

4 - Safety



Policy

Federal Wildland Fire Policy, December 1995

“Every BLM supervisor, employee, and volunteer is responsible for following safe work practices and procedures, identifying and reporting unsafe conditions.” (“Safety and Health for Field Operations;” *BLM Manual Handbook 1112-2*)

Overview

“We are committed to *Zero Tolerance* of carelessness and unsafe actions. The commitment to and accountability for safety is a joint responsibility of all firefighters, managers, and administrators. All land management plans and all suppression plans and actions must reflect this commitment. Individuals must be personally committed and responsible for their own performance and accountability.

Please join us in adopting firefighting's code of safe practices:

Safety Comes First on Every Fire, Every Time.

The Ten Standard Fire Orders are Firm. We Don't Break Them; We Don't Bend Them. All Firefighters have the Right to a Safe Assignment.

Every Firefighter, Every Fireline Supervisor, Every Fire Manager, and Every Agency Administrator has the Responsibility to Ensure Compliance with Established Safe Firefighting Practices.”

Bruce Babbitt and Dan Glickman; Secretaries of Interior and Agriculture

Objectives

The goal of the fire safety program is to provide direction and guidance for the safe and effective management of fires. Safety is the responsibility of everyone assigned to wildland and prescribed fire. Safety must be practiced at all operational levels from the director, state director, field office, and area manager to employees in the field. The safety of employees and the public alike must be of the primary concern during fire management activities. Agency administrators need to stress that firefighter and public safety always takes precedence over property and resource loss. Linkage between the fire management staff and unit safety officers is essential in achieving this objective.

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For additional safety guidance and references please refer to:

- *Fireline Handbook, 410-1*
- *Interagency Incident Response Pocket Guide*

Food and Nutrition

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Nutritious food is not only a morale booster, but more importantly it fuels muscles for hard work and internal organs for health and fitness. A firefighter may burn 5,000 to 6,000 calories a day. These must be replaced to avoid cramping, fatigue, and impaired judgement. Government-provided food must be low in fats and high in complex carbohydrates. A good diet for any hard work is 60% carbohydrates, 25% fat and 15% protein. Drinks provided must replace essential fluids lost from the body during exercise. Firefighters must replace one to two quarts of fluids per hour. Water is an excellent way to replace this fluid loss. Natural juices and sport drinks contain energy-restoring glucose. Avoid caffeinated, carbonated and “diet” drinks. On a normal fireline assignment, firefighters must replace 12 or more quarts of fluids a day.

Fatigue

Firefighting is hard work, dirty and inherently dangerous. The fire itself creates much of that danger. But there is a less visible threat – fatigue. Without enough sleep and rest, after long hours in heat and smoke, or stressful office settings, even the fittest worker tires. Fire management staff, dispatchers, and support personnel are subject to long hours and high levels of stress. Tired people can make mistakes. In fire activities, mistakes often mean accidents and injuries. Managers and fire management personnel can take actions to lower the stress that causes fatigue. Here are three keys to controlling the fatigue-related stresses of wildland fire activities.

Work and Rest

Sleep is a prime factor in controlling fatigue. It is possible to force tired muscles to keep on working, but the brain can't function properly without sleep. Accidents and injuries result among those pushed too much. NWCG has established work and rest guidelines for incident management. However, these are not evenly applied by managers of initial attack crews. For this reason managers and incident management teams should establish work and rest schedules that minimize fatigue in the following ways:

- Establish record-keeping systems that track crew work time.
- Plan and strive to provide one hour of sleep or rest for every two hours worked.
- When deviating from work-rest guidelines, agency administrator or incident commander (IC) must approve in writing.

- Start each operational period with rested crews.
- Provide an adequate sleep environment.
- Breaks during fire operations should be from 10 to 30 minutes in length.
- Frequent breaks of between 10 to 30 seconds should be encouraged.

The pulse is a good way to gauge fatigue. The pulse should recover to less than 110 beats per minute; if not, a longer break is needed. A firefighter's wake-up pulse can signal potential problems. If it is 10% or more above normal, it can mean fatigue, dehydration, or even a pending illness.

