Fire Management and Arson Investigation

Fire Departments

The Roman emperor Augustus is credited with instituting a corps of fire-fighting vigiles ("watchmen") in 24 BC. Regulations for checking and preventing fires were developed. In the preindustrial era most cities had watchmen who sounded an alarm at signs of fire. The principal piece of fire-fighting equipment in ancient Rome and into early modern times was the bucket, passed from hand to hand to deliver water to the fire.

Another important fire-fighting tool was the ax, used to remove the fuel and prevent the spread of fire as well as to make openings that would allow heat and smoke to escape a burning building. In major conflagrations long hooks with ropes were used to pull down buildings in the path of an approaching fire to create firebreaks. When explosives were available, they would be used for this same purpose.

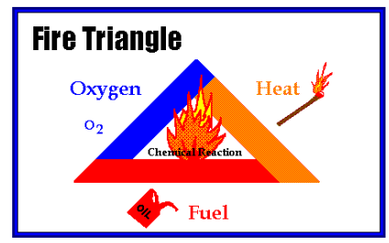
Following the Great Fire of London in 1666, fire brigades were formed by insurance companies. The government was not involved until 1865, when these brigade became London's Metropolitan Fire Brigade. The first modern standards for the operation of a fire department were not established until 1830, in Edinburgh, Scotland. These standards explained, for the first time, what was expected of a good fire department. After a major fire in Boston in 1631, the first fire regulation in America was established. In 1648 in New Amsterdam (now New York) fire wardens were appointed, thereby establishing the beginnings of the first public fire department in North America.

Fire Departments in the United States

In the modern sense, fire departments constitute a comparatively recent development. Their personnel are either volunteer (nonsalaried) or career (salaried). Typically, volunteer fire fighters are found mainly in smaller communities, career fire fighters in cities. The modern department with salaried personnel and standardized equipment became an integral part of municipal administration only late in the 19th century.

Fire is a chemical reaction that requires three elements to be present for the reaction to take place and continue. The elements are:

1. Enough oxygen to sustain combustion,
2. Enough heat to raise the material to its ignition temperature,
3. Some sort of fuel or combustible material, and
4. The chemical, exothermic reaction that is fire commonly known as THE **TETRAHEDRON OF FIRE**.



These three elements typically are referred to as the “fire triangle.” Fire is the result of the reaction between the fuel and oxygen in the air. Scientists developed the concept of a fire triangle to aid in understanding of the cause of fires and how they can be prevented and extinguished. Heat, fuel and oxygen must combine in a precise way for a fire to start and continue to burn. If one element of the fire triangle is not present or removed, fire will not start or, if already burning, will extinguish.

Ignition sources can include any material, equipment or operation that emits a spark or flame including obvious items, such as torches, as well as less obvious items, such as static electricity and grinding operations. Equipment or components that radiate heat, such as kettles, catalytic converters and mufflers, also can be ignition sources.

Fuel sources include combustible materials, such as wood, paper, trash and clothing; flammable liquids, such as gasoline or solvents; and flammable gases, such as propane or natural gas.

Oxygen in the fire triangle comes from the air in the atmosphere. Air contains approximately 79 percent nitrogen and 21 percent oxygen.

FIRE EXTIGUISHING METHODS

There are four methods of fire suppression:

- **Removal of Fuel**- This method is effective but not applicable at all times. Fuel removal includes turning off the fuel supply, pumping flammable liquids from a burning tank, removing unburned portion of a pile of combustible materials (silos or coal piles), or diluting a burning liquid material (ethyl alcohol) when diluted with is soluble in water.
- **Exclusion of Oxygen**- This involves separation of oxygen from other materials that creates a fire by the process of “smothering” or “blanketing”. One of the common example of this method is extinguishing a grease during prying by placing a cover on a pan.
- **Reduction of Temperature**- Temperature control (“cooling off “ or “ quenching ”) involves the absorption of heat with a resultant cooling of the fuel to a point at which it ceases to release enough vapors to maintain a flammable vapor.
- **Inhibition of Chain Reaction**-This method is applicable during combustion process, on which scientist have found that the simultaneous formation & consumption of certain atoms are the key to the chain reaction which produces the flame. Some chemical substances, when introduced into the fire in proper amounts, breaks up this

reaction and inhibits the atoms and the fire cannot continue to burn and therefore, it is extinguished. Examples of these chemicals are:
a) Halon 1301
b) Potassium bicarbonate (purple K)
c) Halon 1211
d) Potassium carbonate (Monnex)
e) Halon 2404
f) Potassium chloride (Super K)
g) Sodium bicarbonate (regular dry chemical)

CLASSIFICATION OF FIRE & THEIR EXTINGUISHING METHODS

1. **Class "A" Fires** – Fires involving ordinary combustible materials, such as wood, cloth, paper, rubber and many plastics.

Class "A" Fire Extinguishment:
Water is used in a cooling or quenching effect to reduce the temperature of the burning material below its ignition temperature.

2. **Class "B" Fires** – Fires involving flammable liquids, greases, and gases.

Class "B" Fire Extinguishment:
The smothering or blanketing effect of oxygen exclusion is most effective. Other extinguishing methods include removal of fuel and temperature reduction.

3. **Class "C" Fires** – Fires involving energized electrical equipment.

Class "C" Extinguishment:
This fire can sometimes be controlled by a non-conducting extinguishing agent. The safest procedure is always attempt to de-energized high voltage circuits and treats as Class A or Class B fire depending upon the fuel involved.

4. **Class "D" Fires** – Fires involving combustible metals, such as magnesium, titanium, zirconium, sodium and potassium.

Class "D" Fire Extinguishment:
The extremely high temperature of some burning metals makes water & other common extinguishing agents ineffective. There is no agent available that would effectively control fires in all combustible metals. Special extinguishing agents are available for control of fire in each of the metals & are marked specially for that metal.

5. **Class "K" Fires** – fires involving kitchen materials. This classification was added during the 1998 NFPA portable extinguishers standard exhibition.

METHODS OF HEAT TRANSFER

Heat can travel throughout a burning building by one or more of the four (4) methods. The existence of heat within a substance is caused by a molecular action.

1. **Conduction** – Heat may be conducted from one body to another by direct contact of the bodies or by an intervening heat-conduction medium. The amount of heat that will e transferred and its rate of travel by this method depends upon conductivity of the material through which the heat is passing. Not all materials have the same heat conductivity. Aluminum, copper and iron are good conductors. Fibrous materials such as felt, cloth and paper are poor conduction.

2. **Radiation** – This method of heat transmission is known as the radiation of heat waves. Heat & light waves are similar in nature but they differ in length. Heat waves are longer than light waves and they are sometimes called infra-red rays. Radiated heat travel through space until it reaches an opaque object. As the object is exposed to heat radiation it will in return radiate heat from its surface. Radiated heat is one of the major sources of fire spread and its importance demands for an immediate defensive attack at points where radiation exposure is severe.

3. **Convection** – is the transfer of heat by the movement of air or liquid. This movement is different from the molecular motion discussed in conduction. When liquid gases are heated, they begin to move in themselves. For example, when water is heated in a glass container, an upward movement within the vessel can be observed through the glass.

4. **Direct Flame Contact** – Fire also spreads along and through the material that will burn by direct flame contact. When substance is heated to a point where flammable vapors are given off, these vapors may be ignited. Any other flammable material which is in contact with the burning vapors may be heated to a temperature where it will ignite and burn.

NATURE OF FUEL PROPERTIES

While the divisions of combustibles in three groups (solids, liquids, and gases) give a rough idea of a hazard, a more precise evaluation of potential hazard requires information on the natural properties of the fuel, such as the melting or boiling point, the volatility or vapor pressure, the heat of combustion, the chemical instability or reactivity, and the tendency towards auto-oxidation or spontaneous combustion. For the fire protection engineer flash and fire points are especially valuable in assessing the potential hazard of flammable liquids. The most significant characteristics are:
Physical State. The normal physical states of matter are gas, liquid or solid.

