

No. 5: Fire Behavior Terminology

Introduction

This topic is a must learn for anyone in the fire service. If we are to be successful in fighting fires we certainly need to know how the enemy behaves. The first order of business is understanding terminology.

- **Combustion** – is the self-sustaining process of rapid oxidation of a fuel, which will produce heat and light.
- **Fire** – the result of rapid combustion.
- **Tetrahedron** – is a pyramid shape depicting the four elements necessary for combustion to occur; oxygen, fuel, heat, and chemical chain reaction.
- **Oxygen** – occurs normally in the atmosphere at about 21 percent. The percentage has a great deal to do with how the fire will react. Below 19.5 percent is oxygen deficient and the intensity of the fire will decrease. Above 21 percent and the fire will intensify.
- **Fuels** – are found in three different states of matter; solids, liquids, and gases.

Heat Transfer

- **Radiation** – is electromagnetic waves through the air.
- **Convection** – heat transfer by the movement of air or a liquid.
- **Conduction** – heat transfers from one object to another by direct contact.
- **Products of Combustion** – heat, light, smoke, and fire gases.

Sources of Heat

- Chemical
- Mechanical
- Electrical
- Nuclear

Classifications of Fire

- **Class A** - Ordinary combustibles
- **Class B** - Flammable liquids
- **Class C** - Electrical
- **Class D** - Combustible metals

Phases of Fire

- **Incipient** - occurs shortly after ignition.
- **Growth** - open burning occurs.
- **Fully Developed** - all contents are burning.
- **Decay or Smoldering** - the point that all fuels have been consumed and the fire is starting to diminish.



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Concerns to Firefighters

Several safety concerns need to be addressed:

Backdraft - which is by far the most dangerous situation. Backdraft will occur when the fire lacks the oxygen it requires to burn freely. The fire has built up a tremendous amount of heat and pressure, with plenty of fuel left to burn. Once the firefighters open up and allow oxygen into the area, a violent explosion occurs. Ventilation is best performed at the highest point. Warning signs of a backdraft are:

- Smoked stained windows
- Smoke puffing from windows, doors, and cracks of structure
- Smoke pushing, under pressure
- Heavy black smoke
- No visible fire
- Windows and doors that are very hot
- Large open areas with lightweight construction

Flashover - this is the point at which all contents in the immediate area of the fire simultaneously heat to their ignition temperature and begin to burn. This generally will occur during the growth phase. Items that need to be addressed to identify the warning signs of a flashover are:

- Rapid buildup of heat in the area
- Environment becomes pitch black

Rollover - the least dangerous, it consists of escaping smoke and gases being ignited overhead, which will consume the fuel in the air very quickly and burn out.

-Prepared by Russell Merrick/Firehouse.com

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