

ESSENTIALS IN FIRE FIGHTING AND SAFETY

1. Definition of Fire vs. Combustion

- (a) Fire is a result of a rapid combustion reaction.
- (b) Combustion is the self-sustaining process of rapid oxidation of a fuel, which produces heat and light.

2. Heat Transfer

- (a) Laws of heat flow state that heat tends to flow from a hot substance to a cold substance.
- (b) Heat can travel through a burning structure by one or more of three methods:
 - (i) conduction - direct contact or with a medium
 - (ii) convection - movement of air or liquid
 - (iii) radiation - heat transfer in waves where matter doesn't exist.

3. Fuels

- (a) Fuels are found in the 3 stages of matter: (i) solids; (ii) liquids; (iii) gases.
- (b) Only gases burn.

4. Phases of Fire

- (a) *Incipient phase*: earliest phase beginning with actual ignition.
- (b) *Rollover phase*: also known as flameover. Takes place when unburned gases accumulate at the ceiling level.
- (c) *Steady state phase*: occurs when enough oxygen and fuel are available for fire growth.
- (d) *Flashover phase*: occurs when flames flash over the entire room or area.
- (e) *Hot smoldering phase*: occurs when flames cease if in an air-tight confinement. Back draft can occur during this phase.
- (f) *Back draft can be the most hazardous condition a fire fighter will ever face.* Characteristics of potential back draft:
 - (i) pressurized smoke exiting a small opening;
 - (ii) black smoke becoming dense yellow gray;
 - (iii) little or no visible flame;
 - (iv) smoke leaving the building in puffs or at intervals;
 - (v) smoke-stained windows;
 - (vi) muffled sounds;
 - (vii) sudden rapid movement of air when an opening is made.

5. Fire Extinguishment Theory

- (a) Reduction of temperature
- (b) Removal of fuel
- (c) Exclusion of oxygen
- (d) Inhibition of chain reaction

