Los Angeles City Fire Department

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FIRE BURNS

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I. OVERVIEW

Aggressive interior firefighting is the trademark of the Los Angeles City Fire Department. It is a way of thinking about how we perform our duty. We hold to a philosophy of aggressively implementing and coordinating. Fire suppression and support operations that will achieve the maximum gain at minimum risks------This is the philosophy of fighting fire smart.

One of the greatest risks Firefighters encounter during Firefighting operations is thermal burns. These can occur in one or more of the following ways:

1. Contact with conducted heat sources such as:

   · Hot embers, tar, or debris between protective clothing and skin around the collar, sleeve, and glove areas.

2. Exposure to convective heat sources such as:

   ♦ Hot scalding water or steam penetrating single layer protective clothing such as hoods and wristlets. (Steam can cause full thickness burns to unprotected skin with less than three seconds exposure.)

   ♦ Encroachment into the thermal layer, as encapsulated Firefighters tend to stand or rise up to advance hose lines or operate inside the involved area.

   ♦ Disruption of the thermal layer through the use of a high flow spray nozzle. This causes rapidly expanding, superheated steam to push down low to the Firefighter's level. This type of disruption of the thermal layer is a major cause of burns to Firefighters.

3. Exposure to radiant heat sources or direct flame impingement such as:

   ♦ Roll over/flame over conditions above the Firefighter.

   ♦ Fire venting from roof, window, or door openings.

♦ Sudden, rapid involvement of the operating area such as:

- Smoke Explosion
- Flammable Liquid/Gas Release
- Structural Collapse or Running Surface Fire on Roofs, in Grass, or Brush

Tests indicate that exposure to temperatures of only 280-320 F will cause extreme pain and severe, full thickness burns to all unprotected skin.

♦ Second Degree Burns can occur with exposure to only 111 degrees.

♦ Second Degree Burns can occur within 20 seconds of exposure to 131 degrees.

♦ Second Degree Burns can occur within one second of exposure to 158 degrees.

♦ Steam burns develop faster and are more severe than dry heat burns at the same temperature, due to latent heat transfer.

♦ Direct flame impingement is the most severe type of exposure.

A Firefighter caught in a flashover, just five feet inside a room, will be exposed to temperatures of 1,000 to 1,500F, and direct flame impingement for at least 2 seconds. During that time, face piece components will melt and portions of protective clothing will ignite and burn before the Firefighter could escape---provided they are able to locate the exit and not be blinded by flame, smoke, or pain.

Improved safety equipment has in most cases reduced Firefighter injuries. However, it has also allowed Firefighters to expose themselves to increasingly higher temperatures for longer periods of time. Body parts once used as indicators of high heat build up are now covered.

Firefighters must recognize that their protective equipment is not designed for, nor intended to allow them to enter farther or work longer than Firefighters could before the use of SCBA. The same basic tactics of fighting fire must apply.

In the days before SCBA, Firefighters had to stay low. Proper nozzle use and timely, coordinated ventilation were critical to cooling and controlling the fire environment ahead of them. These same basic tactics must continue to be used today. The trap is that Firefighters today are so well protected and insulated from the effects of heat and smoke, that basic mistakes involving improper action, position, and timing are masked and not recognized as dangerous. By the time Firefighters do recognize the danger, it is often too late as they have advanced too far and/or stayed too long.

Firefighters must be alert and aware of conditions on the fire ground at all times. We must stay together, watch out for each other, and watch for the traps. Our ability to initiate and carry out sound tactics, standard procedures, and operations on the fire ground will dictate our actions, position, and timing. Actions, position, and timing are the keys to safety. Remember, our protective equipment is critically important but it only accounts for part of the safety equation.

Slow down and look, make sure you SEE what you are looking at. Identify and define the situation first, THEN take action.

II. BASIC FIRE BEHAVIOR

There are many parallels between the fire service and the military. In the fire service, as in the military, the basis for existence is that there is a real or perceived enemy.

Our enemy is the generation of excessive and unwanted heat, smoke, and other damaging products of combustion. To successfully control and defeat the enemy requires a sound knowledge of that enemy.