CLASSES OF FIRE BASED ON CAUSE

Natural
Accidental
Intentional

- **Volatility**. The volatility (the property to evaporate quickly) of the liquid is important since all flaming fires are reactions between the oxygen of the atmosphere and gaseous products. The volatility is governed primarily by the boiling point, although practically all combustible liquids produce flammable vapors at temperatures well below the boiling point.
- The **boiling point** is the temperature at which the vapor pressure of the liquid equals the atmospheric pressure, or a state at which the liquid more or less rapidly changes to the vapor state.
- **Heat of Vaporization**. The amount of heat which must be put into a liquid in order to convert it to a gas is the heat of vaporization. Expressed in British Thermal Unit (btu) per pound & it is approximately 970, 367, 160, and 123 for water, ethyl alcohol, pentane, and turpentine respectively, at their boiling points.
- **Melting Point & Heat of Fusion**. For solids the melting point and the heat of fusion is important since heat is required to make the change from the solid to the liquid state. This required heat is approximately 142 btu. Per pound at 126 degrees Fahrenheit for paraffin wax. (Note: Many solids have appreciable vapor pressures below their melting point, e.g. water in the form of ice and naphthalene which has a flashpoint of 174 degrees farenheit and a melting point of 177 degrees farenheit.
- **Heat Decomposition**. Almost all solids of vegetable origin, such as wood, paper, and cotton do not melt but first decompose. Exceptions are vegetable fats, waxes, resins, sugar, and natural rubber. The principal animal fibers such as wool also melt. However most of this substances undergo some chemical change or decomposition (pyrolysis) which is a rather complex process, and usually a char-like substances and gases are formed, some of the latter being liquids at ordinary temperature. Substances of vegetable and animal origin require an input of heat (heat of decomposition) to bring the change about, but in some cases, wood for example, heat may be given after a certain stages of the decomposition & the figures for the heat of decomposition are likely to be somewhat indefinite.
- While nearly all combustible materials decompose in an endothermic reaction (requiring heat to be put on the material), there are few substances more or less which are unstable in character which produce heat during decomposition. None of these substances occur naturally; they are all chemically synthesized, one of the commonest examples in gas form is acetylene, which involves heat on decomposition equivalent to approximately 3,750 btu. per pound or 26 btu. per cubic foot (calculated at normal pressure and temperature).
- **Specific Heat**. This figure is the ratio as compared to the heat of water in btu. required to raise the temperature of a pound of any substance by one degree farenheit. For majority of combustible materials, the ratio is between one quarter and one half, but there are many exceptions, especially the metals which have a lower specific heat. Another exception on a higher side is ethyl alcohol.
- **Heat Conductivity**. This characteristic property has influence on the fire hazard because the higher the conductivity the more heat has to be applied to the surface of solid fuel in order to raise it to the fire point and at the same time make up for heat loss to the interior of the fuel mass. This is particularly noticeable in heavy sections of metal. Magnesium, for example, has a conductivity of almost 4,000 times than that of the firewood (across the grain).
- On the other hand, a high heat conductivity facilitates the transfer of heat from an exposure or from a combustion zone to a mixture unburned gas and air. Thus, the rate of flame spread is accelerated. A notable example is the gas hydrogen which when mixed with air has a high rate of flame propagation. (Note: The conductivity of hydrogen is almost six times that of air).
- **Heat of Combustion**. The available heat on complete combustion is quite significant but usually is not the most important factor in determining ignition susceptibility or fire intensity, except when the material is very much diluted with inert material such as structural insulating products consisting of cement and excelsior, or alcohol well diluted with water. A high proportion of inert diluents may reduce the average heat of combustion to appoint where the fire hazard is much reduced or even eliminated. Vegetables and mineral oils as well as asphalt, pitch, fats, waxes, have heat of complete combustion ranging from about 15,000 to 20,000 btu. per pound. The various specie of wood generally is in the range of from 7,000 to 9,000 btu. per pound on a dry basis
- **Auto-Oxidation or Spontaneous Heating**. Almost all combustible materials of vegetable origin will combine with oxygen at temperatures well below those required for ignition. There are many of animal and mineral origin which usually do so but somewhat at higher temperatures. Even cotton will oxidized very slowly at ordinary temperatures especially in the presence of moisture. Many vegetable oils are particularly prone to spontaneous heating from oxidation when spread over a large surface area such as on textile fibers and when there is a large mass of the oily fiber which provides sufficient insulating effect to retain the heat of oxidation and thus, permit temperature to rise.

PRODUCTS OF COMBUSTION

There are four (4) products of combustion as the materials burns and undergo a chemical change:

- ☐ **FIRE GASES**- is the vaporized products of combustion. Some of the factors which identify fire gases formed during burning (carbon dioxide and carbon monoxide) of combustible materials are: the chemical composition of the fuel, amount of oxygen present for burning, and the temperature of fire.
- ☐ **FLAME**-It is the visible luminous body of burning gas which become hotter and become less luminous when it is mixed with increased amounts of oxygen.
- ☐ **HEAT-**This is a form of energy which is measured in degrees of temperature to signify its intensity.
- ☐ **SMOKE**- This is a visible product of incomplete combustion. It is consists of a mixture of oxygen, nitrogen, carbon dioxide, carbon monoxide, finely divided particles of soot and carbon and other products released from the materials involved.

PHASES OF BURNING:
There are three (3) progressive phases of burning:

- **Incipient or Beginning Phase**- Under this phase, the oxygen content in the air has not been significantly reduced and the fire is producing water vapor, carbon dioxide, carbon monoxide, perhaps a small quantity of sulfur dioxide, and other gases. Some heat is being generated and the amount will increase with the progress of the fire.
- **Free Burning Phase**- The second phase includes all the free burning activities of fire. During this phase, oxygen-rich air is drawn into the flame as convection (the rise of the heated gases) carries the heat to the uppermost portion of the confinement area. The heated gas spread out laterally from the top downward, forcing the cooler air to seek lower levels and eventually igniting all the combustible materials in the upper levels of the room.
- **Smoldering Phase**- The flame on this stage may stop to occur if the area do not have supply of air. Burning under this point is reduced to glowing embers. The room is completely filled with a dense smoke & fire gases that pressure force them to seep deep the cracks of the building. The temperature will be as high as over 1000 degrees Fahrenheit.

Related Terms

- FLASHOVER-This is the final stage of the process of the fire growth, wherein all the combustible materials within a compartment are all ignited. The cause of the flashover is due to the excessive build up of heat from the fire itself and once all the contents of the fire area are heated gradually into its ignition temperature simultaneous ignition occurs and the entire area becomes fully involved with fire.
- FLAME SPREAD- It is the rate at which flame travels over the surface. Interior building materials & finishes have a flame spread rating that indicates the rate at which flame will spread over the surface of the material. The lowest rating is zero while a higher number indicates a faster rate of travel on the material.

- TYPES OF POISONOUS GASES

1. **Hydrogen Sulfide**- (H2S)- a fire gas formed during fires involving organic material containing sulfur, such as: rubber, hair, wood, meat, and hides. It is colorless highly toxic gas with a strong odor of rotten egg. Exposure for even a short time is dangerous. It will ignite at 500 degrees farenheit (260 degrees Celsius).
2. **Hydrogen Cyanide** (HCN) – a toxic fire gas found in oxygen starve fires involving nitrogen-containing materials such as wool, silk, urethane, polyamides and acrylics. This gas is also used as fumigant which can pose serious danger to firefighters working in recently fumigated buildings. Hydrogen cyanide smells like bitter almonds which may not be easily detected.

3. **Hydrogen Chloride** - a gas which can be fatal after only a few breaths is produced in fires involving chloride-containing plastics. Plastics can be found anywhere, like furnishings, electrical insulation, conduit and piping.

FIRE LADDERS

- **I. Straight ladder** – is nonadjustable in length & consist of only one section. This is sometimes called wall ladder, used for quick access to windows and rooftop one 7 two storey buildings. This type is used in length of 12, 14, 16, 18, and 24 feet.
- **II. Extension ladder** – is adjustable in length, consisting two sections which travel in guide or brackets to permit length adjustment. This is type provides access to windows and roofs within the limit of their extendable lengths. It is 24 to 65 feet in length. A baby Extension (Baby Bangor) is a 12 foot extension ladder without a halyard for raising the fly section.
- **III. Straight Hook ladder**
- **IV. Bangor ladder**
- **V. Combination ladder** – is adjustable in length and has a suitable means for unlocking the sections so that the two separate sections can form equal angles with the floor or ground as a stepladder.
- **VI. Wall-Pompier ladder** – consists of a large goose-neck hook at the tip, with a single beam through which the rungs projects. It may be used to reach upper stories of tall buildings, beyond the reach of ground or aerial ladders.
- **VII. Aerial ladder** – is a mechanical unit generally operated by hydraulic power is mounted upon a specially built chassis. The source of power is usually derived from the apparatus engine which actuates a hydraulic hoist. It is constructed of metal & are trussed to provide adequate strength. It ranges from 65 – 100 feet.

Tower ladder – apparatus combines some features of both aerial ladder equipment and elevating platforms. A telescopic boom has a ladder mounted on it, but the top working area is a partially enclosed platform. Various ground ladders are also carried.

Why Investigate Fires?

Since Roman times, civil authorities have recognized the threat that fire represents, not only to the well-being of individuals, but also, and perhaps more importantly, to the welfare and security of the community as a whole. In the days of wooden walls and roofs and straw-covered floors, any fire could ravage an entire city. So, it was in the interest of all concerned to investigate fires and establish how they began. Civil authorities attempted to control the fire risk by assessing penalties if an accidental fire was allowed to get out of control. Dangerous practices, such as leaving cooking fires unguarded, were identified and controlled.

William the Conqueror issued an edict that cooking fires be damped or covered after a particular time of evening so that unattended fires could not flare up. This policy of couvre feu (cover the fire) gave rise to the"curfew" of today. If authorities could determine the fire was deliberately set, the perpetrator could be identified and punished. Some of the oldest English common laws regarded arson to be the crime of burning the house or dwelling of another. The crime of arson was considered to be such a danger that it was punishable by death.

The same rationale applies today. Fires of accidental cause need to be identified, so that dangerous practices, such as filling kerosene room heaters with gasoline, can be eliminated by public education, or so that defective or dangerous products, such as instant-on televisions or room heaters with no overheating or tip-over protection, can be taken off the market or modified so they no longer pose a significant fire risk. Fires of incendiary (i.e., deliberate) cause must be detected, so that the firesetter
can be intercepted before doing more harm and punished as necessary.

