

FIRE INVESTIGATION OPERATION GUIDE

SAN FRANCISCO FIRE DEPARTMENT

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Fire Investigation Operation Guide January 2008

San Francisco Fire Department 698 - 2nd Street San Francisco, CA 94107

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FOREWORD

The goal of this manual is to establish standard operating practices as authorized by the Chief of Department and implemented by the Division of Training.

The purpose of this manual is to provide all members with the essential information necessary to fulfill the duties of their positions, and to provide a standard text whereby company officers can:

- Enforce standard drill guidelines authorized as a basis of operation for all companies.
- Align company drills to standards as adopted by the Division of Training.
- Maintain a high degree of proficiency, both personally and among their subordinates.

All manuals shall be kept up to date so that all officers may use the material contained in the various manuals to meet the requirements of their responsibility.

Conditions will develop in fire fighting situations where standard methods of operation will not be applicable. Therefore, nothing contained in these manuals shall be interpreted as an obstacle to the experience, initiative, and ingenuity of officers in overcoming the complexities that exist under actual fire ground conditions.

To maintain the intent of standard guidelines and practices, no correction, modification, expansion, or other revision of this manual shall be made unless authorized by the Chief of Department. Suggestions for correction, modification or expansion of this manual shall be submitted to the Division of Training. Suggestions will be given due consideration, and if adopted, notice of their adoption and copies of the changes made will be made available to all members by the Division of Training.

Joanne Hayes-White Chief of Department

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SECTION 1. INTRODUCTION

The Fire Code (2007 SFFC Appendix Chapter 1, Section 104.10) requires that the cause of all fires be investigated. The responsibility for determining the area of origin and cause of the fire belongs to the company officer or Incident Commander. The Bureau of Fire Investigation will assume that responsibility whenever they respond to the scene. Due diligence should be exercised to determine the building of origin, the floor of origin, the room of origin and ultimately the area of origin. Once the area of origin has been identified an effort should be made to establish the point of origin.

The point of origin is where the fuel and the ignition source are brought together. The cause of the fire is the event that brought the ignition source and fuel in contact with one another. The Fire Department member must attempt to identify the cause that initiated the fire ignition sequence.

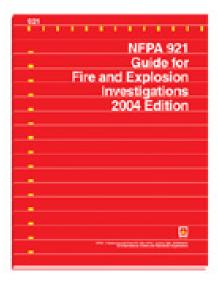
Fire cause can be identified as natural, accidental or incendiary. If the company officer is unable to ascertain the cause of the fire then the appropriate determination is "undetermined".

In 2006, the SFFD responded to almost 4,000 fire incidents. Approximately 2,700 of the fires involved an incident in a structure. There were over 400 incidents involving passenger vehicles, motor vehicles or other types of mobile property. Some type of outdoor fire accounted for the remaining 900 fire incident responses by the Department. The company officer or Incident Commander investigated almost 90% of the fire incidents and reached a determination as to the area of origin and the cause of the fire.

The documentation for the incident (National Fire Incident Reporting System, NFIRS) must be completed as accurately as possible. The area of origin, material first ignited and cause of the fire must be properly reported. An estimate of the dollar value of the damage to the property and the contents is important to track as well as the pre-fire value of the property and contents.

In order to evaluate the effectiveness of fire detection and fire protection equipment, the company officer or Incident Commander must also document on the NFIRS the presence or absence of detection equipment. The effectiveness of the equipment (smoke detectors, heat detectors or other devices) regarding the detection and reporting of the fire needs to be recorded on the NFIRS report. In addition, the presence of fire protection equipment such as sprinklers, specialized suppression systems or standpipes needs to be documented and their effectiveness should also be recorded.

To assist company officers and Incident Commanders it is highly recommended that they become familiar with NFPA 921 Guide for Fire and Explosion Investigations. The 2004 edition is the most recent publication.



If the company officer or Incident Commander is unable to determine the cause of the fire, then the Bureau of Fire Investigation (BFI) will be requested and dispatched to the scene. The BFI Field Investigation unit has a radio call sign of 4710 and is identified in the dispatch report as AR1 (Arson 1). The BFI Field Unit is normally staffed with two investigators. The BFI responds automatically whenever a second alarm is requested.