Understanding fire behavior in structures will:

1. Allow the safe and effective attack, and control of fire.

2. Provide a basis to accurately size-up or evaluate evolving conditions on the fire ground.

3. Permit an accurate appraisal of potential fire conditions during fire prevention and pre-fire inspections.

4. Provide the basis for training objectives and equipment performance standards.

The following is a simplified description of the combustion process. The six observable or measurable factors in a Class "A" fire are:

l. Input heat

2. Fuel

3. Oxygen

4. Proportioning of the fuel/air mixture

5. Mixing of the fuel/air mixture

6. Uninhibited chain reactions between active fuel/air molecules

In any combustion process there are always products of combustion. Due to the wide variety of possible fire conditions, some or all of the following products of combustion will be present:

· Toxic and/or flammable vapors or gases
· Carbon based particulate matter
· Non-toxic and/or non-flammable vapors or gases
· Free radicals
· Heat

Matter is never created or destroyed, it merely undergoes changes of state. Through the combustion process molecules separate and recombine forming new gases and/or particulate matter, or remain separated as ions or free radicals.

These combustion products cause the great majority of civilian fire fatalities and injuries by obscuring visibility, reducing available oxygen content, or replacing oxygen in the lungs.

Heat is a form of energy in transit or change. Any kind of energy, electrical, chemical, mechanical, or nuclear can be converted to heat and potentially start a fire. Heat Measurement

Temperature is the condition of a body that determines whether it will transfer heat to or receive heat from another body.

Heat always moves from warmer bodies to cooler bodies.

BTU or British Thermal Unit is a basic unit of heat. A BTU is the amount of heat required to raise the temperature of one pound of water one degree fahrenheit. Specific Heat is the thermal capacity of a substance. It is the number of BTU's required to raise the temperature of one pound of a substance one degree fahrenheit (the specific heat of water is one BTU).

Latent Heat is the quantity of heat absorbed by a substance when passing between phases. Solid to liquid is the latent heat of fusion. Liquid to vapor is the latent heat of vaporization.

Water has a Latent Heat of fusion of 143 BTU's and Latent Heat of vaporization of 970 BTU's.

Every substance has a set specific and latent heat value per unit mass. Therefore, combustible materials have set heat or combustion per unit mass. The heat of combustion is the maximum amount of heat released in BTU's by the complete combustion of a unit mass of a combustible material.

Heat Transfer Methods

Heat is transferred in three different ways:

l. Radiation is when heat energy is transmitted similar to light waves. Radiant heat energy emanates equally in all directions, in straight lines.

Radiant heat energy from a point source (which is small in relation to surrounding bodies) diminishes in intensity with increased distance according to the inverse square law or, if the distance is doubled, the temperature increase to the exposed body is reduced fourfold (Figure 1).

Radiant heat energy from a line source (which is generally as large or larger than the surrounding bodies) diminishes in intensity with increased distance directly or, if the distance is doubled, the temperature increase to the exposed body is reduced by half (Figure 2).

2. Convection is the transmission, spread, or distribution of heat through the motion of a heated fluid. Convection will cause a heated fluid to become buoyant and rise. It is the primary heat transfer method within structures and is responsible for the majority of fire and smoke spread within structures. Phenomena such as "thermal layering" and "mushrooming" are explained by understanding convection (Figure 3).

3. Conduction is the transfer of heat through matter without any visible motion of that matter. This is the only method of heat transfer through solid objects. Fire extension through conduction occurs only in rare circumstances, but still must be considered at many fires.

The primary consideration relative to conductive heat transfer is structural integrity. The transfer of heat from metal connectors to wooden structural members, weakening those connections, is a major cause of structural collapse, particularly involving any type of truss construction.

Heat is the most dangerous and threatening product of combustion for the following reasons:

l. Products of combustion are carried vertically and horizontally (mushrooming) to remote areas of the structure. This spread of heat and smoke contributes to fire extension and endangers occupants far away from the involved area.

2. Through convection and radiation new fuel sources are heated to their ignition temperatures and contribute to rapid fire spread and extreme fire behavior. This can quickly and unexpected cut off, trap, or burn occupants and Firefighters.

3. Metal to wood structural connections weaken. This can lead to rapid partial or total collapse, particularly in any type of truss construction.

Fire Progress and Development

There are three stages in the development of an interior fire:

l. Growth Stage

During this stage the fire increases in size from a small flame or incipient fire to a fire that involves the entire room or area. It could take anywhere from several seconds to several hours for this to occur.