The Problem of Fire Investigations

1. A fire can be a complex event whose origin and cause are not obvious. Investigators may have to expend considerable time and effort before the cause can be identified. This is the area where Holmes' dictum is especially applicable. Without gathering data, the investigator can only guess at what might have caused the fire, based on circumstances alone. The training and preparation of qualified investigators are often costly and time-consuming, requiring dedication to the profession over many years.
2. The destructive power of the fire itself compromises evidence from the outset. The larger a fire becomes and the longer it burns, the less evidence of causation will remain. In some fires, sufficient data to establish the origin and cause (i.e., evidence) do not survive, no matter how diligent the search or well prepared the searcher. This destruction may be exacerbated by the normal and necessary duties of fire personnel carrying out rescue, suppression, overhaul, and
   salvage tasks.
3. The complexity of the threat a major fire presents to the health and welfare of the community means that representatives from law enforcement, fire, rescue, and emergency medical services; hazardous materials teams; utility company personnel; health and safety officers; and other public agency personnel may be on hand and may conduct some obligatory official duties. The presence of so many people, in addition to members of the press and the public who were attracted by the sights and sounds of a major fire, offers yet more chances for scene security to be compromised and critical evidence to be contaminated, moved, or destroyed.
4. A lack of commitment to conduct fire investigations exists on the part of some law enforcement and fire agencies. Because of the demand for rescue, hazardous materials, and emergency medical
   assistance, in addition to their traditional duties of fire suppression, fire departments often find themselves with fewer resources to stretch to cover all obligations.[1]

Then Who Investigates Fires?

As might be gathered from the preceding points, who actually will investigate a fire is not an easy question to answer. In addition to law enforcement and fire authorities, there may be prosecuting attorney
investigators, forensic laboratory experts, engineering specialists (fire, chemical, mechanical, or electrical), and private investigators representing insurance companies, owners, tenants, and manufacturers of the myriad ignition sources found in a modern home or business.

What Is Arson?

The term "arson" is commonly used today to describe a crime that involves the intentional burning of property. It originates from an Anglo-French word meaning "the act of burning." The common law definition of arson was the willful and malicious burning of a dwelling; over the years, state statues and
federal laws have replaced the common law definition. Most of today's arson laws involve the intentional burning of property, not only dwellings. Statues vary from jurisdiction to jurisdiction. It is recommended that you consult local, state, or federal statutes for more details and specific language and application.

The Role of the Fire Department

It is the role of the municipal fire department to respond to reports of hostile fires and take appropriate action. Members of the local fire department are typically the first officials to arrive at the scene of a fire. Depending on the severity of the fire, numerous firefighting assets may arrive and participate in the operations. It is at this point that the fire investigation really begins. While not formally trained as fire investigators, firefighters can make note of the time of the fire, the fire conditions, the weather conditions, and the point of entry to suppress the fire. In addition, any suspicious or unusual activity surrounding the fire should be noted, including burn patterns, open doors or windows, alarms, unusual odors, deep-seated fire, and overall behavior and conditions.

The actions of a fire department at the scene can be separated into three distinct phases: (1) suppression, (2) overhaul, and (3) investigation. During the fire suppression phase, the first goal is to save lives; the second goal is the suppression of fire and the protection of property. In their mission, firefighters typically utilize hoses that are 1-1/2 to 2-1/2 in. in

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[1] *Death Investigation: A Guide for the Scene Investigator*, Research Report, Washington, D.C.: U.S. Department of Justice, National Institute of Justice, December 1997, NCJ 167568.

diameter to control and suppress the fire . As mentioned in the previous chapter, the application of water removes one side of the fire "triangle" — heat. After the fire has been extinguished, firefighters will search for hidden fire in walls, ceiling spaces, or other areas that are not easily accessible. This phase is termed "overhaul," and includes opening walls, pulling down ceiling materials, removing flooring, etc., to ensure that the fire has been completely extinguished. During overhaul, firefighters can unwittingly alter the fire scene by removing furnishings, devices, wiring, walls, and ceiling or framing materials. Unfortunately, this alteration of the fire scene can create difficulties for the fire investigator. Depending on the jurisdiction involved, the fire scene investigation can occur in conjunction with overhaul, where the investigators are on the scene to direct the overhaul activities and to ensure the preservation of evidence.
The final phase of fire scene activities involves the investigation of the fire with the intent of determining its origin and cause. Although this is identified as the final phase, the investigation of the fire scene can actually begin during the suppression or overhaul phase. The commencement of the investigation depends largely on the time of arrival of the fire investigator or the abilities and responsibilities of the fire suppression personnel. Fire investigators will attempt to determine whether the fire was accidental or intentionally set (incendiary). Upon completion of the fire scene investigation, the property is typically released to the property owner or insurance company for further action.[2]

Fire Patterns or Fire Indicators

The principal objectives in the determination of the origin and cause of a fire is the recognition, identification, and analysis of fire patterns. NFPA 921 defines fire patterns as the visible or measurable physical effects that remain after a fire. These effects represent the history of the fire, as it is recognized that fires cause predictable patterns on materials as they burn. Since fires burn at or near the point of origin longer than at other places, all things being equal, then the most destruction should be at that point. Fire investigators use these patterns as pointers to trace the path of the fire back to its origin since gases from combustion flow like a liquid and will follow the path of least resistance around obstructions in an upward manner. Further examination of the scene can be focused in the suspected area of origin once the fire patterns or indicators have been identified. However, fire patterns can be cumulative and thus result in multiple patterns being overlaid, one atop another, as the fire progresses, other fuels become involved, and ventilation conditions change. It is the responsibility of the fire investigator to examine these patterns and assign them value as appropriate. With the proper examination of fire patterns, the investigator can trace the fire back to its origin.

Patterns that are typically observed at fire scenes include "V" patterns, lines of demarcation, low burns and penetrations, charring (often called "alligatoring"), clean burns, and trailers. These patterns can be readily apparent to the casual observer, or hidden from view and apparent only upon removal of fire debris. Therefore, a comprehensive fire scene examination involves the systematic removal of debris so the investigator can fully evaluate the scene, the fire patterns, and the damage.

1. ***V and Hourglass Patterns***

As fires burn upward and outward from a fuel source due to buoyancy, they usually leave distinct patterns in the shape of a V, typically referred to as a "V" pattern. These patterns are usually apparent on vertical surfaces such as walls that are directly adjacent to a burning object. The apex of the pattern will be located at the fuel source. The pattern then widens as it spreads up and out, away from the fuel source.

2. ***Lines of Demarcation***

Lines of demarcation are the visible patterns or borders that delineate regions affected by heat and smoke from adjacent unaffected or less affected regions. Lines of demarcation can be in many forms and are used by fire investigators to assess the smoke or fire progression within a structure. The lines or patterns are created by a thermal insult to an object or during the deposition of combustion products.

3. ***Low Burns and Penetrations***

The lowest point of burning observed at a fire scene should be examined closely as a potential point of origin. Any penetration in the floor should be evaluated to determine its cause. While penetrations in the floor and associated low burning can be the result of the burning of an ignitable liquid, the patterns can also be caused by structural collapse,
radiation, or the pooling or falling (drop-down) of burning materials. These areas are often the locations where flooring, carpet, and fire debris samples are recovered by investigators for forensic analysis.

4. ***Charring***

Charring to wood materials is commonly found at fire scenes. The amount and depth of charring is commonly used by investigators to evaluate fire spread, intensity, and duration of the fire. While the rate of wood charring has been quantified in laboratory experiments, the use of a defined rate of charring for fire scenes is not appropriate. Since the rate of charring is dependent on the intensity of the fire, duration of exposure, species of wood, and moisture content, an evaluation of charred wood for the purposes of determining an accurate time of exposure may not be reliable for a fire scene investigation. However, the comparison of charring depths in various locations in a fire scene may be reliable in determining relative time of exposure, assuming the wood species are the same.

5. ***Clean Burn***

A clean burn to the surface occurs at a fire scene when a surface is exposed to direct flame impingement. The direct flame contact causes the soot deposits to be burned away, leaving a clean area. The clean burn can vary in size, depending on the size of the localized flame. These patterns can assist fire investigators in identifying the location of burning materials and can sometimes lead to the origin of the fire.

6. ***Trailers and Pour Patterns***

"Trailer" is a term used by fire investigators to describe a combustible material or ignitable fluid intentionally placed to spread fire from one location to another. The pattern resulting from an ignitable liquid trailer is often called a pour pattern. The telltale signs of a trailer can sometimes be observed at a fire scene; however, this is largely dependent on the overall

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degree of damage and the trailer materials used by the arsonist. In a postflashover environment, the persistence of ignitable liquid patterns is less identifiable.

Fire Cause Classification

Once the fire investigator has reviewed all relevant facts and information surrounding a fire, the cause of the fire will be classified. Except in the most clearly defined circumstances, the cause of the fire should be based on the presence rather than the absence of evidence. The cause of a fire is generally classified as accidental, natural, incendiary, or undetermined. If the cause cannot be determined, the fire should be classified as undetermined. The cause can be undetermined for many reasons and may be due to the degree of damage to the structure, lack of witness information, or other physical evidence. The classification of undetermined may change at some later time if additional relevant information is developed. The determination of any fire cause, however, must be based on credible information and facts. While some investigators have used the classification of "suspicious", this classification is discouraged because it is not an actual description of the fire cause. The following is a brief definition of the most commonly recognized fire classifications.