There are certain situations pursuant to Department guidelines when the BFI must be called to the scene. The BFI will assume responsibility for the documentation of the incident. The company officer or Incident Commander must request the response of the BFI (4710) whenever the following situations occur:

Death or Serious Injury

The Medical Examiner, along with the Police, need to be requested to the scene. Whenever possible the fatality should be left in place and the fire scene should be undisturbed. Crime scene tape should be utilized to isolate the area where the body is located. If a civilian or firefighter is transported by ambulance from an incident that is usually an indicator the injury is serious enough to warrant the response of 4710.

Incendiary Fire

During the preliminary examination of the fire scene, if the company officer or Incident Commander encounters indicators that the fire may have been purposely set (incendiary), then the response of 4710 should be requested. All unnecessary overhauling should be suspended and the fire scene should be left undisturbed.

Explosions

If an explosion has occurred and a fire resulted, 4710 should be requested. Sometimes a fire may have already been initiated and an explosion occurs while firefighters are on the scene. In this case, the BFI should also be requested to respond. Typically if the incident involves an un-detonated explosive device or the activation of an explosive device without any resulting fire, then the investigation will be conducted by the Police Department.

Suspicious Incident

Although the SFFD does not recognize the term "suspicious" as a cause for a fire, there may be circumstances where the company officer or Incident Commander encounters fire scene indicators or witness information that is not consistent with normal fire behavior. In those cases, then 4710 should be called to the scene. Unnecessary overhauling should be suspended and the fire scene should be left undisturbed pending the arrival of the BFI.

Undetermined Fire Cause

During the process of attempting to ascertain the cause of the fire, it becomes apparent to the company officer or Incident Commander that they are unable to determine the cause of the fire, overhaul should be suspended and the fire scene should be left undisturbed. All unnecessary personnel should be removed from the scene and 4710 should be called to the incident.

Fires Involving Juveniles

If the company officer or Incident Commander determines that a juvenile may have been involved with the ignition of the fire, 4710 should be called to the scene. Personnel with specialized training are assigned to the BFI to deal with juvenile fire setting problems.

Places of Worship and Family Planning Centers:

If a place of worship or family planning center has been damaged by a fire, or if there appears to be an attempt to burn, 4710 must be called to the scene. The Bureau of Alcohol, Tobacco and Firearms will be notified regarding these incidents and they will be contacted by the BFI.

SECTION 2. INVESTIGATION BY COMPANY OFFICERS AND INCIDENT COMMANDERS

The search for the origin and cause of the fire starts even before the fire is extinguished. Information that is contained on the dispatch report can be helpful such as the reporting party's name and phone number along with the original description of the incident (alarm bell ringing, water flow activated, smoke in the area, smoke in the building or a specific report of what is burning).



STRUCTURE FIRES

Response to the Scene

While responding to the scene, the company officer or Incident Commander should be cognizant of simultaneous fire incidents that may be a diversion or an attempt to delay the normal first alarm assignment. They should be paying attention to vehicles that may be leaving the fire scene at a high rate of speed.

Arrival on the Scene

During size-up, make note of the flame and smoke location. They should evaluate flame and smoke color. Also they should determine if the fire is self-ventilating. Important

information includes if there was a need to force entry or were doors already open or windows broken.

During Suppression

Company officers and Incident Commanders should be cognizant of any difficulty that firefighters encountered while extinguishing the fire. Observations might include fire flaring back up after an area is controlled. That situation might be an indication that some type of fuel may have been introduced or that natural gas piping may have been tampered with. Firefighters might encounter unusual fire behavior or detect odors that might be associated with accelerants. Other information that is important is whether firefighters had any difficulty in gaining entry. Perpetrators may have sabotaged entry points to delay fire department access.

During Overhaul

While active burning and fire is being encountered during the initial stages of overhaul, it is important to continue to search for fire extension in wall stud channels and in areas above ceilings. Once the extension of active burning has been limited in those spaces, then one of the most important steps affecting an investigation that a company officer or Incident Commander can make is to suspend any additional overhauling. By doing this they are now able to efficiently evaluate burn, heat and smoke patterns on walls, ceilings and furniture surfaces. The evaluation of patterns on these surfaces can assist with determining where the fire originated.



Witness Information

The company officer or Incident Commander should confirm that witnesses are being identified and that they are interviewed. That activity can be delegated to fire department personnel. Police officers can also assist with interviews. Some information will be corroborative in nature and it will support the observations of the fire behavior that was encountered.