Heat Stress

Heat becomes a problem when humidity, air temperature, and radiant heat combine with hard work to raise body temperature beyond safe limits. There are three forms of heat stress. The mildest is heat cramps. Heat stress can progress to heat exhaustion and heat stroke. At the first sign, stop work, get into the shade, and begin drinking fluid. **HEAT STROKE IS A MEDICAL EMERGENCY!** Delayed treatment can result in brain damage and even death. Sweat is your main defense. Everyone on the fireline must understand the importance of drinking often. Firefighters must replace one to two quarts of fluids per hour; water is an excellent way to replace this fluid loss. Natural juices and sports drinks contain energy-restoring glucose. Avoid caffeinated, carbonated and "diet" drinks. On a normal fireline assignment firefighters must replace 12 or more quarts of fluid per day.

Smoke and Carbon Monoxide

For decades, firefighters and fire managers have been concerned about the health effects of smoke from wildland and prescribed fires. In 1989 a NWCG team met to develop a study plan to determine the immediate and long-term effects of exposure to forest fire smoke. The plan proposed studies in emissions characterization, employee exposure, health effects, risk assessment, and risk.

This study culminated in a consensus conference held in April, 1997. The conference reviewed progress of the study plan, and reached consensus on a risk management plan that could be implemented within the existing fire management structure.

In brief, participants concluded that toxic emissions were present in smoke, that the incidence of exposure in excess of Occupational Safety and Health Administration (OSHA) permissible exposure limits was relatively low (fewer than five percent of prescribed fire cases, even less in wildfire), and that documented health effects were moderate and often reversible. Recommendations for risk management are also included in the document. Copies are available free of charge in limited numbers. Call USDA Forest Service, Technology and Development Program, Publications. Ask for *Health Hazards of Smoke, Recommendations of the Consensus Conference*, April 1997. The item number is 97512836.

Exposure studies show that firefighters are sometimes exposed to levels of smoke that exceed OSHA permissible exposure limits. Improvements in tactics should minimize opportunities for exposure.

Minimizing Exposure to Smoke in Wildland Fire:

- Include smoke hazards on the ICS-215A worksheet at planning and briefing sessions.
- Use flank attack as opposed to head attack, where appropriate, in heavy smoke situations.
- Minimize mop-up when possible.
- Adjust operational periods on mop-up to avoid periods of inversion.
- Use time and patience instead of water to put the fire out: use burn piles, allow areas to burn themselves out. Rely on burn-up instead of mop-up.
- Minimize snag falling, consistent with safety concerns, to avoid putting heavy fuels on the ground that will require mop-up.
- In heavy smoke conditions, give up acres to gain control.
- Fire behavior forecasts should discuss smoke and inversion potentials.
- Locate camps and incident command posts in areas that are not prone to inversions.
- Reduce dust by watering roads at the incident, on drier roads leading to the incident and in the base camp area.
- Use minimum impact suppression techniques (MIST).

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Personal Protective Equipment

All firefighting personnel must be equipped with the proper personal protective equipment (PPE); operational personnel on wildfires and prescribed fires are required to use PPE. Common permanent-press materials are not to be worn, as they melt and stick to the skin when exposed to flame or heat. Because most synthetic fibers melt when exposed to flame or extreme radiant heat, personnel should wear only undergarments made of 100 percent cotton or wool, aramid, or other fire resistant material.

Required PPE includes:

- 8" high laced leather boots with lug soles (condition of hire)
- Fire shelter
- Hard hat with chin strap
- Goggles
- Ear plugs
- Aramid shirts
- Aramid trousers
- Leather gloves
- Individual first aid kits

Special PPE and a job hazard analysis is required for operations involving aluma-gel, aircraft (particularly helicopters), and felling. These include:

- Chainsaw chaps
- Earmuffs or earplugs

- Face shield or goggles
- Flight helmet
- Dust masks
- Alumina-gel mixing crew must be equipped with eye protection, fire retardant anti-static or 100 percent cotton coveralls, and gloves.

Use of safety equipment is required of all personnel exposed to fireline hazards including prescribed fire operations. Employees must be trained to use safety equipment effectively.

Head Protection

Personnel must be equipped with hard hats and wear them at all times while on the fireline. Hard hats must be equipped with a chin strap fastened while riding in, or in the vicinity of, helicopters.

Helicopter crew persons and helitack crews will be issued and wear flight helmets with chin strap securely fastened when riding in helicopters. All contract helicopter personnel must comply with this standard.

