



Online Courses for Wildland Firefighters

~ Serving the Forest Industry since 1996 ~

Safety is Our #1 Priority!



S-100 A ~ Annual Safety Refresher

S-100 A ~ Part One, Sections 1-5

Fire Behaviour

1 - Types of Fire

Subsurface fires, burning in the [duff](#), partially decayed leaves and woody material do not pose a great safety hazard to fire fighters. Be careful not to step into burnt out root or stump holes. A hazardous condition may exist where large quantities of dead or dried material have accumulated. If fire extends into this material the fire may spread quickly and entrap the fire fighter.

Surface fires, burning in the ground vegetation, slash, windfalls, young trees and the lower branches of standing trees pose a greater hazard to fire fighters. Be careful of radiant heat generated by the fire, flare ups, smokey conditions, poor visibility, sudden shifts of the wind and possible [entrapment](#). Heavy accumulations of [ladder fuel](#) can permit the fire to rapidly extend into the crowns of the trees. Crew safety procedures should be re-evaluated if there is a lot of ladder fuel present.

[Crown](#) fires burning in the tops of trees and jumping from tree to tree, create extremely dangerous conditions to work in. The fire fighter should not attempt to attack a fire once it has started to burn in the crown. Leave the area and retreat to the nearest [safe area](#) by way of pre established [escape routes](#). If a single tree burns to the top, firefighters should back away and reassess the situation because this [candelling](#) effect can initiate a [running crown fire](#).

2 - Fuel Types

Caution should be exercised in proportion to the type, quantity and moisture content of the forest fuels. Wet fuels (high moisture content) will not generate the same heat intensity as will dried fuels.

Areas of heavy fuel accumulations will be more hazardous than areas with less fuel loading. Areas where the fuels are large will produce more heat and will sustain the heat longer than areas with small fuels such as grass, brush and hardwood trees, also known as [deciduous trees](#).

Hardwood (deciduous) trees will burn with less intensity and at a slower rate than softwood (evergreen) trees.

3 - Other Factors Influencing Fire Behaviour

Weather is a dominant factor in fire fighting safety. Hot, dry and windy conditions are far more dangerous than cool, moist conditions with little or no wind. Exercise caution as weather conditions change for the worse. If a wind event is predicted, the fire dispatcher will issue a [weather advisory](#) to all crews in the field. Be prepared to abandon fire fighting efforts if high wind conditions occur. Always be aware of weather conditions and plan operations with them in mind. Fire behaviour will normally be more aggressive as the day progresses into the afternoon.

[Slope](#) can have a dramatic effect on [fire behaviour](#). Fire will move up a slope at a far greater speed than fire on the flat. Be aware of daily afternoon up slope winds and evening down slope winds. Working on a steep slope requires a lot of extra personal energy and the firefighter will move much slower making entrapment a greater risk.

[Aspect](#) will effect the quantity, type and moisture content of the forest fuels. A southern exposure will have drier fuels whereas the northern exposure will be cooler and have a higher moisture content. Never let the aspect distract the firefighter for exercising caution at all times.

[Topography](#) will effect how hard it is to access the fire. Exercise extra caution when crossing steep side slopes or areas of loose rocks. Never work directly below anyone else on a steep slope. If you knock a rock or log loose and it starts to roll down the hill, yell "rock". If you feel you are in the path of a rolling object, do not look up, but immediately protect yourself by staying low to the ground or behind a tree or large rock. In mountainous country, fire fighters should be aware of the chimney effect. This is where a fire will rush up a gully or valley with great speed potentially trapping anyone working above.

4 - Fire Ranking System

In order for the firefighter to better understand the fire conditions they will encounter, this general ranking system will give them a picture of what the fire looks like, depending on fuel types.

Rank 1 Smoldering ground fire or slow moving surface fire. Little or no flames.

Rank 2 Low vigor surface fire in grass and brush. Flames up to your knees.

Rank 3 More aggressive ground fire in brush and lower limbs. Flames at 1-2 mtrs.

Rank 4 High vigor fire burning on surface and into some tree tops. Flames over 2 mtrs.

Rank 5 Extreme surface fire and running from crown to crown. Flames in tree tops.

