – fire cause and preserving evidence

5.3.13 Overhaul a fire scene, given personal protective equipment, attack line, hand tools, a flashlight, and an assignment, so that structural integrity is not compromised, all hidden fires are discovered, fire cause evidence is preserved, and the fire is extinguished.

(A) Requisite Knowledge. Types of fire attack lines and water application devices most effective for overhaul, water application methods for extinguishment that limit water damage, types of tools and methods used to expose hidden fire, dangers associated with overhaul, obvious signs of area of origin or signs of arson, and reasons for protection of fire scene.

(B) Requisite Skills. The ability to deploy and operate an attack line; remove flooring, ceiling, and wall components to expose void spaces without compromising structural integrity; apply water for maximum effectiveness; expose and extinguish hidden fires in walls, ceilings, and subfloor spaces; recognize and preserve obvious signs of area of origin and arson; and evaluate for complete extinguishment.

5.3.14 Conserve property as a member of a team, given salvage tools and equipment and an assignment, so that the building and its contents are protected from further damage.

(A) Requisite Knowledge. The purpose of property conservation and its value to the public, methods used to protect property, types of and uses for salvage covers, operations at properties protected with automatic sprinklers, how to stop the flow of water from an automatic sprinkler head, identification of the main control valve on an automatic sprinkler system, and forcible entry issues related to salvage.

(B) Requisite Skills. The ability to cluster furniture; deploy covering materials; roll and fold salvage covers for reuse; construct water chutes and catch-alls; remove water; cover building openings, including doors, windows, floor openings, and roof openings; separate, remove, and relocate charred material to a safe location while protecting the area of origin for cause determination; stop the flow of water from a sprinkler with sprinkler wedges or stoppers; and operate a main control valve on an automatic sprinkler system.

NFPA Firefighter 2

6.3.4* Protect evidence of fire cause and origin, given a flashlight and overhaul tools, so that the evidence is noted and protected from further disturbance until investigators can arrive on the scene.

(A) Requisite Knowledge. Methods to assess origin and cause; types of evidence; means to protect various types of evidence; the role and relationship of Fire Fighter II's, criminal



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investigators, and insurance investigators in fire investigations; and the effects and problems associated with removing property or evidence from the scene.

(B) Requisite Skills. The ability to locate the fire's origin area, recognize possible causes, and protect the evidence.

NFPA Fire Officer I

4.5* Inspection and Investigation.

This duty involves performing a fire investigation to determine preliminary cause, securing the incident scene, and preserving evidence, according to the following job performance requirements.

4.5.1 Evaluate available information, given a fire incident, observations, and interviews of first-arriving members and other individuals involved in the incident, so that a preliminary cause of the fire is determined, reports are completed, and, if required, the scene is secured and all pertinent information is turned over to an investigator.

(A) Requisite Knowledge. Common causes of fire, fire growth and development, and policies and procedures for calling for investigators.

(B) Requisite Skills. The ability to determine basic fire cause, conduct interviews, and write reports.

4.5.2 Secure an incident scene, given rope or barrier tape, so that unauthorized persons can recognize the perimeters of the scene and are kept from restricted areas, and all evidence or potential evidence is protected from damage or destruction.

(A) Requisite Knowledge. Types of evidence, the importance of fire scene security, and evidence preservation.

(B) Requisite Skills. The ability to establish perimeters at an incident scene.

LESSON 1: INTRODUCTION AND ROLES AND RESPONSIBILITIES

As a first responder, fire investigation relies on your initial observations; you can determine elements of fire cause, ignition factors, and pertinent information for the fire investigator. By understanding these factors, a firefighter must determine when it is imperative to call a fire investigator to the fire scene.

Slide 1

Why determining exact fire cause is important

- To develop preventive measures/information for intervention services
- To compile fire incidence trends
- To provide information to insurance companies



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- To provide supportive evidence in courtroom testimony

Every year, over 30,000 fires in the United States are arson fires, and 50% of these fires are set by children. Youth continue to set fires and often escalate the fires until they get caught and intervention occurs. Research has shown very few youth reoffend after they receive intervention.

As a first responder it is imperative that you notice and advise fire investigators of possible youth caused fires.

Audio

Repeats slide verbiage

Slide 2

NFPA 921 is a guide not a standard

NFPA 921 is considered a tool to which fire investigations and their conduct is compared

Even at the basic level, you can NOT ignore NFPA 921

Scientific Methodology

- Recognize a need (there was a fire)
- Define the problem (origin and cause)
- Collect Data (patterns, photos, evidence, statements, diagrams, etc.)
- Analyze Data (conclusions based upon all data collected)
- Develop a Hypothesis (a theory, opinion)
- Test the Hypothesis (compare to known facts)

Audio

NFPA 921 provides guidelines for fire and explosion investigation along with a detailed description of how scientific methodology can be applied to fire investigations.

