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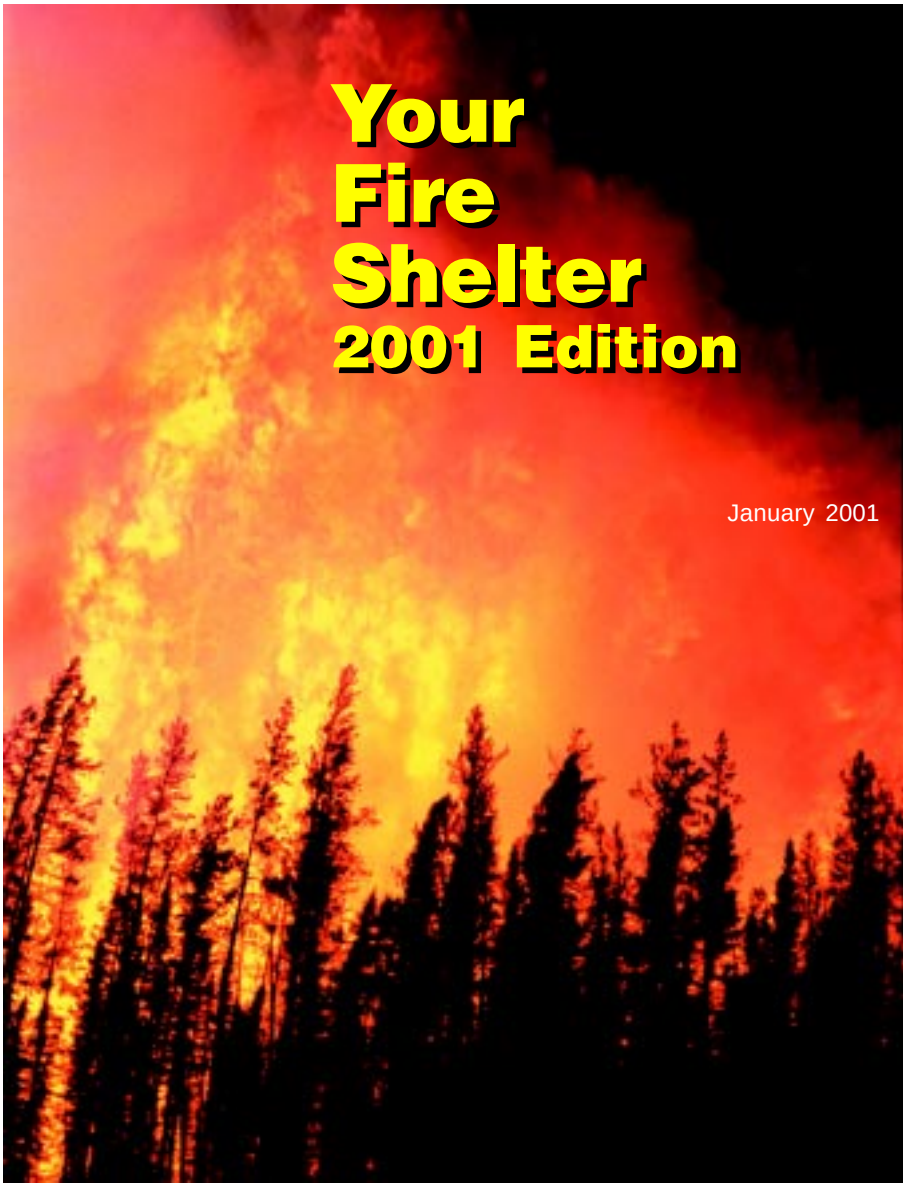

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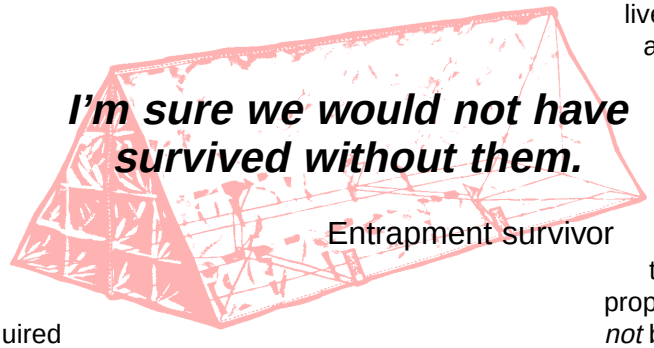
Your Fire Shelter

The fire shelter is a mandatory item of personal protective equipment for all Federal wildland firefighters and must be carried on the fireline by everyone on Federal fires. State, local, and rural fire departments may have different policies. However, no one who is required to carry a fire shelter should go on the fireline without reading, understanding, and practicing the recommendations in this booklet.

This booklet is the reference document for fire shelters. It explains how the fire shelter protects you. It explains the importance of training and knowing when and where to deploy the shelter. It tells you what to expect during an entrapment. It describes inspection procedures that will keep worn shelters off the fireline.

The booklet is not intended to stand alone. **New and experienced firefighters should use it as part of a comprehensive fire shelter training program that includes facilitated discussion and hands-on training.**



I'm sure we would not have survived without them.

Entrapment survivor

During training, be sure you understand the following key learning points:

- *Your highest priority is to avoid entrapment. If entrapment is imminent, escape if you can.*
- *During an escape or entrapment, protect your lungs and airways at all costs.*
- *If you are entrapped, get on the ground before the fire arrives.*
- *Dispose of fusees and other flammable items during escape.*
- *Deploy your shelter where flames will not contact it.*

The fire shelter has saved the lives of more than 250 firefighters and has prevented hundreds of serious injuries and illnesses from burns and smoke inhalation. But the shelter will not protect firefighters under *all* fire situations. Direct flame contact can destroy the shelter's protective properties. The fire shelter should *not* be deployed in areas where

NEVER go into dangerous areas or situations just because you are carrying a fire shelter.

The fire shelter should be used as a last resort if planned escape routes or safety zones become inadequate and entrapment is imminent. The shelter is not meant to allow firefighters to take chances.

Know Your Fire Shelter

Understanding how the fire shelter protects you as well as the factors that limit its performance will help you decide where and how to deploy your shelter for maximum protection. The fire shelter protects primarily by reflecting radiant heat and by trapping breathable air. It is made of aluminum foil bonded to fiberglass cloth. The foil reflects 95 percent of a fire's radiant heat (Figure 1). Only 5 percent of the radiant heat remains to raise the temperature of the shelter material and the air inside the shelter. With prolonged exposure, temperatures inside the shelter can exceed 150 °F. Firefighters can survive such temperatures—dry saunas often reach 190 °F. When you are inside a fire shelter, breathe through your mouth, stay calm, and above all, stay in your shelter.