Rank 6 Total blow up or conflagration. All trees on fire. Fire above tree tops.

Fire fighters will not attempt to control fires greater then a rank 3 blaze unless otherwisw directed by the supervisor.

5 - Chain of Command

The chain of command is a key factor in safe fire fighting. Every fire fighter has only one boss (aka. supervisor or crew leader). Know who your crew leader is and listen to them at all times. Never leave a work area without permission. If you are asked to perform a task that you are not trained to do, or feel you do not have the proper safety gear, or believe the task to be unsafe, inform your crew leader of the situation.

Questions for Sections 1-5

Is the following statement True or False;

1- Running crown fires do not create entrapment issues for firefighters.

True False

2- Areas of heavy fuel accumulations can be a work hazard.

True False

3- South facing slopes will be dryer than north facing slopes.

True False

4- A rank 6 fire can easily be contained by a crew with hand tools.

True False

5- You should have only one Incident Commander (boss) on a wildland fire.

True False

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S-100 A ~ Part Two, Sections 6-10

6 - Size-Up

Before attacking any fire a complete [size-up](#) must be done to assess hazards and a comprehensive plan, including all safety considerations, must be established. The size-up should include such things as; fire rank, size, fuel type, slope, aspect, and weather conditions. The firefighter should be informed of these conditions before commencing work on the fire line.

7 - Crew Briefing

Before starting action on any fire each crew member must attend a briefing session that will cover such things as who is in charge, hazards, escape routes, safe areas, evacuation procedures, weather conditions, the action plan, communications method, each crew member's specific job and any other information pertinent to fire line safety. If you arrive on a fire after fire fighting activities has started, make sure you receive a full briefing before comencing work.

All crew members shall work with a "buddy" and not wander away from each other or their assigned area.

8 - Working on the Fire Line

Firefighters must exercise caution at all times while working on or near wildland fires. Be aware of the following hazards;

Look up for [snags](#), broken limbs (widow makers), and leaning trees. Be aware of any helicopters working near you. Never work within 1.5 times the height of any snag or dangerous tree. Never work within an excluded area as established by a dangerous tree assessor.

Look down for uneven ground, tripping hazards, loose rocks and logs, wet and slippery surfaces, ash filled holes, areas of fresh retardant drop, barbed wire and other human made hazards.

Look around at general lay of the land, the fire's edge and where it is spreading, escape routes, steep slopes, cliffs and any land features that would impede a safe retreat.

If the firefighter is involved in burning-off operations, extreme caution should be used when filling and using a drip torch. Always be aware of the burning conditions and have a minimum of two escape routes and safe areas available to use.

Avoid exposure to intense flame heat or smoky conditions. If you must work in the smoke, use some form of mask or smoke filter and take frequent breaks away from the smoke.

Work at least 3 meters away from the person next to you. Carry tools at waist height, not over your shoulder. While crossing a slope, carry your tool on the down hill side. Never work below any active heavy machinery. Carry and store tools so as not to endanger yourself or others. Stay alert at all times as conditions are always changing. Never remove your safety helmet when in the forest or on the fire line.

At no time should there be any sort of horseplay on the fire line.

Never work up-slope of a fire if there is unburned fuel between you and the head of the fire.

Use the 10 Standard Orders when working on a fire;

- 1- Fight fire aggressively, but provide for safety first.
- 2- Initiate all actions based on current and expected fire behaviour.
- 3- Recognize current weather conditions and obtain forecasts.
- 4- Ensure instructions are given and understood.
- 5- Obtain current information on fire status.
- 6- Remain in communications with crew members and your supervisor.
- 7- Know your escape routes and safe zones.
- 8- Establish lookouts in potentially hazardous situations.
- 9- Retain control at all times.
- 10- Stay alert, keep calm, think clearly, act decisively.

9 - Personal Gear and Health

Wear the proper gear, [good boots](#), gloves, safety helmet, cotton or wool clothing, do not wear synthetics, they may melt or ignite easily. Carry an ample supply of water and enough food for a long day. Carry any medications or personal items you may require. Inform your crew leader of any health problems or allergies you may have.

Pace yourself and watch for signs of heat exhaustion or dehydration. Take small drinks of water on a regular bases to replenish losses.