Slide 3

General rules when conducting fire investigations

- Nothing involved with fire investigation is an absolute
- Exceptions and variations (to the 'rules') are many and frequent
- The intent is not to be vague, but despite what "generally" and "usually" happens:
- YOU WILL NEVER BE AN EXPERT!

Rule of scientific investigation: Sherlock Holmes was the first to talk of scientific investigation when he said: "It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories instead of theories to suit facts."

Slide 4

Key Elements of a Fire Investigation

- Where did it start?



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- What was there to start the fire?
- What burned?
- When did it start?

Audio

The origin, the initial source of heat, the material that burned, the amount of time it burned, and what caused the fire to ignite are all important key factors in fire investigation.

Slide 5

Safety: Personal Health

Many varying factors can influence the danger potential of a fire or explosion scene:

- Entering fire scene during suppression - always notify incident commander and receive permission
- Coordinate activities with fire suppression
- Fires generate noxious gases
- Chemical - biological - radiological hazards

Audio

Your primary responsibility is to yourself. If you don't stay safe, then you certainly can not assist anyone else.

Slide 6

Safety: Clothing and Equipment

Wear appropriate level of PPE for the fire scene you are investigating.

- Gloves, safety shoes or boots
- Safety helmet
- Protective clothing
- Respiratory protection
- Air monitoring

Audio

Always wear full personal protective clothing.

Slide 7

Safety: Fire Scene and Investigating

Fire Scenes are dangerous by nature: possible things to be aware of:

- Trapped victims
- Injured victims
- Utilities
- Structural stability
- Standing water
- Collapse



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- Electrocution

Audio

Be aware of your surroundings.

Slide 8

Responsibilities

- Firefighters and fire officers are the 'initial fire investigators' first on scene and can provide initial observations, evidence protection, and documentation for fire investigators
- Fire investigators follow up with analyzing evidence to determine origin and cause, documenting fire origin and completing fire report.
- The Fire Chief or designated Fire Marshal has a legal responsibility to determine fire origin and cause - per ORS 476.210.

Audio

Repeats slide verbiage

LESSON 2: INTRODUCTION AND ROLES AND RESPONSIBILITIES

Firefighters who understand fire behavior are better able to control and suppress the fire while maintaining and securing the area of origin.

Slide 1

Fire Dynamics Refresher: Knowledge of Fire Behavior

- Statistics from USFA show that of the approximately 400,000 structure fires every year, approximately 3,000 civilians lose their lives and over 15,000 injuries occur. This means that every 162 minutes someone dies in a fire and every 32 minutes someone is injured in a fire.
- Most victims die from smoke inhalation, not from burns.
- Smoking is considered to be the leading cause of residential fire deaths.
- Any ignition has the potential to grow into a major fire that could have dramatic effects on life safety and property conservation.

Audio

Knowledge of fire behavior and fire science assists with the investigators ability to “read” fire spread, fire behavior and intensity, and the chain of events leading to the cause and origin of the fire and how the fire progressed.

Video: Knowledge of Fire Behavior

Slide 2

Fire Dynamics Refresher

- Oxygen



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- Heat
- Fuel
- Chemical Chain Reaction
- Fire Tetrahedron

Audio

In order for combustion to occur, three elements must be combined – there must be fuel, air and a heat source to ignite the fuel. These three elements along with the chemical chain reaction make up what we call the fire tetrahedron; if any one of them is missing there can be no fire.

Slide 3

Heat transfers in three ways

- Conduction
- Convection
- Radiation

Audio

In order for a fire to continue burning, heat must be transferred from one piece of fuel to another. There are three ways this can happen: conduction, convection, and radiation.

Slide 4:

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

Audio

Conduction is the transfer of heat within the material itself. Most metals are good conductors. Wood on the other hand is a poor conductor; for example, a steel pipe with one end in a fire will soon grow hot.

Slide 5

Convection: Heat transferred by the movement of air or liquid

Audio

Convection is the second most common form of heat release rate (60 to 75% of heat is transferred).

Convection is the transfer of heat by the flow of liquids or gases, which, when heated by the fire expand and rise. In fires, you see them as smoke. If this heated mixture of air, particles and gases confine to a column, the convection current can become strong enough to reach 20,000 feet or higher and loft burning embers beyond the fire front. If wind pushes the convection front over unburned fuel, these hot gases can dry and ignite other fuels.

Slide 6

Radiation: Heat transfer by way of electromagnetic energy



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Audio

An example of radiated heat might be sunshine. Light waves make contact with opaque or solid objects heating them.