- ***Accidental***

This classification encompasses situations that generally do not involve direct human involvement, such as fires caused by appliance failure, electrical wiring, or other nonhuman causes. However, an accidental classification can be used in instances that encompass noncriminal human involvement. For example, a homeowner burning leaves may inadvertently cause a secondaryfire in some nearby brush. While the second fire may be caused by negligence, it is still accidental in nature.

- ***Natural***

This classification encompasses fires that are typically identified as acts of God, such as fires related to lightning strikes, earthquakes, etc. No human involvement is linked to the natural fire classification.

- ***Incendiary***

These fires are situations that are intentional, malicious, and are started by direct human intervention. They are criminal in nature and are often classified by law enforcement authorities as arson.

Collection and Preservation of Evidence

Evidence can be anything that furnishes proof and assists in supporting a theory. In the case of a fire scene investigation, evidence is typically used to support the cause of the fire or other issues related to the fire scene. Fire investigators should attempt to protect and preserve the fire scene and its contents as much as possible in an effort to properly identify the prefire conditions. This is why the establishment of a controlled-access perimeter around the scene is important. The entire scene should be protected as evidence until the completion of the fire scene examination as the determination of the cause of the fire is generally not known until the end of the investigation. Items of evidence are often found at a fire scene and include fire patterns and artifacts from the initial fuel or ignitions source.

Should fire investigators suspect that ignitable liquid was used to promote the rapid growth and fire spread within a building, samples of materials or debris should be collected for laboratory analysis to detect the presence of any unconsumed ignitable liquids (accelerants). Examples of other items which might be collected or documented at the fire scene include portions of a door and lock that indicate forced entry, containers of suspected ignitable liquids, tire or foot impressions, tools, documents, and blood.

As each fire scene is unique, it is the responsibility of the trained fire investigator to determine what constitutes evidence, and then make the proper arrangements for the collection and preservation of these items. The determination of what constitutes evidence and the need for the collection of the items can change depending on the responsibility and role of the investigator. In the case of an accidental fire caused by a product failure, the government or public sector investigator may choose not to collect the suspect product from the fire scene but, rather, defer to the insurance investigator for collection of the item, subsequent analysis, and potential civil litigation. The government fire investigator, however, should always collect evidence related to criminal activity.

The evidence most frequently collected from the scene of a suspected incendiary fire is debris and other materials such as flooring, carpet, baseboard, and pieces of furnishings. These items are collected for later examination for the presence of an ignitable liquid. Information developed by fire investigators from witnesses and the fire scene examination will generally lead to a determination as to the origin of the fire.[3]

Glossary

Abatement - Any act that would remove or neutralize a fire hazard.
Administrator - Any person who acts as agent of the owner and manages the use of a building for him.
Blasting Agent - Any material or mixture consisting of a fuel and oxidizer used to set off explosives.
Cellulose Nitrate Or Nitro Cellulose - A highly combustible and explosive compound produced by the reaction of nitric acid with a cellulose material.
Cellulose Nitrate Plastic (Pyroxylin) - Any plastic substance, materials or compound having cellulose nitrate (nitro cellulose) as base.
Combustible, Flammable or Inflammable - Descriptive of materials that are easily set on fire.
Combustible Fiber - Any readily ignitable and free burning fiber such as cotton, oakum, rags, waste cloth, waste paper, kapok, hay, straw, Spanish moss, excelsior and other similar materials commonly used in commerce.
Combustible Liquid - Any liquid having a flash point at or above 37.8_C (100_F).
Corrosive Liquid - Any liquid which causes fire when in contact with organic matter or with certain chemicals.

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[3] DeHann, J., *Kirk's Fire Investigation*, 5th ed., Prentice Hall, Upper Saddle River, NJ, 2002.

Curtain Board - A vertical panel of non-combustible or fire resistive materials attached to and extending below the bottom chord of the roof trusses, to divide the underside of the roof into separate compartments so that heat and smoke will be directed upwards to a roof vent.
Cryogenic - Descriptive of any material which by its nature or as a result of its reaction with other elements produces a rapid drop in temperature of the immediate surroundings.
Damper - A normally open device installed inside an air duct system which automatically closes to restrict the passage of smoke or fire.
Distillation - The process of first raising the temperature in separate the more volatile from the less volatile parts and then cooling and condensing the resulting vapor so as to produce a nearly purified substance.
Duct System - A continuous passageway for the transmission of air.
Dust - A finely powdered substance which, when mixed with air in the proper proportion and ignited will cause an explosion.
Electrical Arc - An extremely hot luminous bridge formed by passage of an electric current across a space between two conductors or terminals due to the incandescence of the conducting vapor.
Ember - A hot piece or lump that remains after a material has partially burned, and is still oxidizing without the manifestation of flames.
Finishes - Materials used as final coating of a surface for ornamental or protective purposes.
Fire - The active principle of burning, characterized by the heat and light of combustion.
Fire Trap - A building unsafe in case of fire because it will burn easily or because it lacks adequate exits or fire escapes.
Fire Alarm - Any visual or audible signal produced by a device or system to warm the occupants of the building or fire fighting elements of the presence or danger of fire to enable them to undertake immediate action to save life and property and to suppress the fire.
Fire Door - A fire resistive door prescribed for openings in fire separation walls or partitions.
Fire Hazard - Any condition or act which increases or may cause an increase in the probability of the occurrence of fire, or which may obstruct, delay, hinder or interfere with fire fighting operations and the safeguarding of life and property.
Fire Lane - The portion of a roadway or publicway that should be kept opened and unobstructed at all times for the expedient operation of fire fighting units.
Fire Protective And Fire Safety Device - Any device intended for the protection of buildings or persons to include but not limited to built-in protection system such as sprinklers and other automatic extinguishing system, detectors for heat, smoke and combustion products and other warning system components, personal protective equipment such as fire blankets, helmets, fire suits, gloves and other garments that may be put on or worn by persons to protect themselves during fire.
Flash Point - The minimum temperature at which any material gives off vapor in sufficient concentration to form an ignitable mixture with air.
Forcing -A process where a piece of metal is heated prior to changing its shape or dimensions.
Fulminate - A kind of stable explosive compound which explodes by percussion.
Hazardous Operation/Process - Any act of manufacturing, fabrication, conversion, etc., that uses or produces materials which are likely to cause fires or explosions.
Horizontal Exit - Passageway from one building to another or through or around a wall in approximately the same floor level.
Hose Box - A box or cabinet where fire hoses, valves and other equipment are stored and arranged for fire fighting.
Hose Reel - A cylindrical device turning on an axis around which a fire hose is wound and connected.
Hypergolic Fuel - A rocket or liquid propellant which consist of combinations of fuels and oxidizers which ignite spontaneously on contact with each other.
Jumper - A piece of metal or an electrical conductor used to bypass a safety device in an electrical system.
Occupancy - The purpose for which a building or portion thereof is used or intended to be used.
Public Way - Any street, alley or other strip of land unobstructed from the ground to the sky, deeded, dedicated or otherwise permanently appropriated for public use.
Pyrophoric - Descriptive of any substance that ignites spontaneously when exposed to air.
Refining - A process where impurities and/or deleterious materials are removed from a mixture in order to produce a pure element of compound. It shall also refer to partial distillation and electrolysis.

Additional Readings:

Simple Arson v. Destructive Arson
Citing Buebos v. People, the Court made a distinction between simple and destructive arson - The nature of Destructive Arson is distinguished from Simple Arson by the degree of perversity or viciousness of the criminal offender. The acts committed under Art. 320 of the Revised Penal Code constituting Destructive Arson are characterized as heinous crimes "for being grievous, odious, and hateful offenses and which, by reason of their inherent or manifest wickedness, viciousness, atrocity and perversity are repugnant and outrageous to the common standards and norms of decency and morality in a just, civilized, and ordered society." On the other hand, acts committed under P.D. 1613 constituting Simple Arson are crimes with a lesser degree of perversity and viciousness that the law punishes with a lesser penalty. In other words, Simple Arson contemplates crimes with less significant social, economic, political and national security implications than Destructive Arson[4].

[4] (People v. Macabando, G.R. No 188708, 31 July 2013, J. Brion)

There is no complex crime of arson w/ homicide

- Art 48 is applicable to crimes through negligence

Example: Juan lit a cigarette as he poured gas in the tank of his car in his garage. The gas caught fire and the house burned. His sister died and the maid suffered serious physical injuries. The crimes of arson, homicide, serious physical injuries and damage to property constitute a complex crime. There is only one penalty but there are 3 civil liabilities.

Rebellion cannot be complexed with Arson

The Supreme Court, through then Associate Justice Roberto Concepcion, ruled that rebellion cannot be complexed with other crimes, such as murder and arson. Rebellion in itself would include and absorb the said crimes, thus granting the accused his right to bail. Murder and arson are crimes inherent and concomitant when rebellion is taking place. Rebellion in the Revised Penal Code constitutes one single crime and that there is no reason to complex it with other crimes. As basis, the Court cited several cases convicting the defendants of simple rebellion *although they killed several persons*. Thus, the petition for bail was granted. On May 30, 1964, the Supreme Court acquitted Hernandez[5].