10 - Cold Trailing

When [cold trailing](#) and searching for [hot spots](#) be careful while using your bare hand. First feel the surface then slowly put your hand into the ground ash or hole. Use a copper probe for deep seated fires on hot landings.

Questions for Sections 6-10

Is the following statement True or False;

6- The initial fire size up can be done after the initial attack is over.

True False

7- Crew briefings can be done after the initial attack is over.

True False

8- Crew members should constantly be aware of ground conditions.

True False

9- Recognizing current weather conditions, understanding instructions, and having good communications are part of the 10 Standard Orders.

True False

10- To find hot spots it is best to quickly push your bare hands into the ash.

True False

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S-100 A ~ Part Three, Sections 11-15

11 - Working with Aircraft

Whenever working in proximity of air tanker action, firefighters must be aware of the areas where the tankers are going to drop their retardant. All workers must leave the area where the drops are to be made. The **bird dog** plane will sound a warbling **warning siren** as it passes over the **drop zone** just prior to a retardant drop. Workers should immediately walk away at right angles to the drop path to a safe area at least 30 meters away. If you cannot safely exit the drop zone, lay face down on the ground, facing the direction the Bird Dog plane came from. Hold your hard hat on your head and lay your hand tools behind you. Protect your air passage. Avoid any snags or material that can fly up and injure you.

Return to work only after the steady **all clear siren** has been sounded. Be extremely careful of walking in the drop zone as the retardant is very slippery.

Whenever working in the proximity of helicopters, fire fighters must be aware of the danger zones. One being under the **main rotor**. Another danger zone is at the rear of the helicopter.

Never walk around the **tail rotor**. The third danger area is under the tail boom as there may be a hot exhaust outlet there. Stay low when approaching and departing a helicopter, hold on to any loose gear and follow the pilot's instructions.

Never walk uphill when departing from a helicopter.

Never run when working around a helicopter.

Never work under a helicopter unless you receive proper training and have on the appropriate protective clothing.

Never carry fire tools over your shoulder and protect your eyes from dust and flying material.

Remove your helmet if you do not have a chin strap.

Keep back 30 meters from the landing site, only approach the helicopter when given the all clear signal by the pilot.

12 - Working with Heavy Equipment

Never work down slope of any **heavy equipment**. Keep at least 2 tree lengths away from working equipment. Make sure the equipment operator sees you before you approach the machine. Be aware of flying debris if in the proximity of feller bunchers and other mechanical tree falling machines. Wear high-vis vests when working with heavy equipment.

13 - Personal Responsibility

While working on the fire line, fire fighters must remember to protect themselves at all times from the numerous hazards

associated with the job.

Unsafe personal behavior includes working while fatigued, being overconfident, rushing or working too fast, running, panicking, not following instructions, not taking the time to fully understand instructions, not knowing where the escape routes are, not taking adequate rest stops and not communicating clearly can result in injury. Because of the many tripping hazards associated with the forest floor, never run while working on the fire line.

14 - WATCH OUT

Workers should always keep in mind the W-A-T-C-H-O-U-T slogan for fire line safety;

W - weather dominates fire behavior

A - action is based on what the fire is doing

T - try out at least two escape routes

C - communications, keep them clear and simple

H - hazards such as snags, flash fuels and dangerous terrain must be observed

O - observe changes in the weather

U - understand your instructions

T - think clearly, stay alert and keep calm at all times

15 - Evacuation Procedures

If an order to evacuate or to leave the fire for any reason, is given, fire fighter's must remain calm, do not panic, follow the crew leader's instructions, stay with your crew, take your tools and personal gear and proceed to the designated safe area by way of the established escape route.

If you become separated from your crew immediately find a safe area such as a wet or swampy area, a creek, some rocky ground or find a burnt out area and seek refuge there. Never try to outrun a fire by going up hill. Move across the slope and/or down hill from a fire. Protect yourself at all times from heat exposure.

In the event of a self directed evacuation, leave the area immediately, proceed to a pre-established safe area and inform the supervisor as soon as possible.

Questions for Sections 11-15

Is the following statement True or False;

11- It is safe to work under an Air Tanker dropping retardant.

