Fire
Tech Tips

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Keeping Warm On Fires

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Wildland firefighters are subject to a wide range of environmental hazards. Heat stress has always been identified as a problem, but firefighters may be exposed to mild to moderate cold stress and damp conditions, especially on early- and late-season fires. Cold weather conditions can lower body temperature, impairing performance and increasing the likelihood of injuries. When your body loses more heat than you can produce, your temperature falls. Hypothermia may occur and can become life-threatening. To prevent hypothermia in cold conditions, pay careful attention to your extremities (hands, feet, and head). Your extremities are the most exposed parts of your body and are the most difficult to keep warm.

Figure 1—Layered clothing allows you to adjust quickly to maintain comfort.

Torso

Firefighters expend a lot of energy on the fireline. When we work hard our body sweats in an attempt to maintain its normal temperature. After you stop working in cold weather, the sweat in your clothes can continue to cool you, even though you're no longer producing excess heat. Think in terms of layers when selecting your cold-weather clothing (Figure 1). Layered clothing allows you to shed

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layers when you are working, reducing sweating, which can soak your clothing and decrease its insulating ability. Even the best vapor-transmission fabrics can't keep up with moisture from heavy sweating. If you wear good firefighting boots and midweight or heavy-weight thermal underwear, you will significantly increase your protection against the cold.

Natural fibers char before melting and have a much higher resistance to heat and flame than the synthetics used for insulating garments. Wool is an excellent insulator and naturally flame resistant, but it is generally uncomfortable next to the skin. Silk also has excellent natural flame resistance. Neither wool nor silk has as much flame resistance as Nomex, but both are far superior to typical synthetic insulating materials. A simple cotton sweatshirt can be worn under your Nomex shirt. The sweatshirt provides warmth, is easy to put on and take off, and stores easily in your line gear. Consider wearing a long-sleeve cotton T-shirt. It is light and offers a little more warmth than a regular T-shirt. A flame-retardant long-sleeve T-shirt is available on the market. Nomex jackets (Figure 2) and Nomex long underwear are also available.

You can wear wool or cotton thermal underwear under your Nomex pants. They should be worn only during the coldest days, because they are not convenient to take off if you become too warm. Some wool-and-cotton-blend thermal underwear is available. Any clothing you wear on a fire in addition to your Nomex should be cotton, wool, or a blend. Synthetics are not recommended because they offer little heat resistance and have a relatively low melting point. Whatever clothing you wear outside your Nomex must be NFPA 1977 approved.

Figure 2—A Nomex jacket can help firefighters stay warm during cold weather.

Head

Most heat is lost from your head (15 to 35 percent of body heat loss). Keeping your head warm is a priority. One difficulty is that firefighters must keep their hardhat on at all times when they are on the fireline. Hardhat liners available on the market are made specifically to keep your head warm when you're wearing a hardhat. It's still a good idea to keep a wool stocking cap in your gear for times when you're not wearing a hardhat.

Hands and Feet

Your hands and feet need attention when you are trying to stay warm. The importance of good socks has been emphasized in the Missoula Technology and Development Center (MTDC) video *Meet Your Feet.* Spare socks are very important, especially in cold weather. Wear good insulated socks, such as wool or wool-cotton blend socks. Wool is a great material because it continues to provide some insulation even when it is wet. Keep a dry pair of wool gloves in your line gear and put them on if your hands become cold. Wool glove liners are available on the market that will fit inside a pair of standard-issue Forest Service leather gloves. Wet, exposed hands can be very miserable and can be a factor leading to hypothermia.

Firefighters often are around hoses, pumps, and other water-handling equipment. Try to keep your hands as dry as possible when handling water in cold weather. Keep an extra pair of work gloves in your line gear. Put dry gloves on as soon as you are through handling water.

Cold-Weather Procedures

Cold weather procedures that should be practiced by the wildland firefighter include:

- Reduce periods of inactivity during cold conditions.
- Maintain proper hydration and nutrition to reduce susceptibility to cold injuries. During cold weather consume half a quart of water with each meal and before going to sleep at night. An additional half-quart should be consumed every hour during the workday. Drink more than half a quart an hour if the work is strenuous enough to cause you to sweat.
- Avoid caffeine and tobacco because they prevent your body from making the proper adjustments for the cold.
- Wear clothes that provide airflow and allow sweat to evaporate. Physically active people sweat even in cold weather. If sweat cannot evaporate, it accumulates, reducing the insulating value of your clothing.

Conclusions

Most firefighters focus on the risk of heat injuries while on a wildland fire, but they should also be aware of injuries from the cold. In some parts of the country fires burn well into the fall, when evening and morning temperatures are below freezing. Under these circumstances firefighters need to be prepared to keep themselves warm, comfortable, and safe. Your brain is the best weapon against cold-related illnesses and injuries. Think about the clothing you are wearing and the conditions you are going to be working in.

About the Author…

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