



# **Fire Prevention, Safety and Preparedness**

# *Fire Safety in Trinity County Buildings & Facilities*

Office of the County Judge Safety

## **Key Concepts**

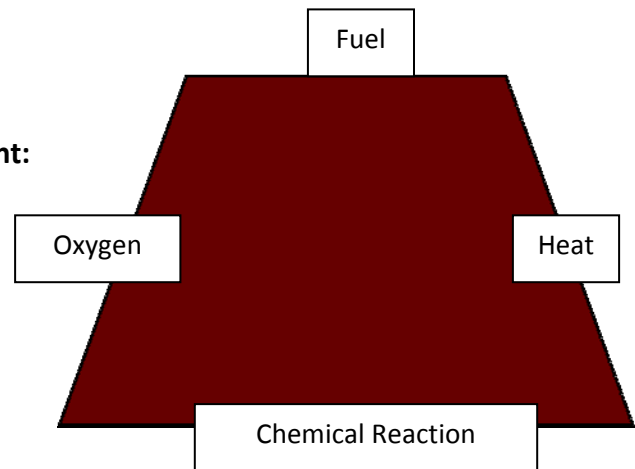
- **Fire Prevention**
- **The Fire Tetrahedron**
- **Stages of Combustion**
- **Classes of Fires**
- **Housekeeping & Storage**
- **Flammable and Combustible Liquids**
- **Electrical Fire Hazards**
- **Fire Extinction**

## **Goals of a Fire Prevention Program**

- **Protect Life**
  - The primary goal of fire safety efforts is to protect building occupants from injury and to prevent loss of life.
- **Protect Property**
  - The secondary goal of fire safety is to prevent property damage.
- **Protect Operations**
  - By preventing fires and limiting damage we can assure that work operations will continue.

# The Fire Tetrahedron

- In order for fire to occur four things must be present:
  - Oxygen
  - Fuel
  - Heat
  - Chemical Reaction



- The basic strategy of fire prevention is to control or isolate sources of fuel and heat in order to prevent combustion.
- When any of the four items are removed, the fire will go out.
- Fire extinguishers function by removing one of the four components of the Fire Tetrahedron.

## Housekeeping

- Good housekeeping habits are an important part of a safe workplace.
- Why is good housekeeping important?
  - To reduce amounts of flammable and combustible materials.
  - To reduce ignition hazards.
  - To ensure safe emergency evacuation of occupants.
  - To allow for quick emergency response.
- Work areas, aisles, walkways, stairways, and equipment should be kept clear of loose materials, trash, scraps, etc.
- Never block aisles, fire exits, emergency equipment, or alarm pull stations with equipment or materials.
- Avoid build up of combustible trash and waste such as paper, wood, cardboard, etc.
- Keep use and storage of flammables and combustibles to a minimum.
- Clean up all spills such as grease, oil, or water immediately.  
A delay could result in accidents.

# Storage Guidelines

- No storage is allowed in commons area or hallways. A cluttered hallway could slow down emergency evacuation.
- Storage must not exceed a plane of 18 inches below ceilings.
- All storage must be at least 3 ft from electrical panels.
- In some emergency situations it will be necessary to access panels quickly.



**Improper Storage in front of Electrical Panel**



**Improper Mechanical Room Storage**

- Maintain at least a 3ft clearance from heating surfaces, air ducts, heaters, and lighting fixtures.
- Storage of combustible materials in mechanical rooms is prohibited.

# Flammable and Combustible Liquids

- Flammable and combustible liquids are potential fuel sources for fires and are present in almost every workplace.
- It is actually the vapor created by flammable and combustible liquids that ignite and burn.
- It is important to understand what materials in your work area are flammable and combustible so that you may properly store and isolate them from ignition sources.