Building Construction Defects

If there were any building construction defects that were identified as being present in the pre-fire event, then they should be documented and evaluated as to their contribution to fire spread. Examples could include penetrations in rated walls, missing doors and walls that might have been breached.

Fire Detection and Protection Equipment

The company officer or Incident Commander needs to determine the presence of equipment type and evaluate its effectiveness in detecting the fire and suppressing the fire. If performance was not as expected, then the cause for the deficiency must be investigated and documented.

Evaluate Heat, Burn and Smoke Patterns

Scene safety must be established. This includes evaluating collapse hazards. Also determine if the atmosphere is tenable without the need for SCBA. All activities in the IDLH atmosphere must be performed in compliance with Department procedures. Utilities should be shut off to the building. When it is safe to do so, examine areas remote from the suspected area of origin to evaluate heat, burn and smoke patterns. Generally work from areas of least damage toward area of the most damage. The area of origin is typically where the most intense ceiling, wall and floor damage is observed.



Evaluate for Preliminary Fire Cause

Attempt to determine if there are ignition or heat sources present at the area of origin. Also try to identify the fuel that was first ignited. Some fuel sources could be food on a stove, trash in a garbage can or bedding in a bedroom. Try to determine if there was a natural sequence (such as spontaneous heating) or accidental sequence (such as unattended food on a stove, electrical equipment malfunction or dropped smoking material) that brought the ignition source and fuel together. If a natural or accidental fire cause cannot be identified, then request the response of 4710. Suspend all unnecessary overhaul. Leave the remaining fire scene undisturbed and exclude all non-essential firefighters from the room or area of suspected origin.

Obvious Signs of Incendiary Fire

If the preliminary examination of the fire scene reveals a possible incendiary fire, then suspend all unnecessary overhauling, leave the fire scene undisturbed and remove all unnecessary fire personnel from the room or area of origin. Sometimes it might be necessary to extend the exclusionary zone to the entire structure. Request the response of 4710.

VEHICLE FIRES

Close to 10 percent of all fire incidents in San Francisco involve a vehicle. The company officer or Incident Commander is responsible for determining and documenting the cause of the fire. If the vehicle driver or operator is present, their observations will many times assist with cause determination. If the driver's

corroborative statements support the physical burn patterns that the company officer observes, that might be enough information to reach a conclusion.



<u>Unattended or Incendiary Vehicle Fires</u>

Recent studies have revealed that it is very difficult to differentiate between an accidentally occurring vehicle fire and an incendiary vehicle fire, when the only physical evidence is the fire-damaged shell of the car. Circumstantial evidence such as time of day, location and indications of another crime (boosted auto parts) can assist with the determination. For those reasons the SFFD has established the following protocols when dealing with vehicle fire incidents involving unattended vehicles. An unattended vehicle is defined as one where the owner, responsible party or the most recent driver of the vehicle is not present. After the fire has been extinguished, the company officer should request the response of the San Francisco Police Department. The responding police unit will generate a SF Police Case Number. The police officers will arrange for a tow to the impound yard with a "Hold for Arson". The police officer should be instructed to fax a copy of the police report to the Arson Task Force at (415) 695-6638.

The company officer must contact the BFI by phone regarding the vehicle fire. This notification is best made between 07:00 and 08:00 hours. Information that needs to be provided to the BFI includes: SFFD Incident Number, vehicle description, license plate, Vehicle Identification Number, SF Police Case Number and name of responding police officer.

BFI Response to Vehicle Fires

Normally the company officer or Incident Commander initially handles the investigation of the vehicle fire. There is not a need for the BFI (4710) to be dispatched unless one of the following exceptions is present:

- A suspect is on the scene.
- A witness to the setting of the fire is on the scene.
- Obvious physical evidence of a crime (incendiary devices, ignitable liquid containers). All evidence should be left in place and handling should be kept to a minimum until photographs can be taken and the evidence can be processed.
- A pattern or series of fires has been identified. Examples would include multiple responses to the same location or numerous vehicle fires occurring within a short time span.

Whenever the BFI is requested to an incident, the requesting officer must remain at the site to preserve the integrity of the scene as well as to preserve the chain of custody for any potential evidence.

