

FIRE SIZEUP AND INITIAL ATTACK

Often times firefighters and incident commanders take shortcuts concerning fire sizeup, establishing communications and safety. A thorough fire sizeup, establishing communications among all resources on a fire, and applying safety to all aspects of fire suppression are critical elements that must be adhered to. If adequate communications can not be established and firefighter safety is compromised then it is time to back off and re-evaluate your tactics.

If you are assigned to fight fire in an area where you are unfamiliar with the local fuels, weather, topography, and fire behavior you should request a briefing from the local agency, to provide you with this information.

In many cases sizeup and initial attack go hand in hand because the firefighter with a passion for safety begins to gather information about the fire situation from the initial dispatch and/or prior to departing to the fire incident.

En route To A Fire

En route to a fire begin to think about your knowledge of the fire area and how current conditions compare to past experiences. Some items to consider are:

- Firefighter safety.
- Fuels and terrain. What are the fuels? Are they heavy timber types or light, flashy, grass types? Are the fuels sheltered from direct solar radiation due to aspect or cover? Is the terrain steep or gentle? How do you expect this fire to burn compared to recent fires in similar areas?
- Weather—is the windspeed greater or less than the forecast? Is it from the same direction? Are there dust devils or gusty winds that would indicate erratic behavior? Is the humidity about what was forecast? Are there any indicator clouds or thunderstorms?
- Smoke column—check size, height, color, direction and shape.

The greater the height and size of the column the greater the fire intensity. A fractured (bent over by the wind) column indicates a wind-driven fire. Wind-driven fires can pose serious threats to safety as the fire grows. Spotting can become long range creating new fires ahead of the main fire. However, direction and rate of spread is more predictable.

A large developing mushroom shaped column can indicate a plume-dominated fire where the fire's rate of spread and direction is very unpredictable. Strong wind indrafts and downbursts can occur with short range spotting in all directions.

Light colored smoke generally indicates lighter burning fuels whereas a dark colored smoke indicates heavier burning fuels such as brush or timber.

- Access routes and their limitations—also look for alternate routes.
- Fire barriers (natural and human made).
- Potential water sources.
- Land ownership (including cooperative agreements and assistance on fire suppression).
- History of fires in area and cause.
- Capabilities of responding resources and available back-up forces.
- Look for people coming from the fire area or suspicious people at the fire scene. Write down license plate numbers and descriptions of vehicles and/or people.
- Public safety concerns.

Arrival On Fire Scene

Safety of assigned resources, facilities, and the public should always be a prime item to consider when evaluating possible attack options. An appropriate decision **always** provides for safety first. The Fire Orders, Watch Out Situations, and the LCES system are to be implemented and reviewed often.

After arrival on the fire scene, your next decisions are critical to initial attack success. This is where you "make it or break it." If you go off in all directions little will be accomplished and firefighter safety could be jeopardized. You need to gather additional **critical** information to **complete** the fire sizeup and formulate an appropriate plan of attack.

These are the key factors you should observe in relation to fuels, weather, topography, and fire behavior during your sizeup process:

Fuels:

- Type/model.
- Size classes present and size classes burning.
- Are fuels light and continuous?
- Live/dead ratio (frost, bug kill, drought conditions).
- Fine dead fuel moisture (dangerous below 6%).
- Live fuel moisture (chaparral, sagebrush, Gambel oak, etc.)
- Vertical arrangement and horizontal continuity (ladder fuels, tight crown spacing less than 20 feet).
- Loading (heavy vs. light).
- Snag concentrations.
- Areas with reburn potential.
- Access restrictions for personnel.

Some fuels such as chamise, chaparral, pines, palmetto-gallberry, junipers, mountain laurel, rhododendron, and eucalyptus burn hotter and produce longer flame lengths than others because they contain flammable oils.

Generally, taller and thicker fuel will produce longer flame lengths and control lines must be wider.

Heavy fuels do not ignite easily and fires do not spread as fast as in light fuels such as grass, leaves, needles, and twigs. However, once ignited, logs, snags, and heavy branches burn for a long time and may require wide control lines to keep the flame, sparks, or radiated heat from igniting fuels across the line.

Fuel moisture and whether fuel is dead or alive have a definite effect on a burning fire's intensity. Generally, the drier the fuel the hotter it burns and longer flame lengths are produced. Longer flame lengths require wider firelines to stop the fire.

Topography:

- Aspect.
- Position on slope (ridge top, mid-slope, drainage bottom).
- Building line downhill or uphill.
- Width of canyons (wide/narrow).
- Box canyons and/or chutes.
- Percent slope.
- Potential for rolling material.
- Available natural and/or constructed barriers.
- Elevation.

When a fireline is built above a fire burning on a slope, generally the steeper the slope, the wider the line must be because the fire usually burns faster and more intensely than on a gentler slope. The more gentle the slope the narrower the line can be.

When a fireline is built below a fire burning on a slope, the width of the line does not depend so much on the slope, but trenching becomes important. Generally the steeper the slope, the deeper the trench must be, to prevent rolling burning material from crossing the fireline.

Weather:

- Maximum/minimum relative humidities.
- Wind velocity, direction and patterns (gusty vs. steady).
- Temperature variations.
- Thermal belts.
- Thunderstorm activity.
- Diurnal wind patterns and windspeed.

- Inversions.
- Foehn winds.
- Battling winds or sudden calm.