## How do I tell what's flammable?

- **National Fire Protection Agency (NFPA) 704 classification system**
  - The NFPA diamond is an easy way to determine the safety risks associated with hazardous materials. To determine materials flammability refers to the red section of the diamond. A number in this section will indicate the flammability rating of the material.
- **The following numbering system is used to indicate flammability**

0 - will not burn

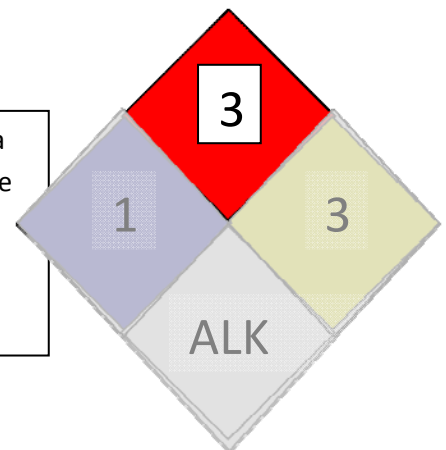
1 - Must be preheated to burn

2 - Ignites when moderately heated

3 - Ignites at normal temperature

4 - Extremely flammable

For example, an NFPA diamond on a can of gasoline would have a 3 in the red section indicating that gasoline could ignite at normal working temperatures.



# NFPA Classification System

- Product labels
- Material Safety Data Sheets
- **How do I determine the flammability of chemicals that don't use the NFPA classification system?**
  - The flashpoint of a chemical may be used to determine its flammability.
  - Flashpoint information may be found on product labels or MSDS sheets.
    - The flashpoint of a liquid is the lowest temperature at which the liquid gives off enough vapor to be ignited.
    - The lower the flashpoint, the greater the risk for ignition.
- **Flammable liquids are considered flammable because their flashpoints are < 100°F. This means that flammable liquids burn easily at normal working temperatures.**
- **Combustible liquids have a flashpoint at or above 100°F. These liquids are less hazardous than flammable liquids but still pose a risk.**
- **The volatility of flammable and combustible liquids requires special storage and handling requirements.**

## Storing Flammable and Combustible Liquids

- **Flammable liquids must be stored away from ignition sources in cool, well ventilated areas away from incompatible materials**
- **Limit the amount of flammable and combustible liquids to the minimum amount necessary.**
- **As a general rule, No more than 10 gallons of flammable materials should be outside of approved flammable liquid storage cabinets or approved storage rooms.**
- **Room storage limits of flammable and combustible materials depend on various factors such as sprinklers, and storage cabinets. Refer to the table on the following slide for storage guidelines.**

# I.S.U. Flammable Liquid Storage Limits

**Table 1. Room Storage Limits for Flammable and Combustible Liquids**

Class of Liquid	Flash point (°F)	Boiling point (°F)	Non Sprinkled Building	Non Sprinkled Bldg. & Flammable Liquid Storage Cabinet	Sprinkled Building	Sprinkled Bldg./Flammable Liquid Storage Cabinet
Class 1A, Flammables	<73 °F	<100 °F	10 gal.	20 gal.	10 gal	40 gal.
Class 1B Flammables	<73 °F	>100 °F	10 gal.	40 gal.	10 gal	80 gal.
Class 1C Flammable	> 73 & <100 °F	NA	10 gal.	60 gal.	10 gal	120 gal.
Class II Combustibles	>100 & <140 °F	NA	30 gal.	60 gal.	60 gal.	90 gal.
Class III-A Combustibles	>140&< 200°F	NA	50 gal.	100 gal.	100 gal.	150 gal.

Note: Containers other than safety cans shall not be greater capacity than one (1) gallon. The number of two (2) gallon safety cans shall not exceed five (5). The number of one (1) gallon safety cans in use outside storage cabinets shall not exceed ten (10).