The rate of combustion, fire intensity, and the total combustion product output are governed by six major f actors :

A. The amount of exposed combustible surface.

B. The arrangement of the combustible surfaces.

C. The type of fuel source.

D. The nature of the combustible surfaces.

E. The ratio of combustible surface to room or area volume.

F. The amount of available air flow or ventilation.

The total amount of combustible material is only of interest in determining how long a fire will burn, if unchecked.

The amount of surface area, relative to its mass, that the fuel source presents and the type of fuel determines the ease of ignition, along with the size and intensity of the fire.

The arrangement of the combustibles, the proximity and relation of the combustibles to each other, and the nature of the fuel surfaces will regulate heat transfer and influence the ignition of the combustibles.

Dark or rough surfaces absorb convective and/or radiant heat faster than do light colored, smooth, or shiny surfaces.

Assuming an adequate air supply, the ratio of combustible surface to room or area volume is the primary factor that determines the time to flashover or full room/area involvement.

The rate of sustained combustion is largely determined by available ventilation or air flow.

The growth stage of a fire can be identified by the upward direction of the fire curve on the time temperature curve.

2. Fully Developed Stage

In this stage the entire room or area and its contents are involved and burning. The fire is producing its highest temperatures. Again, the length of time the fire will remain in this stage is determined mainly by the total amount of burnable fuels in the room or area. The fully developed stage can be identified by the horizontal portion of the fire curve.

Flashover can be identified as the curve occurring near the end of the growth stage. This marks the beginning of the fully developed stage.

3. Decay Stage

In this stage the combustion rate and temperature output begin to decrease. The major portion of the combustibles have been consumed by the fire. The decay state is identified by the downward direction of the fire curve or temperature decrease.

As we can see fire is not a thinking enemy, it must follow physical and chemical laws of nature. The progression, development, and effect of fire, heat, and smoke can and must be anticipated.

Knowledge and understanding of fire behavior, building construction, and combined tactical operations dictate proper position, action, and timing on the fire ground. Remember the philosophy to fight fire smart generates the greatest decisive effect against the fire at the least possible cost to ourselves. We must know what we are up against.

III. FIRE PHENOMENA

Flashover

Sudden full room or area involvement in flame, or the sudden auto ignition of combustible surfaces and/or gases in an area heated by convection and/or radiation, resulting in a sudden and intense rise in temperature.

Flashover is one of the major causes of fire ground fatalities. It is the most dangerous stage of fire development.

The technology and attitudes of today are in many ways major contributing factors.

l. Increasing use of synthetic furnishings that when ignited burn two to three times hotter and faster than ordinary combustibles making the time temperature curve look more like a spike (Figure 4).

The increased production of flammable gases along with dense black smoke further increase and mask the flashover danger.

2. Increasing use of light weight construction materials reducing structural mass. Higher surface area to mass ratios result in increased fire intensity and early structural failure.

3. Building design with large open or undivided floor areas. This increases fire spread and intensity. Firefighters have no protected or separated area to initiate interior operations and therefore no area of safe retreat.

4. Improved protective equipment has, in most cases, reduced Firefighter injuries. However, this same equipment insulates us from sensing the warning signs of rapid heat build up leading to flashover. This insulation is leading Firefighters to believe that they can withstand higher temperatures for longer periods of time precisely at a time when fires are burning hotter and faster, and buildings are failing sooner.

Flash Phenomena

The following three flash phenomena can occur in a superheated, smoke filled environment, which can trap and kill Firefighters:

1. Roll over is a sudden sporadic generation of flame mixed with smoke at the upper ceiling level just before flashover occurs. It is the last warning for Firefighters to withdraw from the area, if charged lines are not in place and operating effectively. This condition is caused as combustible gases released during the growth stage of a fire mix with air as they enter their flammable range.

ROLL OVER IS A WARNING OF A MORE DEADLY EVENT TO FOLLOW!

2. Flashover takes place after rollover, at the end of the growth stage of a fire, with full room or area involvement immediately following. **FLASHOVER IS THE MOST DEADLY OF THE FLASH PHENOMENA, AS IT IS A PARTICULAR DANGER TO FIRST-IN FIREFIGHTERS CONDUCTING INITIAL ATTACK AND SEARCH OPERATIONS WITHOUT PROPER VENTILATION AND BACK-UP.**

Flashover may cause the death of any trapped victim and serious injury or death to any trapped Firefighter inside the involved room or area. It also negates any effective search and rescue operation unless an immediate knockdown and venting of the area is effected.

