

Ground Cover

Introductory Drill Night

Version Oct 2015

TEXAS A&M FOREST SERVICE



NOTICE

This course is not designed to meet any certification requirements and is not intended to present comprehensive information. It is designed to present a brief introduction and overview of information for introductory use.

Texas A&M Forest Service recommends all firefighting personnel receive training that meets recognized standards before working in the fire ground environment.

Course Objective

Upon completion of this course, the student will have a basic understanding of the principles of wildland firefighting and the tools and strategies needed to do so in a safe and effective manner.

Course Outline

- Unit 1 Wildfire Terminology
- Unit 2 Fire Behavior
- Unit 3 Locating the Fire
- Unit 4 Wildfire Size Up
- Unit 5 Wildfire Suppression Methods
- Unit 6 Mop Up
- Unit 7 Safety



Unit 1

WILDFIRE TERMINOLOGY

Unit Objectives

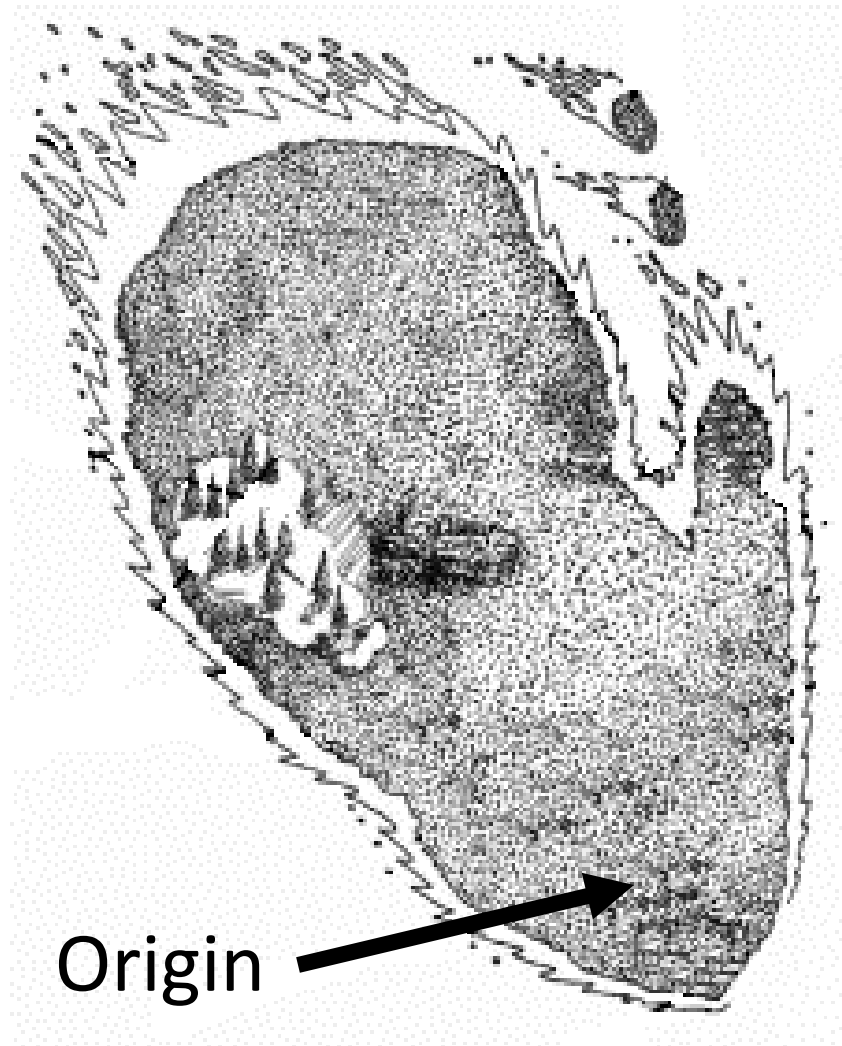
1. Become familiar with common fire service terminology.

Parts of a Wildfire



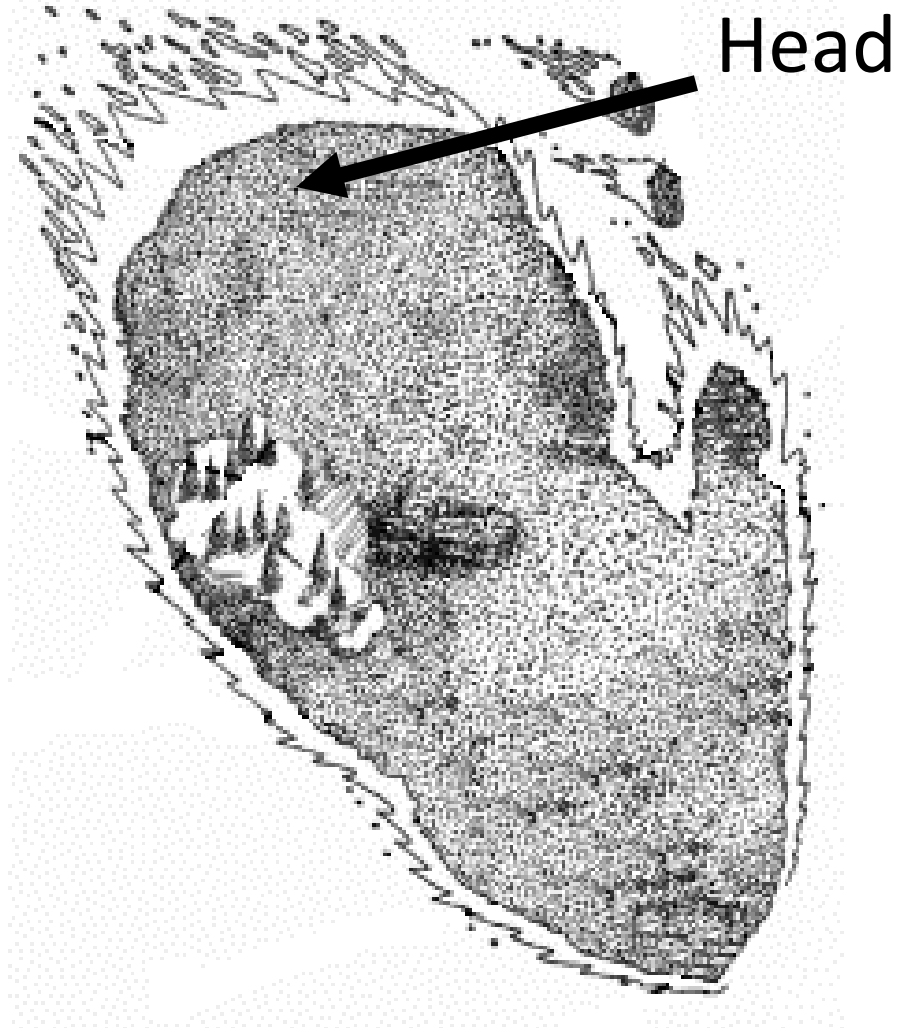
Origin

- The location where the fire started.



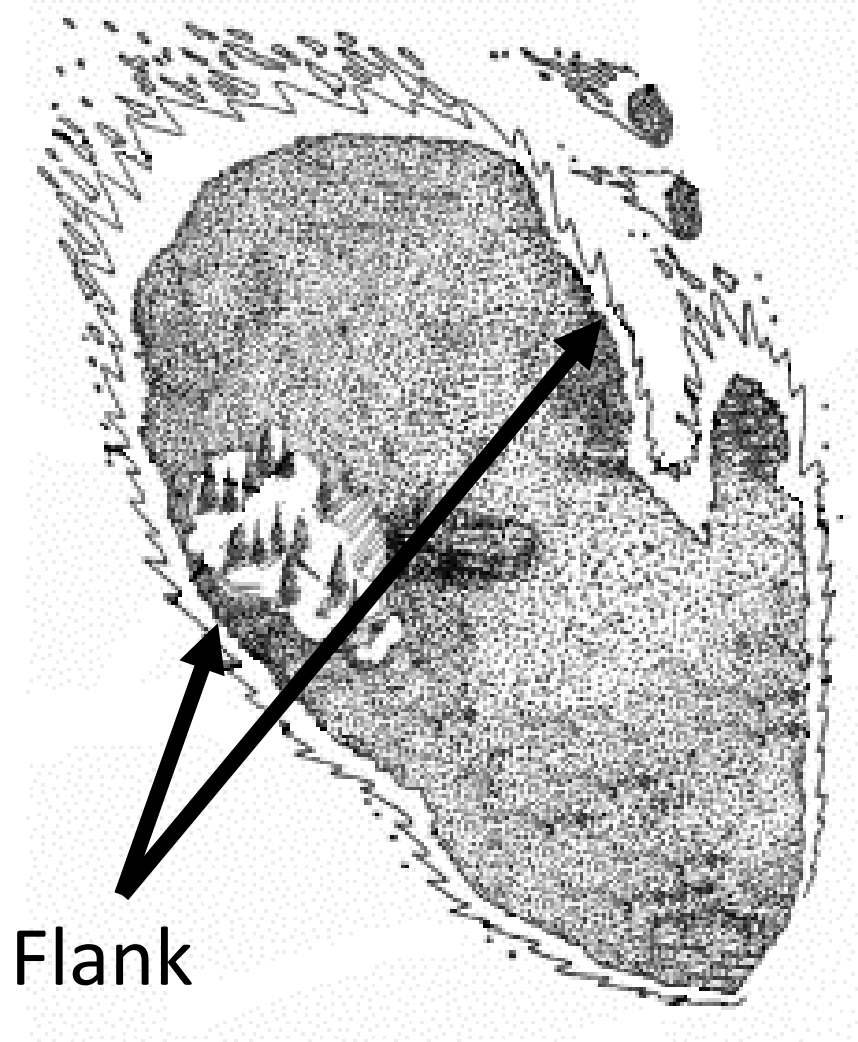
Head

- Shows the direction in which the fire is burning.
- This is the hottest and most active part of the fire.