…the right side of my shelter delaminated and the foil flipped over onto the left side…. I really started to get burned at that point because the only thing that was…on that side of my shelter was the glass mesh…. (When) there was still a tremendous amount of radiant heat coming off the surrounding area, a wind blew the shelter half back on to the other side, back to where it belonged, and it was like somebody closing a door on the oven…. The radiant heat difference that just that little piece of foil made was absolutely amazing.

Entrapment survivor

Unlike radiant heat, convective heat (from flames and hot gases) is easily absorbed by the fire shelter material and can rapidly raise its temperature. When the material reaches a temperature of about 475 °F, the glue that bonds the layers begins to break down. The layers can separate or "delaminate," allowing the foil to be blown about or torn by turbulent winds. Without the foil, the shelter provides far less protection. Flame contact can also cause the aluminum-foil layer to melt. Aluminum melts at 1,200 °F. Temperatures of flames in wildland fires average about 1,600 °F.

Types of Heat

Radiant Heat: Think of radiant heat as a ray or a wave. When you stand close to a campfire, radiant heat warms you. No air movement is required for radiant heat transfer.

Convective Heat: Think of convective heat as a blast of hot air. If you put your hand above a campfire, convective heat will burn you. Convective heating occurs when hot air moves past a surface, such as your hand or your fire shelter. Higher temperatures and stronger winds cause greater heating.

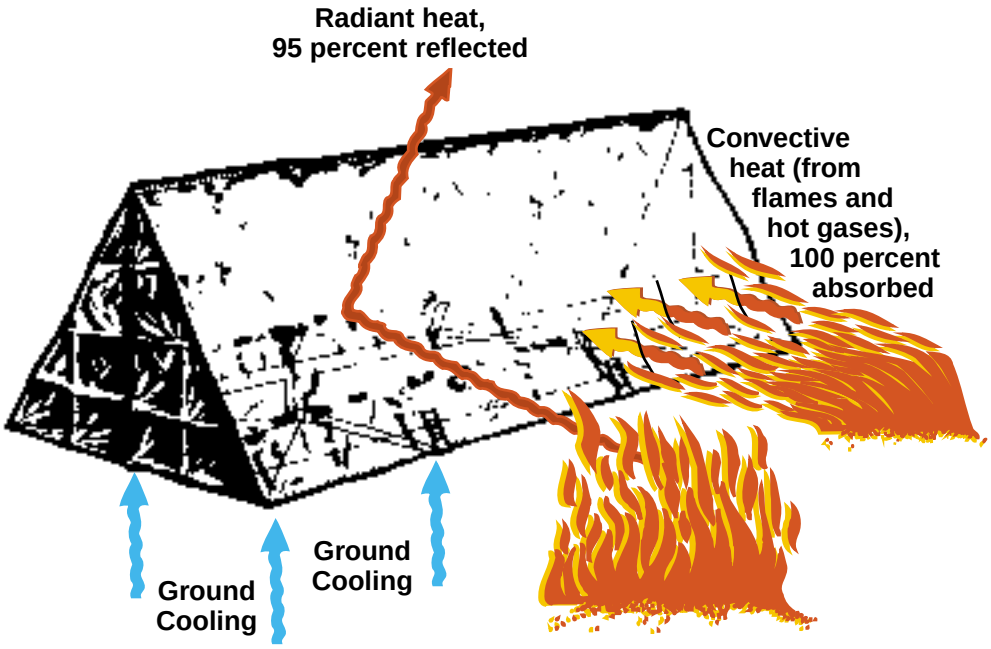


Figure 1 —The fire shelter reflects radiant heat and absorbs convective heat.

As the glue between the layers breaks down, the shelter may begin to fill with smoke and flammable gases. The gases are released more rapidly as temperatures rise. These gases can ignite and burn, especially if flames enter the shelter from the outside (Figure 2). Keep the shelter as far as possible from concentrations of natural fuels and flammable equipment. Deploying the shelter on a site that has been scraped to mineral soil helps prevent flames from contacting or entering the fire shelter. Radiant heat alone can raise the temperature of the shelter material to critical levels, but the temperature rises more slowly because most of the heat is reflected.

It is critically important to keep the fire shelter away from direct flame!

The shelter's pup-tent shape allows you to lie flat against the ground. This exposes less of your body to radiant heat and more of your body to the cool ground. With your face pressed to the ground, you are in the best position to breathe cooler, cleaner air.

The shelter's hold-down straps and perimeter skirt make it unlikely that it would be blown away by high winds. The skirt also helps keep out smoke, heat, and flames. It is critical that the fire shelter be held down on the ground before the flame front arrives. The shelter is quickly damaged if flames or radiant heat contact its inner surface.

It is important to carry the fire shelter properly. The case should be vertical if it is worn on your side or horizontal if it is worn in the small of your back under your pack. A chest harness is now available that allows persons operating machinery to carry the shelter on their chest. Never carry your shelter inside the main body of your field pack.

Figure 2—When direct flame contacts the fire shelter, glue in the shelter material may form gases that can ignite inside the shelter.

...The shelters really do an amazing job of reflecting that radiant heat.... When that shelter lifted up and you got that radiant heat directly, and the convective heat that was coming (in), it was just an incredible change in what you felt in there.

Entrapment survivor

Training

Hands-on shelter deployment is an essential part of fire shelter training. Firefighters have died when they were unable to deploy their shelters in time. Seconds are critical. It can take an untrained person several minutes to deploy a shelter. After three or four tries, most persons can deploy a shelter in 20 seconds or less. Practice fire shelters allow firefighters to practice frequently at a reasonable cost.

> ***It was obvious that (the firefighters) had (trained) and that they were comfortable with the task, and it seemed to sort of calm everybody down.***
>
> **Entrapment survivor**

Firefighters who have been through entrapments have reported that deploying the shelter had a calming effect—they were doing something they had been trained to do. The more you practice using your shelter, the more likely you are to react correctly in an emergency.