# Preventing Electrical Fires

- **Electrical hazards are the cause of numerous workplace fires each year. Employee electrical equipment or misuse of equipment produces heat and sparks that serve as ignition sources in the presence of flammable and combustible materials.**
  - **Examples of common ignition hazards:** overloading circuits -  
use of unapproved electrical devices - damaged or worn wiring

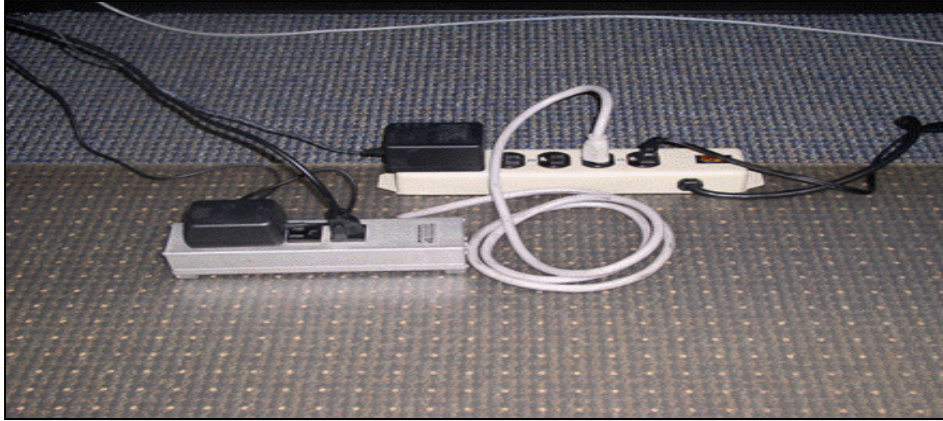
## Extension Cords

- **Extension cords are only approved for temporary use. They may only be used for a period of three days or less. Instead of using extension cords contact FP&M to install permanent wiring.**
- **When using extension cords check for defaults such as frays, brittleness, or broken wires.**
- **Never place extension cords in high traffic areas where they can be damaged by being stepped on or run over by equipment.**
- **Extension cords and other temporary flexible cords must be used in compliance with the National Electrical Code (NEC), NFPA-70 & 70e.**

## Multi-plug strips

- **Multi-plug strips should only be used for office equipment such as computers, printers, and fax machines.**
- **Other common items such as microwaves, refrigerators, and copy machines must be plugged directly into wall outlets.**  
**This is a requirement of the State Fire Marshal and the Fire Code.**
- **Multi-plug strips should have a fuse or circuit breaker and be UL approved.**
- **Laboratory instruments must be plugged directly into a wall outlet.**

- **DO NOT DO THIS!**



## **Avoid Improper and Hazardous Practices**

- Never use three prong adapters that allow a three pronged plug to plug into a two prong outlet.
- Never use any item with a damaged or frayed electrical cord.
- Space Heaters are not allowed in county buildings.

**Never daisy chain or piggy back multi-plug strips and electrical cords (plugging strips and cords into each other)**

**Do not use piggy-backed multi-plug strips**



# Compartmentalization

- Buildings are designed to prevent fire, heat, and smoke from spreading beyond locations of origination. Building elements such as fire walls, fire dampers, and doors, are designed to seal off one location from the next. This system is called compartmentalization.
- Compartmentalization increases the safety of evacuating building occupants because smoke and fire are not able to escape into exit passageways.
- Containment of fire and smoke reduces property damage and prevents small fires from growing into large fires.

In order for compartmentalization efforts to be effective fire barriers must be maintained.

## Reasons Not to Wedge or Leave Doors Open

1. **For the safety of your buildings occupants.**
  - If a fire occurs in a location where the door has been left open or wedged, smoke and heat will travel freely into exits hindering or preventing occupant evacuation.
2. **It's State Law**
  - Periodically the State Fire Marshal inspects and issues numerous citations for wedging or open doors.
- 3 **To reduce or prevent damage to property or personal belongings, etc.**
  - Keeping your door shut will keep out smoke or fire originating in other locations.