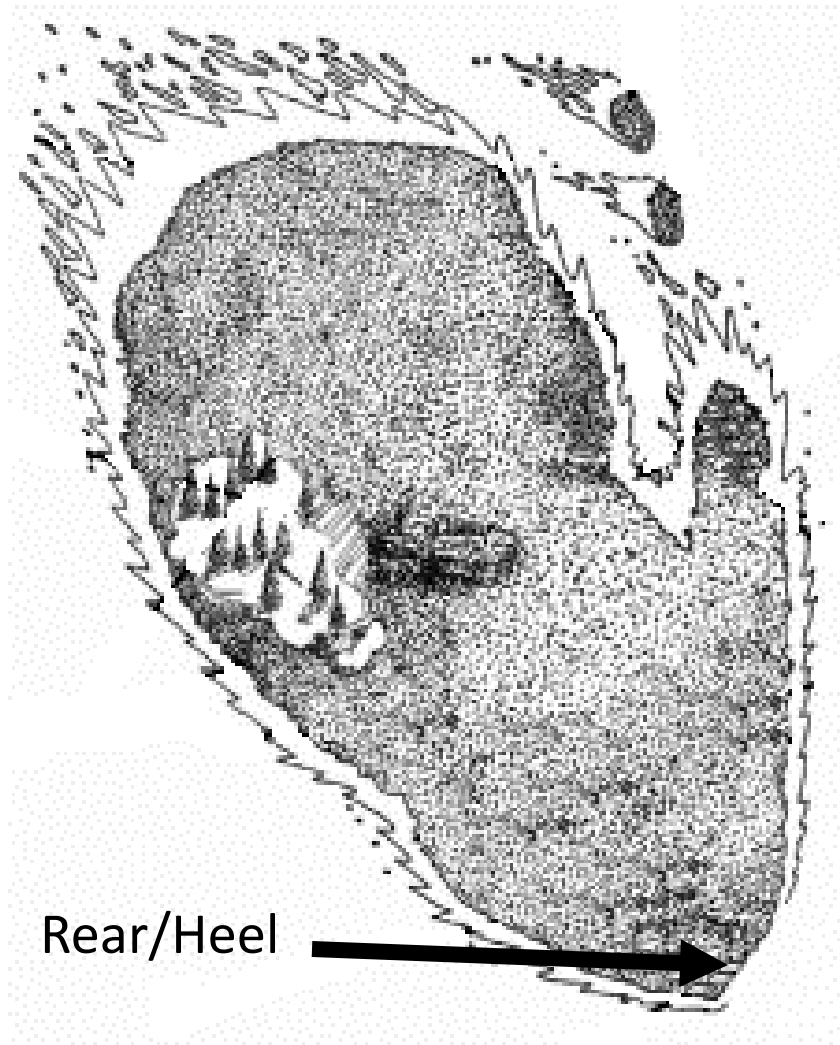
Flank (right and left)

- Side of the fire.
- Parallel to the main direction of spread.
- May have active fire, but not as hot as head of fire.



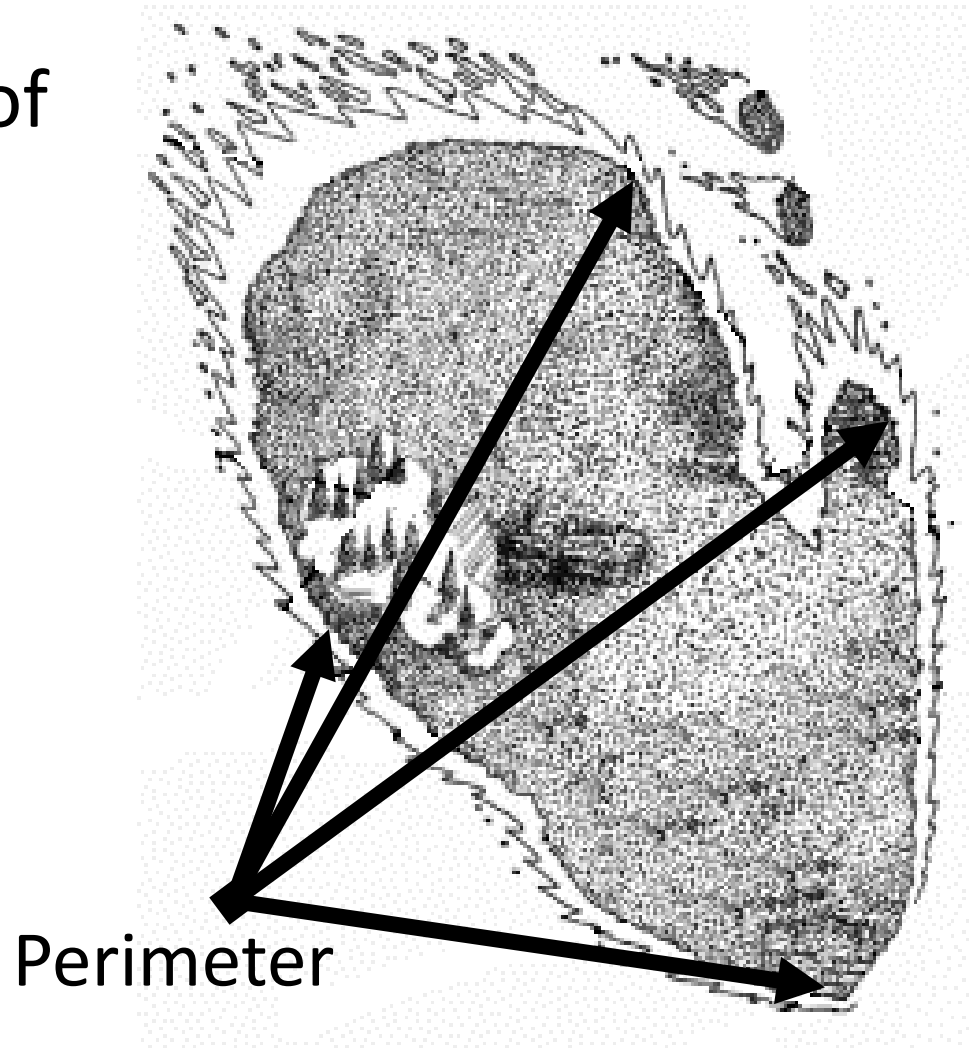
Rear/Heel

- Opposite the head of the fire.
- Burning less vigorously, if at all.
- Often near the fire origin.



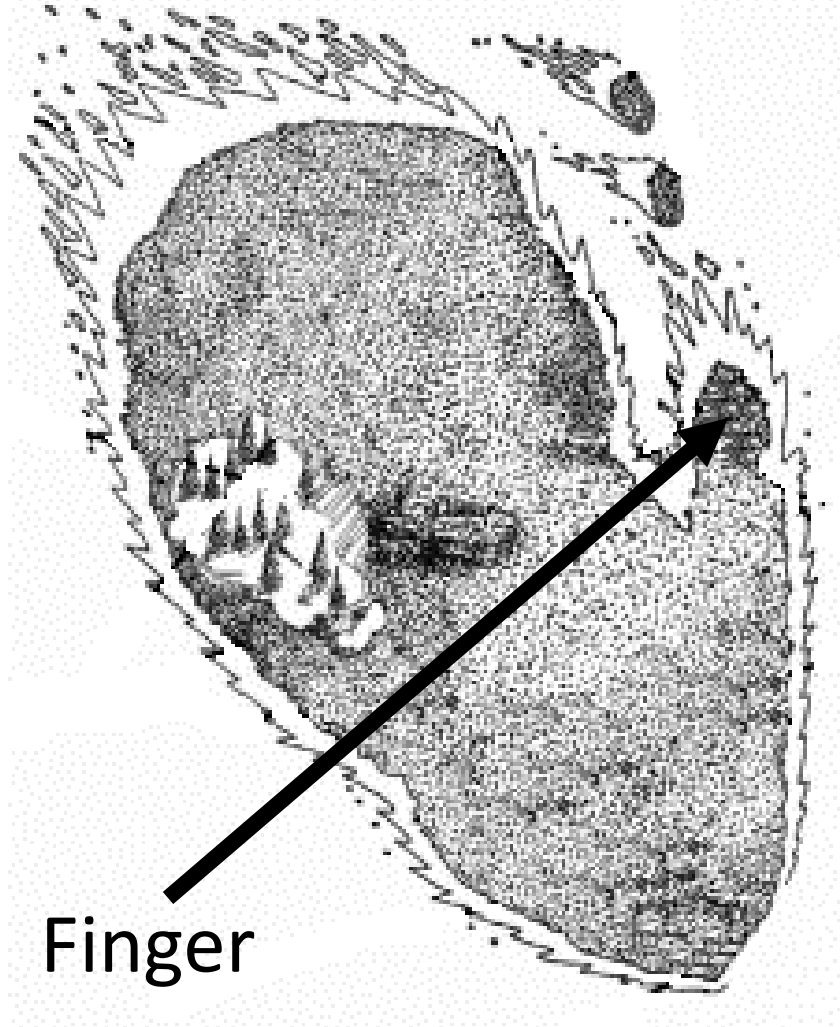
Perimeter

- Boundary line of the fire or fire edge.
- May not have active fire on some points.



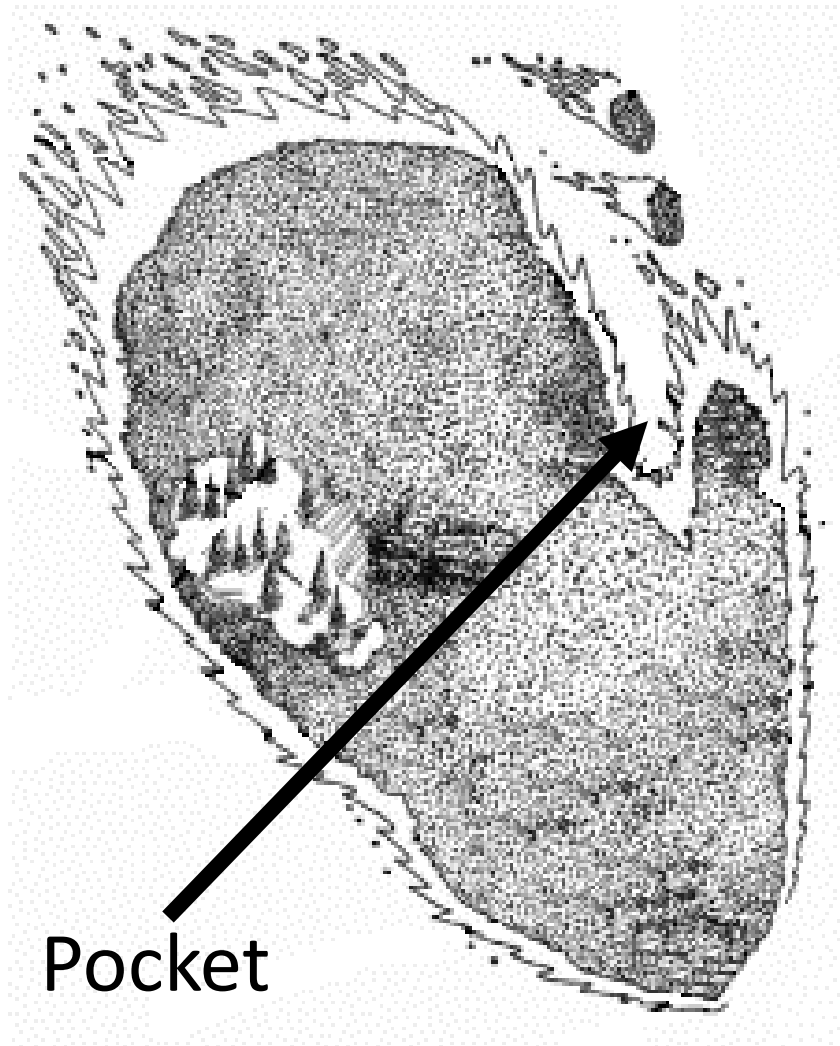
Finger

- An area, usually a narrow strip, that burns away from the main part of the fire.
- Could be dangerous if personnel working the fire are flanked by a finger.