OUTDOOR FIRES

Almost twenty-five percent of the fire incidents in San Francisco occur outdoors and can involve trash, grass, trees and other vegetation. It is important to properly document these types of incidents. Serial arsonists often start their sprees with what appear to be harmless or inconsequential fires that later escalate to major problems. To be truly categorized as an outdoors fire, the damage must be confined to the vegetation or trash. If the fire spreads to and causes damage to a structure, then the accurate NFIRS category is a structure fire.



Special attention must be applied to outdoor fires involving fireworks. The use of fireworks in the City and County of San Francisco is prohibited by code. Any fire that is initiated by fireworks needs to be documented properly. If the outdoors fire spreads to a building, then the correct NFIRS Incident type is "111" Building Fire. If a structure has been damaged, then a crime has been committed. A SF Police case number must be initiated and the BFI should be contacted.

SECTION 3. BUREAU OF FIRE INVESTIGATION



The Bureau of Fire Investigation is one of two Bureaus in the Division of Fire Prevention and Fire Investigation. A Captain, who also serves as the coordinator of the Arson Task Force, manages the BFI. The Lieutenant of the BFI supervises and trains the Fire Department Investigators. The field unit of the BFI is known by its radio call sign (4710) and by its identifier in the dispatch system (AR1). Normally two investigators staff the field unit.

The San Francisco Arson Task Force (ATF) is a cooperative alliance with the San Francisco Fire Department, San Francisco Police Department and the District Attorney's Office. Police Inspectors from the Special Investigation Unit along with an Assistant District Attorney are assigned to the Arson Task Force so that an organized and systematic method is available for the investigation and prosecution of arson related crimes.

Investigators assigned to the BFI have received training regarding basic fire origin and cause determination as well as advanced training regarding fire scene evidence collection and documentation. Investigators are also trained to conduct interviews as well as interrogations.

BFI Response to the Scene

Whenever the BFI responds to a fire scene, it is understood that the Investigators will assume control of determining the origin and cause of the fire. The requesting officer or

their designee must remain on the scene and all unnecessary overhauling must be suspended.

Awaiting BFI Arrival

Personnel at the fire scene can assist with the investigation by identifying witnesses as well as owners or responsible parties. Identifying information such as driver's licenses along with work and home addresses accompanied with telephone numbers can prove invaluable in the event that the witness is unable to remain at the scene. Whenever possible, the name of a friend or relative to be used as a contact can be very helpful. If an injured party must be transported prior to the arrival of the BFI, then every effort should be made to obtain a statement prior to their departure.



Documentation

Whenever the BFI is on the scene, the investigators will assume responsibility for the completion of the NFIRS report.

SECTION 4. PROCEDURES AND SAFETY AT SITES OF EXPLOSIONS



The San Francisco Fire Department responds to a wide variety of calls to investigate unusual conditions. For example, companies might be called to investigate a vehicle leaking an unknown substance or to assist at a scene where there is a suspicious package. Regarding any potential explosion or explosive device, company officers need to address these types of incidents with a high degree of suspicion that there could be an immediate hazard or threat.

Suspicious Device

If Fire Department personnel should discover a suspected explosive or hazardous device, the device shall not be disturbed in any way. Identify and set boundaries, leave the area immediately, deny entry to the exclusion zone, and from a safe distance, notify the Communication Center to request SFPD-Explosive Ordinance Disposal Unit (EOD). A safe guideline is to limit "time on target". Do not spend any time in the same locale as the device.

Any reported bomb threat, destructive device, or related explosions may involve crime scenes and are under the authority of the San Francisco Police Department. Fire Department personnel shall not participate in any initial search efforts for device(s), unless directed to do so through the Fire Department Incident Commander, but shall conduct a secondary search around their apparatus once at the staging area, and around any parked apparatus, for any suspicious devices.

Building Owner Responsibility

It is the responsibility of the Police Department with assistance from the building owner or manager to evacuate the premises and it is also their decision when to reoccupy the building. This may be done with the advice and assistance of the Fire Department Incident Commander.

Communications

Until otherwise directed through the Incident Commander, adhere to radio and cellular phone discipline. No radio frequency transmissions or cellular phones are to be used within three hundred feet of the incident until the Police Department gives permission.

Utilities

Police officials will leave the decision as to whether or not to shut off gas, electricity or other utilities to the Fire Department. All Department apparatus and all support vehicles shall be directed to the Staging Area.