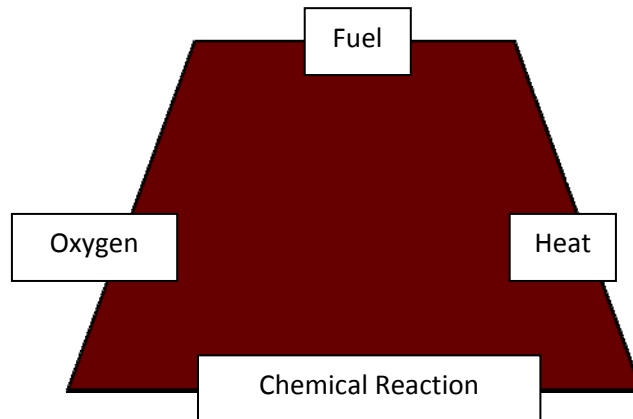
# The Four Stages of Combustion

**Most fires have quite humble beginnings & grow through four stages:**

1. **Incipient Stage** - At this stage, decomposition is occurring at the surface of the fuel due to the influence of some form of heat. Products of combustion given off at this stage are invisible to the eye.
  2. **Smoldering Stage** - At this stage, up to 10% of the decomposing products released at the surface of the fuel are visible.
  3. **Flaming Stage** - Vapors from the decomposing fuel have ignited and are at the stage where flames are self propagating.
  4. **Heat Stage** - At this stage the burning has progressed to the point where the fire is still small but generating sufficient heat to warm the air immediately around the fire, sending warm products of combustion upwards by convection.
  - 5.
- **The time required for a fire to develop through the first two stages is usually quite long when compared to the last two.**
  - **Depending on conditions, the time involved going through all stages may be anything from seconds to days.**

# Fire Extinction

Eliminate or remove one or more of the four elements of the fire tetrahedron by:



**Cooling** - The most commonly used fire fighting medium is water. Water absorbs heat from the fire and cools the fuel to a temperature where it no longer produces flammable vapors.

**Smothering** - By excluding the oxygen in the surrounding atmosphere, the fire will be extinguished.

**Starvation** - Starvation is achieved by removal of the fuel burning in the fire. Sometimes combustible material can be removed such as by shutting off gas valves or fuel flows.

**Stop Chain Reaction** - Stop or interrupt the chain reaction between the fuel, heat and oxygen the fire will be extinguished.

**Specific methods of extinguishing fires often involve a combination of more than one of the four principles.**

## Fire Extinction and Electricity

- **Electricity presents a special hazard in a fire situation.**
- **Electricity does not burn; it produces heat which may result in one of the classes of fire.**
- **If the electricity is removed (e.g. by switching off the power), the heat source is removed and the remaining fire should be dealt with according to its class.**
- **Learn where the breaker or emergency disconnect switch is for your work area. Switch off the power in event of a fire or emergency.**
- **If the source of electricity cannot be eliminated, a non-conductive extinguishing agent should be used.**

## When should you Attempt to Fight the Fire?

- If you can't get within 10 feet of the fire, it's probably too big for a typical hand-held fire extinguisher. Call 911 or 642-1424 and evacuate the area.
- Before you begin to fight a fire, make sure to:

1. Evacuate the building.

2. Call Emergency services 911

3. Make sure that the fire is confined to a small area and is not spreading.

4. Make sure that you have an unobstructed escape route to which the fire will not spread.

5. Make sure that the extinguisher is the right type for the fire.

6. Make sure that you have read the instructions and know how to use the extinguisher.

# Using a Fire Extinguisher

- Keep your back to an unobstructed exit & stand six to eight feet away from the fire.
- Follow the 4-step procedure: Pull, Aim, Squeeze and Sweep (PASS)

**Pull the pin,** This unlocks the operating lever and allows you to discharge the extinguisher. Some extinguishers may have other lever-release mechanisms.