Slide 7

Basics of Fire Science - Terms

Self-heating and self-ignition (Spontaneous Combustion)

- Self-heating is the ability of certain materials to increase in temperature without drawing heat from its surroundings. If this continues to the material's ignition temperature, then self-ignition happens.
- Factors influencing or controlling this occurrence- rate of heat generation (faster than heat is dissipated or transferred).
- Effects of ventilation (adequate but not excessive) insulating effects of the material's immediate surroundings (heat retained rather than dissipated).

Fuel Load: Amount of fuel in a room or space may have an effect on the fire patterns and how much damage that may occur.

Ignition properties of materials

Products of Combustion: The products given off when materials burn-combustibility (refer to NFPA 3.6).

Fire Pattern Development ("V" Patterns)

- Plume generated
- Ventilation generated
- Hot gas layer generated
- Patterns generated by full room involvement

Ignition Properties of Materials: Different types of materials ignite and burn at different temperatures

Fire Development: Fire patterns can be confined and unconfined. Refer to sections 3-5 of NFPA 921; how fires burn in rooms and what pattern effects this development creates in determining the point of origin. All come into play when doing fire investigations

Slide 8

Heat Sources

Fuel States

- Gases



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- Solids

- Liquids

Ignition Sources

- Chemical
- Mechanical
- Electrical

Audio

Ignition sources may be varied. They may be chemical, mechanical or electrical in nature. Fuel can come in many forms. Fuel may be in the form of a gas, a solid, or a liquid.

Slide 9

The Ignition Process

- Adequate heat generated
- Heat to fuel transmitted
- Fuel heated to ignition temperature

Slide 10

Ignition Factors

- An Act
- Omissions: a lack of action that causes something to happen

Both acts and omissions may be due to negligence or reckless conduct.

- Determining the sequence of events or conditions that might have occurred
- Example: Fire is on a kitchen range that started when a pan of oil ignited and spread fire throughout the kitchen.
- The cause may be more than “the pan of oil overheated”.

Questions to ask:

- Was the control turned up too high?
- Did the control contacts stick?
- Why did the high temperature cutoff not prevent overheating?

Audio

Various contributing factors should be investigated and included in the explanation of the ignition sequence. Ignition factors may involve acts or omissions which may have been accidental (unintentional) or intentional. Act: Dropping a lit cigarette into a sofa or placing combustible near a heater. Omission: Failing to repair a worn extension cord or failure to clean flues. Both acts and omissions may be due to negligence or reckless conduct.

Video: Ignition Factors, Kitchen Fire and fire development

Slide 11

Fire phases



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- Rollover
- Flashover
- Backdraft

Audio

Knowledge of fire phases will assist firefighters to make more effective tactical decisions on a fire scene.

Slide 12

Rollover/flame over

The condition where unburned fuel from the originating fire has accumulated in the ceiling layer to a sufficient concentration that it ignites and burns. This can occur without ignition and prior to the ignition of other fuels separate from the origin.

Audio

Flame over or rollover is a condition where unburned fuel accumulates at the ceiling level, this eventually ignites and burns.

Slide 13

Flashover video

Audio

A transition phase in the development of a contained fire in which surfaces exposed to thermal radiation reach ignition temperature more or less simultaneously and fire spreads rapidly throughout the space. Flashover occurs at approximately 1100° F in ceiling layer.

Slide 14

Backdraft Instantaneous combustion that occurs when oxygen is introduced into a smoldering fire. The stalled combustion resumes with explosive force.

Audio

Repeated slide verbiage

Slide 15

Understanding Key Elements of a Fire Investigation

Origin - starting point of fire

Source: e.g.: electric outlet

Form: e.g.: short-circuit arc, mechanical damage

Fire Cause Elements

Heat - for the initial source of ignition

Source: e.g.: match

Form: e.g.: open flame



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Time - duration of burning
Type: e.g.: wood, plywood
Form: e.g.: wall stud, siding

Fuel - material initially ignited
Type: e.g.: cotton, ignitable liquid
Form: e.g.: shirt, gasoline

Audio

Applying the scientific method provides the investigator with prescribed methodology based on scientific principals and procedures proven in court.

Video: Fire cause elements, cotton/shirt and gasoline

LESSON 3: INITIAL OBSERVATIONS AND READING FIRE INDICATORS

This lesson provides fundamental training about the responsibility of fire suppression personnel en route, on arrival and during fire suppression. Additionally this lesson will discuss why reading fire indicator is an important component in these initial observations.

