

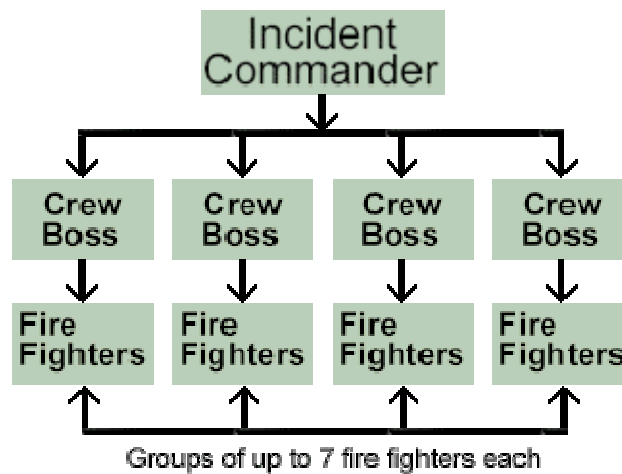
FIRE SUPPRESSION



CREW ORGANIZATION

All crews have the same basic organization no matter how many firefighters are involved. Depending upon your job on the fireline, your immediate supervisor is known as the *incident commander*.

A crew basically breaks down like this:



TOOLS AND PERSONAL GEAR

The most common hand tools used in fire suppression work in British Columbia are:

- shovels;
- axes;
- mattocks;
- pulaski tools (combination axe mattocks);
- saws;
- machetes;
- sandviks;
- handtank pumps;
- drip torches;
- fusees; and
- pumps and hose

Each firefighter should have the following clothing and personal gear:

- Nomex or non-flammable long-sleeve shirt and pants;
- heavy work boots with 6" or 8" tops and composition soles;
- medium heavy wool socks to prevent blisters, plus one extra pair in case of wet feet; and
- hard hats and other special safety equipment will be supplied by the ministry as required.

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All firefighting clothing must be made from natural fibres such as cotton, wool or Nomex-type material. Synthetic materials such as nylon or Dacron can aggravate injuries to the wearer if they catch fire.

HEAVY EQUIPMENT

Of course, firefighters have many resources available to them besides the basic hand tools. Often, on a large fire, heavy equipment is brought in.

Dozers

Dozers are used extensively for pushing a path through standing trees, building roads and fireguards. There are many safety considerations to be taken into account when operating or working around a dozer:

- Every machine should have a metal canopy and roll-over protection to protect the operator;
- All crew members working around a dozer should wear brightly coloured hard hats and vests.

Helicopters

Helicopters may be used to sling in equipment along the fireline and for dropping water or retardant from buckets. There are some basic rules to be followed when helicopters are being utilized:

- Take direction from your supervisor when working with or near a helicopter.

Air Tankers

These planes come in several models and can carry anywhere from 600 to 2500 gallons of retardant. They are very effective in firefighting, but firefighters can be killed or injured if they get caught in the drop area. However, in most cases, you will be well warned to get out of the way. Your supervisor and the aircraft may be in radio contact and you will be told when the tanker is coming in for a drop. There are also other easy ways to know when to leave the target area.

In British Columbia, air tankers are always preceded by a smaller lead plane (bird dog) over the drop zone. The bird-dog plane will make a pass and warn you of an impending retardant drop and completion of drops as follows:

Warbler (yelping sound) means an impending drop. Clear the area and take cover. NEVER TAKE COVER BEHIND A TREE OR SNAG.

Siren means all clear, return to normal activities.

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To move safely out of the drop zone, you should walk, not run, to a location at right angles to the drop path about 100 feet away from the target. Get clear of dead snags, rocks, power lines and poles or other materials that may be dislodged by the drop, especially if you are downhill from the target.

If you are caught by surprise in a drop zone, place your hand tools to the side, behind or downhill from your body. You should lie on the ground, face down, hard hat on, with your body facing the approaching plane and grasp something firm to prevent being carried or rolled around.

If you get covered with retardant, it should be cleaned off and kept out of the eyes.

Air tankers are an effective tool but an expensive one, and whether they work depends on the individual firefighters. Retardant dropped from an aircraft will not work on a fireline by itself, nor will it stop a hot moving fire. It will be most effective on spot fires, small fires, and hot spots along the edges of larger fires in order to cool them down so that a firefighter can keep building the line. It is important that firefighters keep working after a retardant drop because, if a hot spot rekindles or the fire gets away, the drop was wasted.

SIZE-UP AND FIRST ATTACK

The person who arrives first or who is in charge of the first crew to arrive at the fire must size it up and decide on the point of first attack before effective work can be done.

A good firefighter will:

- look after personal safety and safety of others first;
- note the exact time of arrival;
- make a quick size-up of the job;
- formulate a simple plan of attack and make sure that all his crew know and understand the plan;
- select two escape routes and make them known; and
- post a look-out if there is possible danger.