3. Flame over is the third flash phenomenon encountered by Firefighters. It usually occurs after flashover and is defined as rapid flame spread over one or more surfaces during a fire. Similar to flashover, it is caused by the sudden ignition of combustible vapors that are produced from a heated surface. Once a room or area has flashed over and flames spread out of the original fire area, Firefighters on hose lines or conducting search operations in a hallway or corridor leading to the involved unit may be encircled and trapped by flame over.

<u>Warning Signs of Flashover</u>

- A fire burning within a room or area that is producing a buildup of heated smoke at the upper levels of the structure.

- Smoke that is increasing in heat and density.

- A rapid banking down of heated smoke.

- Fire of significant intensity exposing contents and surrounding areas to radiant and/or convective heat.

- Roll over occurring. Flame visible in the smoke rolling out the tops of open doors or windows, and/or flames rolling in the upper ceiling level inside the fire area.

These warning signs may not be apparent in buildings with large unenclosed floor or attic spaces and ceilings 12 to 20 feet above the floor or joist level.

When a fire occurs in a structure with full walls and normal ceiling heights of eight to ten feet, the smoke and heat from a fire will quickly accumulate and bank down indicating the flashover danger.

Experienced Firefighters make a mental note of the heat level or thermal layer when entering the fire area and as they advance. The lower they are forced to crouch down to see and to stay cooler, the greater the danger of flashover.

In a structure with a high ceiling or large attic, the area above the Firefighter's head can accumulate a great deal of superheated smoke. This delays the observable build up of heat and smoke down low that would normally alert us to the flashover danger.

When Firefighters enter a high ceiling area and are not forced to get down because heat and smoke have not banked down to floor level, they may subconsciously assume the fire hazard is small. This can be a deadly judgment error.

Smoke Explosions

Conditions for a smoke explosion develop before Firefighters enter or while they fight fire in the early stages as super heated smoke particles build up and are forced into enclosed, hidden areas.

To ignite and explode they need only a draft, a little more oxygen to mix with and produce an ignitable mixture. Conditions for a smoke explosion are not always observable or recognizable. It often occurs after unsuccessful ventilation and extinguishment operations have been underway for some time. A smoke explosion is sudden and almost always unexpected, it can trap and burn Firefighters.

When operating inside, watch for the following warning signs of a smoke explosion:

- Sickly or intermittent flame due to a reduced oxygen level.

- Smoke being drawn past you into the fire area of the structure.

- Heavy smoke swirling with great force.

· Flickering flames in the smoke above you as heavier combustion products suspended in the superheated atmosphere try to ignite.

Backdraft

A true backdraft is extremely rare, it is a serious, structure damaging explosion.

It needs a building tight enough and strong enough to contain fire and hold back sufficient oxygen until the burning process moves into the decay stage. Oxygen content must fall to between 11% and 15%. Explosive products of combustion are 1,000F to 1,800F and higher, well above their ignition temperature. They have mushroomed and pressurized the entire structure. The process needs only one additional element ---- air.

If sufficient air is introduced through a horizontal opening, a rapid explosive force will occur inside the structure and cause building components to be hit with a severe concussion. The now flaming gases explode out the openings that were just made. It is classic, defined and, because of known observable signs, predictable - if you are paying attention.

Warning Signs of Backdraft:

· Smoke issuing out of any available structural openings, door jambs, window frames, roof, and attic vents, wall cracks, etc.

· Smoke igniting when it rolls into the outside air.

· Heavy, hot smoke is visible but no fire can be seen or heard.

· Structure appears to be breathing or puffing smoke.

· Windows darkened due to long exposure to heat, may look like mirrored glass from the outside.

· Condensation forming on windows.

· Windows pulsating or rattling from internal pressure.

· Large plate glass windows may bulge from heat and internal pressure.

Differences Between Flashover and Backdraft

The primary difference between the two occurrences is the amount of air present.

A flashover occurs during the first or growth stage of a fire, and initiates the transition to the second or fully developed stage. In a flashover there is sufficient oxygen to support combustion. The triggering event for flashover is the addition of heat. This heat addition is primarily re-radiated heat and convective heat from the upper areas to the lower areas of the room, preheating combustibles to their auto ignition temperature.