Acceptable helmets for fireline use are: "Safety helmet, wildfire" NSN 8415-01-055-2265 listed in GSA's Wildfire Protection Equipment and Supplies Catalog or equivalent helmet meeting NFPA Standard 1977 requirements.

Eye and Face Protection

The following positions require the wearing of goggles: nozzle person, chainsaw operator, heliport and ramp personnel, and retardant mixing crew members. Other personnel in the immediate vicinity of these operations may also require eye protection. Full face protection offered by face shields must be worn by tool sharpeners using power sharpeners and Terra-Torch® nozzle operators.

Hearing Protection

Personnel who are exposed to a noise level in excess of 90 db must be provided with, and wear, hearing protection. Seasonal fire suppression personnel must be issued two pairs of earplugs, either universal or fitted, at the beginning of the fire season. Other fire crew members must be issued earplugs upon fire assignment. Personnel must be trained to use and clean earplugs to prevent hearing damage and hygiene problems. Hearing protection may be required on helicopter flights.

Earmuffs will be issued to the following personnel:

- Chainsaw and portable pump operators
- Helibase and aircraft ramp personnel
- Retardant mixing personnel
- Any other personnel exposed on a regular basis to damaging noise levels. Intermittent saw and pump operators may use earplugs.
- Engine operators.

National Fire Equipment System kits contain earmuffs for the above positions. Any kits maintained on a unit for these positions must also comply with the kit's hearing protection standards.

Leg Protection

Chainsaw chaps, in good condition, must be worn by all chainsaw operators.

Foot Protection

4 Personnel assigned to fires must wear heavy duty, all leather, lace type work boots with non-slip (Vibram type) melt resistant soles and heels. The leather top must be at least 8 inches in height, measured from the top of the heel. (Alaska exempt.) The boots are a condition of hire for firefighting positions and are purchased by the employee prior to employment.

Fire Shelters

Fire shelters will be issued and worn by all line personnel. They will be inspected regularly, and "training" shelters will be deployed annually at required refresher safety training. The shelter is to be viewed as a **last resort**, and will not be used as a tactical tool. Supervisors and firefighters must never employ fire shelters instead of using well-defined and pre-located escape routes.

Fireline Safety

Incident Briefings

The fire manager, through the IC, must ensure that safety factors are covered with incident personnel at all operational briefings and that safety briefings are occurring throughout the fire organization. The identification and location of escape routes and safety zones must be stressed. The IC, safety officer, fire behavior analyst and remainder of the command and general staff will use Standard Fire Orders, Watch Out Situations, and ICS 215-A (L.C.E.S.) for guidance at strategy meetings, during briefings and when developing the incident action plan, safety message, and medical plan.

LCES Key to Safety in the Wildland Fire Environment

- L – Lookout(s)
- C – Communication(s)
- E – Escape routes
- S – Safety zone(s)

LCES is a System for Operational Safety In the wildland fire environment where four basic safety hazards confront the firefighter—lightning, fire-weakened timber, rolling rocks, and entrapment by running fires—LCES is key to safe procedure for firefighters. LCES stands for "lookout(s),"

“communication(s),” “escape routes,” and “safety zone(s)”—an interconnection each firefighter must know. Together the elements of LCES form a safety system used by firefighters to protect themselves. This safety procedure is put in place before fighting the fire: select a lookout or lookouts, set up a communication system, choose escape routes, and select safety zone or zones.

In operation, LCES functions sequentially. It's a self-triggering mechanism: lookouts assess—and reassess—the fire environment and communicate to each firefighter threats to safety; firefighters use escape routes and move to safety zones. Actually, all firefighters should be alert to changes in the fire environment and have the authority to initiate communication.

Key Guidelines: LCES is built on two basic guidelines:

- Before safety is threatened, each firefighter must be informed how the LCES system will be used.

- The LCES system must be continuously reevaluated as fire conditions change.

“Safety is defined as freedom from exposure to danger, exemption from injury, and to protect from accident.” Safety requires knowledge and skill in methods of avoiding accidents, injury and exposure to danger. As such, it requires an ability and attitude that grows with experience and training. In fire management activities there are subjective hazards that we create, and objective hazards such as: fire entrapment, snags, rolling debris, and terrain. The subjective hazards, we have control over just by using our attitudes and abilities. The objective hazard we cannot eliminate; these are the risks inherent to fire management activities. The possibility of injury or entrapment is always there, the probability may be large or small. We must take steps to reduce the risks associated with our actions. By using a set procedure during each operational period, we can ensure our safety by taking the following steps to minimize our exposure to hazards:

- Define the assignment.
- Identify the hazards.
- Analyze the situation as it changes.
- Re-analyze the situation as it changes.