Sample Arson Cases:

The arson committed in the instant case involving an **inhabited house or dwelling** is covered by Section 3(2) of Presidential Decree No. 1613.In the prosecution for arson, proof of the crime charged is complete where the evidence establishes: (1) the *corpus delicti*, that is, a fire because of criminal agency; and (2) the identity of the defendant as the one responsible for the crime. In arson, the c*orpus delicti* rule is satisfied by proof of the bare fact of the fire and of it having been intentionally caused. Even the uncorroborated testimony of a single eyewitness, if credible, is enough to prove the *corpus delicti* and to warrant conviction. When these are present, the only issue is the credibility of the witness. Whenever there is inconsistency between the affidavit and the testimony of a witness in court, the testimony commands greater weight considering that affidavits taken *ex parte* are inferior to testimony in court, the former being almost invariably incomplete and oftentimes inaccurate, sometimes from partial suggestions and sometimes from want of suggestions and inquiries, without the aid of which the witness may be unable to recall the connected circumstances necessary for his accurate recollection of the subject.[6]

CIRCUMSTANTIAL EVIDENCE IN **ARSON CASES**

In all prosecutions for arson there are two elements of the alleged crime, which the prosecution must prove beyond a reasonable doubt: (1) That the fire was caused by the willful criminal act of some person;
and (2) the identity of defendant as the one responsible for the fire. Both of these elements may be established by direct or positive evidence or by circumstantial evidence or both. A conviction may be sustained although there is no direct evidence of the guilt of the accused. As in other criminal cases, one may be convicted of arson on circumstantial evidence. Whether the evidence is direct or circumstantial, the same broad rule applies, and that rule requires the proof to show the guilt of the accused beyond a reasonable doubt. Arson is one of those crimes which is peculiarly of secret preparation and commission. It is very seldom that the prosecution can furnish testimony of an eye witness who observed the setting of the fire. If it required positive testimony to convict in cases of arson, it would be next to impossible ever to procure a conviction, for it is a crime committed under cover of darkness, and when there is no human
eye to see. To hold, therefore, that no man could be convicted unless the state is able to establish by an eye witness that he set the fire would make a dead letter of the statute. The very nature of the crime is such that it becomes necessary for the state, in many, if not in most cases, to rely upon circumstantial
evidence to establish the guilt of the accused. It is judic;ally recognized that a well directed train of circumstances may be as satisfactory as an array of direct evidence, and in some cases more so.

The **circumstantial evidence** is that which relates to a series of other facts than the fact in issue, which by experience have been found so associated with that fact that in the relation of cause and effect they
lead to a satisfactory conclusion. examples are: (1) Saturation of the premises with gasoline, kerosene, or other inflammable liquid, if not normally kept upon the premises; (2) two or more fires, each separate and distinct, having no connection with each other; (3) a person seen entering or leaving the premises just before the fire; (4) removal of furniture, fixtures, or stock from the premises prior to the fire; *(5)* a false alibi; and (6) flight of defendant after the crime was committed. Such evidence, therefore, is founded on experience, observed facts, and coincidences establishing a connection between the known and proven facts and the facts sought to be proved.[7]

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5 (*People v. Hernandez (1964)*

6 **(G.R. No. 159950) THE PEOPLE OF THEPHILIPPINES,vs. TINGA, and VELASCO, JR., *JJ*.**

7 **1.** State v. Jacobson, **130** Minn., 347; 153 N.W., 145.

PRESIDENTIAL DECREE No. 1613

AMENDING THE LAW ON ARSON

WHEREAS, findings of the police and intelligence agencies of the government reveal that fires and other crimes involving destruction in Metro Manila and other urban centers in the country are being perpetrated by criminal syndicates, some of which have foreign connections;

WHEREAS, the current law on arson suffers from certain inadequacies that impede the successful enforcement and prosecution of arsonists;

WHEREAS, it is imperative that the high incidence of fires and other crimes involving destruction be prevented to protect the national economy and preserve the social, economic and political stability of the country;

NOW, THEREFORE, I, FERDINAND E. MARCOS, President of the Philippines, by virtue of the powers vested in me by the Constitution, do hereby order and decree as part of the law of the land, the following:

Section 1. Arson. Any person who burns or sets fire to the property of another shall be punished by Prision Mayor.

The same penalty shall be imposed when a person sets fire to his own property under circumstances which expose to danger the life or property of another.

Sec. 2. Destructive Arson. The penalty of Reclusion Temporal in its maximum period to Reclusion Perpetua shall be imposed if the property burned is any of the following:

1. Any ammunition factory and other establishment where explosives, inflammable or combustible materials are stored.

2. Any archive, museum, whether public or private, or any edifice devoted to culture, education or social services.

3. Any church or place of worship or other building where people usually assemble.

4. Any train, airplane or any aircraft, vessel or watercraft, or conveyance for transportation of persons or property

4. Any building where evidence is kept for use in any legislative, judicial, administrative or other official proceedings.

5. Any hospital, hotel, dormitory, lodging house, housing tenement, shopping center, public or private market, theater or movie house or any similar place or building.

6. Any building, whether used as a dwelling or not, situated in a populated or congested area.

Sec. 3. Other Cases of Arson. The penalty of Reclusion Temporal to Reclusion Perpetua shall be imposed if the property burned is any of the following:

1. Any building used as offices of the government or any of its agencies;

2. Any inhabited house or dwelling;

3. Any industrial establishment, shipyard, oil well or mine shaft, platform or tunnel;

4. Any plantation, farm, pastureland, growing crop, grain field, orchard, bamboo grove or forest;

4. Any rice mill, sugar mill, cane mill or mill central; and

5. Any railway or bus station, airport, wharf or warehouse.

Sec. 4. Special Aggravating Circumstances in Arson. The penalty in any case of arson shall be imposed in its maximum period;

1. If committed with intent to gain;

2. If committed for the benefit of another;

3. If the offender is motivated by spite or hatred towards the owner or occupant of the property burned;

4. If committed by a syndicate.

The offense is committed by a syndicate if its is planned or carried out by a group of three (3) or more persons.

Sec. 5. Where Death Results from Arson. If by reason of or on the occasion of the arson death results, the penalty of Reclusion Perpetua to death shall be imposed.

Sec. 6. Prima Facie evidence of Arson. Any of the following circumstances shall constitute prima facie evidence of arson:

1. If the fire started simultaneously in more than one part of the building or establishment.

2. If substantial amount of flammable substances or materials are stored within the building note necessary in the business of the offender nor for household us.

3. If gasoline, kerosene, petroleum or other flammable or combustible substances or materials soaked therewith or containers thereof, or any mechanical, electrical, chemical, or electronic contrivance designed to start a fire, or ashes or traces of any of the foregoing are found in the ruins or premises of the burned building or property.

4. If the building or property is insured for substantially more than its actual value at the time of the issuance of the policy.

4. If during the lifetime of the corresponding fire insurance policy more than two fires have occurred in the same or other premises owned or under the control of the offender and/or insured.

5. If shortly before the fire, a substantial portion of the effects insured and stored in a building or property had been withdrawn from the premises except in the ordinary course of business.

6. If a demand for money or other valuable consideration was made before the fire in exchange for the desistance of the offender or for the safety of the person or property of the victim.

Sec. 7. Conspiracy to commit Arson. Conspiracy to commit arson shall be punished by Prision Mayor in its minimum period.

Sec. 8. Confiscation of Object of Arson. The building which is the object of arson including the land on which it is situated shall be confiscated and escheated to the State, unless the owner thereof can prove that he has no participation in nor knowledge of such arson despite the exercise of due diligence on his part.

Sec. 9. Repealing Clause. The provisions of Articles 320 to 326-B of the Revised Penal Code and all laws, executive orders, rules and regulations, or parts thereof, inconsistent with the provisions of this Decree are hereby repealed or amended accordingly.

Section 10. Effectivity. This Decree shall take effect immediately upon publication thereof at least once in a newspaper of general circulation.

Done in the City of Manila, this 7th day of March, in the year of Our Lord, nineteen hundred and seventy-nine.

Republic Act No. 9514 December 19, 2008
Repealed PD 1185

AN ACT ESTABLISHING A COMPREHENSIVE FIRE CODE OF THE PHILIPPINES, REPEALING PRESIDENTIAL DECREE NO. 1185 AND FOR OTHER PURPOSES

Be it enacted by the Senate and House of Representatives of the Philippines in Congress assembled::

Section 1. This Act shall be known as the "Revised Fire Code of the Philippines of 2008".

Section 2. It is the policy of the State to ensure public safety and promote economic development through the prevention and suppression of all kinds of destructive fires and promote the professionalization of the fire service as a profession. Towards this end, the State shall enforce all laws, rules and regulations to ensure adherence to standard fire prevention and safety measures, and promote accountability for fire safety in the fire protection service and prevention service.

Section 3. Definition of Terms. - As used in this Fire Code, the following words and phrases shall mean and be construed as indicated:

Abatement - Any act that would remove or neutralize a fire hazard.

Administrator - Any person who acts as agent of the owner and manages the use of a building for him.

Blasting Agent - Any material or mixture consisting of a fuel and oxidizer used to set off explosives.

Cellulose Nitrate Or Nitro Cellulose - A highly combustible and explosive compound produced by the reaction of nitric acid with a cellulose material.

Cellulose Nitrate Plastic (Pyroxylin) - Any plastic substance, materials or compound having cellulose nitrate (nitro cellulose) as base.

Combustible, Flammable or Inflammable - Descriptive of materials that are easily set on fire.

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Combustible Liquid - Any liquid having a flash point at or above 37.8_C (100_F).