Detonation

If a suspected explosive device should detonate and a fire results, the Fire Department shall conduct necessary fire suppression and rescue operations and then exit the area immediately. If the Bureau of Fire Investigation is not already on the scene, the Incident Commander shall immediately summon them. No overhauling shall take place and the area shall not be disturbed. If a building is involved, structural collapse is a possibility. Additional devices may be present. Use extreme caution. Fire Department personnel shall not enter the Incident Area until the Police Department declares the area safe.

All Fire Department actions are at the discretion of the Fire Department Incident Commander and SFFD safety practices shall be observed at all times. All actions may be coordinated through the Unified Police and Fire Department Command Post (if established).

Cover versus Concealment

Cover is described as an object that will provide safety from projectiles such as shrapnel, glass, lightweight debris, etc. Concealment is defined as an object that simply obstructs another's view of you, but offers no real protection from the above projectiles.

When responding to an explosion incident, please keep the following examples in mind:

- An engine company's water-tank or a concrete wall, may sometimes provide COVER
- The cab area of an engine may only provide CONCEALMENT

Consider that a secondary device is a possibility at an explosion scene. A hoax device may be detonated to keep attention away from a more hazardous device. Also, the detonation of a first device may be initiated so as to direct rescue personnel and evacuees to a targeted area. It could be followed by a second and larger detonation. Incident Commanders should be aware of this possibility when deploying personnel at a suspected bomb scene.

Secondary Devices

Projectiles and debris from a secondary exploded device, depending on their composition and size, can travel at high rates of speed. It is best to utilize cover rather than concealment.

SECTION 5. DOCUMENTATION



The determination of the area of origin and the cause of the fire must be properly documented. The company officer or Incident Commander shall make every effort to complete the NFIRS report before the end of the watch. The "Assignment Office Reports (AO reports)" will track open NFIRS reports, and the responsible officer will be held accountable for any deficiency. In most cases, the only official documentation of the incident will be the NFIRS report. The accurate and timely completion of that report will capture the true fire problem. The report can be used to track trends and also to document the fire loss in San Francisco. The company officer or Incident Commander plays an important role in documenting the service that the SFFD provides.

Estimated Losses and Values

The estimated dollar value of the loss to property and to contents should be entered and rounded to the nearest dollar. Also enter values for the pre-fire value of the property and contents. Contents usually refers to personal property that is not permanently affixed to the real property.

Accurately enter applicable information for all of the following:

Incident Type

Use code 111 for any fire or burning in a structure Use code 113 for cooking fire contained to container. If there is any damage to structure such as smoke or soot that will necessitate repair or paining, then the appropriate code is 111.

Mixed Use Property & Property Use

- Area of Origin
- Heat Source
- Item First Ignited
- Type of Material First Ignited:
- Cause of Ignition:
- Factors Contributing Ignition
- Human Factors for Ignition
- Structure Type
- Building Status
- Stories above
- Fire Damage
- Stories damaged by Flame
- Contributing Item
- Contributing Type
- Detector Presence

Type Power Supply Operation Effectiveness Failure Reason

Automatic Extinguishment System AES

AES Presence
AES Type
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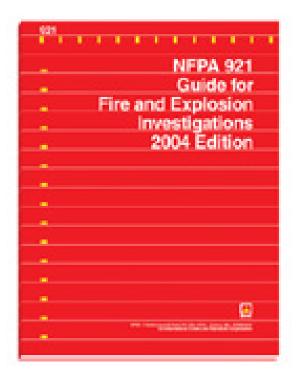
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Date Printed: 12/27/2007

Incident Most. 07101038

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SECTION 6. NFPA 921 GUIDE FOR FIRE AND EXPLOSION INVESTIGATION



The basic methodology for the conducting of an investigation of a fire or explosion is presented as a guide in the 2004 edition of NFPA 921, Guide for Fire and Explosion Investigations. The recommended systematic approach is to use the scientific method.

Chapter Four of NFPA 921 outlines the Scientific method as:

- Recognize the need (identify the problem),
- Define the problem
- Collect data
- Analyze the data (inductive reasoning)
- Develop a hypothesis
- Test the hypothesis
- Select the final hypothesis

Legal Proceedings

On occasion, a company officer or Incident Commander might be contacted regarding the investigation of a fire that they conducted. All requests for depositions or review of fire reports are coordinated through the Bureau of Fire Investigation.