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# Forest Fire Shelters Save Lives

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The 1985 fire season proved especially active for firefighters nationwide. Drought and adverse weather combined to set the stage for extreme fire behavior. Massive crowning, spotting, and fast spread characterized last year's fires, which trapped more than 200 firefighters. But thanks to good crew leadership and the fire shelter, many deaths and serious injuries were prevented.

Fires trapped crews in the East early in the year. Out West, the most dangerous fires took place later in the summer. Two serious incidents occurred in Idaho fires. Some 82 firefighters deployed shelters while battling the Lake Mountain Fire on the Payette National Forest. On the Butte Fire, in the Salmon National Forest, a fast-moving crown fire chased four crews into safety zones. The firefighters set up shelters and survived despite intense heat and smoke. According to one crew boss, the fire shelter made the difference: "The shelter saved our lives. We had no escape alternative."

Reports from the Lake Mountain Fire tell us that most firefighters deployed their shelters under circumstances that were not life threatening. Nevertheless, the shelter is credited with saving a few lives, and it protected countless crew members from serious burns and smoke inhalation.

## Lives Saved on Butte Fire

The Butte Fire entrapments clearly were life threatening. Eddie Abeyta,

crew liaison officer, Santa Fe National Forest, who was one of those trapped, says, "We would've never made it without the shelter. There is no question about it. No shelter, no walk out of there."

According to Nick Montoya of the Carson Hotshots, who was trapped in the larger of the two safety zones, "Mortality might have been 75 percent without the shelter." Of the 73 deployments in both safety zones, investigators believe at least 60 firefighters would have died without the shelter's protection. Once again the fire shelter had proved itself.

We estimate that the fire shelter has saved more than 140 lives since its introduction in the early 1960's. The main reason the fire shelter saves lives is because it gives firefighters a way to protect face and airways. Breathing flames and hot gases is the greatest hazard in fire entrapment; thus protecting face and airways is vital. This fact cannot be stressed enough. A Federal Aviation Administration study of 1,140 burn cases involving 106 fatalities concluded that if the lower respiratory tree (trachea, main bronchi, and secondary bronchi) is burned, death is almost inevitable.

We also believe the more you know about the fire shelter, the more confidence you'll have in it, and the better prepared you'll be to stay put in your shelter should you ever become trapped. We have learned a lot from our investigation of the Butte Fire entrapments and want firefighters to know about the role the fire shelter

played and how they can increase their chance of survival.

## What the Shelter Can and Can't Do

The fire shelter protects primarily by reflecting radiant heat. As demonstrated on the Butte Fire, even large cracks or tears do not reduce the shelter's protective capabilities when radiant heat is the principal hazard. Several people on that fire deployed shelters with 4- to 18-inch tears. These shelters let in some smoke but still protected their occupants from radiant heat and heavier concentrations of smoke.

The shelter's thin aluminum-glass cloth laminate can withstand only limited contact with flames. Cracks, tears, or holes reduce its protection in direct flames. The shelter should be deployed away from fuel concentrations—both natural fuels and flammable equipment.

## Techniques for Survival

**Avoid Entrapment**—Experienced firefighters know the best way to ensure their safety on a wildfire is to avoid entrapment. But when drought conditions and severe fire weather combine, as they did on the Butte Fire, avoiding entrapment is not always possible. Several people we interviewed said that before being trapped on the Butte Fire, they felt they would never let themselves get into such a situation and need a fire shelter.

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## **We estimate that the fire shelter has saved more than 140 lives since its introduction . . . .**

Although entrapment can't always be avoided, you can make it unlikely by:

- Following the 10 Standard Firefighting Orders.
- Knowing the 13 fire situations that shout "Watch Out!"
- Knowing the four major common denominators of fire behavior that lead to tragedy or near-miss fires.

*Use the fire shelter as a last resort. Follow proven escape procedures first.*

### **Select Safety Zones Carefully—**

The large safety zones on the Butte Fire minimized direct flame contact on the shelters, allowing them to perform effectively and reflect radiant heat as they were designed to do.

First, select safety areas carefully. Next, look for natural protection within the safety zone and use it. Erect the shelter behind a large rock, dozer blade, or other heat shield. Take advantage of constructed or natural depressions or small earth berms. On roads, deploy in the cut slope ditch. Such spots expose you and your shelter to less heat, smoke, and wind.

### **Commit Yourself to the**

**Shelter—**When you know you can't escape entrapment, commit yourself to the shelter. Deploy it quickly. Use any extra time to pick the best spot and prepare the site by scraping away flammable fuels. Keep an arm or leg through one of the shelter straps. Otherwise, you might lose the shelter in the high winds the flame front generates. A survivor of the Butte Fire—a

veteran of 23 fire seasons—estimated winds at 50 to 70 miles per hour.