When a gravity or foehn wind interacts with a local wind, significant wind reversals are likely. Definite indicators are winds battling back and forth causing a wavering smoke column and a sudden calm.

A decreasing foehn wind that allows a local wind to regain influence can be as dangerous as the foehn wind that overpowers a local wind. A wind reversal from a decreasing foehn wind has been a factor in several fatality fires.

- Weather forecasts (request spot weather forecast if predicted weather condition is unknown).
- Last precipitation and amounts.
- Indicators of turbulence (dust devils, thunderstorms, lee sides of ridges, saddles).
- Indicators of instability (clear visibility, smoke rising straight up, inversions lifting).
- Indicator clouds.
- Haines Index 5 or 6.

In general the higher the temperature and the lower the humidity, the lower the fuel moisture. The lower the fuel moisture, the more intensely a fire will burn and the wider the fireline must be.

The wind or air currents increase the burning intensity by supplying more oxygen, by moving currents of hot, drying air into the fuels ahead, or by actually carrying burning embers (spotting) ahead of the fire itself. Therefore, the stronger the wind or convection current, the wider the line must be.

Fire Behavior:

- Rate of spread on various portions of the fire.
- Flame lengths on various portions of the fire.
- Type of fire spread (smoldering, creeping, running, torching, spotting).
- Classification of fire (ground, surface, aerial [trees torching]).
- Indicators of extreme fire behavior (a rapid buildup of intensity, a high sustained rate of spread, a well developed convection column, frequent or long distance spotting [600 feet or more], firewhirls, horizontal flame sheets)
- Size of fire.
- Location of fire in relation to topographic features (chutes, canyon bottoms, ridge tops, mid-slope).

Flame length is an important fire behavior factor you should be concerned with during sizeup. Generally fires with flame lengths greater than 4 feet are too intense for direct attack on the head by persons using hand tools (see Figure 2).

Figure 2—Fire Suppression Limitations Based On Flame Length*

Flame Length	
4'	Fires can generally be attacked at the head or flanks by persons using hand tools. Handline should hold the fire.
4'-8'	Fires are too intense for direct attack on the head by persons using hand tools. Handline cannot be relied on to hold fire.
8'-11'	Fires may present serious control problems; torching out, crowning and spotting. Control efforts at the head will probably be ineffective.
>11'	Crowning, spotting and major fire runs are probable. Control efforts at the head of the fire are ineffective.

*This may be modified for local fuels and conditions.

Other critical elements to consider:

- Restrictions on suppression tactics (wilderness areas, threatened and endangered species, etc.).
- Span of control.
- Biological and environmental hazards.
- Constructed hazards (powerlines, hazardous waste dump sites).
- Urban interface.
- Availability of critical support (hose lays, helicopter/fixed wing).
- Physical and mental condition of assigned resources.
- Ability to re-supply.
- Availability of human made and natural barriers (game trails, cow paths, roads, trails, lakes, rivers, old burns).
- Availability of water sources.
- Observation points.
- Archeological sites.
- Cultural resource sites.
- Accessibility and mobility.
- Poor visibility.
- Coordination with dispatch and/or adjoining forces.
- Other agency involvement.

Now that you have sized up the fire the following decisions need to be made:

- How to establish and implement lookouts, communications, escape routes, and safety zones (LCES).
- How to attack the fire (direct, parallel, indirect attack).
- Where to anchor and attack the fire (rear, flanks, head).
- Organization and command structure.
- Location of control line.
- Type of control line (width, burnout).
- Additional help needed.

Considering the following factors will help make the decisions above.

- Firefighter safety.
- Size of fire and fire behavior.
- Fire environment (fuels, weather—current and predicted, topography).
- Forces presently available to construct control line and hold it.
- Location of the fire head.
- Period of day fire is burning into (morning, afternoon, night).
- Improvements and other values in path of fire.
- Point of origin and cause.
- Public safety.

HOW TO ATTACK A FIRE

If you are the first person to arrive at a fire or a single resource boss in charge of the first crew at a fire, you have several problems. You are confronted with deciding; 1) what is the most important work to do first, and 2) where the most effective work can be done. Keep in mind at all times that firefighter safety is the highest priority in fire suppression.

After sizing up the fire you need to select an anchor point and make your attack. Following are some good practices in making an initial attack or suppressing a large fire.

- If you are the incident commander, establish an organization and command structure. Make sure your subordinates know the plan and are kept informed on changing conditions, tactics and/or strategies.
- Use water or dirt to cool and extinguish hot spots.
- Anticipate future control action when the fire cannot be contained promptly.
- Construct fireline uphill from an anchor point.
- As a first effort, keep fire out of the most dangerous fuels, and prevent it from becoming established in explosive types of fuels, such as grass, thickets of tree seedlings, heavy brush, or slash areas.
- Confine fire as quickly as possible.
- Locate and build firelines. Move all rollable material so it cannot roll across firelines.
- Leave no significant areas of unburned material close to fireline.
- To gain control, swiftly locate and build fireline in the easiest and safest places for line construction that can be held. Burn out as needed when line is constructed and burning out can be controlled.
- Utilize existing barriers to full extent.
- If fire spread cannot be contained, notify dispatch and do some safe, effective work on at least a part of the fire.
- Where improvements (houses, other buildings, fences) are involved, consider all the facts before determining which point to attack first. No improvement or piece of property is worth firefighter injury or fatality.