> ***I didn't say, "Start talking to each other," because I was thinking "Well, I need to calm these people down." I was thinking that because I was trained to do that. I had been told that in the training, "Once you're in the shelters, begin to talk to each other immediately."***
>
> **Supervisor and entrapment survivor**

Training Scenarios

> ***Training should not be done (under) controlled circumstances. Catch (firefighters) when they're tired; catch them when they are off guard; it may be more similar to what it's like in the real world.***
>
> **Supervisor and entrapment survivor**

Each individual should practice deploying the fire shelter under the following five scenarios. It is best to train in realistic field conditions. **Remember, always train wearing gloves, a hardhat, a full pack, and if you have one, a face and neck shroud.**

1. **Deploy your fire shelter while standing.**

   If there is time during a deployment, you should clear a 4- by 8-foot site down to mineral soil (Figure 3). Practice preparing the site so you can do so quickly. Practice deploying the shelter from a standing position. The best training locations are in the field where different site selections can be discussed. Practice evaluating possible deployment sites when out on the fireline so you can recognize deployment sites quickly under stress. Be aware of the time it takes to clear a site, remove your shelter, and be fully deployed on the ground under the shelter.

2. **Deploy your shelter while lying on the ground.**

   Practice deploying on the ground by opening your shelter and pulling it over you, head first. If the fire approaches before you are fully deployed, your most important action is to get flat on the ground (Figure 4). Temperatures just a few inches from the ground are

Figure 3—Deployment from a standing position.

Figure 4—Deployment from the ground.

dramatically higher than those at ground level. Death is almost certain if you get caught off the ground in a flame front.

3. **Drop your gear and remove your shelter while escaping.**

   When speed is essential for escape, drop your gear and run with only your fire shelter. You are more likely to remember these steps when stress and fear set in during an escape if you practice them each year. As you are running:

   - *Drop your gear.*
   - *Grab your shelter.*
   - *Strip off the shelter's vinyl bag.*
   - *Partially unfold the shelter.*

   The partially unfolded shelter can be used as a heat shield and can be fully deployed in a matter of seconds. You must take care not to catch the shelter on brush or rocks.

4. **Deploy your shelter in a strong wind.**

   Since fires are accompanied by high winds and turbulence, it is important to practice in these conditions. Some people find it easier to deploy from the ground in strong winds. Try a variety of deployment techniques to find one that works for you. Always remove your pack at the earliest stage of deployment—it is extremely difficult to deploy a fire shelter in the wind while wearing a pack.

   ***Note**:* While windstorms provide the most realistic training, you can get a good feel for wind deployments by using one or more strong fans, such as the positive ventilation fans used by structural fire departments.

5. **Lie in your shelter.**

   Lie in your shelter and picture yourself in an actual entrapment situation. Fear of confined spaces and the dark, combined with extreme heat, turbulence, and noise, can cause panic. Imagine the sounds, heat, and fear. Imagine steeling yourself to pain and staying in your shelter no matter what. Some firefighters have suffered claustrophobia while in their shelters. Spend

enough time inside a shelter to find out if you're claustrophobic. If you are, gradually increase the time you spend inside a shelter to help you adapt.

Annual refresher training will maintain proficiency in shelter deployment.

Visualization

In addition to hands-on training, visualize yourself going through the deployment scenarios. Think of visualization as a dress rehearsal. It is a form of practice that allows you to experience events before they happen. Images have a powerful effect on us. The mind treats an imagined entrapment as if it were real. If you ever do have to drop your pack and deploy your shelter, visualization makes it more likely that you'll react correctly, quickly, and without panic. Visualization should be used only to supplement—never to replace—hands-on training.

Picture yourself in different entrapment situations. Think your way through the entrapments and imagine yourself reacting correctly to each situation. The most important actions to visualize are:

- *Dropping your pack and tools to escape more quickly.*
- *Getting on the ground before the fire arrives.*
- *Getting under your shelter.*
- *Staying completely under your shelter even if you are being burned or the shelter starts to fail.*
- *Protecting your airways and lungs by remaining prone, with your face to the ground.*

Never Train in Live Fire

For more realism in training, some crews have occupied shelters near burning brush piles. This is unacceptable. Such training is extremely dangerous and risks firefighters' lives.

***NEVER* use live fire for fire shelter training.**

Water Can Make the Difference

It is extremely important that you stay well hydrated when fighting fire. Drink water often, during your shift and when you are off duty. If you are well hydrated, your body can sweat and cool itself more effectively. This is particularly important in the case of an entrapment.

Do not use your water to wet your clothing or your bandanna inside the fire shelter. Wet clothing conducts heat to the skin more quickly than dry clothing, so burns are more likely. As the water on the clothing evaporates, it increases the humidity inside the shelter. Moist air causes more damage to airways than dry air at the same temperature.

The best way to use your water is to drink it. Take canteens into your fire shelter if you have time. Continue to sip the water to replace lost fluids.

Escape

If entrapment seems likely, attempt planned escape procedures first. If there is reasonable doubt, take your shelter out of its case, pull one of the red rings, and remove the plastic bag. If time is critical, leave your gear and run with the shelter in your hands. If escape plans fail or become impossible to execute, use your shelter.

The fire shelter is a last resort. If you are threatened with entrapment, your first priority must be escape. All firefighters must know the location of their escape routes and safety zones at all times. Remember—in a true safety zone you do not need a fire shelter to protect you from heat and smoke. Follow the *10 Standard Fire Orders* and be aware of the *18 Watch Out Situations*. Continually reevaluate the effectiveness of your *Lookouts, Communications, Escape Routes, and Safety Zones* (LCES). Crew supervisors **must** identify escape routes and safety zones, and make sure they are known by their crews. Remember that changing conditions may compromise planned escape routes and safety zones, requiring that new escape routes and safety zones be identified if work in the area is to continue.

If you feel that entrapment is imminent, you will have to decide quickly whether or not you have time to escape. You will have to recognize when deployment of your fire shelter is your only option. If you cannot reach a safety zone, do not pass through an effective shelter deployment site only to get caught later in a more hazardous area. You must be decisive. If you are with a crew, follow the orders given by your supervisor. If you are in charge, be sure to give clear instructions and make sure they are understood.

Drop Gear for Speed

Since 1990, 23 firefighters have perished carrying packs and tools while moving uphill to escape fires. Some of these firefighters probably would have lived if they had dropped the extra weight. You can run 15 to 30 percent faster without the weight of your tools and pack. **Drop your pack as soon as you realize your escape may be compromised. Time is critical.** If you are escaping over uncleared ground, keep your tool. You may need it to clear a deployment site. Toss your gear well away from fire shelters so it does not ignite and burn a shelter.