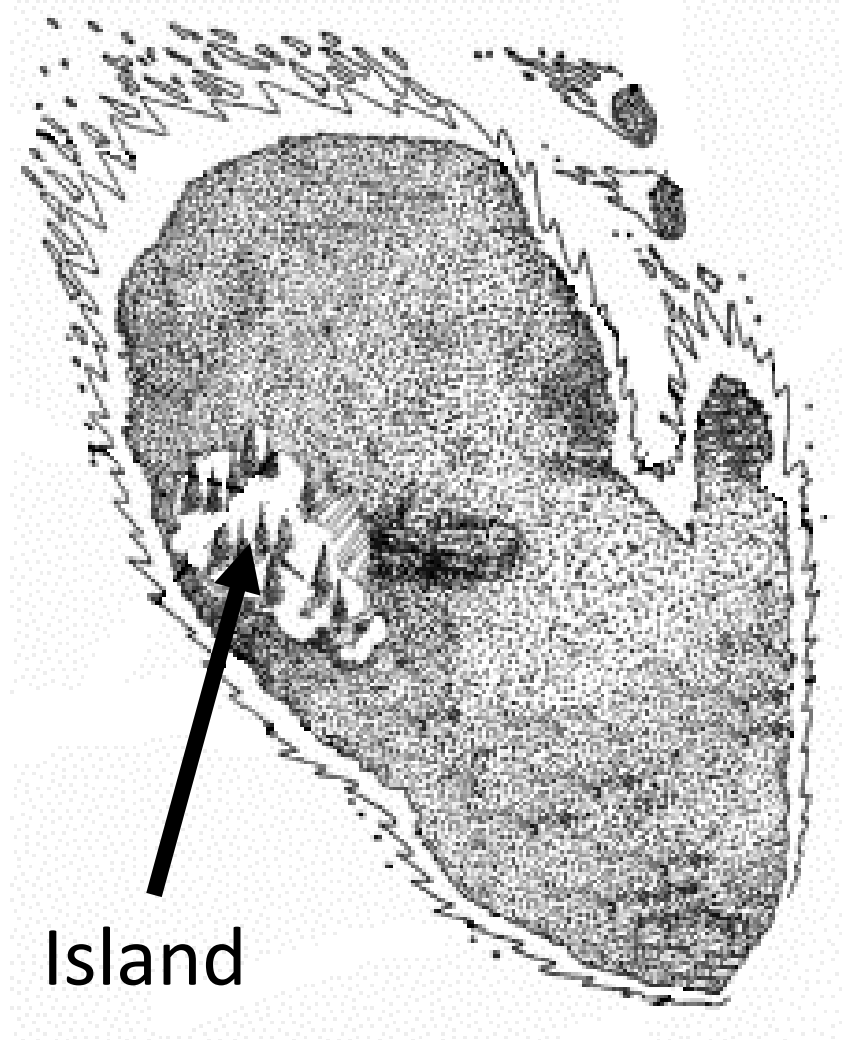
Pocket

- Unburned area between the main fire and any fingers.



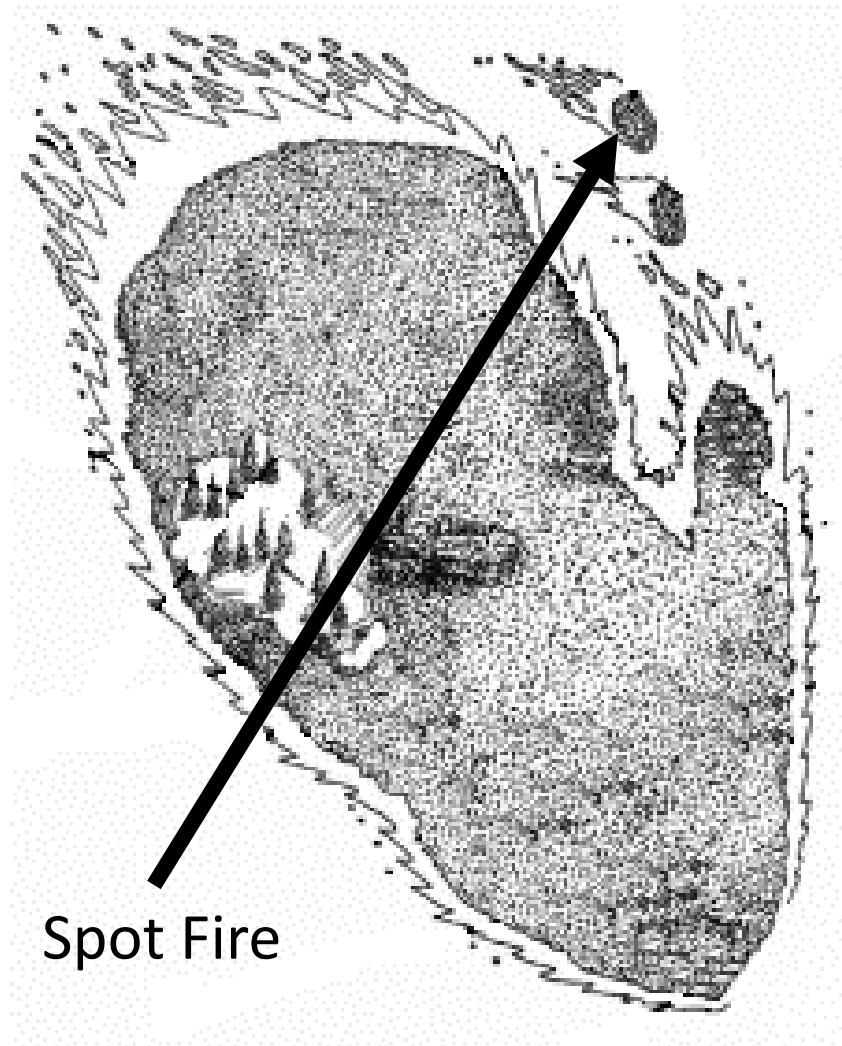
Island

- Area of unburned fuel inside the fire perimeter.



Spot Fire

- Burning area outside the main fire perimeter.
- Often caused by wind blown embers or rolling debris.



Mop Up

- The process of making a controlled fire safe by extinguishing all remnants of fire within a specified strip adjacent to the control line.
- On small fires, the entire burned area should be gone over. On Larger fires, a definite strip, usually 100' wide and adjacent to the control line, should be made safe.



Direct Attack

- A series of related actions to cool, drown, smother, starve, beat out, or otherwise extinguish the flames of an active fire. All control actions are carried out directly against the fire edge.



Indirect Attack

- Control Action conducted a variable distance from and usually parallel to the edge of a wildland fire in such a manner as to deprive the advancing fire of fuel and thereby halting its further progress.



Fuel

- The substance upon which the fire feeds. In the case of a wildland fire, it is the flammable materials in the forest or rangeland.



Burn Out

- A fire set between the main fire and control line or barrier to burnout unburned fuels and widen the “black” area from the control line. Generally, conducted well in advance of the fire and considers specific weather and terrain conditions for effectiveness.



Backfire

- Fire set along the control line, usually fairly close to the fire. This is typically a last-ditch effort. A backfire differs from a burnout, in that backfire is used when the fire is advancing quickly and there is not time to plan ahead and choose specific weather and terrain conditions.



Barrier

- Any obstruction, natural or man-made, to the spread of fire, typically, an area or strip devoid of flammable fuel.



Topography

- The physical features of the land surface – both natural and man-made.



Suppression

- Any action taken to extinguish a wildfire.



Fire Behavior

- The magnitude, direction and intensity of fire spread.



Incident Commander

- The person responsible for all suppression and service activities on a fire.



Incendiary Fire

- A fire set deliberately by someone.



Mutual Aid

- Two-way assistance freely given under prearranged plans or agreements by fire departments/agencies of two or more areas on the basis that each will aid the other in time of emergency, providing for joint or cooperative response to alarms near their boundaries.



Fire Season

- The period or periods of the year during which fires are likely to occur, spread, and do sufficient damage to warrant organized fire control.



Convection Column

- The thermally produced ascending column of gases, smoke, and debris produced by a fire.



Anchor Point

- An advantageous location, generally a fire barrier, from which to start constructing a fireline.
- Used to minimize the chance of being outflanked by the fire while the line is being constructed.



Wildland/Urban Interface

- The area where structures and other human development meet or intermingle with undeveloped wildland.



Unit 1 – Review

Mop up

The process of making a controlled fire safe.

Direct Attack

All control action is directly on the fire edge.

Indirect Attack

Control action conducted a variable distance from the edge of a wildland fire.

Unit 1 – Review

Fire Season

The period or periods of the year during which fires are likely to occur.

Convection Column

The thermally produced ascending column of gases, smoke and debris.

Barrier

Any obstruction to prevent the spread of a fire.

Unit 1 – Review

Topography

The physical features of the land's surface.
The lay of the land.

Suppression

Any action taken to suppress a fire.

Incendiary fire

Any fire deliberately set by someone.



Unit 2

FIRE BEHAVIOR

Unit Objectives

1. Define the fire triangle and fire tetrahedron.
2. Describe the transmission of heat.
3. Describe effects of fire by:
 1. Fuel size
 2. Fuel moisture
 3. Fuel continuity
 4. Weather
 5. Topography

Fire Behavior

- The manner in which fuel ignites, flame develops, fire spreads and exhibits other phenomena.
- The magnitude, direction and intensity of fire spread.

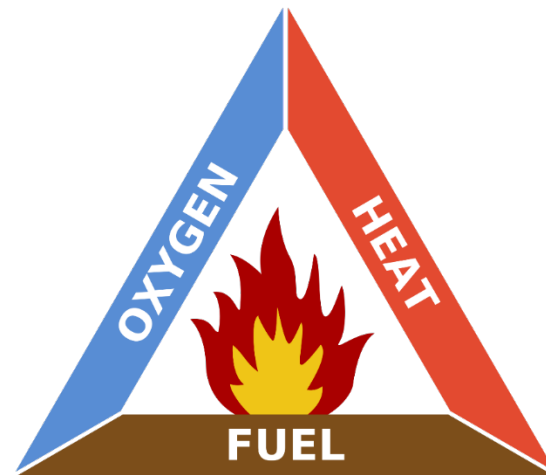


Fire Triangle

- Historically, the fire triangle has been used for understanding the ingredients necessary for most fires.
- Removal of any element results in the fire going out.

3 Elements of burning:

1. Heat
2. Oxygen
3. Fuel

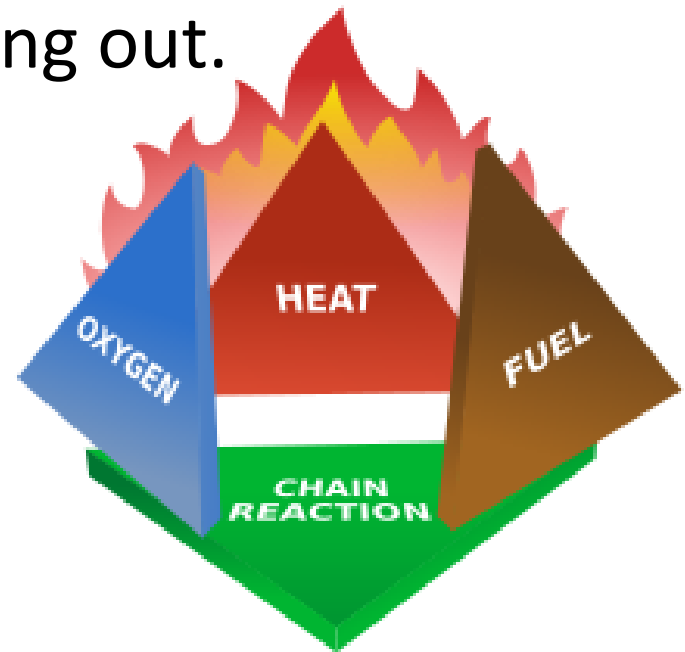


Fire Tetrahedron

- The fire triangle has largely been replaced in the industry by the tetrahedron, which provides a more complete understanding of the required elements for flaming combustion. Removal of any element results in the fire going out.