Corrosive Liquid - Any liquid which causes fire when in contact with organic matter or with certain chemicals.

Curtain Board - A vertical panel of non-combustible or fire resistive materials attached to and extending below the bottom chord of the roof trusses, to divide the underside of the roof into separate compartments so that heat and smoke will be directed upwards to a roof vent.

Cryogenic - Descriptive of any material which by its nature or as a result of its reaction with other elements produces a rapid drop in temperature of the immediate surroundings.

Damper - A normally open device installed inside an air duct system which automatically closes to restrict the passage of smoke or fire.

Distillation - The process of first raising the temperature in separate the more volatile from the less volatile parts and then cooling and condensing the resulting vapor so as to produce a nearly purified substance.

Duct System - A continuous passageway for the transmission of air.

Dust - A finely powdered substance which, when mixed with air in the proper proportion and ignited will cause an explosion.

Electrical Arc - An extremely hot luminous bridge formed by passage of an electric current across a space between two conductors or terminals due to the incandescence of the conducting vapor.

Ember - A hot piece or lump that remains after a material has partially burned, and is still oxidizing without the manifestation of flames.

Finishes - Materials used as final coating of a surface for ornamental or protective purposes.

Fire - The active principle of burning, characterized by the heat and light of combustion.

Fire Trap - A building unsafe in case of fire because it will burn easily or because it lacks adequate exits or fire escapes.

Fire Alarm - Any visual or audible signal produced by a device or system to warm the occupants of the building or fire fighting elements of the presence or danger of fire to enable them to undertake immediate action to save life and property and to suppress the fire.

Fire Door - A fire resistive door prescribed for openings in fire separation walls or partitions.

Fire Hazard - Any condition or act which increases or may cause an increase in the probability of the occurrence of fire, or which may obstruct, delay, hinder or interfere with fire fighting operations and the safeguarding of life and property.

Fire Lane - The portion of a roadway or publicway that should be kept opened and unobstructed at all times for the expedient operation of fire fighting units.

Fire Protective And Fire Safety Device - Any device intended for the protection of buildings or persons to include but not limited to built-in protection system such as sprinklers and other automatic extinguishing system, detectors for heat, smoke and combustion products and other warning system components, personal protective equipment such as fire blankets, helmets, fire suits, gloves and other garments that may be put on or worn by persons to protect themselves during fire.

Fire Safety Constructions - Refers to design and installation of walls, barriers, doors, windows, vents, means of egress, etc. integral to and incorporated into a building or structure in order to minimize danger to life from fire, smoke, fumes or panic before the building is evacuated. These features are also designed to achieve, among others, safe and rapid evacuation of people through means of egress sealed from smoke or fire, the confinement of fire or smoke in the room or floor of origin and delay their spread to other parts of the building by means of smoke sealed and fire resistant doors, walls and floors. It shall also mean to include the treatment of buildings components or contents with flame retardant chemicals.

Flash Point - The minimum temperature at which any material gives off vapor in sufficient concentration to form an ignitable mixture with air.

Forcing -A process where a piece of metal is heated prior to changing its shape or dimensions.

Fulminate - A kind of stable explosive compound which explodes by percussion.

Hazardous Operation/Process - Any act of manufacturing, fabrication, conversion, etc., that uses or produces materials which are likely to cause fires or explosions.

Horizontal Exit - Passageway from one building to another or through or around a wall in approximately the same floor level.

Hose Box - A box or cabinet where fire hoses, valves and other equipment are stored and arranged for fire fighting.

Hose Reel - A cylindrical device turning on an axis around which a fire hose is wound and connected.

Hypergolic Fuel - A rocket or liquid propellant which consist of combinations of fuels and oxidizers which ignite spontaneously on contact with each other.

Industrial Baking And Drying - The industrial process of subjecting materials to heat for the purpose of removing solvents or moisture from the same, and/or to fuse certain chemical salts to form a uniform glazing the surface of materials being treated.

Jumper - A piece of metal or an electrical conductor used to bypass a safety device in an electrical system.

Occupancy - The purpose for which a building or portion thereof is used or intended to be used.

Occupant - Any person actually occupying and using a building or portions thereof by virtue of a lease contract with the owner or administrator or by permission or sufferance of the latter.

Organic Peroxide - A strong oxidizing organic compound which releases oxygen readily. It causes fire when in contact with combustible materials especially under conditions of high temperature.

Overloading - The use of one or more electrical appliances or devices which draw or consume electrical current beyond the designed capacity of the existing electrical system.

Owner - The person who holds the legal right of possession or title to a building or real property.

Oxidizing Material - A material that readily yields oxygen in quantities sufficient to stimulate or support combustion.

Pressurized Or Forced Draft Burning Equipment - Type or burner where the fuel is subjected to pressure prior to discharge into the combustion chamber and/or which includes fans or other provisions for the introduction of air at above normal atmosphere pressure into the same combustion chamber.

Public Assembly Building - Any building or structure where fifty (50) or more people congregate, gather, or assemble for any purpose.

Public Way - Any street, alley or other strip of land unobstructed from the ground to the sky, deeded, dedicated or otherwise permanently appropriated for public use.

Pyrophoric - Descriptive of any substance that ignites spontaneously when exposed to air.

Refining - A process where impurities and/or deleterious materials are removed from a mixture in order to produce a pure element of compound. It shall also refer to partial distillation and electrolysis.

Self-Closing Doors - Automatic closing doors that are designed to confine smoke and heat and delay the spread of fire.

Smelting - Melting or fusing of metallic ores or compounds so as to separate impurities from pure metals.

Sprinkler System - An integrated network of hydraulically designed piping installed in a building, structure or area with outlets arranged in a systematic pattern which automatically discharges water when activated by heat or combustion products from a fire.

Standpipe System - A system of vertical pipes in a building to which fire hoses can be attached on each floor, including a system by which water is made available to the outlets as needed.

Vestibule - A passage hall or antechamber between the outer doors and the interior parts of a house or building.

Vertical Shaft - An enclosed vertical space of passage that extends from floor to floor, as well as from the base to the top of the building.

Section 4. Applicability of The Code. - The provisions of the Fire Code shall apply to all persons and all private and public buildings, facilities or structures erected or constructed before and after its effectivity.

Section 5. Responsibility for the Enforcement of this Code. - This Code shall be administered and enforced by the Bureau of Fire Protection (BFP), under the direct supervision and control of the Chief of the Bureau of Fire Protection, through the

hierarchy of organization as provided for in Chapter VI of Republic Act No. 6975. with the approval of the Secretary of the Department of the Interior and Local Government (DILG), the BFP, is hereby authorized to:

a. Issue implementing rules and regulations, and prescribe standards, schedules of fees/fire service charges and administrative penalties therefore as provided in the pertinent provisions of this Code;

b. Reorganize the BFP as may be necessary and appropriate;

c. Support and assist fire volunteers, practitioners and fire volunteer organizations in the country who shall undergo mandatory fire suppression, inspection, rescue, emergency medical services and related emergency response trainings and competency evaluations to be conducted by the BFP. In the case of the Fire practitiones, they shall undergo mandatory continuous professional education and competency evaluation of their expertise, knowledge and skills in the area of fire science, engineering and technology to be conducted by the BFP;

The BFP may enter into external party agreements for the conduct of training, education and evaluation of fire volunteers, practitioners and fire volunteer organizations, which shall be under the full control and supervision of the BFP: Provided, however, That during firefighting operations, fire volunteer organizations shall be under the direct operational control of the fire ground commanders of the BFP;

d. Enter into long term agreement, either through public biddings or negotiations in accordance with the provisions of Republic Act No. 9184, otherwise known as the Government Procurement Reform Act of 2003, for the acquisition of fire prevention, fire protection and fire fighting investigation, rescue, paramedics, hazardous material handling equipment, supplies, materials and related technical services necessary for the fire services;

e. Enter into Memoranda of Agreement with other departments, bureaus, agencies, offices and corporations of the government, as well as private institutions, in order to define areas of cooperation and coordination and delineate responsibility on fire prevention education, fire safety, fire prevention, fire suppression and other matters of common concern;

f. Call on the police, other law enforcement agencies, and local government assistance to render necessary assistance in the enforcement of this Code;

g. Designate a fire safety inspector through his/her duly authorized representative, who shall conduct an inspection of every building or structure within his area of responsibility at least once a year and every time the owner, administrator or occupant shall renew his/her business permit or permit to operate;

No occupancy permit, business or permit to operate shall be issued without securing a Fire Safety Inspection Certification (FSIC) from the Chief, BFP, or his/her duly authorized representative;

h. Inspect at reasonable time, any building, structure, installation or premises for dangerous or hazardous conditions or materials as set forth in this Code, provided that in case of single family dwelling, an inspection must be upon the consent of the occupant or upon lawful order from the proper court. The Chief, BFP or his/her duly authorized representative shall order the owner/occupant to remove hazardous materials and/or stop hazardous operation/process in accordance with the standards set by this Code or its implementing rules or regulations or other pertinent laws;

i. Where conditions exist and are deemed hazardous to life and property, to order the owner/occupant of any building or structure to summarily abate such hazardous conditions;

j. Require the building owner/occupant to submit plans and specifications, and other pertinent documents of said building to ensure compliance with applicable codes and standards; and

k. Issue a written notice to the owner and/or contractor to stop work on portion of any work due to absence, or in violation of approved plans and specifications, permit and/or clearance or certification as approved by the Chief, BFP or his/her duly authorized representative. The notice shall state the nature of the violation and no work shall be continued on that portion until the violation has been corrected.