Slide 1

Initial Observations: Important information to note
En route to the fire

- Dispatch information
- Time of day
- Weather conditions
- Barriers - conditions that might create a delayed response

Approaching the fire scene

- Bystanders and residents
- Appearance - color of smoke
- Persons leaving the area

Upon arrival at the fire scene

- Time
- Stage of fire: when discovered versus when arrived
- Location of fire
- Force of venting
- Fire and smoke conditions

During Fire Suppression



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- Access
- Forced entry
- Unusual odors
- Fire reactions: Abnormal behavior of fire when water is applied
- Obstacles hindering firefighting
- Heat intensity - can indicate accelerants

Unusual conditions: availability of documents - usually locked away, so if readily accessible could be suspicious

Audio

Firefighters should begin by conducting an overall assessment en route to the fire. Noticing such things as: time of day, barriers, weather conditions, color of smoke, people leaving the scene, including juveniles' and/or any other suspicious appearances. Upon arrival pay attention to the stage and location of the fire, the fire and smoke conditions and if there is any sign of forced entry. Although putting the fire out is your number one priority, it is important not to have tunnel vision. During fire suppression pay attention to any unusual odors, and abnormal fire behavior when water is applied, any obstacles hindering your ability to fight fire. Heat intensity can indicate accelerants so pay attention to anything suspicious.

Slide 2

General Observations of fire scene

- Areas of greatest damage
- Fire scene “macro” indicators
- Report observations to officer in charge
- Information should not be shared
- Avoid overhaul of “important” areas
- Removal of debris: “reconstruction”
- Watch for evidence
- Write notes of circumstances observed
- Firefighter Observation Reports

Audio

General observations of the fire scene are fundamental and are the responsibility of suppression personnel in observing evidence. Protecting the area of origin is crucial in determining the fire cause as is appropriate documentation. Firefighter narrative or notes should be based upon firefighter observations and not based upon others' recollections and only shared with anyone else besides the officer in charge or the fire investigator.

Slide 3



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Legal Survival: Every fire presents its own kind of hazards, and law-enforcement officers need to be aware of any potential dangers during the course of their investigation such as downed power lines, traffic, hazardous materials, or human threats.

- Ensure your scope of authority to conduct investigation
- Understand your authority to enter property
- Understand your local authority to secure scenes
- Understand and comply with applicable agency policies

Audio

Everyone has a role in the investigation process. Law-enforcement officers responding to fires are frequently performing a number of different functions - assisting with crowd control, interviewing suspects, and investigating. Maintaining clear and concise communications throughout the investigation is vital, whether you're working at the fire scene, or in another area altogether.

Slide 4

Review of indicators to look for

- How did the fire spread?
- Look for obvious "macro" indicators
- Heat and smoke damage
- Fire damage; one area burned more
- Collapsed roof
- Fire "V" patterns
- Other indicators to lead "backward"

Audio

Fighting a fire efficiently and successfully begins with an accurate observation of fire indicators and patterns such as greatest heat damage, areas of collapse, and V patterns.

Slide 5

Reading Fire Indicators

Macro Fire Indicators: From the least damaged area to the greatest damaged area

Audio

Begin your investigation by working from the least damaged area to the area of greatest damage. Outside to inside. Start in the lightly charred areas working back toward heavily charred areas.

Video: Reading Macro Fire Indicators

Slide 6

Fire Effects

- Temperature
- Loss of material



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- Char
 - Surface effect
 - Appearance
 - Rate and depth
- Spalling
- Window glass
- Collapsed springs
- Distorted light bulbs
- Rainbow effects
- Victim injuries
- Oxidation (rust)
- Color changes
- Melting
- Thermal expansion and deformation
- Smoke on surfaces
- Clean burns
- Calcination

Audio

The effects of fire will cause loss of material, charring, and spalling. Fire also causes oxidation, color changes, melting, thermal expansion, and deformation. You should also pay attention to smoke on surfaces, clean burns, and calcination. Fire effects on window glass are called crazing: Pock marks or half moon indentations are usually indicative of water streams hitting hot glass.

Slide 7

Fire Patterns

Heat Shadowing

- Blocking the travel of radiant or convected heat, or direct flame contact
- Conducted heat does not produce shadowing

Nature of protected areas

- An object preventing the products of combustion from depositing
- Indicate the location of objects in their pre-fire location

Nature of protected areas

- An object preventing the products of combustion from depositing
- Indicate the location of objects in their pre-fire location

This is from NFPA 921 ed. Section 6.2.2.3 and another dimension to the theory that sharp v patterns indicate a fast burning fire.

Lower heat release rate fuels may not produce flame heights sufficient for the flame zone of the plume to reach a ceiling or other horizontal barrier.



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These fires produce triangular shaped fire patterns with the bases at the bottom and the vertices at the top, such as inverted cone or hourglass patterns. As the rate of heat release increases and the flame zone begins to approach the horizontal barrier; the sides of the patterns produced become columnar (straight sided).