In the following “Risk Analysis” section, answer each question for the Watch Out Situation by checking the appropriate column. For each question answered with a no, the Fire Orders and LCES become important responses to reduce the risk of entrapment.

Risk Analysis

Situation	Considerations	Ye s	N o
Fight Fire Aggressively but Provide for Safety First	Aggressively: <ul style="list-style-type: none"> • Is the suppression method adequate? • Are there adequate resources and time for effective suppression? Safety: <ul style="list-style-type: none"> • Are lookouts posted? • Are communications prompt with crews and other resources? • Have escape routes been established? • Do you feel comfortable with your assignment? 		

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To Reduce the Risks – Post lookouts until the fire is sized up and escape routes and safety zones are established, or **back off** if the situation is too complex!

Initiate ALL Actions Based on Current and Expected Fire Behavior	<ul style="list-style-type: none"> • Can the resources you are replacing give you a thorough briefing? • Can you observe the area, use scouts? • Have escape routes and safety zones been thoroughly scouted? • Are they marked for night use? • Have potential dangers been located, can they be dealt with? • Access to weather and fire behavior forecast? 		
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To Reduce the Risks – Post lookouts, check communications, back off if the situation becomes too complex, or if you have doubts about your escape routes or safety zones.

Safety Zones and Escape Routes NOT Identified	<ul style="list-style-type: none"> • Can you identify them by scouting? • Are they large enough to accommodate everyone without using fire shelters? • Does the escape route need clearing? And marking? • How much warning time do you need to get to your safety zone safely? • Does everyone know the escape routes and safety zones? • Can you create a safety zone if you don't have one? • Have you seen the escape routes and safety zones? 		
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Situation	Considerations	Ye s	N o
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To Reduce the Risks – Back off until you find safety zones or escape routes!

In Country NOT Seen In Daylight	<ul style="list-style-type: none"> • Can the resources you are replacing give you a thorough briefing? • Can you observe the area, use scouts? • Have escape routes and safety zones been thoroughly scouted? • Are they marked for night use? • Have potential dangers been located, can they be dealt with? 		
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To Reduce the Risks – Post lookouts, check communications, back off if the situation becomes too complex, or if you have doubts about your escape routes or safety zones.

Fire NOT Scouted and Sized Up	<ul style="list-style-type: none"> • Can you observe personally, or use scouts? • Do you know the location of the fire perimeter? • Do you know the direction of fire spread? • Does the direction of fire spread increase the risk? • Do you know the fuels and their condition? • Do topographic hazards exist? • Does enough information exist to establish a plan of attack? • Do other dangers exist? 		
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To Reduce the Risks – Post lookouts until the fire is sized up and escape routes and safety zones are established, or back off if the situation is too complex!

Unfamiliar with Weather and Local Factors Influencing Fire Behavior	<ul style="list-style-type: none"> • Can you ask questions of local experts? • Does the operational period plan give you adequate weather and information? • Can you get information from resources that have been on the fire? • Is there any other way to obtain information? 		
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To Reduce the Risks – Base all actions on current and expected fire behavior.

Post lookouts, establish escape routes and safety zones!! Take Extra Caution.

Uninformed on Strategy, Tactics or Hazards	<ul style="list-style-type: none"> • Can communications be established to find out? • Can scouting safely identify potential hazards? • Have strategy, tactics or hazards changed since last informed? • Can you get a briefing from your supervisor? 		
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To Reduce the Risks – **Post lookouts, establish safety zones and escape routes.** Consider backing off until you are informed. Don't leave a staging area

Situation	Considerations	Ye s	N o
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or briefing until you have all the pertinent information.

<p>Instructions and Assignments NOT Clear</p>	<p>Giving Instructions</p> <ul style="list-style-type: none"> • Did they ask questions? • Did they take notes? • Did they repeat them back? • Did you give all the necessary information: task, location, communications, hazards, who, when, etc. <p>Receiving Instructions</p> <ul style="list-style-type: none"> • Did you really listen? • Did you understand the assignment, location, and the nature and location of hazards? 		
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To Reduce the Risks—Take the time to get it right! **You must know the location of the assignment, what** is to be done, **who** you are to report to and **how** often to report, **when** you are expected to complete the assignment, any deadlines, any hazards, communication plan, weather and fire behavior, status of adjoining forces.