4 Elements of burning:

1. Heat
2. Oxygen
3. Fuel
4. Chemical Chain Reaction



Transmission of Heat

- The transmission of heat from one area to another is a foundation of fire behavior.
- The transfer of heat from the original burning object to other fuels in and around the origin affects the growth of any fire.
- Firefighters use their knowledge of heat transfer to estimate the size of a fire before attacking it and to evaluate the effectiveness of an attack.

Transmission of Heat

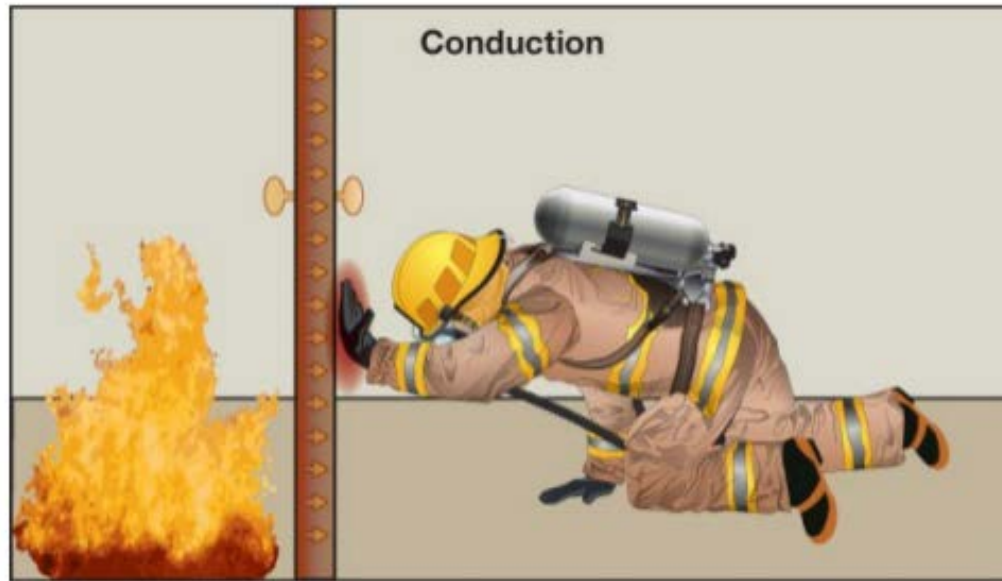
Heat can be transferred from one body to another by three mechanisms:

- **Conduction**
- **Convection**
- **Radiation**

Transmission of Heat

Conduction is the transfer of heat from one body to another body by direct contact.

(The heat flow through and between solids.)

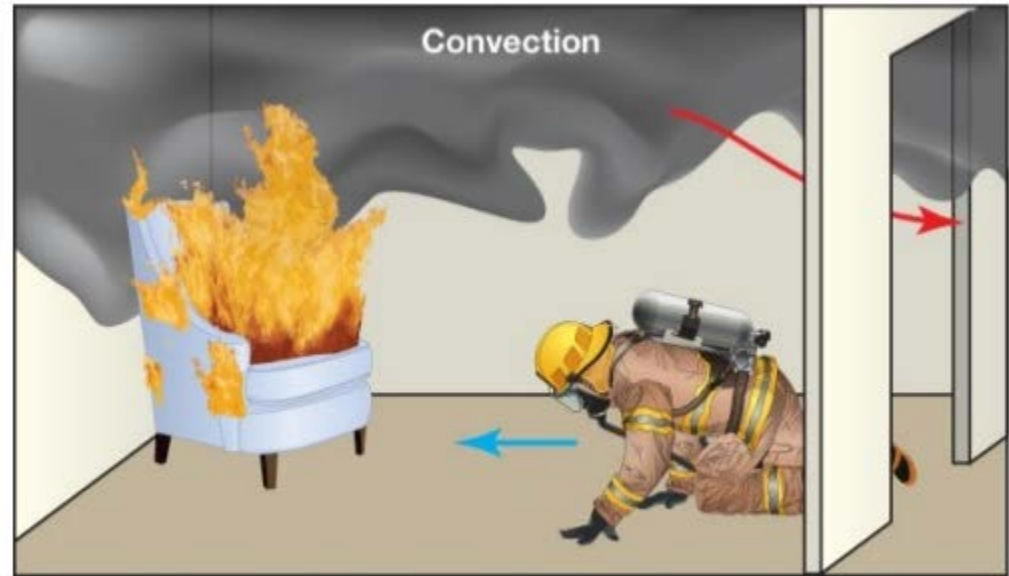


Transmission of Heat

Convection is the transfer of heat from a fluid (liquid or gas) to a solid surface.

In the fire environment, this usually involves transfer of heat through the movement of hot smoke and fire gases.

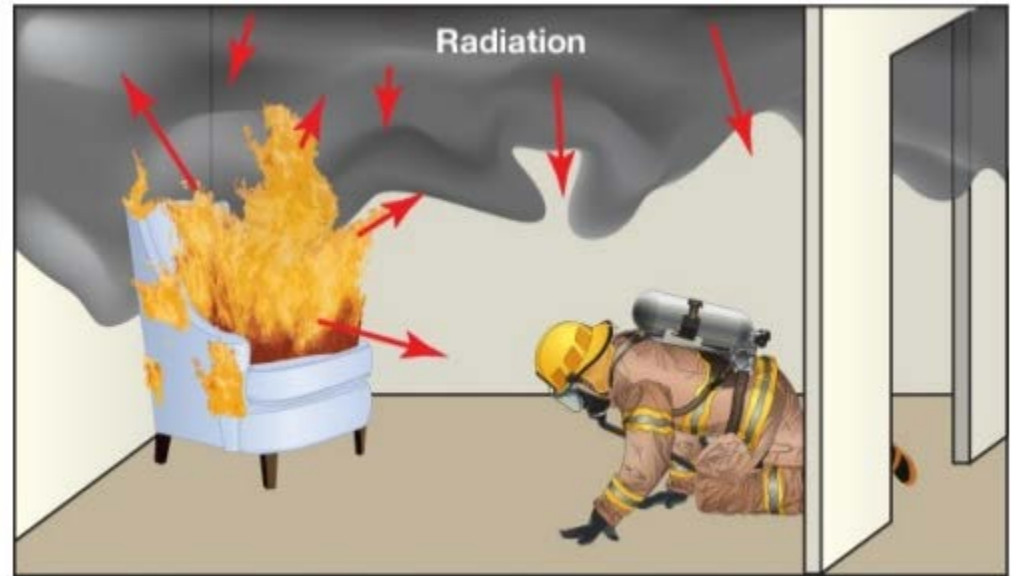
As with all heat transfer, the flow of heat is from hot fire gases to the cooler structural surfaces, building contents and air.



Transmission of Heat

Radiation is the transfer of energy as an electromagnetic wave (such as light waves, radio waves or X-rays) without an intervening medium.

Radiant heat becomes the dominant mode of heat transfer when the fire grows in size and can have a significant impact on the ignition of objects located some distance from the fire.



Factors that Influence Ignition & Spread

- ***Fuel***
- ***Weather***
- ***Topography***

Fuel Characteristics

- ***Fuel size***
- ***Fuel moisture***
- ***Fuel continuity***

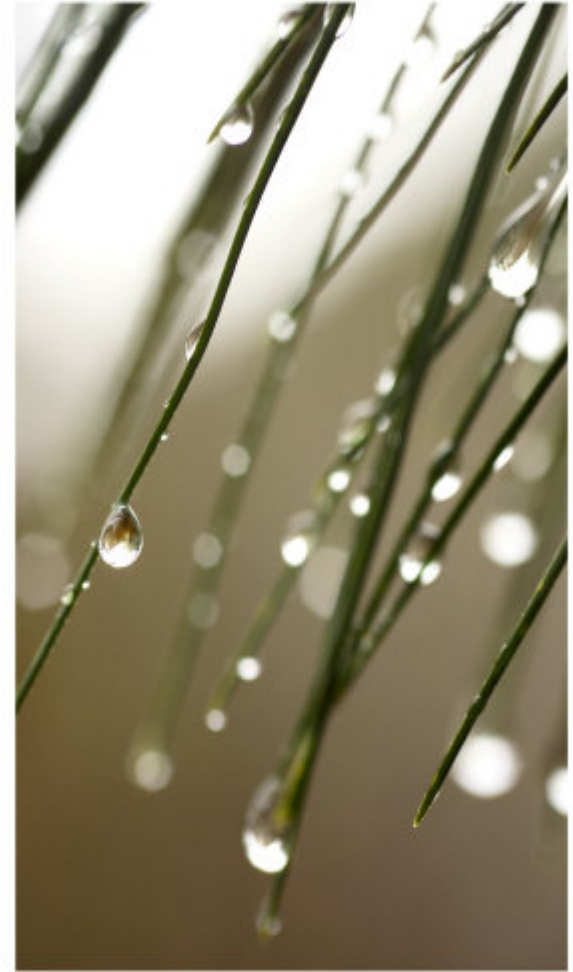
Fuel Size

- Smaller fuels ignite and burn easier and faster. Small fuel size contributes to a faster spreading fire that has a shorter duration.
- Larger fuels ignite and burn slower. Larger fuel size contributes to a slower spreading, longer duration fire.
- This is why you use kindling to start a camp fire.



Fuel Moisture

- Fuel moisture is the amount of moisture in the fuel. The higher the moisture content, the more heat is needed to burn the fuel.
- Live fuels typically have more moisture than dead fuels, thus dead fuels burn more easily.



Fuel Continuity

- Another factor which influences the spread of a fire is continuity of fuels.
- This is thought of as horizontal and vertical spacing.



Fuel Continuity – Horizontal

- The spacing of the fuel, or the distance between burnable fuel as it lies on the ground.



Fuel Continuity – Vertical

- When fuels are closely spaced vertically, fire will spread rapidly as convective heat preheats and ignites fuels above.



Volume or Quantity of Fuel

- How much fuel is burning or will burn is also important. The amount of fuel available to burn is usually referred to as volume or quantity.
- The more fuel to burn the more intense the fire can be.



Weather Influences

- One of the most important factors affecting the behavior of a fire is ***weather***.
- In fire control, we usually break weather into three parts. These are:
 - Temperature
 - Relative Humidity
 - Wind



Weather Influences – Temperature

- The effect of temperature is important because fuels that are preheated by the sun burn more rapidly than cold fuels.
- Air is heated and rises up during the day, and cools at night and reverses direction.



Weather Influences – Relative Humidity

- It is expressed in percent (%). It is the amount of moisture present in a parcel of air compared to the total amount the air could hold at that temperature.
- As air is heated the Relative Humidity (RH) decreases.



Weather Influences

Day

- Higher wind speeds
- Lower humidity
- Higher temperatures
- Fire is harder to suppress

Night

- Lower wind speeds
- Higher humidity
- Lower temperatures
- Fire is easier to suppress



Weather Influences – Wind

- Of all influences on a fire's behavior, **wind** has the greatest influence on both the rate and direction of spread.
- Wind generally blows up slope during the day and down slope at night. Up and down slope winds are sometimes overcome by the stronger prevailing winds.