Section 6. Technical Staff. - The Chief, BFP shall constitute a technical staff of highly qualified persons who are knowledgeable on fire prevention, fire safety, and fire suppression. They may be drawn not only from the organic members of the BFP and other government offices and agencies, but also from other sources. In the latter case, they will either be appointed into the service or hired as consultants in accordance with law. The technical staff shall study, review and evaluate latest developments and standards on fire technology; prepare plans/programs on fire safety, prevention and suppression and evaluate implementation thereof; develop programs on the professionalization of the fire service; coordinate with appropriate government and private institutions for the offering of college courses on fire technology and fire protection engineering; propose amendments to the Fire Code; advise the Chief, BFP on any matter brought to his attention; and perform such other functions as directed on any matter brought to his attention and perform such other functions as directed by higher authorities.

Section 7. Inspections, Safety Measures, Fire Safety, Constructions, and Protective and/or Warning Systems. - As may be defined and provided in the Rules and Regulations, owners, administrators or occupants of buildings, structures and their premises or facilities and other responsible persons shall be required to comply with the following, as may be appropriate:

a. Inspection Requirement - A fire safety inspection shall be conducted by the Chief, BFP or his duly authorized representative as prerequisite to the grants of permits and/or licenses by local governments and other government agencies concerned, for the:

(1) Use or occupancy of buildings, structures, facilities or their premises including the installation or fire protection and fire safety equipment, and electrical system in any building structure or facility; and

(2) Storage, handling and/or use of explosives or of combustible, flammable, toxic and other hazardous materials;

b. Safety Measures for Hazardous Materials - Fire safety measures shall be required for the manufacture, storage, handling and/or use of hazardous materials involving:

(1) cellulose nitrate plastic of any kind;

(2) combustible fibers;

(3) cellular materials such as foam, rubber, sponge rubber and plastic foam;

(4) flammable and combustible liquids or gases of any classification;

(5) flammable paints, varnishes, stains and organic coatings;

(6) high-piled or widely spread combustible stock;

(7) metallic magnesium in any form;

(8) corrosive liquids, oxidizing materials, organic peroxide, nitromethane, ammonium nitrate, or any amount of highly toxic, pyrophoric, hypergolic, or cryogenic materials or poisonous gases as well as material compounds which when exposed to heat or flame become a fire conductor, or generate excessive smoke or toxic gases;

(9) blasting agents, explosives and special industrial explosive materials, blasting caps, black powder, liquid nitro-glycerine, dynamite, nitro cellulose, fulminates of any kind, and plastic explosives containing ammonium salt or chlorate;

(10) fireworks materials of any kind or form;

(11) matches in commercial quantities;

(12) hot ashes, live coals and embers;

(13) mineral, vegetable or animal oils and other derivatives/by products;

(14) combustible waste materials for recycling or resale;

(15) explosive dusts and vapors; and

(16) agriculture, forest, marine or mineral products which may undergo spontaneous combustion.

(17) any other substance with potential to cause harm to persons, property or the environment because of one or more of the following: a) The chemical properties of the substance; b) The physical properties of the substance; c) The biological properties of the substance. Without limiting the definition of hazardous material, all dangerous goods, combustible liquids and chemicals are hazardous materials.

c. Safety Measures for Hazardous Operation/Processes - Fire Safety measures shall be required for the following hazardous operation/processes:

(1) welding or soldering;

(2) industrial baking and drying;

(3) waste disposal;

(4) pressurized/forced-draft burning equipment;

(5) smelting and forging;

(6) motion picture projection using electrical arc lamps;

(7) refining, distillation and solvent extraction; and

(8) such other operations or processes as may hereafter be prescribed in the Rules and Regulations.

d. Provision on Fire Safety Construction, Protective and Warning System - Owners, occupants or administrator or buildings, structures and their premises or facilities, except such other buildings or structures as may be exempted in the rules and regulations to be promulgated under Section 5 hereof, shall incorporate and provide therein fire safety construction, protective and warning system, and shall develop and implement fire safety programs, to wit:

(1) Fire protection features such as sprinkler systems, hose boxes, hose reels or standpipe systems and other fire fighting equipment;

(2) Fire Alarm systems;

(3) Fire walls to separate adjoining buildings, or warehouses and storage areas from other occupancies in the same building;

(4) Provisions for confining the fire at its source such as fire resistive floors and walls extending up to the next floor slab or roof, curtain boards and other fire containing or stopping components;

(5) Termination of all exits in an area affording safe passage to a public way or safe dispersal area;

(6) Stairway, vertical shafts, horizontal exits and other means of egress sealed from smoke and heat;

(7) A fire exit plan for each floor of the building showing the routes from each other room to appropriate exits, displayed prominently on the door of such room;

(8) Self-closing fire resistive doors leading to corridors;

(9) Fire dampers in centralized airconditioning ducts;

(10) Roof vents for use by fire fighters; and

(11) Properly marked and lighted exits with provision for emergency lights to adequately illuminate exit ways in case of power failure.

Section 8. Prohibited Acts. - The following are declared as prohibited act and omission.

(a) Obstructing or blocking the exit ways or across to buildings clearly marked for fire safety purposes, such as but not limited to aisles in interior rooms, any part of stairways, hallways, corridors, vestibules, balconies or bridges leading to a stairway or exit of any kind, or tolerating or allowing said violations;

(b) Constructing gates, entrances and walkways to buildings components and yards which obstruct the orderly and easy passage of fire fighting vehicles and equipment;

(c) Prevention, interference or obstruction of any operation of the Fire Service, or of duly organized and authorized fire brigades;

(d) Obstructing designated fire lanes or access to fire hydrants;

(e) Overcrowding or admission of persons beyond the authorized capacity in movie houses, theaters, coliseums, auditoriums or other public assembly buildings, except in other assembly areas on the ground floor with open sides or open doors sufficient to provide safe exits;

(f) Locking fire exits during period when people are inside the building;

(g) Prevention or obstruction of the automatic closure of fire doors or smoke partitions or dampers;

(h) Use of fire protective of fire fighting equipment of the fire service other than for fire fighting except in other emergencies where their use are justified;

(i) Giving false or malicious fire alarms;

(j) Smoking in prohibited areas as may be determined by fire service, or throwing of cigars, cigarettes, burning objects in places which may start or cause fire;

(k) Abandoning or leaving a building or structure by the occupant or owner without appropriate safety measures;

(l) Removing. destroying, tampering or obliterating any authorized mark, seal, sign or tag posted or required by the fire service for fire safety in any building, structure or processing equipment; and

(m) Use of jumpers or tampering with electrical wiring or overloading the electrical system beyond its designated capacity or such other practices that would tend to undermine the fire safety features of the electrical system.

Section 9. Violation, Penalties and Abatement of Fire Hazard. - Fire hazards shall be abated immediately. The Chief, BFP or his/her duly authorized representative, upon the report that a violation of this Code or other pertinent laws, rules and regulations is being committed, shall issue notice/order to comply to the owner, administrator, occupant or other person responsible for the condition of the building or structure, indicating among other things, the period within which compliance shall be effected, which shall be within ten (10) to fifteen (15) days after the receipt of the notice/order, depending on the reasonableness to adequately comply with the same.

If, after the lapse of the aforesaid period, the owner, administrator, occupant or other responsible person failed to comply, the Chief, BFP or his/her authorized representative shall put up a sign in front of the building or structure that it is fire hazard. Specifically, the notice shall bear the words "WARNING: THIS BUILDING/STRUCTURE IS A FIRE HAZARD", which shall remain posted until such time that the owner, administrator, occupant or other person responsible for the condition of the building, structure and their premises or facilities abate the same, but such period shall not exceed fifteen (15) days from the lapse of the initial period given in the notice/order to comply.

Finally, with the failure of the owner, administrator, occupant or other person responsible for the condition of the building, structure and their premises or facilities to comply within the period specified above, the Chief, BFP may issue order for such abatement. If the owner, administrator or occupant of buildings, structure and their premises or facilities does not abate the same within the period fixed in said order, the building, structure, premises or facilities shall be ordered closed by the Chief, BFP or his/her duly authorized representative notwithstanding any permit clearance or certificate earlier issued by the local authorities.

Any building or structure assessed and declared by the chief, BFP or his/her duly authorized representative as a firetrap on account of the gravity or palpability of the violation or is causing clear and present imminent fire danger to adjoining establishments and habitations shall be declared a public nuisance, as defined in the Civil Code of the Philippines in a notice to be issued to the owner, administrator, occupant or other person responsible for the condition of the building, structure and their premises or facilities. If the assessed value of the nuisance or the amount to be spent in abating the same is not more than One hundred thousand pesos (P100,000.00), the owner, administrator or occupant thereof shall abate the hazard within fifteen (15) days, or if the assessed value is more than One hundred thousand pesos (P100,000.00), within thirty (30) days from receipt of the order declaring said building or structure a public nuisance; otherwise, the Chief, BFP or his/her duly authorized representative shall forthwith cause its summary abatement. failure to comply within five (5) days from the receipt of the notice shall cause the Chief, BFP or his/her duly authorized representative to put up a sign in front of the building or structure, at or near the entrance of such premises, notifying the public that such building or structure is a "FIRETRAP", which shall remain until the owner, administrator, occupant or other person responsible for the condition of the building, structure and their premises or facilities abate the same within the specified period.