The coolest, cleanest air is within a few inches of the ground. So stay low with your nose pressed to the earth.

Once inside the shelter, stick it out no matter how scared you are or how painful it is. Remember, it is always much better inside the shelter than outside. If you make a dash for it, your chances of survival are poor. If you leave after the flame front passes but while it's still smokey, you risk injury—from smoke inhalation. It's best to stay put until a crew leader says it's safe to leave.

**Maintain Communications—**The entrapment reports we've studied show the psychological benefits of reducing fear and panic by talking to trapped coworkers directly or by radio. If you can't talk on the radio, listen. Outside observers may be able to provide valuable information about the fire in your location. At its peak, the noise of a fire can be deafening, and you may not be able to hear anyone. Don't panic. As soon as the noise subsides, resume communications.

**Role of Other Equipment—**Recent fire entrapments illustrate the value of flame-resistant clothing. This clothing protects you while you're escaping entrapment or deploying and occupying a shelter. Be sure to wear gloves. Butte Fire experiences show that holding the shelter down can be a major problem in high winds. Without gloves you may burn your hands and not be able to hold the shelter

down. We hope to improve shelter hold-down features in future designs. Wear your hardhat, equipment packs, and other gear inside the shelter to help keep hot surfaces away from your body. Be sure to leave tools, which can cut shelter cloth, outside. Any gasoline or fuses should be left behind or thrown far from any shelter.

In larger safety areas, you may want to move the shelter to get away from heat concentrations. This tactic was effective on the Butte Fire. However, firefighters reported that as they moved the shelters were hard to hold onto, allowing smoke to get inside. *Remember, if you move, there is the danger of exposing your face to hot flames and gases.*

**Shelter Training—**The more you know about the fire shelter and what to expect during entrapment, the better prepared you'll be should it happen. A new film, "Your Fire Shelter," is a good place to begin. Study the pamphlet of the same title carefully. Practice the imaging techniques, then get hands-on training by deploying obsolete shelters. Refer to the pamphlet for training recommendations.

**Care and Inspection—**Experiences during the past several years have shown why proper shelter care and inspection are vital. Many shelters deployed on the Butte Fire had cracks along the fold lines. Most shelters with this type of damage should be screened out in a proper inspection program. The pamphlet "Your Fire Shelter" contains details on care and inspection.

The events of the 1985 fire season have reaffirmed the worth of the fire shelter and the wisdom of having every firefighter carry one on the line. Entrapment experiences made believers out of many firefighters during this past fire season. Learn from their experience—find out as much as you can about how to use, care for, and inspect the fire shelter. This know-how could save your life someday. ■

#### **Shelter Use Observations**

1. Fire shelters work, even when they are not in the best condition. Some shelters used in the Butte Fire had 4- to 18-inch tears along folds.
2. In indirect attack situations, safety zones should be constructed to provide effective backup if alternative escape routes are cut off or early evacuation is not possible.
3. Safety zones on ridge tops should be at least 300 feet in diameter in timber with fuel model G or 10. They may have to be larger in other locations.
4. The value of competent, well-trained, and experienced crew bosses, strike team leaders, and division supervisors cannot be overemphasized. In the Butte Fire incident, many lives were saved through their actions.

5. Overhead should recognize that firefighters using shelters may not be able to use their radios if turbulent conditions make it difficult to hold the shelter in place. On the other hand, one-way communications should continue to give instructions and reassurance. It will be a challenge to overhead to effectively communicate reassurances to sheltered firefighters while still transmitting key information regarding the nature of a major incident.

6. When in shelters, firefighters should continue to talk to one another to maintain contact and reduce the chance of panic.

7. Once the fire has passed over, firefighters should stay in their shelters until the smoke has cleared.

8. Sheltered firefighters should not wet down their skin or clothing or wet handkerchiefs for breathing. Moist heat causes more damage to lung tissues than dry heat.

9. Sheltered firefighters should sip water to prevent dehydration.

10. Incident commanders, operation section chiefs, and emergency medical technicians should follow up after an incident to ensure that those involved in the shelter deployment are in the proper physical and mental con-

dition to continue in their fire assignments. A delayed stress response following a traumatic incident could seriously impair the safety and productivity of fireline personnel.

11. The life-saving value of shelters should be ensured through proper care and handling by firefighters. Throwing shelters around, sitting on them, or other rough treatment will accelerate the development of tears and holes.

12. Missoula Equipment Development Center's field trial publication "Your Fire Shelter" (August 1984) contains the most up-to-date information on fire shelter use and inspection. All firefighting personnel should carefully review this publication. The publication includes information on entrapment and on deployment, inspection, and care and handling of the shelter.

13. Measures need to be taken to ensure that all firefighters know how to deploy and use the fire shelter. Contract sawyers, dozer operators, National Guard truck drivers, and other involved persons should be instructed as well.

**Richard C. Rothermel and  
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