Size-Up

Sizing up the fire can be done quickly. Walk around the fire edge if it is small or get to a vantage point where you can see the entire edge. Remember that you are looking for:

- types of fuels;
- weather;
- topography; and
- fire behaviour.

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If there is evidence of a person-caused fire, make note of any suspicious activity in the area. Take licence numbers or anything else that might help an investigator track down those responsible for the fire. Try not to disturb evidence a fire investigator may require to determine the cause of the fire.

Now that the problems are identified and the priorities and point of first attack have been determined, you must advise the dispatcher of the arrival time, estimated fire size and the fire situation. If it is necessary, request help now.

Attack

The rule is to *attack the point where the fire is most likely to escape*.

There are three basic ways to attack (remember the fire triangle).

- *Remove the fuel.* Cut a path between the fuel supply and the fire. This is a fireline.
- *Remove the air.* Since there may be spot fires ahead of the fireline, they should be extinguished by shovelling dirt.
- *Remove the heat.* The most popular way is to apply water. Water should only be applied in emergency hot-spot control situations and then used sparingly as a short-term solution. You will seldom have enough water to completely extinguish a fire. Water, then, is usually used only to cool a fire to stop its spread. Action is not completed until all fuel is removed from the path of the fire. This is accomplished by the construction of a fireline down to the mineral soil.

ATTACK METHODS

Prompt action must be taken on the vital areas. Do not get bogged down at one place and let the fire escape. *Hot-spotting* means moving from one "hot spot" to another and making them safe as you go.

Start by cooling down the hot spots with dirt or water if available. Then separate fuels, knock down low-hanging limbs, and create a narrow fireline around the hot spots.

Basic Principles

Remember, spots may be more dangerous than the main fire; temporarily 'hot-spot' them. Use water or dirt.

All danger trees such as snags must be assessed. Snags must be cut down by a qualified faller if necessary to stop the fire spread. Watch for loose limbs and trees leaning against each other. If the snag is not on fire but in immediate path of the fire, put a fireline around it to keep it from catching.

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Low-hanging limbs may lead fires to the crowns. Cut them off and remove fuel from beneath the trees. Cut down and remove small trees that may candle.

Grass or tree needles lead fire to heavy fuel. Throw dirt or spray water on the fire edge or scrape a narrow fireline immediately against the fire edge.

Logs and cones may roll and scatter fires. Turn logs to lie up and down the slope or block with rocks to prevent rolling away. Chip fire off the outside of logs. Shoestring a trench below logs and rolling cones. Roll logs out of hot coal beds to reduce burning.

Piles of limbs and logs cause high-intensity burning and may shoot flames and sparks high into the air. Separate piles, cool down with dirt, and shoestring fireline.

Constructing a Fireline

When you have cooled down all the dangerous places, you are ready to construct a fireline. A fireline is used for separating the fuel from the fire, halting the fire's advance, and containing the fire within this line. This can be done by cutting, scraping or digging a trench wide enough to prevent a fire from smouldering, burning or spotting across and igniting the fuels on the other side.

The fundamentals of fireline construction are:

- line width, depth, length and clearance.
- the line should only be wide enough and deep enough to keep the fire from crossing it; the width and depth will depend on the type of fuel, and the rate of spread;
- the depth in most cases will be down to the mineral soil;
- a fireline of some sort must encircle the entire fire for total control;
- a v-trench or roll trench must be provided on all underslung fireline where danger of rolling debris is present.

Parts of the fire to be controlled are:

- flank;
- head; and
- rear.

Either hit the head (point of most rapid spread) or start at the rear and work forward on both sides (flanks) at the fire edge and thus pinch out and control head.

Line Location

If the fire is too hot and moving too fast to safely stop forward spread with the resources you have, locate a place to start the final control line. This should be along the edge of the fire where you can work safely.

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When selecting an anchor point, keep the following points in mind.

The safest spot to start from will normally be at the lowest point on the fire. This way, the fire cannot outflank you because there is no fire below you.

Many times, there will be a natural or man-made barrier to start from.

Build your line from the anchor point, uphill along the flank, toward the head of the fire.

If you cannot get right on the edge of the fire because of the heat, build your line parallel to the edge, a few feet away. This is called *parallel line construction* and should be just far enough from the fire edge to enable crew members to work effectively. The line may be shortened by putting across unburned fingers. Do not leave piles of limbs, low-hanging branches and other hazardous fuels next to the fireline. The intervening strip of unburned fuel is normally burned out as the control line proceeds, but may be allowed to burn out unassisted where this will occur without undue delay or threat to the line. A crew leader will normally do the burning out as a part of the line construction. Fireline should be located as close to the fire edge as possible. Your best option is to build right on the fire edge without wasting time, if possible. This is called a *direct line*.

If the fire is spreading too rapidly, the line will have to be located far enough from the edge to allow time for you to encircle it and burn out. This is an *indirect line*.

Fireline should be made as short as possible, although a line built right on the edge of the fire is best in some cases, even though it may be longer.