As the heat release rates continue to increase, creating ceiling jets and /or descending upper smoke layers, descending flame impingement on surfaces and downward radiating heat energy begin to broaden the tops of the fire patterns and V or U shaped pointer or arrow patterns are produced on truncating vertical surfaces. Circular shaped patterns are produced on the bottoms of horizontal surfaces.

Slide 8

Fire Patterns

- V patterns
- U-shape
- Truncated
- Pointer and arrow
- Circular
- Irregularly shaped
- Doughnut shaped
- Linear
- Area

Audio

Fire patterns come in many forms, these patterns are discussed in detail in the Basic Fire Investigation 200 level course, for the first responder, you should have a basic awareness of the patterns that fires cause because these patterns can lead the fire investigator to the origin of fire.

Slide 9

Reading Fire Indicators

Other types of fire indicators

Bodies are good fire indicators (V pattern). DON'T move body, if at all possible

Always check for signs of forced entry

Check smoke alarm to see if it has been tampered with

- Check to see how burned it is
- Check to see if it has batteries

Light Bulbs

- Low wattage (< 25 watts) will pull inward due to vacuum inside
- High wattage (> 25 watts) will push outward due to pressure inside
- Light bulbs are very fragile indicators

Clocks may be used to establish an estimated burn time.

- Wall mounted clocks often fall - BUT - their hands may be protected.



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- Accuracy of clocks should be checked with the occupant.
- Clocks are not necessarily an accurate indicator of actual time

Bed springs can be fire indicators and may help to determine:

- Fire Direction
- Fire duration
- Fire intensity

Always look at the entire scenario, not just the bed NFPA 921 2004 ed. 6.14

LESSON 4: DETERMINING FIRE ORIGIN AND CAUSE

In simple terms, fire investigation is the discovery of the circumstances, conditions, and sequence of events that caused the fire. This lesson will focus on the first responder's role in determining fire origin and cause.

Slide 1

Purpose of an investigation: To locate, document, and preserve all relevant evidence that shows what and who caused the fire and to do so in such a manner that public agencies can make sound decisions based on the results of the investigation.

Fighting a fire efficiently and successfully begins with an accurate determination of its origin and cause. It's the responsibility of all personnel to ensure that every fire is properly investigated so that civil or criminal responsibility can be established, successful fire prevention programs developed, and strategic plans for future fires can be prepared.

Audio

When you conduct a fire origin and cause investigation you are searching for evidence, but before you can collect evidence you must consider the legal question of whether the search was reasonable and whether there is an expectation of privacy under the 4th Amendment. The answer to this question lies in where you are searching and exactly what evidence you plan to collect and how it may relate to the investigation.

Slide 2

Determining Fire Origin and Cause

Area of Origin: "The room or area where a fire began."

Point of Origin:

"The exact physical location where a heat source and a fuel come in contact with each other and a fire begins."

Room of Origin:

The room in which the fire started



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Audio

The most important tool you have in identifying the origin area of a fire is understanding fire behavior. What you learned earlier in this program becomes very important in accomplishing one of your primary responsibilities as a first responder – locating and securing the origin area.

Slide 3

Fire Cause Classifications

For the purposes of this class, NFPA 921 is the guide for determining fire cause. The four fire cause classifications we discuss from 921 are accidental, natural, undetermined, and incendiary. Unintentional or intentional are NOT considered fire cause classifications. NFIRS has additional categories that you may see in Fire Bridge (our online reporting system).

Slide 4

Fire Cause Classifications

Accidental fires are defined as: “Fires where the proven cause does not involve a deliberate human act to ignite or spread fire into an area where the fire should not be.”

Audio

Accidental fires do not involve a deliberate human act.

Slide 5

Accidental Fire Indicators

- Reckless
- Failure to use ordinary care
- Misuse
 - Material; ignition source brought to material
 - Ignition source; material brought to ignition source
- Mechanical failure, malfunction
- Design, Construction, Installation Deficiency
- Operational Deficiency
- Natural Condition

Audio

Accidental fires can be caused by reckless acts, misuse of materials, mechanical failure, construction deficiencies, operational deficiency, or natural conditions.

Slide 6

Fire Cause Classifications: Accidental

- Heating Equipment
- Cooking Equipment
- Misuse of Smoking



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Audio

The cause of all fires may not be as they appear, further examination may be required. Would you expect to see a stove fire with the burners turned off? Be sure that you take into consideration all the possibilities. Before fire cause determination is made, all other potential ignition sources must be ruled out.