Topography Influences

- Where the fire is burning, whether it be in steep mountainous terrain or on the coastal plain, the lay of the land is an important factor in the rate and direction of fire spread.



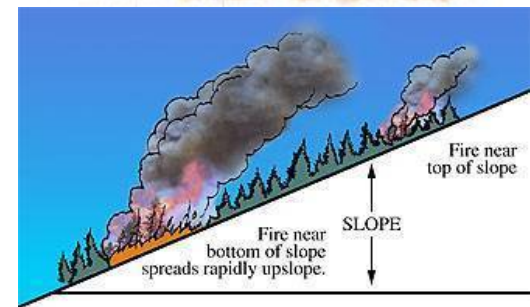
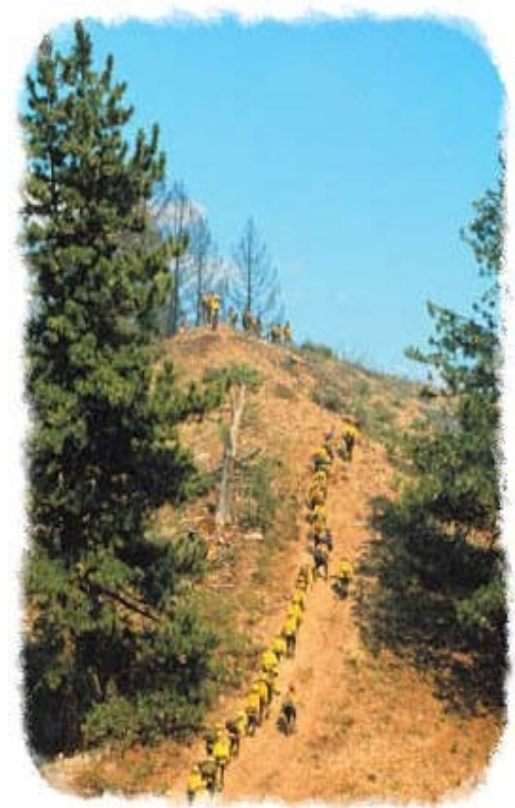
Topography Influences

- Topography is broken into (3) parts:
 - ***SLOPE***: how steep it is
 - ***ASPECT***: the direction it faces
 - ***TERRAIN***: the local features of the land

Topography Influences – Slope

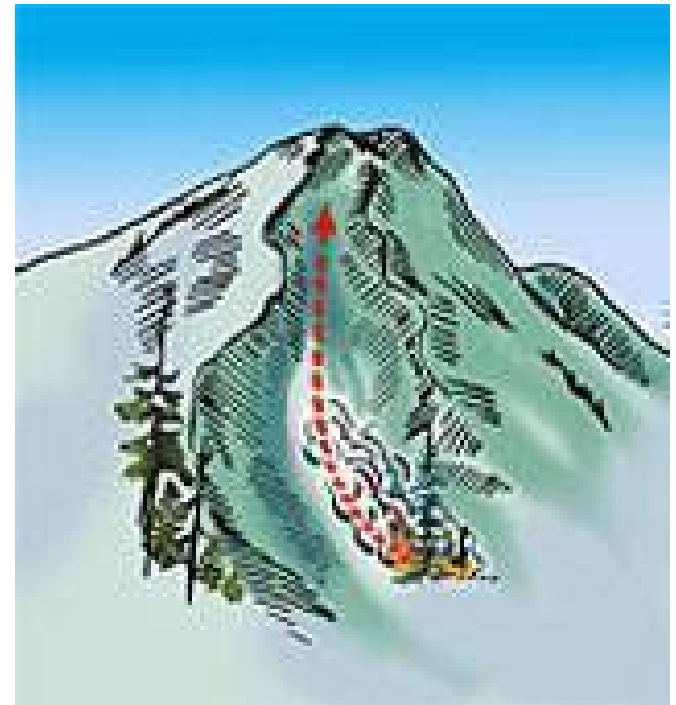
Greatest influences of fire spread:

- Flames are closer to the fuels.
- Wind currents are normally uphill.
- Heat rises along the slope increasing ROS (rate of spread).
- Burning embers can roll down hill, setting new fires.



Topography Influences – Terrain

- Terrain refers to special land features or obstructions.
- Wind will take the path of least resistance, which can cause turbulence or eddies on the low side of obstructions.
- Critical areas are chutes and chimneys.



National Fire Danger Rating System

- The National Fire Danger Rating System (NFDRS) is a system that allows fire managers to estimate today's or tomorrow's fire danger for a given area. It combines the effects of existing and expected states of selected fire danger factors into one or more qualitative or numeric indices that reflect an area's fire protection needs. It links an organization's readiness level (or pre-planned fire suppression actions) to the potential fire problems of the day.
- Knowledge of these levels can help forest visitors make decisions about whether or not to have a campfire or ride their OHV in a grassy area. Homeowners may choose to postpone burning a debris pile if they are aware of the fire danger level for that day. Contractors working in the forest may consider extra precautions when using equipment that might produce sparks. In some cases, the National Forest may even restrict certain activities based on the fire danger levels.



National Fire Danger Rating System

Low (L) – (Dark Green)

Fuels do not ignite readily from small firebrands although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering, and burn in irregular fingers. There is little danger of spotting.

Moderate (M) – (Blue)

Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.

High (H) – (Yellow)

All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.

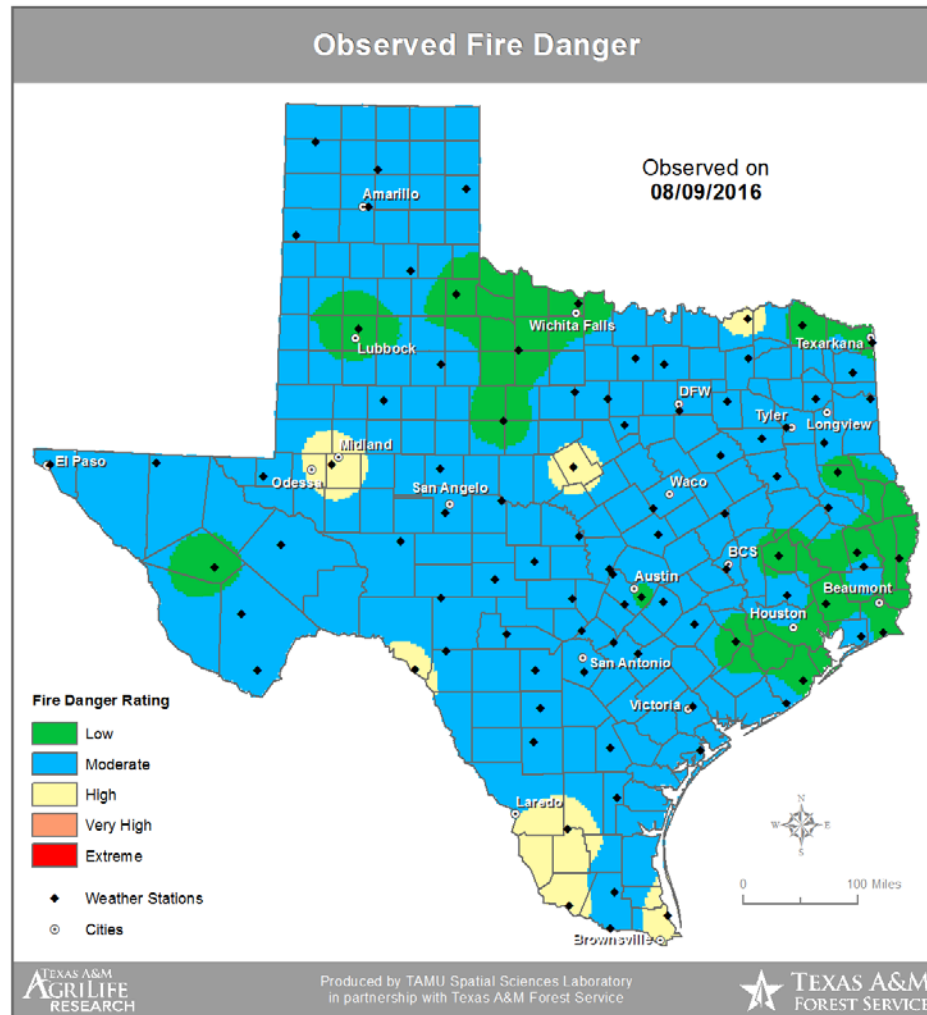
Very High (VH) – (Orange)

Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.

Extreme (E) – (Red)

Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.

National Fire Danger Rating System



KBDI

- The Keetch-Byram Drought Index (KBDI) is basically a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. This system was originally developed for the southeastern United States and is based primarily on recent rainfall patterns.

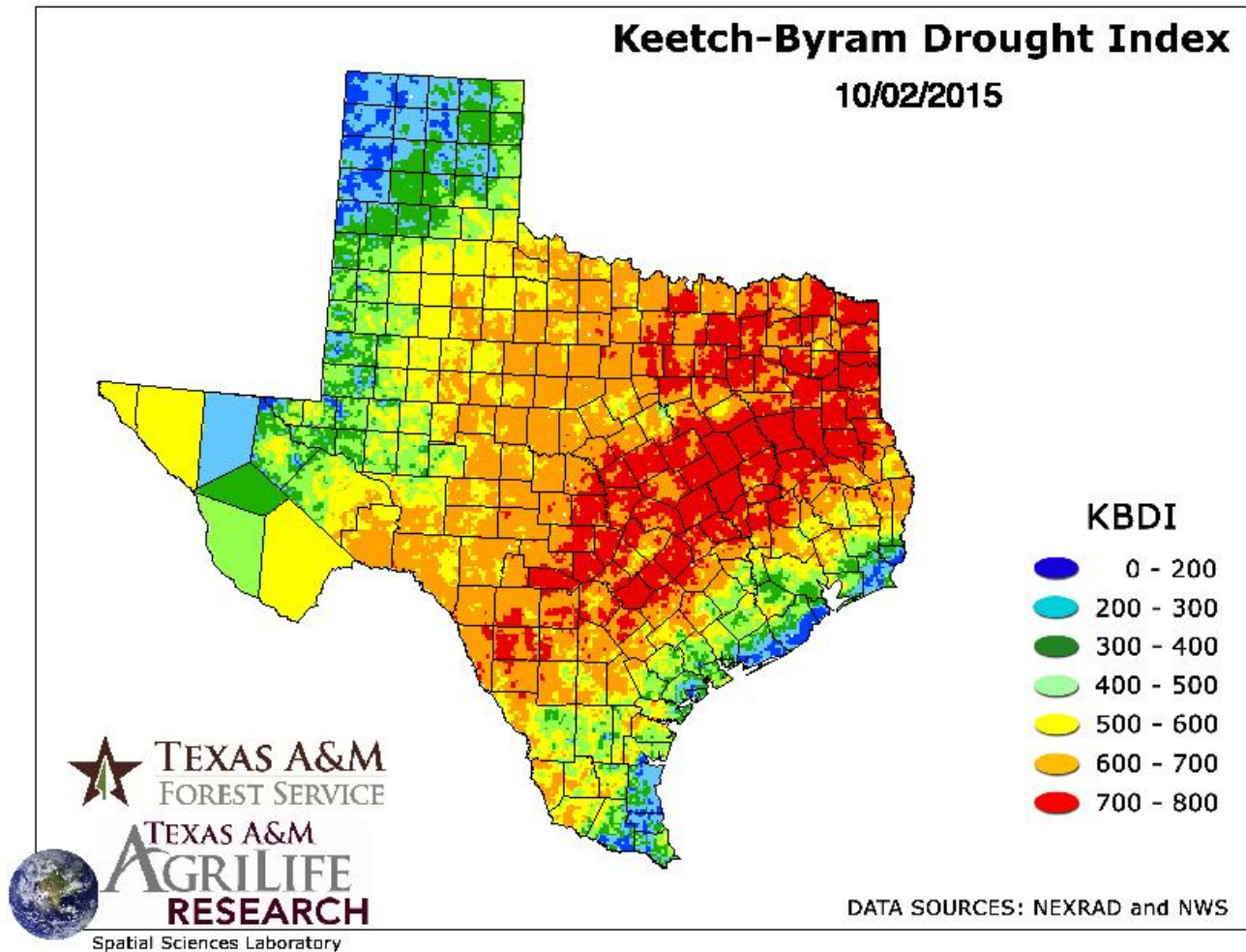
0 - 200 Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in spots and patches.