Use Your Face and Neck Shrouds

Face and neck shrouds offer additional protection against radiant heat during escape. Shrouds should not be used to go into areas where you would not go without them. If shrouds are worn, they should be attached to the hardhat for quick deployment when they are needed. **Do not rely on shrouds to protect your airways from hot gases.**

Discard Your Fusees

Fusees are the most dangerous items you carry (Figure 5). When wearing shrouds and long-sleeved T-shirts, firefighters have worked close enough to radiant heat to melt goggles and hardhats. These plastics melt at around 320 °F. Fusees ignite at 375 °F. This temperature can occur under escape conditions. Fusees are one of the reasons you should drop your pack as soon as you recognize danger. In an entrapment situation, you do not have time to think about items in your pack that could be dangerous.

Do not take fusees into your fire shelter. Throw them as far away as possible.

Figure 5—Never take fusees into a fire shelter.

Stay Alert

When you are escaping an entrapment, you need to stay alert and be prepared to act. If the fire is closing in behind you, get your shelter out and partially unfold it. Use the shelter as a shield if you need one (Figure 6). Be careful not to drop the shelter, allow it to blow away, or allow it to snag on brush. Be ready to grab the shelter by an edge and get into it.

Be alert for signs of hot gases. Hot gases may have little smoke or color. Your only warning may be air movement, an increase in temperature, and embers blowing past. If gases get hot enough to burn you, it is time to get under your fire shelter.

As you move along your escape route, stay alert and talk to other crew members. Talking helps relieve stress and ensures that hazards will be communicated quickly. Be alert for deployment areas as you move. If it becomes apparent that you are not going to reach a safety zone, keep in mind how long it will take you to deploy your shelter. Deployment takes 20 seconds under ideal conditions, 30 to 40 seconds in turbulence, and 40 to 80 seconds in turbulence while you are wearing a pack. When time is critical, get rid of your pack and start to deploy on the move. Leave enough time to get on the ground and under your shelter before the heat arrives.

While the fire shelter is considered a last resort, it can also protect you from falling embers or help you escape through thick smoke. You should not hesitate to use your shelter to protect yourself. Your safety is always the highest priority. Do not worry about the cost of using a fire shelter. They are less costly than fire-resistant clothing or a visit to the hospital for smoke inhalation.

Figure 6—If necessary, use your shelter as a heat shield during escape.

Deployment

If you are part of a crew, your supervisor will decide where and when to deploy fire shelters. Follow orders. If you are not in a crew or have become separated from your crew, you must rely on your own judgment. Remember:

- *Follow planned escape procedures first.*
- *Use your fire shelter as a last resort.*
- *Give yourself enough deployment time.*
- *Don't panic.*
- *Have confidence in the shelter and in yourself.*

Get On the Ground

If time runs out while you are attempting to escape, you must get on the ground before the fire arrives and finish deploying on the ground. Death is almost certain if the fire catches you off the ground. **The optimal survival zone with or without a fire shelter is within a foot of the ground.** Once you are entrapped, your highest priority is to protect your lungs and airways.

Picking Your Deployment Site

Your goal in selecting a deployment site is to keep the fire shelter away from flames and convective heat as much as possible. Heat from flames, or convective heat, is quickly absorbed by the shelter and can decompose the glue that bonds the layers. The gases the glue produces can ignite inside the shelter.

When possible, you should take steps to limit the amount of radiant heat that reaches the shelter. Although radiant heat is absorbed much less readily than convective heat, it will increase the temperature inside the shelter. Extreme radiant heat can damage the shelter.

Try to pick natural firebreaks such as wet meadows, creekbeds, wet swampy areas, and rock slides (Figure 7).

Figure 7—Natural fuelbreaks, such as wide creekbeds, can be effective deployment sites.

Figure 8—Deploy fire shelters well away from thick vegetation such as the shrubby understory and the trees in this photograph.

Figure 9—Avoid areas where snags can fall on you, or where logs or rocks can roll on you.

Figure 10—Do not deploy in or next to tall or thick grass, small trees, trees with low branches, brush, piles of slash, or firefighting equipment such as packs, parachutes, tools, or chain saws. Firefighters who have deployed their fire shelters in sites that were otherwise adequate have been burned because they deployed too close to such fuels.

Large rockslides (right) can be effective deployment sites, but firefighters must deploy their shelters well away from grass, brush, and trees.

Figure 11—Wide areas that have been cleared of fuel, such as dozer lines or roads, can be effective deployment sites.

Figure 12—Ground fuels such as grass or tree litter can ignite rapidly in front of intense flames. Clear the deployment site to mineral soil if at all possible. If time is critical, pick a site with the sparsest fuels.

Figure 13—Burned areas can be effective deployment sites if there is no residual fuel that can reburn.

Figure 14—The lee side of ridgetops or knobs can be effective deployment sites because the convective heat and flames will generally continue rising above them. Fire intensity often drops when fire reaches a ridge. However, be alert for the possibility that the fire will spot and run up the lee side. Recommendations for staying away from fuels still apply.

Broad ridgetops (right) can offer effective deployment sites. Do not deploy in draws.

Figure 15—Flat areas on slopes, such as benches or road cuts, offer some protection from radiant and convective heat. Level areas like these can keep you below the path of flames and convective heat. A drainage ditch on the uphill side of a road cut can be an effective deployment site unless it contains fuels that can ignite and burn the shelter.

Four firefighters deployed their fire shelters on this road (right) during a burnover. All four survived with only minor burns.

Figure 16—Keep away from narrow draws, chutes, and chimneys. They tend to funnel smoke, flames, and hot gases.

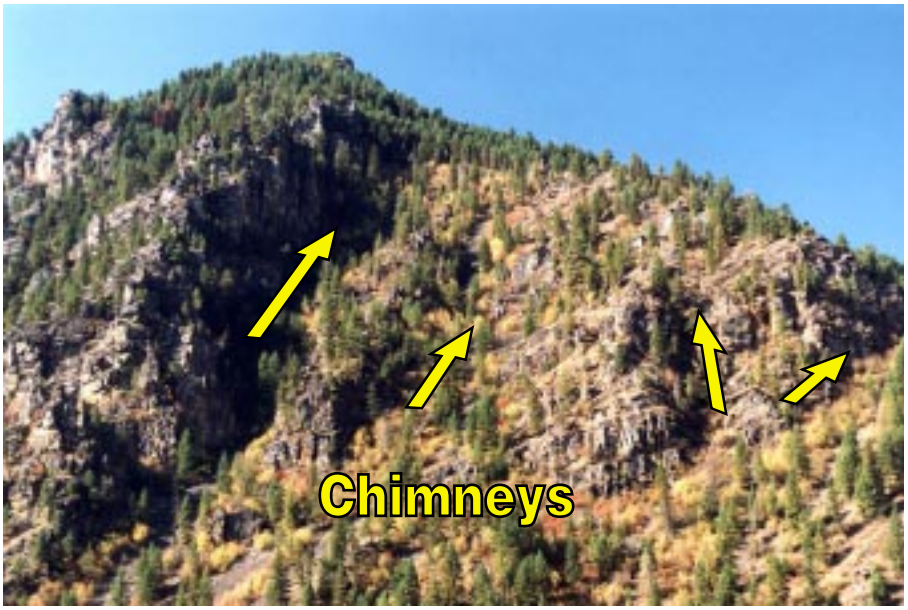


Figure 17—Avoid saddles on ridgetops since they also funnel smoke and heat.