Slide 7

Fire Cause Classification: Accidental

- Electrical: heat from arcing
- Open flames, sparks, and embers
- Spontaneous Combustion can occur 3 ways:
 - Chemical mixture
 - Fermentation
 - Oxidation
- Natural sources
- Mechanical
- Explosives and fireworks
- Chemical
- Heat from hot objects

Audio

Some deliberately ignited fires can still be accidental. For example in a legal setting, in accidental fires the ignition will either be electrical, mechanical, or chemical. An example of mechanical ignition might be friction or over heating. An example of electrical ignition might be over use or over current. And an example of chemical ignition might be a reaction brought upon with the introduction of heat or another chemical. Trash fire may be spread by a gust of wind. The spread of fire was an accidental event though the initial fire ignition may have been deliberate.

Slide 8

Fire Cause Classifications: Natural

“Fires where the proven cause does not involve direct human intervention.”

Lightning is an electrical discharge associated with thunderstorms. It often strikes trees, snags and power lines and can ignite combustibles. It often leaves obvious physical evidence at the origin area; such as, strike marks on trees and other objects, splintered wood fragments, and needle showers.

Audio

Natural fires involve fires caused without direct human intervention or actions, such as fires resulting from lightening, earthquake, and wind.

Slide 9



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Fire Cause Classifications

Undetermined generally means the investigator is either unsure or has not been able to find a cause. The cause cannot be proven.

- There may be more than a single possible cause
- The fire may still be under investigation
- “Suspicious” is not an accurate description of fire cause

Audio

Whenever the cause cannot be proven to an acceptable level of certainty, the proper classification of fire cause is undetermined.

Slide 10

Fire Cause Classifications

Incendiary fires are defined as:” Fires that are deliberately ignited under circumstances in which the person knows that the fire should not be ignited.”

- Color and quantity of smoke and flames
- Unusual odors
- Multiple fires
- Use of ignitable liquids
- Use of common equipment or appliances
- Excessive or “created” structural damage
- Extreme, unnatural, or excessive fire spread

Audio

Arson continues to be a significant portion of the fire problem in the US. Each year approximately 30,000 structure fires are intentionally set. These fires cause millions of dollars in damage and loss of life.

Slide 11

Incendiary Fire Indicators: This is a crime, law enforcement must get involved.

- Covered windows, doors, or other openings
- Obstructed or delayed fire department access
- Intentionally created
- Short time between occupants leaving and fire being discovered or time of call
- Time of day
- Secondary fires

Slide 12

Incendiary fires: youth-set fires

If the youth is not identified...NO INTERVENTION takes place.



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Many youth have mental health issues, crisis in their families, or are engaged in dangerous and risky behaviors that are preventable.

Audio

Child fire play and experimenting may cause fires. Because many of them occur in residential areas they're usually detected and suppressed quickly. Properly protecting the area of origin may give the investigator clues to the cause of the fire. Most fires of this type the result from natural curiosity, but some motives are more pathological. That is why it is also important to identify any

children at or leaving the scene. Child fire play must be reported so the responsible parties can be referred to juvenile authorities for counseling.

Video Youth Fire Prevention and Intervention

LESSON 5: SECURING THE FIRE SCENE AND PRESERVING AND PROTECTING EVIDENCE

When an area of origin has been identified or located it must be secured against tampering or destruction by suppression efforts. Secure and protect this area until further investigation can be conducted.

Slide 1

The entire fire scene is evidence

- Origin must be protected against destruction or contamination
- Keep unnecessary personnel away from area
- Use Fire Scene tape (plywood / plastic / tarps) to secure the fire scene
- Utilize law enforcement

While on the fire scene (prior to the arrival of the investigator):

- Efforts of firefighters should be toward the protection of the scene
- Fire chief or officer in charge at the scene of an emergency is authorized to place ropes, guards, barricades...to prevent accidents or interference with lawful efforts of fire department activities
- If there is incendiary evidence the fire department should leave at least two people on premise until investigator arrives – you must contact law enforcement or it will require a warrant to reenter

Slide 2

Permission to Enter



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For an emergency situation no permission is required due to the ongoing emergency operation; however, when the scene has been abandoned, the only way to return to the scene is by consent or warrant.

Consent

Verbal (OK if “witnessed”) or Written (Best). It is best to have a written Standard Operating Procedure. Make sure consent is from the correct person. Must be voluntary, informed, conditional, and able to be withdrawn at anytime

Slide 3

ORS 476

- ORS 476.210 - “Investigation of fires by municipal officers and constables”
- United States Supreme Court case: Michigan v Tyler

- Authority to investigate does not abridge citizens’ right to property or expectation of privacy
- Inspection Warrants (authorized by ORS 476.150 to 476.170)
- Criminal search warrant is a law enforcement tool that should be used as a last resort

Audio

ORS 476.210 allows access onto private property in emergency situations and the fire department can stay a reasonable period of time; however, once the emergency responders leave the scene in order to return they must have the proper Permission to Enter form or secure an inspection warrant. These legal requirements are based on the Supreme Court decision Michigan v Tyler.