200 - 400 Fires more readily burn and will carry across an area with no gaps. Heavier fuels will still not readily ignite and burn. Also, expect smoldering and the resulting smoke to carry into and possibly through the night.

400 - 600 Fire intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems.

600 - 800 Fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

KBDI Statewide Map



Unit 2 – Review



Unit 2 – Review

Combustion can occur only when _____, _____, _____, and a _____ are present.

Fuel, Air (oxygen) , Heat, Chemical chain reaction

The five wildfire danger rating levels are:

Low, Moderate, High, Very High and Extreme

Convection from a wildfire results in more oxygen being available for a fire. True or False?

True

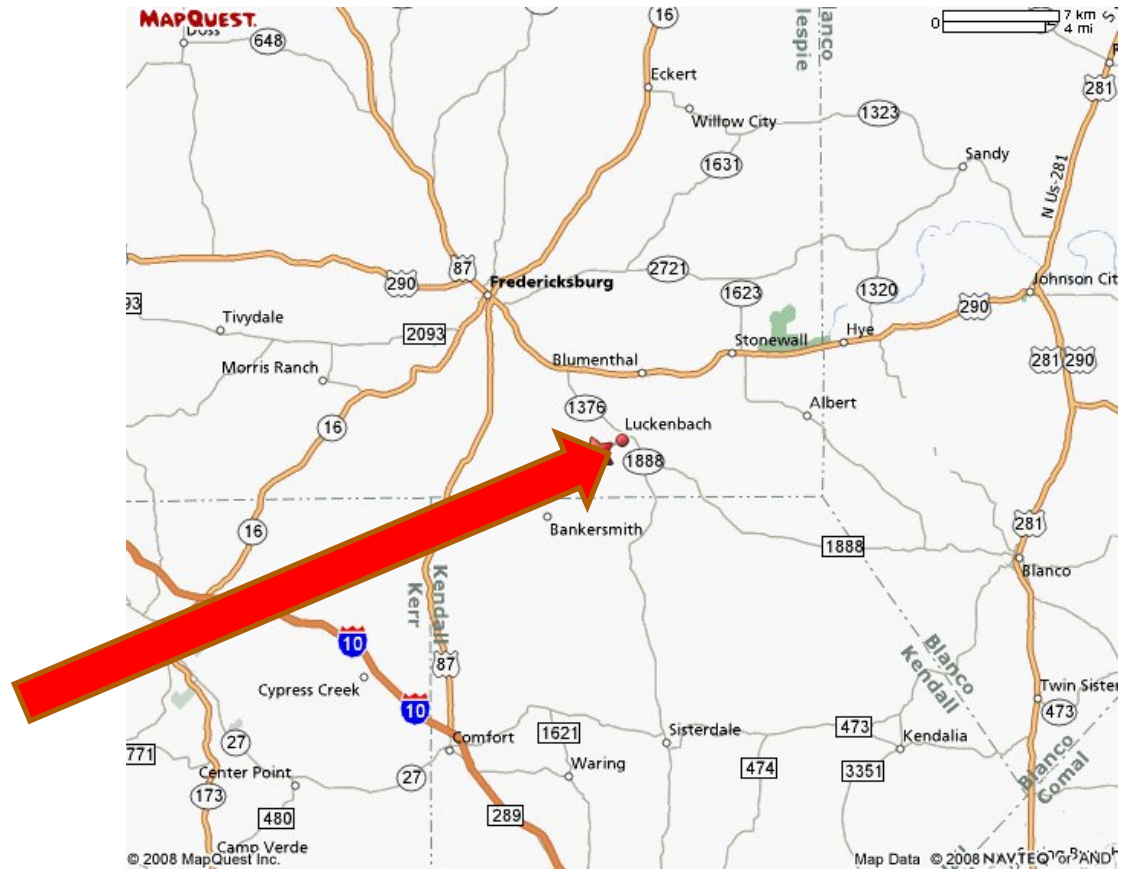
Unit 2 – Review

The likelihood of a fire starting is dependent on the temperature of the fuel. True or False?

True

Weather differences during the night time usually aid firefighters because of:

Lower temperatures, higher humidity, lower wind speeds.



Unit 3

LOCATING THE FIRE

Unit Objectives

1. Demonstrate how to locate your present position and the location of a wildfire.
2. Describe the factors involved in safe route selection.

Map and Direction Methods

“Attention Fire Department”

We have a grass fire located on Pg126 (Block C2)

CR 140 @ Emma Ross Rd West

Route Selection

Some factors involved in route selection:

- Street closures
- Alternate routes (shortest route?)
- Bridge or railroad crossing
- Traffic patterns
- School zones
- Waterways
- Minimum access roads
- Bridge clearances



Factors that Affect Response Time

- Knowledge of exact locations
- Delays waiting for late comers
- Route selection
- Equipment status
- Travel time (getting to the fire quickly)

Getting to the Fire Quickly

- Drive safely
- Don't get side tracked
- Avoid congested areas
- Avoid detours
- All riders remain seated



Unit 3 – Review



Unit 3 – Review

The map grid is the recommended method when giving directions to a fire. True or false?

True

Route selection can greatly effect response time. True or false?

True

Riders should stand inside or ride on the tailboard in order to reduce response time. True or false?

False

Unit 4

WILDFIRE SIZE UP



Unit Objectives

1. List the information, observation and actions needed prior to dispatch and during travel to the fire.
2. Demonstrate the ability to scout a fire and list factors used in size up.
3. Analyze the observations and conditions to determine suppression options.
4. Develop a safe and efficient plan of action to suppress the wildfire.
5. Locate the approximate point of origin of the fire and plan for protection of that area.

Size Up

- The preliminary and continuing appraisal of the overall fire situation for purposes of determining appropriate control actions.
- Size-up is continuing and constantly changing.



Prior to the Call

Weather observations

- Current conditions and forecasted conditions
- Recent fire occurrence/behavior



PERSONNEL

- Protective clothing
- Training
- Fitness
- Drinking water

EQUIPMENT

- Sufficient fuel
- Water
- Radio
- Maps

Fire Reported by Dispatch

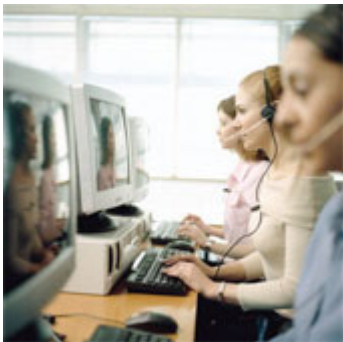
LOCATION

- Understand exact site!
- Use map.
- Note locations of water sources.



BEHAVIOR

- Be especially mindful of information on fire behavior.



Fire Reported by the Public

Make sure you get:

- Location
- Access road
- Landowner
- Size
- Call back telephone number
- Cause
- Values threatened



While en route to the Fire

Think about:

- Fuels and terrain
- Access roads
- Fire barriers
- Ownership
- History of fire area
- Water sources
- Mutual aid resources



While en route to the Fire

Think about:

Recent fire behavior

Considering:

- Fuels
- Terrain
- Relative to today's weather, how do you expect this fire to burn compared to recent fires in similar areas?

While en route to the Fire

Think about:

Indicators for current weather

Wind:

- Is it faster or slower than forecasted?
- Is speed and direction changing?



While en route to the Fire

Think about:

Erratic Fire Behavior

- Indicated by any dust devils, fire whirls or gusty winds.



After Sighting the Smoke Column

- Check size, height, color, direction and shape.
- Verify your expected behavior of fire relative to the forecast and the resulting smoke column.



Approaching the Fire Scene

- Look for alternate routes.
- Look for suspicious people or cars coming from a fire area; record the description of the people and any license plate numbers.
- Protect evidence.
- Look for gates or breaks in fences to enter a fire area.

Arrival on the Scene

- Look at the total fire picture.
- Size up the entire situation and determine the best method of attack.



Factors to Consider

- Size of fire.
- Location of head – be sure you know what's in the path of fire.
- Point of origin and cause – preserve evidence.
- Time of day – can greatly affect fire behavior (now/future).
- Improvements and other values threatened.
- Weather at fire – wind speed and direction variable or steady?
- Behavior of fire:
 1. How fast is fire spreading?
 2. How high are flames?
 3. Is it spotting?
 4. How far?
 5. Is it hotter than usual?

Factors to Consider

- Fuel type and arrangement of fuel?
- How clean is fire burning fuels in path of fire:
Do they change and if so, how will they affect the fire?
- Terrain or topography – slope and aspect, natural barriers, access roads.
- Safety factors – placement of personnel.
- Identify line of retreat for personnel and equipment.

Planning the Attack

Based on:

- Reconnaissance of the fire
- The fire situation
- The availability of personnel
- Other expected personnel



Factors to Consider

- Where to attack: Head, Flank, Rear.
- Method of attack: direct or indirect.
- Location of control lines – use natural barriers.
- Estimate probable spread and behavior of fire.
- Determine possible danger spots: fuel buildup, snags, bogs, etc.
- Brief crews. Do not scatter crews; use as a team.
- Preserve evidence.



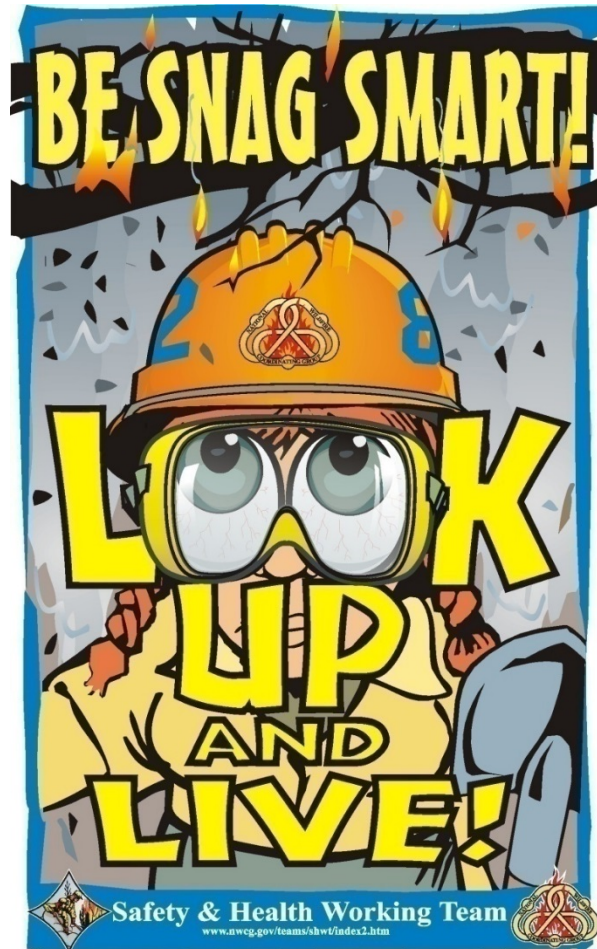
Make Initial Attack

REMEMBER:

- There is only one initial attack of a fire!
- The situation is constantly changing!!!!!!!!