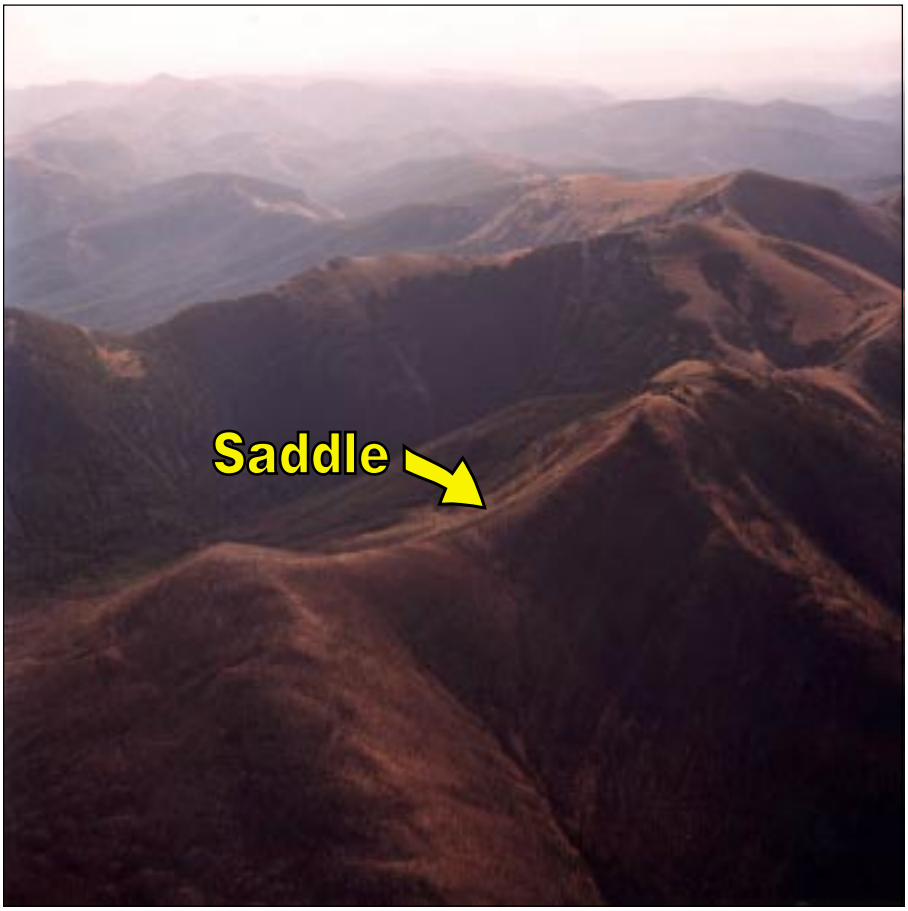


Figure 18—Stay out of draws, even when deploying on a road.

Figure 19—Large objects that will not burn, such as large rocks or piles of dirt, can help protect you from heat if they are between you and the approaching flames.

Standard Deployment Procedures

If you must deploy your fire shelter:

1. Remove your shelter from its case (Figure 20).

2. Scrape away ground fuels if time permits. Clear an area 4 by 8 feet (larger if you have time) down to mineral soil. A clean area minimizes flame contact with the shelter and reduces the likelihood the shelter will produce gases that could ignite inside it. Never deploy your shelter immediately downwind or uphill from a large concentration of fuel.

3. Pull either red ring on the vinyl bag down to the bottom and up the other side (Figure 21).

4. Pull the two halves apart at the bottom and remove the shelter.

5. Pick your deployment site. The lowest depression on the site is best. It should be as free of fuels as possible.

Figure 20—Pull the shelter from its case.

Figure 21—Pull the red ring to open the vinyl bag.

6. Flip out the shelter and unfold it (Figure 22).

7. Place your shelter so your feet are toward the oncoming flames. The end facing the advancing fire will become the hottest part of the shelter. It will be easier to hold that end down with your feet than with your hands and elbows. Keeping your head away from the heat as long as possible will better protect your lungs and airways.

8. The shelter can be deployed from a standing position or from the ground. Some firefighters have reported that deploying from a standing position is easier and allows you to better anchor the fire shelter.

   If the fire is closing in, get on the ground and finish your deployment there. Keep your face next to the ground as you pull the shelter over you, headfirst.

Figure 22—Flip out the shelter and unfold it.

Regardless of the deployment method, you must:

- *Position your feet and body so the holddown straps are beneath you when you lie prone (Figure 23).*
- *Fold out the floor panels when you are on the ground so they are under your body.*
- *Push the sides of the shelter away from your body to provide an air gap between you and the shelter material.*
- *Hold the shelter down with your feet, legs, elbows, and hands.*

What to Take Into the Shelter and What to Toss Aside

Some items should not be taken into the shelter under any circumstances. These are dangerous flammable items such

Figure 23—Position yourself properly inside the fire shelter.

as fusees and gasoline. Throw these items well away from you when you deploy your shelter. You should also keep tools such as pulaskis and shovels away from the shelter. Otherwise, they might cut the shelter material.

You should always wear your hardhat and gloves in the fire shelter. Wear your face and neck shroud if you have one. If you have time, take water with you so you can stay hydrated. Take your radio to maintain communication during and after the entrapment.

You should remove your pack before entering the shelter. Your pack may contain dangerous items, such as fusees. In addition, you can get into the shelter more quickly without your pack, particularly during high winds.

Group Deployment

People have suggested that in a group deployment of fire shelters, certain formations may be better than others. Fire shelters should be deployed close together. However, no particular formation is recognized as best. Optimal shelter placement will depend on the conditions. Select the best deployment sites available.