<p>No Communication Link w/ Crew Members Supervisors & Adjoining Forces</p>	<ul style="list-style-type: none"> • Can communication be established? • Is the communication triangle complete? 		
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Only if the situation is simple and safe should operations continue without communications. **If the situation is complex – back off.**

<p>Constructing Line without a Safe Anchor Point</p>	<ul style="list-style-type: none"> • Can you hold the line without the fire hooking under you? • Are there adequate safety zones and escape routes? • Can you develop your starting point into an anchor point? • Have you posted good lookouts? • Do you have good communications? 		
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To Reduce the Risks—**Start the line in another location.**

<p>Attempting a Frontal Assault on a Fire</p>	<ul style="list-style-type: none"> • Has the fire been scouted and sized up? • Is your position defensible? • Are escape routes and safety zones adequate? • Do you have an anchor point? • Do you have adequate resources to complete the 		
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Situation	Considerations	Ye s	N o
	assault? • Are you informed on strategy, tactics, and hazards? • Is the terrain favorable to holding the fire?		

To Reduce the Risks—reassess your tactics, **post lookouts!**

Building Fireline Downhill with Fire Below	<ul style="list-style-type: none"> • Has the area been scouted for fire perimeter and behavior? • Will wind direction be at your back? Will it stay at your back? • Is the area free of chimneys and gullies? • Are there adequate safety zones and escape routes as you progress downhill? • Can you carry your burnout downhill as you go to provide an anchor point and safety zones? • Have lookouts been posted? • Do you have good communications, especially with lookouts and crews working towards you? • Can the line be completed and burned out before the fire reaches the line? • Do you have adequate resources to complete the assignment? • Is the aerial support available if needed? • Has everyone been briefed on the assignment, fire behavior, weather, communications, escape routes and safety zones, hazards, and tactics? 		
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If NO to any of these questions – consider other tactics, **provide for safety first.**

Unburned Fuel Between You and the Fire	<ul style="list-style-type: none"> • Can you see the fire? • Is fire spread in a direction away from you? • Will your position be defensible when the fire reaches you? • Is your line anchored? • Are your escape routes and safety zones adequate? 		
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To Reduce the Risks—**post lookouts, consider a different location to make a stand.**

Cannot See the Main Fire, NOT in Contact with	<ul style="list-style-type: none"> • Are you informed on expected fire behavior and weather? • Do you have safety zones and escape routes? • Will you receive adequate warning to go to your safety zone? 		
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Situation	Considerations	Ye s	N o
Anyone Who Can	<ul style="list-style-type: none"> • Are you informed on strategy, tactics, and hazards? 		

To Reduce the Risks – **re-evaluate your position, limit your exposure!!**

On a Hillside Where Rolling Material Can Ignite Fuel Below	<ul style="list-style-type: none"> • Can you locate/construct a line to prevent material rolling below? • Will you get enough warning of rolling material to prevent being hit by it? • Can you see where any material that rolls below you goes and what it does? • Is the area free of large amounts of flashy fuels? • Is the area free of chimneys, gullies and steep slopes? • Do you have two escape routes so you can go either way? 		
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To Reduce the Risks – **post lookouts**, consider locating line in a defensible position!!

Weather is Getting Hotter and Drier	<ul style="list-style-type: none"> • Do you have a workable plan if fire behavior increases? • Do you have a plan if the fire reaches you earlier than expected? • Is the method of spread the same? • Are your escape routes and safety zones still adequate? • Will you have adequate warning if you need to use the safety zones? 		
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Take weather observations more frequently, **Base ALL Actions on Current and Expected Fire Behavior**. As fire behavior increases you must re-examine your plan and risk analysis. Post more lookouts, if more warning time is needed.

Wind Increases or Changes Direction	<ul style="list-style-type: none"> • Is the wind at your back? Will it stay at your back? • Do you know what you will do if the fire reaches you faster than expected? • Are escape routes and safety zones still adequate? • Do you still have adequate warning time? • Will you be able to handle any additional spotting? • Is there little probability of the fire hooking around you? • Can you still carry out your strategy and/or tactics? 		
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Re-examine your situation. **Base ALL Actions on Current and Expected Fire**

Situation	Considerations	Ye s	N o
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Behavior! If fire behavior increases you must re-examine your plan and risk analysis.