Slide 4

Fire Watch

Need a minimum of two personnel to secure a fire scene.

Personnel need to be able to testify that:

- the scene was secure
- all points of entry were watched and
- the scene was not tampered with.

Fire Watch

- Firefighters
- Police
- Others

Methods of securing the scene

- Scene Tape
- Fencing
- Other



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Audio

Appropriate personnel to assign the position of securing the fire scene might be firefighters, police, private security personnel, reserve, volunteer or anyone credible third party. To secure the fire scene you may use fire scene tape, fencing, boards, locks, or any other construction method.

Slide 5

1. When does a fire department authority end?
2. Whose duty is it to secure a fire scene?
3. How long should the premises be guarded and kept under the control of the fire department?

4. Why should evidence of fire origin and cause be marked, tagged, and photographed before the last firefighter leaves a fire scene?

Slide 6

1. When a fire scene is secured, who should be allowed to enter?
2. When a person is authorized to enter a fire scene, what information should be recorded and how should it be recorded?
3. What is the legal case and its basis for firefighters to return to fire scenes after leaving?

Slide 7

Fire Scene Preservation

DO:

- Use cardboard box around tire marks or foot prints
- Leave charred documents found in containers
- Keep firefighters out if not needed!
- Leave it as you find it!
- Avoid fire operations impacts
- For fragile evidence immediately take photographs, diagrams, and notes if possible
- Close dampers in fire place to protect partially burned papers

DON'T:

- Don't handle evidence unless absolutely necessary
- Don't over use water
- Don't contaminate scene while operating power tools, hose lines, etc...

Audio

There is no set method to secure the scene because every fire is unique the bottom line is that you should be conscious of protecting the area of origin and that you make an effort to preserve and protect the evidence using whatever methods are available.



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Slide 8

Spoliation of Evidence

- A spoliation allegation is basically saying that the investigator has, in some manner, prevented the defendant from defending themselves.
- Investigator should document not only the evidence relevant to the opinion but also other reasonable alternative ignition sources.
- Failure to document other potential ignition sources may result in a spoliation allegation.
- Criminal and civil courts can apply various remedies where spoliation is alleged.
- Don't forget one of the investigator's most important pieces of evidence; the fire scene.

Audio

Spoliation is a term investigators must be familiar with. NFPA 921 defines spoliation as: Loss, destruction, or material alteration of an object or document that is evidence or potential evidence in a legal proceeding.

Slide 9

Overhaul

Firefighters should avoid trampling over possible evidence and obliterating it

Try not to use excessive water

Improperly done overhaul operations can be detrimental to fire cause investigation - postpone overhaul until IC authorizes it.

Audio

Aggressive overhaul makes reconstruction of the fire scene more challenging for the investigator. Only remove what must be removed in order to complete fire extinguishment. Overhaul efforts should be done with reconstruction in mind. It may be a good idea to photograph items before removing them or inform the investigator where the item had been originally.

Slide 10

Protecting Evidence

How should firefighters deal with evidence discovered at fire scenes?

Under what circumstances should a firefighter gather evidence?

If evidence is gathered by a firefighter, what must be done?

LESSON 6: FIREFIGHTER PROFESSIONALISM AND DOCUMENTATION

Firefighter professionalism is imperative when dealing with the public the investigator must be polite, conscientious, and professional. Remember this may be the first contact the fire victim has with your fire department.



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Slide 1

Interview Witnesses

Interviewing witnesses is an essential part of any fire investigation. Information obtained in those interviews is often crucial in determining the cause of the fire and may need to be presented in court.

The 5th Amendment of the Constitution gives all U.S. citizens the right not to incriminate themselves. However, issues of self-incrimination do not apply to witnesses, only to persons suspected of committing a criminal violation.

Audio

Two considerations must always be taken into account when you are questioning a witness or a potential suspect. First, does the person being interviewed believe the questioner is a government official? In other words, have you clearly identified yourself as a fireman, fire investigator, ranger, or whatever the case may be? Second, does the person being questioned believe that they are free to leave, that is, not being held in custody or against their will? Ultimately this issue may rest with that person's perception of the situation. Even if they are not actually being detained by law-enforcement officials, they may perceive that they are in custody simply because they are in a police dominated environment, such as a police station.

Slide 2

Firefighter Professionalism

Interview techniques

- Talk to People
- Don't "grill" people
- Be yourself
- Ask open ended questions
- Listen, Listen, Listen
- You are an interviewer
- You are NOT an interrogator
- You do not read Miranda!