A backdraft occurs during the smoldering or decay stage of a fire. The triggering event for a backdraft is the addition of oxygen, either by a pressure induced broken window or by Firefighters making entry through a door. Prior to a backdraft there is inadequate oxygen to support combustion.

Fight fire smart, read the conditions, heed the warning signs, watch for the traps, stay together, and get it done!

IV. STRUCTURAL COLLAPSE

Flashover signals the beginning of the collapse danger of a fire. Before flashover occurs the fire generally is fueled only by the contents of the room or area. After flashover the structural elements of the building may begin to burn and fuel the fire.

Most of the serious fires at which Firefighters operate, occur in buildings. In general, it can be said: "The building makes the problem." The fact that a fire is in a building, rather than a vacant lot, adds the following possibilities and risks:

· The building itself may burn.
· Contents of the building may burn.
· Occupants can be trapped.
· The building layout will complicate our fire attack.
· The building may collapse in whole or in part.

· Firefighters may be injured or killed.

Buildings are designed to withstand the external forces of gravity, wind and rain, the dead load of structural components and the live loads of people, stock, and

furnishings.

Beams, trusses, walls, and columns are the primary structural elements that carry these loads throughout the building and transfer them to the ground.

Some materials are good in compression, others in tension. But the characteristics of all materials change when subjected to the high temperatures of a fire. Bricks soften, concrete spalls and disintegrates, steel elongates and twists. Wood that is burning not only loses strength, but adds fuel to the fire.

A building that is on fire is a building under demolition. Any failure of continuity may lead to partial or total collapse. When the collapse potential is not anticipated and planned, it can be deadly.

There are four construction features that present the greatest danger to Firefighters from collapse:

l. Any type of truss construction
2. Unreinforced masonry construction
3. Any cantilever construction
4. Unprotected steel construction

These types of construction, once involved with fire, fail suddenly, rapidly, and without warning.

A dangerous trap is to only be concerned with overall building stability, and to consider a partial collapse as insignificant or unimportant. Remember a partial collapse is important to two groups of people, those under it and those on top of it. If you are caught in a collapse, the least of your concerns is whether it was a total or partial collapse.

Remember fight fire smart. Know the building before the fire, look for structural involvement and always expect the unexpected.

V. FIRE GROUND SURVIVAL

In 1991, nationwide, 105 Firefighters lost their lives... firefighting is still one of the most dangerous professions in the country. All members, from the Incident Commander to the

rookie Firefighter, need to think about interior fire attack strategies, tactics, and methods.

Firefighter survival begins with pre-fire planning, preparation, and training.

· Study fire development and behavior in structures.

· Learn construction methods, hazards, and applicable fire codes by age and occupancy type.

· Develop and maintain expertise with tools, equipment, and fittings as well as ladder and hose evolutions.

· Be able to apply knowledge and skills, as part of a team, to accomplish basic tactical objectives on the fire ground.

· Establish standardized mission objectives and operating guidelines that encourage initiative, imagination, and most importantly, develops unity of purpose.

Your survival may depend on a complete precheck of your safety equipment and the apparatus inventory. Take the morning equipment and apparatus prechecks seriously.

It is very important for all members to make their own mental size-up. This mental size-up must consider the following areas:

· The occupancy involved

· The age of the building

· The construction type

· Smoke conditions

· Fire location and intensity, is it a "contents" fire or is the structure involved.

♦ How long has it been burning? Under fire conditions time is a major factor. What do you have now and what will you have in ten minutes.

♦ Consider the other team problems, Engine versus Truck Operations.

♦ Consider water supply, weather conditions and accessibility in and around the involved

structure. These are all key factors that can change everything.

Initiate basic operations: Truck work supports Engine work!

Engine work supports Truck work!

Remember the ultimate objective is fire extinguishment. This must be accomplished tactically, by eliminating heat and smoke through water application and ventilation. Methods employed should minimize human risk and personal property damage.

There are many factors involved with your safety as a Firefighter. These factors must be considered and acted upon by each member to ensure a safe operation.

♦ Use your full protective equipment.

♦ Stay together working as teams. Teams support teams. Watch out for each other. Do not get caught in one-upmanship, macho heroics or false pride. Help the first teams get in position. Always remember the objective.

♦ Approach, is it safe, again consider the potential for extreme fire behavior and other hazards. Attempt to establish and work from a safe area.