Getting Frequent Spot Fires Across the Line	<ul style="list-style-type: none"> • Can you handle increased spotting? • Do you have a plan for long range spotting? • Is help available if necessary? • If fire behavior increases is your position still defensible? • Do you have more than one safety zone in case one gets cut off? • Do the primary lookouts have a good view of the situation? • Is the primary burning period ending? 		
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To Reduce the Risks – **Be ready to retreat.** Keep your guard up even if spotting has not occurred for a few hours.

Terrain and Fuels Make Escape To Safety Zones Difficult	<ul style="list-style-type: none"> • Does the crew's condition allow for fast travel? • Will you get adequate warning to make it to your safety zone? • Can escape routes be improved to make travel faster? Marked? • Will posting more lookouts give adequate warning? 		
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To Reduce the Risks – Consider other tactics that will allow you to be in a safer location!

Taking a Nap Near the Fireline	<ul style="list-style-type: none"> • Are lookouts posted? • Is the area free of hazards? • Are you still within agency work and rest policies? • Does your crew need a break? Have they been pushed too hard? 		
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The more "NO" answers, the higher the probability of being entrapped!! If the plan depends on everything going perfectly, ask, "What if? Is something else better?" Ask, "What am I protecting?" Is the value as high as the risk of exposing your crew(s) to a situation with a high possibility and high probability of entrapment?

In situations of low complexity you may be able to do your risk analysis in your head. As the situation gets more complex, i.e., more hazards or higher probabilities, do the risk analysis on paper to make sure you recognize the potential danger, and take proper steps to ensure safety.

Safety Zones

Identification of a safety zone is one of the primary responsibilities of any wildland firefighter working on or near the fireline. One aspect of firefighter safety is safety zone size. The following can be used in making safety zone selection:

- Calculations indicate that for most fires, safety zones must be wider than 50 meters to ensure firefighter survival.
- The calculation to determine safety zone radius is four times the maximum flame height plus 50 square feet per firefighter or an additional four feet of radius per firefighter. This calculation provides the radius of the safety zone, meaning the safety zone diameter should be twice the value of the above formula.
- If potential for the fire to burn completely around the safety zone exists, the diameter should be twice the values indicated above.
- Factors that will reduce safety zone size include reduction in flame height by thinning or burnout operations, shielding the safety zone from direct exposure to the flame by locating it on the lee side of ridges or other geographic structures, or reducing flame temperatures by applying fire retardant to the area around the safety zone.
- Full firefighter protective clothing, helmet, and neck protection must be worn.
- Keep in mind that these guidelines do not address convective energy.

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Common Denominators of Fatality Fires

- Most incidents happen on the smaller fires or on isolated portions of larger fires.
- Most fires are innocent in appearance before the “flare-up” or “blow-ups.” In some cases, tragedies occur in the mop-up stage.
- Flare-ups generally occur in deceptively light fuels.
- Fires run uphill surprisingly fast in chimneys, gullies, and on steep slopes.
- Some suppression tools, such as helicopters or airtankers, can adversely affect fire behavior. The blasts of air from low flying helicopters and airtankers have been known to cause flare-ups.

Downhill/Indirect Line Construction

Fireline can be constructed with handtools, mechanized equipment, water or retardant. The only reliable line is one that has been cut to mineral soil, that will catch rolling material, AND that is on the fire's edge.

As a general rule, construct line moving uphill. If there is no practical alternative to constructing line downhill, do so with extreme caution. Many firefighters have lost their lives attacking wildland fires from above. The following are guidelines for downhill line construction. They also apply to fireline that is being constructed some distance from the fire's edge where fire behavior cannot be observed and responded to.

- The decision is made by a competent firefighter after thorough scouting.

- Downhill line construction should not be attempted when fire is present directly below the proposed starting point.
- The fireline should not lie adjacent to a chute or chimney that could burn while the crew is nearby.
- Communication must be established between the crew working downhill and crews working toward them from below. When neither crew can adequately observe the fire, communications will be established between the crews, supervising overhead, and a lookout posted where the fire's behavior can be seen.
- The crew must be able to rapidly reach a zone of safety from any point along the line, if the fire unexpectedly crossed below them.
- A downhill line must be securely anchored at the top. Avoid underslung line, if practical.
- Line firing should be done as the line progresses, beginning from the anchor point at the top. The burned out area provides a continuous safety zone for the crew and reduces the likelihood of fire crossing the line.
- Beware – avoid the Watch Out Situations.
- Comply with all Standard Fire Orders.