Audio

Identify any witnesses in the area. Write down their personal and vehicle information and, if possible, have them wait for the investigator who will conduct a more thorough interview. Write down the license number and description of any vehicles that drive by the scene more than once, and take extra note of people who seem unusually interested in the fire or who try to assist with suppression or the investigation. Some things to consider are that the person is not in custody and is free to leave; you are not a police investigator. You are part of a Fire Investigation Team which



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includes the State Fire Marshal, Law Enforcement, OSP Arson, the local jurisdiction, and the Medical Examiner. You may not detain anybody. Subjects must know they are free to leave. Youths require special interviewing skills and other intervention resources may be considered. You may not detain a youth involuntarily (i.e.: Do NOT put a youth in a command vehicle or a fire engine and tell them not to leave).

Slide 3

Firefighter Professionalism

Questions to consider

1. What is a sufficient reply to any question about fire cause?
2. To whom should a firefighter share their opinions regarding where and why a fire started?
3. Why should you be careful about the questions you ask?
4. Why should a statement about the cause of a fire not be shared prematurely?

Slide 4

Documentation

- Firefighter Observation
- Firefighter Notes
- Photography
- Diagrams
- Report Writing

Slide 5

Documentation: Firefighter Observation

Document everything using: who, what, where, when and how

Notes should NOT contain:

- Your personal thoughts
- Your personal impressions
- Any personal statements

Only provide statements to trained investigators, not other firefighters

Refer bystanders and media to the Fire Chief or the Public Information Officer.

If you are asked how the fire started just say “the fire is under investigation”.

Audio

When writing your notes write the facts not opinions. Your notes should only be shared with the incident commander and/or fire investigator. Do not talk to other firefighters. Afterwards, keep your ears open for any rumors or facts about the cause of the fire and report them to the investigators.

Slide 6

Documentation: Firefighter Notes



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Notes allow for a total evaluation of gathered facts during a less stressful time

- Note taking is considered the “backbone” of a thorough and conscientious investigation
- Notes are often accessible to the defense at time of trial
- Note taking can be recorded in two ways:
 - Written into a notebook
 - Tape recorded

Audio

If it is not written down, it did not happen or more importantly, you cannot prove it caused the fire. Notes can be recorded two ways: written into a note book and using a tape recorder. When using a tape recorder, it is a good idea to transfer the information into a note book ASAP, for permanent record. Always verify that the tape recorder is working and check the batteries. Always retain a copy of your notes for yourself. Notes should contain: accurate documentation of

what you are doing and observing, all measurements and a rough diagram of the incident scene, and identification of all recovered physical evidence.

Slide 7

Documentation: Importance of Photographs

- The relationship existing between objects present in the scene cannot be clearly understood unless the measured distance is known.
- The photograph does not provide accurate information concerning the distance between various objects present at the scene.
- Photos are used to support detail when used with a sketch or drawing.
- They are a good method to reproduce the entire fire scene and aid in recording the fire facts
- Will show where evidence was found and how it was collected.
- Can be used to counter claims of scene tampering.

Audio

Another documentation tool is photography which presents a pictorial form of facts and physical circumstances of fire or incident; aids in preserving perishable evidence; effective when, due to size, bulk, weight, or immobility evidence cannot be brought into the court room. A photo is worth 1000 words in describing the circumstances to a jury.

Slide 8

Documentation: Diagrams

- All measurements and a rough diagram of the incident scene
- Identification of all recovered physical evidence
- Used to counter scene tampering claims
- Used to show how evidence is found and collected
- Shows how scene was left after investigation



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Audio

Documentation and Diagrams - Sketches and diagrams can assist the investigator in documenting and analyzing the fire scene.

Slide 9

Documentation: Report Writing

- Provide description of property and/or structure(s) involved
 - Provide description of fire
 - Provide details on fire scene examination
 - What you did, what you found, who, what, why, when, where, how
 - Explain photographs: what they are showing, location, direction, etc.
 - Concise statements and pertinent facts - use familiar words, short sentences and active verbs
-
- Avoid personal opinions and conclusions in the main text
 - Personal opinions and conclusions may be added in the conclusion or comment section

Audio

When investigation of the scene has been completed including a review of: notes, interviews, witness information, photos, lab reports and sketches; and then all of this information must be compiled into a final report.

Slide 10

Documentation: Court

Fire department personnel may be required to testify in court regarding their actions, observations and, knowledge of the fire

Audio

How good is your memory? Will you be able to remember the details of a fire investigation years from now when you may be called into court. This is the reason why a thorough report and thorough documentation is so important to the investigator.