True False

12- You must keep low when walking under Helicopter rotors.

True False

13- Personal safety is every firefighters responsibility.

True False

14- Working within 2 tree lengths of a bulldozer is dangerous.

True False

15- If caught in a fast moving fire it is best to panic and run.

True False

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S-100 A ~ Part Four, Sections 16-20

16 - Emergency Radio Procedures

If you have an extreme emergency where someone's life is in danger, and you must use the two way radio, make sure the radio is turned on and the volume is up. Hold the radio upright and using the channel the radio is already on, hold the radio close to your mouth, press the push to talk button and in a clear calm voice say as one sentence; "Mayday, Mayday, Mayday" then state your name, your location and the nature of the emergency. If you get no reply, first try broadcasting from a new location, if you still get no reply from two different locations, try a different channel. Keep your conversations short and to the point. Even if you get no reply, someone may have heard your message and passed on the information to the proper authorities.

Remember, the radio term "Mayday" should only be used in extreme emergencies if there is a threat to someone's life.

If you have a non-life threatening situation, but require emergency assistance, use the term "Pan, Pan, Pan" and follow the above mentioned procedures.

17 - LCES

Remember the safe work procedure of LCES

- L - Lookouts Post a [lookout](#) to observe the fire conditions.
- C - Communications Maintain good communications at all times.
- E - Escape routes Know where your escape routes are.
- S - Safe areas Know where your safe areas are.

18 - Pumps & Water Delivery Systems

When working around fire pumps protect your hearing by using ear muffs and avoid touching the hot muffler.

When choosing a location to set up a pump, select an area that is free of lower limbs, hazardous trees, falling rocks or any obstacle that would impede a speedy evacuation. Take the time to clear out the area to be used and make it safe. Be aware of steep or slippery shorelines and fast moving water.

When working with or around pressurized fire hose, be careful of possible hose rupture due to the high pressures used in fire fighting operations.

When using fire foam avoid getting the foam on your skin or in your eyes as it is caustic and can irritate skin. Wash with copious amounts of water if contaminated. Avoid letting any foam spill into water ways such as streams, creeks, ponds and lakes.

19 - Fuel Handling

When working with any fuels exercise caution at all times. Do not smoke around or have open flames near a fuel container. If you spill fuel on your clothing, immediately remove yourself from any flame source and change clothes.

Review [WHMIS](#) information if working with gasoline, diesel, stove fuel, propane or fire foam or other types of Dangerous Goods.

Always read the label on any product with a WHMIS sticker if you are required to use it.

Always store compressed gas cylinders in a safe location.

Keep open flames away from any container marked "Flammable".

Always wear required protection gear as indicated on the WHMIS label.

Know how to access the Material Safety Data Sheets (MSDS) when required.

Do not work with any regulated material if you are unfamiliar with the substance or do not have the proper protective equipment.

Do not do any task that you are untrained or unprepared to do.

Report any problems you encounter to your supervisor immediately.

20 - Miscellaneous Safety Concerns

Remove all garbage, plastic water bottles, etc. from your worksite daily. Maintain a clean, litter free camp if you are staying in one. This will minimize the potential for bear problems.

Except for a low intensity rank 1 or 2 fires, avoid working at the head of the fire.

Be aware that a "red flag warning" means that strong winds are expected and precautions must be take to ensure crew safety.

MOST OF FIRE FIGHTING SAFETY IS COMMON SENSE !

ALWAYS THINK AND BE AWARE !

YOU ARE RESPONSIBLE FOR YOUR OWN SAFETY AND THE SAFETY OF YOUR FELLOW CREW MEMBERS !

WHEN IN DOUBT.... BACK OUT!

AND THE 3 MOST IMPORTANT ASPECTS OF FIRE FIGHTING ARE.....

SAFETY, SAFETY AND SAFETY!

Questions for Sections 16-20

Is the following statement True or False;

16- If you get no radio reception, move to a new location.

True False

17- The term LCES means Lookouts, Communications, Escape Routes, and Safe Areas.

True False

18- When working with high pressure pumps, no hearing protection is needed.

True False

19- WHMIS training is not important to wildland firefighters.

True False

20- The most important aspects of fire fighting is personal Safety.

True False

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