Sharing a Shelter

Never plan to share a shelter unless someone is without one. The shelter is designed for one person, but in some entrapments, two persons have shared a shelter. Sharing a shelter greatly increases your risk of injury because it reduces the amount of insulating airspace and increases body contact with hot shelter material. If sharing is unavoidable, both persons should lie with their heads at the end away from the oncoming flames. If you must get into a shelter with another person, yell at them so they know wind is not lifting the shelter. Always enter from the side away from flames or hot air, so you don't expose the shelter's occupant.

During an Entrapment

Once you've prepared your spot, get into your shelter and stay there. You must protect your airways and lungs from the fire's hot gases. Turbulence can lift a shelter's edge, letting in hot gases. Fires can generate winds of 50 mph or more, so you must hold the shelter down firmly. **Gloves are critical.** Without them you may burn your hands and be unable to hold down the shelter. In 1979, a firefighter in Idaho was killed when his hands were burned and he was unable to hold down his shelter. Wear your hardhat so the shelter fabric does not burn your head.

Keep the shelter's sides pushed out so the shelter material does not touch you. Even small air gaps offer excellent insulation. **Do not roll up in the shelter**. This reduces the availability of breathable air, can cause conduction burns, and can allow the air temperature inside the shelter to rise more quickly.

Keep your nose pressed to the ground as much as possible. The air right at ground level is usually cooler and cleaner than air even inches higher. Breathe through a dry bandanna to help reduce the heat and smoke you inhale.

> ***(With) any change in elevation inside the shelter, there was a drastic change in the temperature. If you look at the burn injuries that I received, anything that was off the ground and certainly the things that were higher up in the shelter (were) the areas (where) I received the most significant burns.***
>
> **Entrapment survivor**

Moving Your Shelter

You may want to move your shelter as the flame front changes position or to be closer to someone in trouble. Move by crawling on your belly, keeping the shelter edges close to the ground. If you have to adjust the shelter, remember that your lungs are vulnerable. Try not to breathe until your face is against the ground. If you are wearing a shroud, keep the front of it fastened in case any heat enters the shelter. Moving is risky. It exposes your airways and lungs to hot flames and gases. It may allow the shelter to fill with smoke. There's a chance of losing your shelter in high winds because you can't hang onto the shelter as well while moving. You can do little to help another person during the peak of an entrapment. **Do not move unless it is absolutely necessary**.

Talk to Others

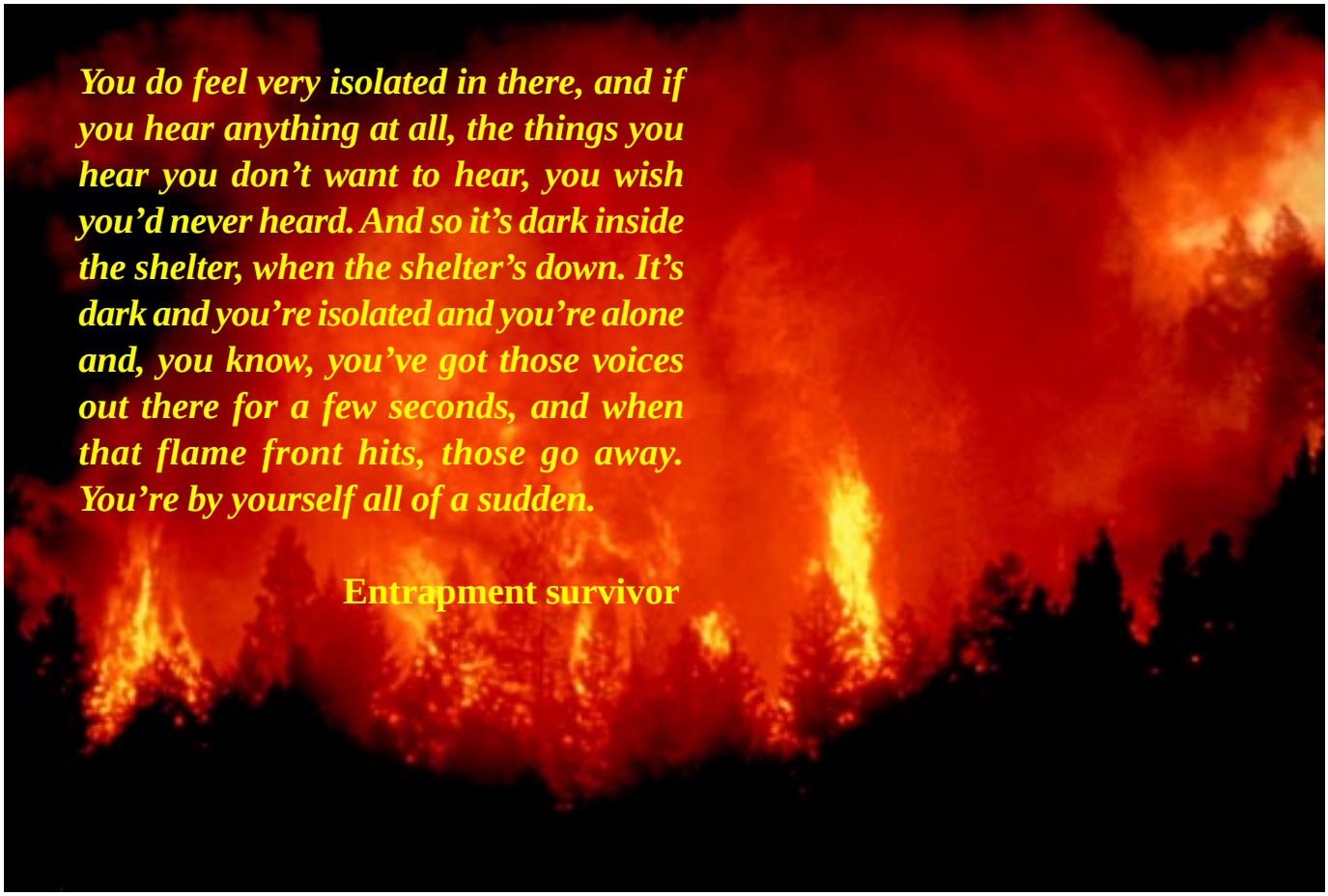
During entrapment, talk to other trapped firefighters by radio or shout back and forth. If someone yells at you, try to let that person know you're okay. If someone doesn't respond to your shouts, **do not leave your shelter.** Fire entrapment can induce panic. Some people may not answer until after the danger has passed. During very turbulent conditions, it will take all your effort to hold down the shelter. At a fire's peak, the noise will be deafening. You may be unable to hear anyone. Keep calm. As soon as the noise subsides, resume talking to each other.