Summary abatement as used herein shall mean all corrective measures undertaken to abate hazards which shall include, but not limited to remodeling, repairing, strengthening, reconstructing, removal and demolition, either partial or total, of the building or structure. The expenses incurred by the government for such summary abatement shall be borne by the owner, administrator or occupant. These expenses shall constitute a prior lien upon such property.

Section 10. Enforcement of The Lien. - If the owner, administrator or occupant fails to reimburse the government of the expenses incurred in the summary abatement within ninety (90) days from the completion of such abatement, the building or structure shall be sold at public auction in accordance with existing laws and rules. No property subject of lien under Section 9 hereof, may be sold at a price lower than the abatement expenses incurred by the government. The property shall be forfeited in favor of the government if the highest bid is not at least equal to the abatement expenses.

Section 11. Penalties. -

1. Against the private individual:

a) Administrative fine - Any person who violates any provision of the Fire Code or any of the rules and regulations promulgated under this Act shall be penalized by an administrative fine of not exceeding Fifty thousand (P50,000.00) pesos or in the proper case, by stoppage of operations or by closure of such buildings, structures and their premises or facilities which do not comply with the requirements or by both such administrative fine and closure/stoppage of operation to be imposed by the Chief, BFP. Provided, That the payment of the fine, stoppage of operations and/or closure of such buildings, structures, and their premises or facilities shall not absolve the violator from correcting the deficiency or abating the fire hazard. The decision of the Chief, BFP, under this subsection, may be appealed to the Secretary of the Interior and Local Government. Unless ordered by the Secretary of the Interior and Local Government the appeal shall not stay the execution of the order of the Chief, BFP. The decision of the Secretary of the Interior and Local Government shall be final and executory.

(b) Punitive - In case of willful failure to correct the deficiency or abate the fire hazard as provided in the preceding subsection, the violator shall, upon conviction, be punished by imprisonment of not less than six (6) months nor more than six (6) years, or by a fine of not more than One hundred thousand (P100,000.00) pesos or both such fine and imprisonment; Provided, however, that in case of a corporation, firm, partnership or association, the fine and/or imprisonment shall be imposed upon its officials responsible for such violation, and in case the guilty party is an alien, in addition to the penalties herein prescribed, he shall immediately be deported; Provided, finally, that were the violation is attended by injury, loss of life and/or damage to property, the violator shall be proceeded against under the applicable provisions of the Revised Penal Code.

Any person who, without authority, maliciously removes the sign that a building or structure is a fire hazard/firetrap placed by the authorized person in this Code shall be liable for imprisonment for thirty (30) days or a fine not exceeding One hundred thousand pesos (P100,000.00) or both in the discretion of the court.

Any person, who disobeys the lawful order of the fire ground commander during a firefighting operation shall be penalized with imprisonment of one (1) day to thirty (30) days and a fine of five thousand pesos (P5,000.00).

2. Against the public officer/employee

a) Administrative - The following acts or omissions shall render the public officer/employee in charge of the enforcement of this Code, its implementing rules and regulation and other pertinent laws, administratively liable, and shall be punished by reprimand, suspension or removal in the discretion of the disciplining authority, depending on the gravity of the offense and without prejudice to the provisions of other applicable laws:

(1) Unjustified failure of the public officer/employee to conduct inspection of buildings or structures at least once a year;

(2) Deliberate failure to put up a sign in front of the building or structure within his/her area of responsibility found to be violating this Code, its implementing rules and regulations and other pertinent laws, that the same is a "FIRE HAZARD" or a "FIRETRAP";

(3) Endorsing to the Chief, BFP or his/her duly authorized representative for the certification, or submitting a report that the building or structure complies with the standards set by this Code, its implementing rules or regulations or other pertinent laws when the same is contrary to fact;

(4) Issuance or renewal of occupancy or business permit without the fire safety inspection certificate issued by the Chief, BFP or his/her duly authorized representative;

(5) Failure to cancel the occupancy or business permit after the owner, administrator, occupant or other person responsible for the condition of the building, structure and other premises failed to comply with the notice/order for compliance with the standards set by this Code, its implementing rules and regulations and other pertinent laws, within the specified period;

(6) Failure to abate a public nuisance within fifteen (15) days after the owner, administrator, occupant or other responsible person failed to abate the same within the period contained in the notice to abate;

(7) Abusing his/her authority in the performance of his/her duty through acts of corruption and other unethical practices; or

(8) Other willful impropriety or gross negligence in the performance of his/her duty as provided in this act or its implementing rules and regulations.

b) Punitive - In the case of willful violation involving the abovementioned acts or omissions enumerated under Section 11 subparagraph 2(A) the public officer/employees shall, upon conviction, be punished by imprisonment of not less than six (6) months nor more than six (6) years or by a fine of not more than One hundred thousand (P100,000.00) or both such fine and imprisonment: Provided, That where the violation is attended by injury, loss of life and/or property, the violator shall be proceeded against under the applicable provisions of the Revised Penal Code.

Section 12. Appropriation and Sources of Income. -

(a) To support the manpower, infrastructure and equipment needs of the fire service of the BFP, such amount as may be necessary to attain the objectives of the Fire Code shall be appropriated and included in the annual appropriation of the BFP.

(b) To partially provide for the funding of the fire service the following taxes and fees which shall accrue to the General Fund of the National Government, are hereby imposed:

(1) Fees to be charged for the issuance of certificates, permits and licenses as provided for in Section 7 (a) hereof;

(2) One-tenth of one per centum (0.1%) of the verified estimated value of buildings or structures to be erected, from the owner thereof, but not to exceed fifty thousand (P50,000.00) pesos, one half to be paid prior to the issuance of the building permit, and the balance, after final inspection and prior to the issuance of the use and occupancy permit;

(3) One-hundredth of one per centum (0.10%) of the assessed value of buildings or structures annually payable upon payment of the real estate tax, except on structures used as single family dwellings;

(4) Two per centum (2%) of all premiums, excluding re-insurance premiums for the sale of fire, earthquake and explosion hazard insurance collected by companies, persons or agents licensed to sell such insurances in the Philippines;

(5) Two per centum (2%) of gross sales of companies, persons or agents selling fire fighting equipment, appliances or devices, including hazard detection and warning systems; and

(6) Two per centum (2%) of the service fees received from fire, earthquake, and explosion hazard reinsurance surveys and post loss service of insurance adjustment companies doing business in the Philippines directly through agents.

Section 13. Collection of Taxes, Fees and Fines. - All taxes, fees and fines provided in this Code, shall be collected by the BFP. Provided, That twenty percent (20%) of such collection shall be set aside and retained for use by the city or municipal government concerned, which shall appropriate the same exclusive for the use of the operation and maintenance of its local fire station, including the construction and repair of fire station: Provided, further, That the remaining eighty (80%) shall be remitted to the National Treasury under a trust fund assigned for the modernization of the BFP.

"Sec. 13-A. Assessment of Fire Code Taxes, Fees and Fines. - The assessment of fire code taxes, fees and fines is vested upon the BFP. The BFP shall, subject to the approval of the DILG, prescribe the procedural rules for such purpose.

Sec. 13-B. Collection and Assessment of Local Taxes, Fees and Fines. - The collection and assessment of taxes, fees and fines as prescribed in the Local Government Code, except those contained in this Code, shall be function of the concerned local government units.

Sec. 13-C. Use of Income Generated from the Enforcement of the Fire Code. - The Chief, BFP is authorized, subject to the approval of the Secretary of the Interior and Local Government, to use the income generated under the Fire Code for procurement of fire protection and fire fighting investigation, rescue, paramedics, supplies and materials, and related technical services necessary for the fire service and the improvement of facilites of the Bureau of Fire Protection and abatement of fire hazards.

The BFP shall determine the optimal number of equipment, including, but not limited to, fire trucks and fire hydrants, required by every local government unit for the proper delivery of fire protection services in its jurisdiction.

In the procurement of fire fighting and investigation supplies and materials, the Bureau of Product Standards of the Department of Trade and Industry shall evaluate, determine and certify if the supply to procured conforms to the product standards fixed by the BFP. For this purpose, the BFP shall submit to the Bureau of Product Standards a detailed set of product standards that must be complied with in the procurement of fire fighting and investigation supplies and materials within six (6) months from the effectivity of this act.

Sec. 13-D. Monitoring the Implementation of the Fire Code and the Amount of the Fees Collected. - The Chief, BFP shall, within six (6) month from the effectivity of this Code, submit to the Secretary of the Interior and Local Government for his/her approval, a management tool or mechanism that would ensure effective monitoring of the enforcement of the Fire Code to include the amount of Fire Code fees collected.

Section 14. Within sixty (60) days from the effectivity of this Act, the Secretary of the Interior and Local Government shall issue the rules and regulations for its effective implementation.

Section 15. Presidential Decree No 1185 is hereby repealed. All laws, presidential decrees, letters of instructions, executive orders, rules and regulations insofar as they are inconsistent with this Act, are hereby repealed or amended as the case may be.

Section 16. In case any provision of this Act or any portion thereof is declared unconstitutional by a competent court, other provisions shall not be affected thereby.

Section 17. This Act shall take effect fifteen (15) days after its publication in the Official Gazette or in two (2) national newspapers of general circulation.