Unit 4 – Review



Unit 4 – Review

Three of the things you must consider when you are sizing up the fire are fuels, weather and topography. True or False?

True

Wind has great influence on a fire's _____ and _____ of spread.

Rate, Direction

The fuels that are burning when you arrive at the fire are of the most importance in size up. You do not need to be concerned with what fuels are ahead of the fire. True or False?

False



Unit 5

WILDFIRE SUPPRESSION METHODS

Unit Objectives

1. Define indirect and direct suppression methods and list the conditions when each is used.
2. Illustrate the standards of direct and indirect fire line construction necessary to control smoldering (creeping) and fast-moving fires in light fuels.
3. Locate fire line placement in flat and rough terrain. Illustrate when to use direct and indirect methods of line construction.
4. List potential safety hazards involved in the use of the direct and indirect line building methods and precautions which should be taken in each case.
5. Demonstrate the proper use and maintenance of the hand tools used in natural fuels, fire line construction.
6. Demonstrate the proper use of water in building a fire line in natural fuels.

Basic Types of Wildfire

SURFACE:

- Fire that burns away ground litter.



Basic Types of Wildfire

GROUND:

- Fire that burns below ground level.

Usually caused
by a surface fire.



Basic Types of Wildfire

CROWN:

- Fire that burns through the top of fuel.

Independent of
surface fire.



Direct Attack

- Consists of a series of related direct actions to cool, drown, smother, beat out, starve, or otherwise extinguish the flames of an ongoing fire.



Conditions to use Direct Attack

- Fire is small
- Light fuels
- Ground fire
- On flanks and rear of large fires
- Where conditions allow working close to the fire

Direct Attack

Pros:

- Limits chance for fire to gain size or momentum.
- Eliminates uncertain elements in backfiring.
- Reduces danger of fire crowning.
- If necessary you can escape into the burned area.
- Takes advantage of burned out areas along control line.

Direct Attack

Cons:

- You work in more intense heat and smoke.
- More mop up and closer patrol required in heavy fuel.
- More danger of spot fires and breakovers/slopoverters in heavy fuel.
- Control line generally follows fire edge thus longer and irregular.
- Does not take advantage of existing fire barriers (both man-made and natural).

Direct Attack

Do:

- Take advantage of wind lulls.
- Time attack to coincide with fire entering lighter fuels.
- Use water to cool flames so hand tool personnel (if available) can get in close.
- Use water only as necessary on flanks and rear
- Scatter heavy fuels inside the burn.
- Fell snags adjacent to the control line, if present
- Work as a team.

Direct Attack

Don't:

- Attack head on fast moving hot fires from the unburned fuel.
- Waste water.
- Risk safety of fire fighters and equipment.

In-Direct Attack

- Control action conducted a variable distance from and usually parallel to the edge of a fire in such a manner as to deprive the advancing fire of fuel and thereby halting its progress.



In-Direct Attack

When to Use:

- When burning intensity, rate of spread and working conditions are too extreme.
- Insufficient number of fire fighters.
- Where good natural barriers exist.
- On fast spreading/ hot fires.
- To straighten the fire lines.

In-Direct Attack

Pros:

- Not working in as intense heat and smoke.
- Takes advantage of changes in fuel type.
- Eliminates irregularity of line.
- Less danger of breakovers/slopoverters in heavy fuels.
- Permits taking advantage of terrain features.

In-Direct Attack

Cons:

- Sacrifices acreage.
- You may be flanked by fire.
- Burn out may get out of control.
- Fire may suddenly change direction.
- Must stay alert & remain ready until fire burns out.



In-Direct Attack

Do:

- Establish lines in lighter fuels, if possible.
- Make lines as straight as possible.
- Try to keep heavy fuels outside of the line.
- Make use of natural barriers.
- Clean line to mineral soil.
- Patrol established lines.
- Burnout fuels when needed.
- Establish periodic rest breaks.

In-Direct Attack

Don't:

- Over extend yourself.
- Set unwatched backfires or burnout operations.
- Construct lines adjacent to tall fuels.
- Take unnecessary chances with firefighters and equipment.

Routine Brush Truck Tactics

Cool head fire:

- Establish anchor point.
- Start at rear & move up one of the flanks.
- Suppress entire perimeter.



Routine Brush Truck Tactics

Hot head fire:

- Attack rear.
- Start short distance from head.
- Move across to right flank
- From right flank counter clockwise.



Routine Brush Truck Tactics

Mop up Entire Perimeter

- Small fires: entire burn area.
- Large fires: up to 100ft into burn area.



Routine Brush Truck Tactics

Heavy fuels:

- Look for barrier.
- No barrier position brush truck at angle forward of but facing head from driver side.
- Set nozzle to yield medium spray at high pressure.



Routine Brush Truck Tactics

Heavy fuels:

- Advance toward fire, hold nozzle near face, spray from side to side.
- Approach the head, concentrate the stream in the hottest region of the flame from center to your left.



Brush Truck Support to Heavy Equipment

- Dozer plows fire line directly in front of the fire head. May or may not string backfire.
- Brush truck takes a position in front and to one side of fire to observe backfire and to take care of any spotting.

Pump & Nozzle Operations

Spray

- Covers a wider area.
- Can be used to flank or from the black.

Straight stream

- Knock down power.
- When using from black be careful of embers being knocked into unburned area.

Pump & Nozzle Operations



Common Hose Types

- Cotton jacket hose- light weight for hose advancement (hose lays over hot embers).
- Red line – pump and roll, mop up.



Hose Handling

- Get in close as is safely possible.
- Light fuels – nozzle man rides.
- Heavy fuels – nozzle man walks.
- Don't drag hose.
- Don't run over hose.



Water Conservation

- Work during wind lulls.
- Wait if possible to meet fire in lighter fuels.
- Spray water parallel to line; under and over sprays will hit flames.
- For small fires and mop up use 1" or 3/4 " forestry hose.



Common Hand Tools

Shovel

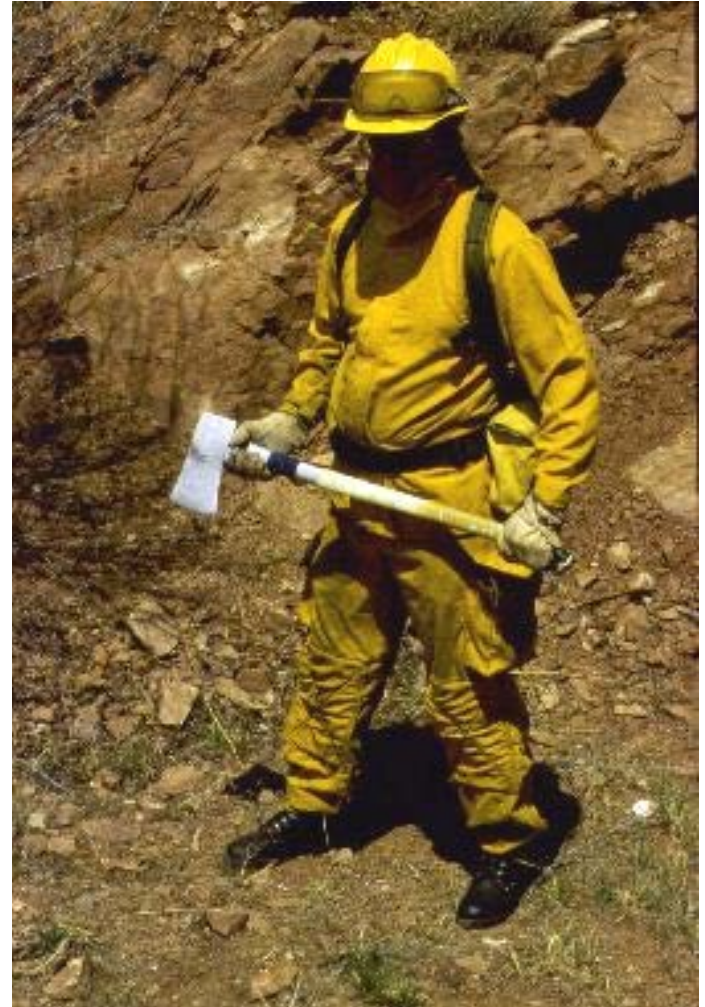
- Can be used for digging, throwing, or scraping.



Common Hand Tools

Axe

- Used for removal of snags, logs or limbs.



Common Hand Tools

Pulaski

- Used for scraping, cutting and removal of duff material.



Common Hand Tools

Swatter

- Used to smother fire, best when dragged along fire edge.



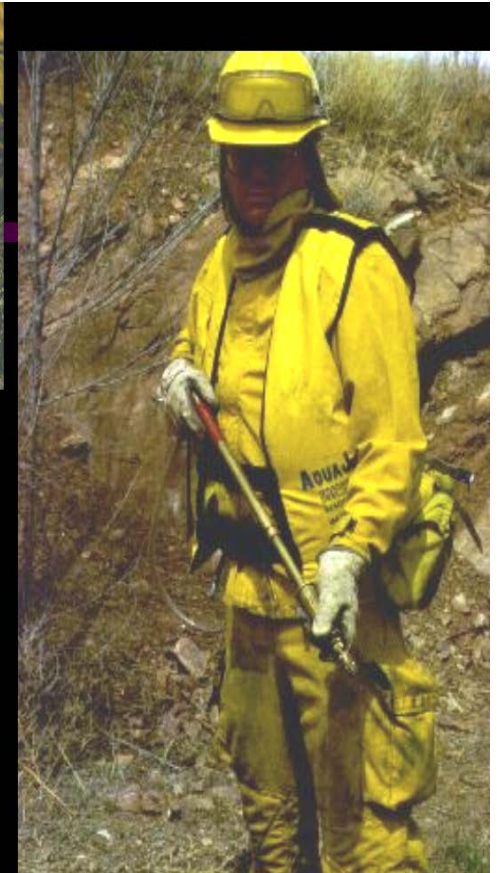
Common Hand Tools

Backpack Pump

- Excellent for small slop-overs, spot fires and mop up.



Backpack Pump



Common Hand Tools

Drip Torch

- Used for starting backfires and burn out operations.
- Mixture of diesel and gas (3 to 1).



Common Hand Tools

Fusee

- Used for starting back-fires and burn out operations.



Standard Line Construction

- Penetrate to mineral soil.
- Line of adequate width.
- Use the easiest route.
- Take advantage of light fuels.
- Take advantage of any natural barriers.
- Avoid sharp angles in the control line
- Take advantage of terrain in slope country.
- Avoid line construction below a burned area where fire is spreading rapidly and direct attack is inappropriate.