- Existing natural barriers should be used where possible.
- When possible, construct fireline through open areas rather than fight through dense or heavy fuels which can take much longer.
- Avoid sharp angles.
- Block off high-hazard fuels where possible by leaving them outside the fireline.
- Lines should be located far enough from burning snags to enclose them when felled and to catch sparks.
- Encircle areas of numerous spot fires if individual fireline construction around each spot fire is impractical.
- Use oblique lines to pinch off the head.
- When possible, locate line to give an uphill start to burning out.
- Take advantage of normal daily wind shifts.

Snags

Removal of *snags* is necessary by a qualified faller where snags exist adjacent to the fireline. Old snags are dry, punkish and in a general state of disintegration. One small spark will set them ablaze and they, in turn, will shower the area with sparks.

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As operations proceed, cut down snags standing adjacent to, and on both sides of, the control line for a distance of 200 to 300 feet on the fire side of the line and for a distance of 50 feet on the opposite side of the line. The distance to which snags are to be felled increases with the height of the snags, their elevation above the fireline level, and the degree to which they are exposed to wind.

Fires have been lost because snags have not been felled on both sides of the line. If speed is essential or if snags are so situated that felling is not possible, the fuel around the base of each snag inside the line should be cleared and scattered. This is called ringing a snag.

Rules of Line Construction

On the flank of a fire spreading in needles, scrape a 6- to 8-inch line to mineral soil. Clearing should be about the same width as the height of the surrounding burning fuel.

Turn logs and chunks parallel with the slope to keep them from rolling.

Place spotters at high safe strategic points to be on the lookout for spot fires and fast-running fingers from the main fire. Be prepared to put out spot fires before they get large.

Line Strategy

- Attack first where the fire is most likely to get away.
- In dense brush or timber, if the fire is too hot to attack head on, flanking action should be taken from a safety view-point.
- Hot-spot or hit vital points of spread first.
- Fell all trees and snags away from the line.
- Watch for spot fires and extinguish them fast.
- Make use of any natural barriers.
- Tie in the whole perimeter.

Burning Off

Before any fireguard can be considered completed, it must be *burned off*.

How to Burn Off

After control lines are established at strategic places in advance of the fire, the burn-off fires are started by experienced supervisors. These control lines should include roads, ridges, creeks, or other existing breaks, with the thought that burning off is to be started from them. The lines are to be as straight as possible and in such a location (taking into consideration draft, wind, slope, fuel, etc.) that a good burn will be safely achieved, insuring control of the main fire.

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The Purpose of Burning Out

This is a method of widening the control line and cleaning up unburned pockets or segments of fuel extending to the line from the fire edge. *Burning out the intervening strip* between the fireline and fire edge is for the safety of the line. This is used on small strips or larger areas abutting the control line. Backfiring applies this method in a more extreme way to control the fire. It is fighting fire with fire. It is the main tool with which the fire is stopped by indirect method of attack.

Burn all vegetation. Either cut or cold-trail all islands, peninsulas or brush that won't burn. Start burning off when the time is right, slightly below the top of a hill or ridge and on the opposite side from the main fire.

Mop-Up

The mop-up stage occurs after a fire, or any part of a fire, is controlled and before suppression work is reduced to a patrol and inspection. Mopping up makes a fire safe by extinguishing or removing burning and hazardous material, including snags along or near the control line.

The following tasks must be accomplished:

- extinguish all smouldering material along the fire edge after the spread has been stopped;
- put all rolling fuel so it cannot roll across the line or trench below it;
- make sure that all burning fuel either burns itself out or is spread or buried to stop spark travel;
- clear the line on both sides of all special threats such as snags, rotten logs, stumps, singed brush, and low-hanging limbs of trees;
- search for underground burning roots near the line;
- cover yourself for the worst possible conditions on a fire by mopping up all material adjacent to the line on large fires to make sure the fire cannot blow, spot, or roll over the control line;
- watch out for smouldering spot fires across the line in front of the main head of the fire;
- fell all burning snags into the burn in such a position that they will not roll or slide down the hill. If a snag has a lean that does not permit it to be felled either up or down the hill, clear the fuel away from where it will fall, roll, or slide, then fell it;
- when a snag is burning at the base, slow down the blaze with dirt or water, scrape out the burning part, then clear or dig a safety fireline around the area in which burning material has rolled.

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INSPECTION AND PATROL

Once a fire is controlled and mopped up, the incident commander will declare the fire to be on a "patrol" basis.

The job of the fire patrol is to walk the control line to prevent escapes, discover and control spot fires, and mop-up whenever necessary.

A fire patrolman will also keep a sharp lookout for "sleepers". Sleepers should be spotted before they have a chance to ignite the adjacent fuel and cause fire escape.

A sleeper is a hidden fire, deep inside the duff layer, or in a root tip. It is probably transferring heat along the root, or through the duff. As well, there is no glowing stage. The "sleeper" is aptly named. It may take up to three weeks before an adjacent patch of fuel is brought up to ignition temperature. Until then, it normally defies detection.