Conditions Inside the Shelter

In a prolonged entrapment, peak temperatures inside the shelter can exceed 150 °F. Take advantage of the layer of fresh air usually found at ground level. Take short, shallow breaths through your mouth when you're breathing very hot air.

The fire shelter has pinholes and may have cracks along its folds. Entrapped firefighters say that firelight entering these openings looks like hot coals or embers on clothing. These openings do not reduce your protection. No matter how big a hole or tear your shelter may have, you are better off inside the shelter.

The inside surface of the shelter material can become hot enough to burn you. This is why you should be wearing a hardhat, flame-resistant clothing, and gloves. Usually, the shelter fabric does not touch you, but entrapped firefighters tell of turbulent, fire-generated winds strong enough to blow the shelter against them. Gloves will let you push the cloth away from your body to maintain a protective air gap.



When the first fire front came across us, I would estimate that the winds were probably in excess of 70 miles per hour. The sense of power that you had around you, that energy release that we had around us was just absolutely incredible. It was a very humbling experience. I mean you felt very small and very insignificant at that point.

Entrapment survivor

In longer entrapments, or when flame contacts the shelter, burns are more likely. Shelter material is most likely to contact your feet, buttocks, head, elbows, and hands. It is best to gently shift the points of contact, especially around your feet and elbows, since prolonged contact will cause burns.

If flames contact the shelter, the glass/foil fabric heats up rapidly. The adhesive may start to break down and the shelter may begin to fill with gases and smoke. These gases can ignite, especially if flame enters the shelter. You may still survive if you remain in your shelter with your nose pressed to the ground. **Conditions will be far worse outside the shelter**. Spots of aluminum foil can melt or tear away from the fire shelter, reducing protection. Even so, it is still safer inside. Your flame-resistant clothing becomes your backup protection.

Direct contact with flames or hot gases is the biggest threat to your shelter. It is vital to deploy the shelter in a spot that offers the least chance of such contact. The heavier the fuels, the larger your fuel break needs to be.

It was extremely painful…. Things that were going through my head were, "I'm going to die, this is going to kill me."… Afterwards, I remember thinking that because my legs were burned on the back of both calves and the backs of my thighs and it was so painful and it had gone on for such a long period of time that they're probably going to have to amputate my legs.

You believe that you're being burned to death or that you're being burned to the point that you'd never be able to use those limbs again, when in fact (my injuries) were deep third degree burns. But…I ended up…being able to fully recover and not have any really serious disability.

(We need to) make sure that people know what they might encounter, what it might be like, what they might hear and see around them, and to know above all else that if you get up, you die.

I think people need to know that you're going to think you're dying lying there on the ground, but in fact it's probably not as bad as you really think it is, and as long as you can protect your respiratory tract, you're probably going to walk away from this and maybe fight fire again another day. People have to know that up front, going into this, or they're just going to be surprised by it when they get in there and they start feeling these things and they go, "Oh, my God, I'm dying. What do I do now?" You have to condition them to know what the response to that should be, "Oh, my God, I'm dying. Well, they told me I would. And, so I need to stay here."

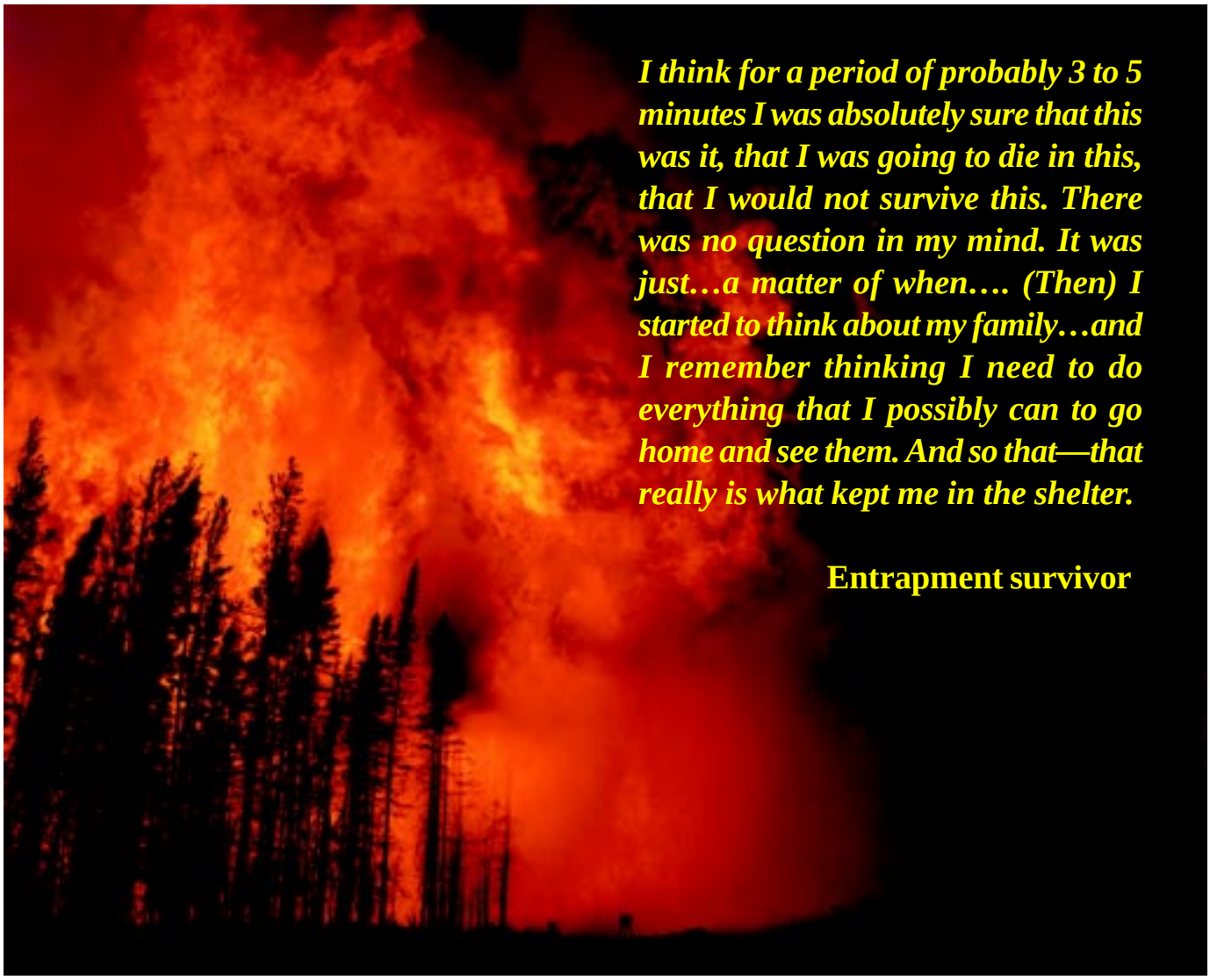
Entrapment survivor

Controlling Panic

> ***This was like a nuclear blast occurring right over you and you're lying in tinfoil.***
>
> **Entrapment survivor**