♦ Entry and exit considerations - doors are best and should be the first choice. Fire escapes are usually good but the entire opening from the balcony must be cleared to create a doorway. Windows should be your last choice, they can be extremely dangerous as openings which are smaller and no work platform can be provided except the ladder. Again, when they must be used, knock out the entire window to create the largest possible opening.

♦ Make entry from the uninvolved to the involved. Provide a loaded line(s) of sufficient length and flow prior to making entry. Coordinate entry with ventilation operations. Make the entry point large or provide multiple entry points to allow for rapid escape.

♦ Place ladders to upper floors of multi story structures to provide secondary access and egress for Firefighters. Remember, if windows must be used for entry or

exit knock out the entire window to create the largest opening possible.

♦ If vertical ventilation is required, place additional ladders to the roof, again working from the uninvolved to the involved. In general, provide a minimum of two ladders to every structure and one additional ladder for every two member team on the roof. Make roof opening(s) directly over the fire where possible and large enough to exhaust heat and smoke quickly.

♦ When inside, stay low, work the nozzle in the upper atmosphere to affect cooling and push back rollover. Control the form and flow of water to maintain thermal balance and prevent excessive steam production. To obtain a knock down, water must reach the seat of the fire. With a loaded line in position, pull ceilings to help vent the area and to access the attic to control any possible extension.

♦ Never let the fire spread between you and the exit you came in. Press the attack methodically, securing avenues of vertical and horizontal spread as you advance. In stairways and hallways do not bunch up, always think about a hasty retreat.

Wherever your team is operating, inside, outside, or on top, continually reassess heat buildup and changing conditions. Use your experience and all your senses. Timely, effective fire attack and ventilation operations should improve conditions quickly.

Always think about when it is time to get out. Consider the time the fire was burning before your arrival and the time involved in making an effective attack on the fire. Again watch, listen, and feel. Draw on all your experience and apply it.

OFFICERS

If your crews cannot safely move over the fire to vent or are unable to advance hand lines to the seat of the fire, back them off to a defendable position. Continue to communicate observations, conditions and needs in your area of operation. Maintain coordination and unity of purpose. Strategy, tactics, and operational timing must fit the situational needs. Ask yourself, are the probable gains worth the possible risks.

Remember that the best protection we have is to not get in a situation where our protective equipment is needed to save our life.

What to do if everything goes wrong...at some point in every Firefighters career you will respond to the fire where the unexpected happens and you will be forced to use all of your training and experience to save your life or the life of another Firefighter. When that occurs there are several things you must remember.

- ♦ Use extreme self control, do not panic, keep thinking.
- ♦ Communicate your situation, location, and actions taken to escape so rescue teams can be directed properly.
- ♦ Stick together, maintain a will to survive and do not give up.
- ♦ Buddy breathe, follow the hose line, a drop bag, or the walls, whatever it takes, to get out.
- ♦ You or your partner may know the building, apply that information to escape.
- ♦ You may be forced to stick with your nozzle and fight fire to save your life. Activate your emergency radio button and your PAL Device.
- ♦ When you do get out, count heads, make sure everyone is out.

Critique your fires while on scene and back at quarters. Be proud of your performance, but just as important, admit, and correct your mistakes. It may save your life or the life of your partner at the next incident.

Your knowledge of firefighting and your ability to think clearly under stressful conditions are your most important pieces of safety equipment. Remember, position, action, and timing are the keys to safety.

Fire burns, fight it smart.....slow down and look, make conscious decisions to act because mental mistakes on the fire ground can be deadly.

VI. CONCLUSION

As Firefighters, we are constantly subjected to dangerous conditions and situations. Each member must become proficient in recognizing and dealing with this danger. In order to perform our duty we must not fear these conditions but respect and understand them. There is no room for complacency or ignorance on the fire ground. Every member must be alert and competent.

"Get down, stay low" are common commands heard on the fire ground. These are basic rules to firefighting that we have all been versed in. However, we must go beyond the elementary and progress to a level of expertise through education and experience. The experience gained will become more beneficial to each member, when that member can fully understand the conditions they will encounter. This document was formulated to assist members in that pursuit. The information presented in this training bulletin was a compilation of research and personal experience from some of this Department's most knowledgeable and experienced officers. This document along with the "Fire Burns Videotape" contains information that every member should review and understand. Only through concentrated effort and dedication will members gain the experience and education necessary to meet the challenges and standards of our Department. Remember fire burns....fight it smart.

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