Unexploded Ordnance (UXO)

Millions of acres of property in the United States contain unexploded ordnance (UXO), most of which is a result of weapons system testing and troop training activities conducted by the Department of Defense. This property includes active military, formerly used defense (FUD) and base realignment and closure (BRAC) sites. The risks posed by property containing UXO could be great depending on the types and amount of UXO present and how the property is or may be used.

Those who use and manage property with UXO, as well as those responsible for making decisions regarding the property, need information on the risks presented by UXO, options for eliminating or reducing the risks, and factors to be considered in the decision-making process.

A person's ability to recognize a UXO is the first and most important step in reducing the risk posed by a UXO hazard.

The following types of UXO are those most likely to be encountered on active military sites and FUD and BRAC sites:

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|------------------------|-------------------|
| ➤ Small arms munitions | ➤ Hand grenades |
| ➤ Rockets | ➤ Guided missiles |
| ➤ Projectiles | ➤ Mortars |
| ➤ Projected grenades | ➤ Rifle grenades |
| ➤ Submunitions | ➤ Bombs |

UXO is found in the environment in many different ways depending in part on the specific type of ordnance, when and where it was deployed, how it was deployed, and activities that may have taken place at the locations since deployment.

UXO may also be found fully intact or in parts or fragments. All UXO, whether intact or in parts, presents a potential hazard and should be treated as such. UXO that has deteriorated presents a particular hazard because it may contain chemical agents that could become exposed.

UXO Safety and Reporting UXO, whether present in an area by design or by accident, poses the risk of injury or death to anyone in the vicinity.

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“IF YOU DID NOT DROP IT, DO NOT PICK IT UP!”

- When you see UXO, stop. Do not move closer.
- Never transmit radio frequencies (walkie talkies, citizens' band radios).
- Never attempt to remove anything near a UXO.
- Never attempt to touch, move, or disturb a UXO.
- Clearly mark the UXO area.
- Avoid any area where UXO is located.
- Keep a minimum of 500 feet away from any UXO that is on fire.

Report discovery of UXO to your immediate supervisor.

Standard Safety Flagging

NWCG has established the following standard for wildland fire (prescribed and suppression) activities.

Safety Zones/Escape Routes lime green, fluorescent, biodegradable 1" wide (NFES #0258). When flagging no longer shows valid safety zones/escape routes, remove it **IMMEDIATELY**.

Hazards yellow w/black diagonal stripes, fluorescent, biodegradable 1" wide (NFES #0267)

Safety for Managers Visiting Fires

The BLM's *Fire and Aviation Program-wide Management Review Report* outlines the need for agency administrators to become actively involved in the management of wildfires. The report goes on to discuss performance requirements, one of which is to "personally visit an appropriate number of escaped fires each year." In preparation for these visits, it is important to have the proper PPE. Listed below are a few scenarios and the required PPE. If you have any questions, please discuss them with your fire and aviation management staff.

Visit to Fire Camp

The requirements for PPE at fire camp are the same as all field locations. Refer to *BLM Manual Handbook* 1112-2, "Safety and Health for Field Operations," page 16, 3.3. For general working conditions, the minimum requirements are:

- 8-inch leather lace boots with non-slip soles and heels
- long trousers
- long-sleeve shirt

The BLM field uniform is excellent; however, for more flexibility you may choose to wear the aramid fire shirts and trousers or flight suit.

Visits to the Fireline

When visiting the fireline, there are three major considerations: PPE, physical fitness, and training requirements or escort.

PPE Required

- 8-inch leather lace boots with non-slip soles and heels
- long trousers made of flame-resistant material
- long-sleeve shirt made of flame-resistant material
- hard hat
- leather gloves
- fire shelter and hand tool
- water canteen/personal First Aid Kit

Physical Fitness To visit the fireline, there are no specific physical fitness requirements, if escorted (escorts must be qualified at the single resource boss (crew or engine) level). However, you must be able to walk in mountainous terrain and be in good physical condition with no known limiting conditions. If you are not physically active and in good health, consider a medical examination, including an exercise electrocardiogram. If a manager visits a fireline unescorted, they must meet the physical fitness level of moderate.