Firefighters can panic when they become entrapped. Panic can cause firefighters to leave their shelters and make a run for it—a far more hazardous gamble than staying put. It is very important to control such feelings so you can think clearly. Once you are under the shelter, concentrate your attention on your breath or on an object, person, or religious symbol that is very meaningful to you. You can also use a repetitive chant or phrase. These techniques of meditation will help quiet your mind. They can help reduce panic, yet keep you alert for necessary actions.

> ***…One of the other firefighters began to pray out loud, and it had almost a soothing effect at that point, listening to him do that.***
>
> **Entrapment survivor**



Stay in Your Shelter

> ***When the flame front hit, the shelter was unbearable. I cannot put in words what it was like. It was just totally unbearable. The only reason I didn't get up and get out was because I had enough sense to realize it was a lot worse on the outside.***
>
> **Entrapment survivor**

Remember, once you commit yourself to the shelter, stay there. No matter how bad it gets inside, it is much worse outside. If you panic and leave the shelter, one breath of hot, toxic gases can damage your lungs. Suffocation will follow. Most firefighters who perish die from heat-damaged airways and lungs, not from external burns. You may be burned. You may feel like you are dying, but your only chance to protect your airways and lungs is to stay in your shelter.

> ***We need to emphasize that to people, that they may receive injuries, but their greatest hope is staying inside that shelter and protecting themselves, no matter what they hear, no matter what they see or feel, that they have to make just an absolute commitment to staying with that shelter if they want to go home.***
>
> **Entrapment survivor**

When to Leave the Shelter

There is no fixed time to stay under your shelter. **Don't move until the flame front has passed**. A drop in noise, wind, and heat, and a change in the color of light passing through the shelter are tipoffs that it's safe to leave the shelter. Stay put until temperatures have cooled significantly or a supervisor tells you it's safe to come out. Leaving a shelter too soon can expose your lungs to superheated air or dense smoke. Typical entrapments have ranged from 15 to 90 minutes. Entrapments are shorter in light, flashy fuels, and longer in dense, heavy fuels. **Firefighters have died when they came out of their shelters too soon. Stay inside a little longer if you have any doubt about leaving the shelter.**

Inspection

The shelter has an indefinite shelf life because its materials do not degrade in normal fire-cache storage. Nevertheless, all shelters should be inspected when they are issued and every 14 days during the fire season. Only serviceable fire shelters should be taken to the fireline. Don't assume that a new carrying case contains a new shelter. Shelters with the oldest manufacture dates should be issued first.

Inspect the carrying case, liner, vinyl bag, and shelter. **Do not open the vinyl bag**. All opened shelters should be removed from service.

1. Check the vinyl plastic bag to ensure that the quick-opening strip is unbroken and the two red pull rings are intact. If any item is broken, remove the shelter from service (Figure 24).

2. Abrasion is the most common shelter damage. It can be spotted through the vinyl bag. Typically, the aluminum foil is rubbed from the fiberglass cloth on the outer surface or the outside edges of the shelter. Remove the shelter from service if you see extensive edge abrasion, if aluminum particles have turned the clear vinyl bag dark gray or black, or if debris is in the bottom of the bag. All of these problems are signs of serious abrasion.

3. Look for tears along folded edges. Tears are most likely to occur at the top end of the shelter where all the sharp edges come together above the liner. Damage is less common along the wider folds. Remove shelters from service when tears are longer than $^{1}/_{4}$ inch. Many cracks and pinholes occur in the shelter fabric during manufacture, particularly when the shelter is sewn and folded. Holes the size of a dime

Figure 24—Frequent inspection keeps damaged shelters off the fireline.

or smaller don't impair the shelter's ability to reflect radiant heat. If holes are larger than a dime, remove the shelter from service.

Shelters that have been removed from service make excellent training aids, but should be clearly marked "For Training Only" so they do not reach the fireline.

Care of the Fire Shelter

Firefighting is rough on equipment, so the fire shelter is expected to have a limited service life. A little care can extend that life—even on the fireline.

The shelter is an important piece of protective equipment. Treat it accordingly:

- *Keep your shelter away from sharp objects that may puncture it.*
- *Don't load heavy objects on top of the shelter.*
- *Avoid rough handling.*
- *Do not crush the shelter when leaning against objects.*
- *Do not sit on the shelter or use it as a pillow.*
- *Always keep the shelter in its hard plastic liner.*

Practice Fire Shelters

Practice fire shelters are made from blue plastic and are designed to be reused many times. The carrying case and liner are identical to the standard case except that the practice shelter's carrying case is orange. *Never* mix practice and real fire shelter components. Sooner or later someone could end up carrying a practice shelter onto the fireline. This is another reason to inspect your fire shelter when you first receive it.

Conclusions

As a firefighter, your highest priority is to stay out of situations that can lead to entrapment. You must take responsibility for your own safety. You have an obligation to speak up if you see something that is wrong, and you have the right to be heard without criticism. Remember, the fire shelter does not guarantee your safety. It is a last resort.

But, if you ever have to use your fire shelter, use it with confidence. The fire shelter has saved the lives of over 250 firefighters and has prevented serious burn injuries for hundreds of others. Take your training seriously. Practice deploying your shelter until deployment is, in the words of one entrapment survivor, “like tying your shoe.” Think of training as life insurance—insurance that if the unthinkable ever occurs, you will have every possible chance to survive.

Feedback

Improving the fire shelter and the fire shelter training aids is an ongoing process. Ideas for improvements come primarily from you, the users. Please send your ideas for improvements to us.

Send comments and suggestions to:

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About the Project Leader

Leslie Anderson has been a Project Leader for the fire shelter and fire clothing projects since 1998. She has a bachelor's degree in forestry from the University of California, Berkeley, and a master's degree in forestry from the University of Montana. She has worked in wildland fire since 1979, including stints as a smokejumper and as an Assistant District Fire Management Officer on the Bitterroot National Forest.