Standard Line Construction

Width of a fire line varies with:

- Slope & Aspect
- Fuels
- Topography
- Weather conditions
- Part of fire (head, flank, rear, etc.)
- Size and intensity of fire
- Equipment and fire fighters available



Standard Line Construction

Rule of thumb regarding fire line width:

Fast moving fires

- Head – 2x flame height
- Flank – 1x flame height

Slow moving fires

- Head – 3-4 ft. Wide
- Flank – 6-8 inches

Remember

Incident Commander Will Declare Fire Out!



Unit 5 – Review



Unit 5 – Review

The ____ attack suppression method is conducted a variable distance from and usually parallel to the edge of a fire in such a manner as to deprive the advancing fire of fuel.

Indirect

A fire which burns away the low vegetation and forest litter is a:

Surface fire

A hot fire, which is dangerous to get near with a brush truck, indicates the need for which nozzle setting?

Straight stream

The fastest moving and hottest part of a wildland fire is:

Head



Unit 6

MOP UP

Unit Objectives

1. Discuss general objectives during mop up.
2. Discuss critique factors to consider.

Mop Up

The last step in fire suppression

- Process of making a controlled line safe by removing or extinguishing all burning material along or near the perimeter edge of the burned area.

Dry mop

- Consists of turning, scaping and/or relocating logs and materials.

Wet mop

- Consists of the same, but includes the use of water or foam.

General Guidelines

- On small fires: mop up entire burn.
- On large fires: mop up within 100 feet of fire line-variable with weather and fuel conditions.
- Cover stumps, logs and debris with dirt.
- Dig out roots that might cross line by underground burning.
- Turn logs parallel to slope.
- Clear all flammable material down to the mineral soil.
- Cut down burning snags adjacent to control line.

General Guidelines

- Relocate control line if burning snags cannot be extinguished or removed.
- Concentrate on downwind hot spots near the control line.
- Burn out pockets within the control line.
- Use hands to locate hot spots (cold trailing).

Standards for Determining the Fire is Out

- Check outside the fire perimeter for spot fires.
- Inside perimeter, check to see:
 1. No unburned patches of fuel are left.
 2. All heat is out of stumps and logs.
 3. Fire is mopped up and checked the next morning.

Continue Mop Up Until
Incident Commander Says It's Safe!

Critique Factors

- Prevention
- Detection & Response
- Size up
- Suppression



Critique Factors

Prevention

ASK YOURSELF:

- What caused the fire?
- What could I or the department have done to prevent it?



Critique Factors

Detection and Response

ASK YOURSELF:

- What did we do right?
- What did we do that can be improved upon?



Critique Factors

Size Up

ASK YOURSELF:

- What did we do right?
- What did we do that can be improved upon?



Critique Factors

Suppression

ASK YOURSELF:

- What did we do right?
- What did we do that can be improved upon?



Unit 6 - Review

We should start mop up operations as soon as the fire is controlled. True or False?

True

How much of a large fire should be mopped up?

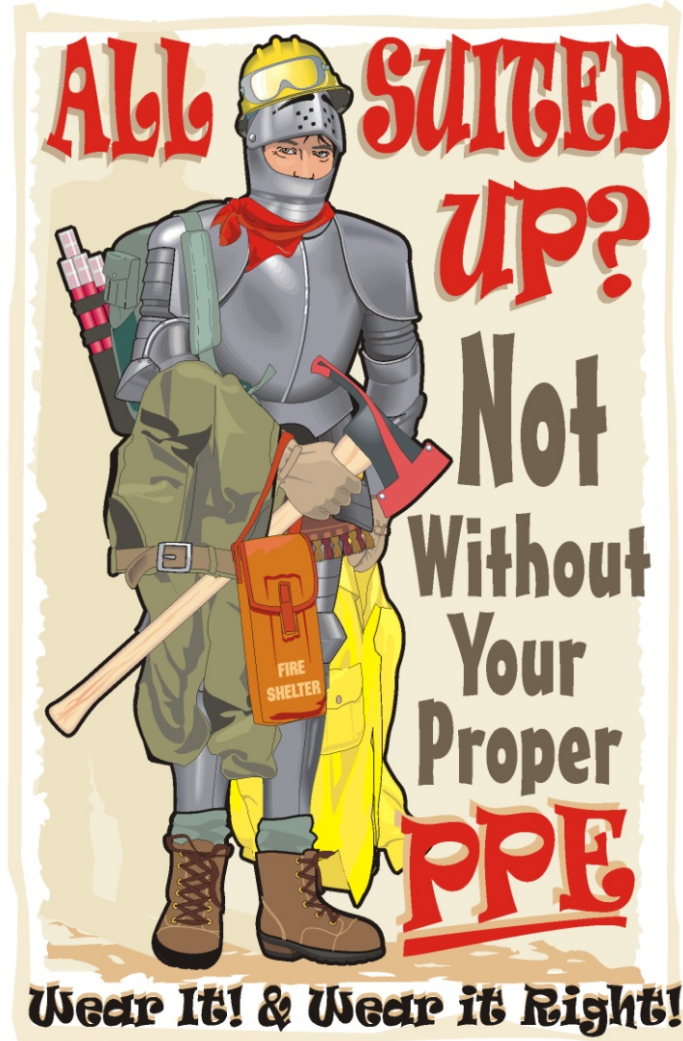
Area within 100 feet of fire lines – variable with weather and fuel conditions

Critiques should be conducted immediately after suppression action is completed because they organize suggestions for improving prevention, detection and suppression techniques. True or False?

True

Unit 7

SAFETY



Safety & Health Working Team

www.nwcc.gov/teams/shwt/index2.htm



Watch Out Situations

Watch out when:

- Fire is not scouted and sized up.
- In country not seen in daylight.
- Safety zones and escape routes not identified.
- Uninformed on strategy, tactics and hazards.
- Unfamiliar with weather and local factors influencing fire behavior.
- Instructions and assignments not clear.
- No communication link with crew members/supervisors.
- Constructing line without safe anchor points.
- Building fireline downhill with fire below.
- Attempting frontal assault on fire.

Watch Out Situations

Watch out when:

- Unburned fuel between you and the fire.
- Cannot see main fire, not in contact with anyone who can.
- On a hillside where rolling material can ignite fuel below.
- Weather is getting hotter and drier.
- Wind increasing and/or changing directions.
- Getting frequent spot fires across line.
- Terrain and fuels make escape to safety zones difficult.
- Taking a nap near the fire line.

Standard Fire Orders

1. Keep informed on fire weather conditions and forecasts.
2. Know what your fire is doing at all times.
3. Base all actions on current and expected behavior on the fire.
4. Identify escape routes and safety zones, and make them known.
5. Post lookouts when there is possible danger.
6. Be alert. Keep calm. Think clearly. Act decisively.
7. Maintain prompt communications with your forces, your supervisor, and adjoining forces.
8. Give clear instructions and be sure they are understood.
9. Maintain control of your forces at all times.
10. Fight fire aggressively, having provided for safety first.

Brush Truck Safety Operations

- Select a route that will bring you closest to the blaze in the shortest time.
- Secure tools inside the vehicle in such a manner so they can injure no one.
- Remain seated.
- Be aware of vehicle weight limits on bridges.
- Be alert for stumps, rocks & other debris that block your approach.
- Don't take your vehicle where hand tools are better suited!

Brush Truck Safety Operations

- Attack a head fire from inside the burn in light fuels that present no risk to tires or hose.
- If you run out of water, use hand tools until you are resupplied.
- Never drive into an area unless you have a safe exit.
- Be constantly aware of changing traffic and road conditions.

Brush Truck Safety Operations

Safety considerations are what determine all methods of brush truck attacks.

Nozzle and hose is a lifeline.

- Line must be charged.
- Use correct nozzle pattern and pressure.
- Knock down hot spots.



Brush Truck Safety Operations

Breathing and Visibility Problem:

- Get low.
- Use nozzle spray pattern to clear away smoke.
- Put mouth close to nozzle.

Hand Tool Safety

Do:

- Keep cutting edges sharp.
- Keep handles tight.
- Keep tools clean & rust proofed.
- Store tools neatly.



Hand Tool Safety

Don't:

- Lean on tools.
- Carry pump by hose.
- Use tools for any non-fire use.
- Throw tools around.
- Allow tools to lie around.



Personal Protective Equipment (PPE)

Always Wear:

- Fire retardant clothing.
- Hard hat.
- Gloves.
- Lace up boots.
- Eye Protection.



General Safety

- Don't run.
- Mop up completely; avoid slop-overs.
- One spot of fire left behind may build and spread.
- Work on or near fire edge.
- Move into burned area if needed.

General Safety

Watch For Obstacles

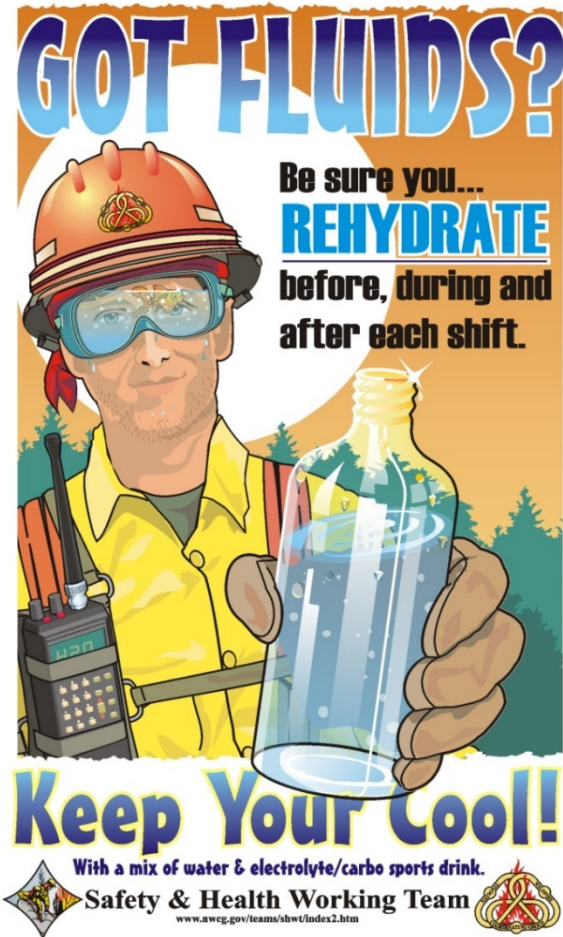
- Brush & rocks may catch your hose.
- Burning of hose & brush truck tires.
- Hidden ditches, holes & logs.
- Obstacles crossed on foot can cause damage to brush truck.
- Down power lines.

General Safety

Keep your mind on your work and pay attention!



Unit 7 - Review



Unit 7 - Review

PPE stands for:

Personal Protective Equipment

When conducting brush truck operations always attack a head fire from the un-burned. True or False?

False

Hand tools should always be kept clean, sharp and stored neat and secure when not in use. True or False?

True

Special Thanks

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For More Information

For information regarding wildland firefighter training in Texas, go to tiwa.tamu.edu and contact your local Regional Fire Coordinator: tfsweb.tamu.edu/RFC

For suggestions or corrections for this course, please contact

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