Training Requirements Managers who are escorted are not required to have any previous training. However, if a manager is not escorted, he/she must have successfully completed the following:

- Introduction to Fire Behavior (S-190), 16 hours
- Firefighter Training (S-130), 32 hours
- Standards for Survival, video/workbook, 8 hours
- Your Fire Shelter, pamphlet
- Common Denominators of Fire Behavior on Tragedy & Near-Miss Forest Fires, booklet

Helicopter Observation Flights

Managers who take helicopter flights to observe fires must receive a passenger briefing and wear the PPE listed below.

PPE Required

- flight helmet
- fire-resistant clothing
- leather boots
- all leather or leather and aramid gloves

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Training Requirements can be met by any of the following courses: B1 Basic Helicopter Safety, B3 Basic Helicopter/Airplane Safety; or, S-270 Basic Air Operations. Occasional passengers have no training requirement, but a qualified flight manager must supervise loading and unloading of passengers.

Fixed-Wing Observation Flights

Managers who take fixed-wing flights to observe fires must meet the following minimum requirements:

- Flight level must not drop below 500' AGL
- Passenger briefing
- No PPE is required

Training Requirements can be met by any of the following courses: B2 Basic Airplane Safety; B3 Basic Helicopter/Airplane Safety; or, S-270 Basic Air Operations.

Prescribed Fire Safety

For more information on Prescribed Fire see *Prescribed Fire Management Handbook*, H-9214-1, U.S. Department of the Interior, Bureau of Land Management.

Safety Responsibility

Every person involved in a prescribed fire project is responsible for identifying safety issues and concerns.

A personnel briefing will be conducted prior to any prescribed fire activity to ensure those people involved understand how the project will be executed and what their individual assignments are. Briefings must cover safety considerations for both known site specific hazards and potential hazards. The development of a briefing checklist which is attached to the prescribed fire plan is required. A JHA will be completed and attached to each prescribed fire plan. Additional components of the Prescribed Fire Plan that have a direct impact on safety are: the go/no go checklist, and the communications plan.

Training and Qualifications

A discussion of prescribed fire training and qualifications can be found in the training and qualifications chapter.

PPE

All personnel on a prescribed fire project will be equipped with required PPE appropriate to their position or as identified in a JHA. For holding and ignition personnel the minimum PPE (unless otherwise identified in the JHA) is the same as that required for wildland fire assignments.

Smoke Exposure

Exposure to smoke during prescribed fire operations can be a significant safety concern. Smoke exposure on prescribed fires, especially in the holding and ignition positions, often exceeds that on wildfires.

- Use equipment rather than people, when possible, in holding areas (sprinklers, foam, etc.).
- Design burn plans with "maximum allowable perimeter" to permit minor slopovers.
- Minimize mop-up whenever possible (consider regulatory conflicts regarding hazard tree removal, endangered species, and so forth in risk assessments for fire safety and health).
- Change ignition times and firing patterns to minimize smoke impacts on lighters.
- Address smoke impacts in the JHA.
- Rotate personnel out of heavy smoke areas.
- Adjust prescriptions where possible to reduce smoke by providing more complete combustion.

Hazardous Materials

Purchase Purchase of hazardous materials (products containing chemicals) should be done using waste minimization principles to prevent surplus of product. Many products are sold with a shelf life that can expire before use if not managed properly. **Material Safety Data Sheets (MSDSs) should be obtained at time of purchase.**

Use Use of any product containing chemicals must be in compliance with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. The primary elements of that standard require employee training, material safety data sheets (including hazard determination), inventory of products, and a written hazard communication plan intended to protect employees using the products.

Storage Proper storage of hazardous materials is essential for the protection of employees. This is particularly important in the case of flammables and combustibles. The quantity of product affects storage requirements, and should be

considered when purchasing is done. Storage of flammables and combustibles must be in compliance with OSHA 29 CFR 1910.106.

Surplus Make every attempt not to over purchase products. Surplus products remain in the field, and may create a disposal or use problem for the field office that receives them. Any products left behind after an incident **must** be properly labeled and be accompanied by the appropriate material safety data sheet.

Classification NFPA 704 HazMat Classification descriptions can be found in the *Interagency Incident Response Pocket Guide*.