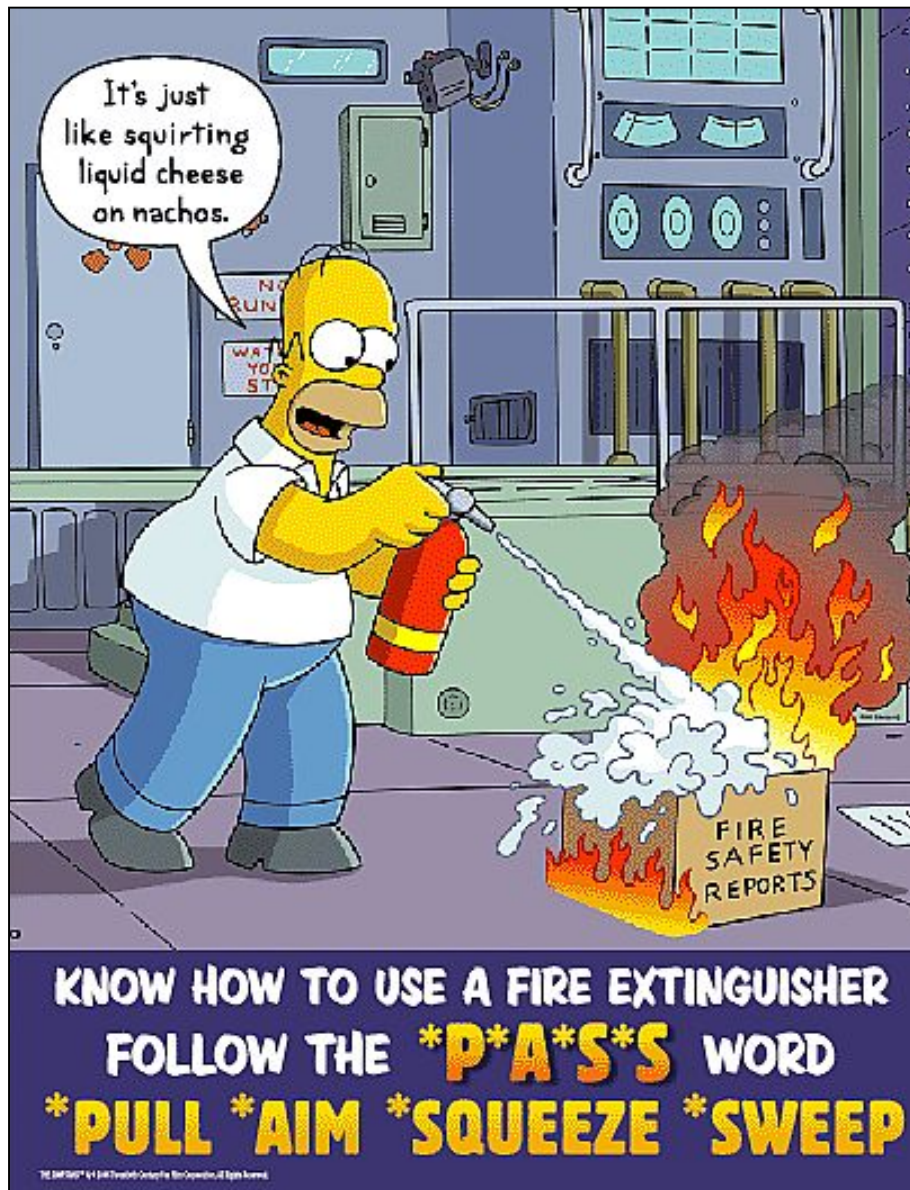
**Aim low,** Point the extinguisher nozzle (or hose) at the base of the fire. Generally, you must be within 10 ft of the fire, to use a hand-held fire extinguisher effectively.

**Squeeze the lever above the handle,** This discharges the agent. Releasing the lever will stop the discharge. Some extinguishers have a button instead of a lever.

**Sweep from side to side,** Moving carefully toward the fire, keep the extinguisher aimed at the base of the fire and sweep back and forth until the flames appear to be out. Watch the fire area. If the fire re-ignites, repeat the process.



## After Using an Extinguisher



- Always be sure the fire department inspects the fire site, even if you think you've extinguished the fire.
- When finished, return the extinguisher to the Fire & Life Safety Officer to get inspected & refilled.

