



The Development of Safety Training after Mann Gulch

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In the decade following the Mann Gulch fire that killed twelve smoke jumpers and one recreational guard in Montana in 1949, the U. S. Forest Service created technical and research centers in Montana and California dedicated to developing equipment to help protect firefighters from a multitude of dangers on the fire line. Probably the most dramatic invention was the metal-coated, pup tent-like fire shelter that reflects radiant heat and gives a firefighter a better chance at surviving an entrapment. Today, the centers also study a myriad of health and safety issues--from the long-term effects of smoke inhalation on firefighters, to driver safety in and around large fire camps.



The agency also constructed a fire laboratory in Missoula, Montana, where scientists study and analyze fire behavior. The research has led to educational videos, pamphlets, and other training methods that give wildland firefighters a clearer picture about how local weather conditions, local topography, and fuels interact with fire. With this knowledge firefighters can better predict how volatile fuels, temperature, humidity, wind speed, and slope can quickly alter the characteristics of a fire and pose a threat to workers. Today, the agency issues maps and radios as standard equipment to firefighting crews.

But probably the most important change is the emphasis the agency puts on individual safety training--from the Incident Commander who coordinates a fire camp of hundreds of workers down to the individual groundpounder. All firefighters receive this training while qualifying for a 'red card.' Without the card, they cannot work the fire line. Over time the agency identified and emphasized "Ten Standard Fire Orders" (developed in 1957) and "Eighteen Watch Out Situations" (proposed during the 1960s) during training sessions. Some researchers and firefighters thought the focus too wide ranging to be effective.

The most recent development in safety training for wildland firefighters is called "Lookouts, Communication, Escape Routes, and Safety Zones"--or, LCES. The simple message of LCES saves lives on the fire line for the same reason lettuce, cheese, pickles and onions on a sesame bun sells a lot of hamburgers--it's simple. The idea came to life on June 26, 1990, when Paul Gleason--superintendent of the Zigzag Hotshots at the time--watched a wall of flames on the Dude Fire in Arizona rush through continuous vegetation and overtake the Perryville inmate fire crew--killing six men. The crew had posted no lookouts, nor designated any escape routes. Gleason reasoned that by covering the four points of LCES firefighters essentially accomplish all the 'Ten Standard Firefighting Orders' and 'Eighteen Situations that Shout Watch Out.' Gleason thus laid the foundation for new training methods for wildland firefighters--but more hard work was needed before the information reached the fire line.

After the South Canyon Fire killed fourteen firefighters in Colorado in 1994, Ted Putnam, an ex-smokejumper and, later, a researcher with the Missoula Technology and Development Center, also looked for answers to safety problems. Through his studies with airplane pilots, Putnam found that even the sharpest individuals can normally process only a handful of elements at one time. And when a situation becomes intense, individuals can focus on only one or two things at a time. Consequently, Putnam organized the Human Factors Workshop. Paul Chamberlin, a thirty-year veteran smoke jumper, took Putnam's and Gleason's studies and turned them into a new training method for firefighters. Gleason's goal was to simplify the "complicated and inaccessible nature of the amassed Orders, Situations, Guidelines, and Denominators."

A smokejumper from Missoula, Montana, is dressed for action, 1954.

Five years earlier, the lives lost by the experienced men who jumped into the Mann Gulch situation led to improved fire fighting equipment development at the Missoula center. Chamberlin, who personally decided to follow LCES every time he went on a fire, got his chance to test Gleason's theory on the ground during the 1995 fire season. As deputy incident commander on the 6,000-acre Sprite Fire in the Gila Wilderness, Chamberlin followed LCES to the letter. He ordered crews to spruce up hiking trails to act as fire lines within the wilderness. He stationed seasoned veterans to watch the fire from clear vantage points and frequently check radio transmissions to assure communications. If, for any reason, communications went down, Chamberlin suspended operations.



Firefighters also identified safety zones and escape routes at every briefing, and continually updated the information. Sometimes, on the way to the fire, Chamberlin personally walked people over to the safety zones. "We elevated and integrated LCES into everything we did," he said. Everyone got involved in the safety process--hotshots, type II crewmembers, the overhead team, and crew bosses. The interaction generated a dialogue amongst the firefighters themselves and Chamberlin walked away from the Sprite Fire convinced that LCES was the best possible way to train workers to avoid dangerous situations while fighting fires. "When you get away with an unsafe act once in a while, you reinforce your comfort level," he said. "There's too many times we approach a fire and think we'll get away without a lookout this time. And we think that if we worry about safety, production will go down. But actually, it goes up."

Lookouts are all important, according to Chamberlin. Although the Standard Orders call for posting a lookout only "when necessary," Chamberlin believes, "we can have a lookout at all times." Mann Gulch, Storm King Mountain, and other killer fires have proven that small incremental changes in the nature of the fire environment can lead to an unacceptable situation. The wind picks up a little, the vegetation gets thicker, and the humidity drops a notch--some of the things that Wag Dodge may have picked up on when he decided to retreat to the river. "You notice these things on the fire line," Chamberlin said, "and you get a little nervous, but the line's holding and you keep moving. Lookouts are often better situated to notice the cumulative changes of fire behavior. Most fires seem to posture to make a run before moving. Depending on the fuel types, you might have twenty minutes during this time to pull out before it blows up." Instinctively Dodge had realized this--but he spent those twenty minutes heading in the wrong direction.

Chamberlin, along with the help of fellow smoke jumpers Ken Heare and Paul Fieldhouse, plus Nelda St. Claire Vorce--the intelligence coordinator for the Bureau of Land Management in Montana--designed a new safety training method that not only emphasizes LCES, but also gets firefighters more committed to the training process. LCES training is now standard fare for wildland firefighters across the country.

While studying the events that occurred during the Mann Gulch fire one can see how LCES training might have saved many lives that day. A lookout atop the south-facing ridge could have followed the progress of the fire as it descended the northfacing slope to jump the canyon mouth. Although crews did not carry handheld radios in 1949

many crewmembers had been trained in the military and possibly knew Morse code, which they may have utilized by signaling with mirrors or flags. Before the blow-up Dodge would also have determined that the best escape route would have been straight up and over the south facing slope to the scree patches in Rescue Gulch that Sallee and Rumsey eventually stumbled upon.

There is one other significant change in firefighter training that would have pleased Henry Thol Sr.—a former Forest Ranger who sued the Forest Service for negligence in the death of his son at Mann Gulch. Before the Board of Review, Thol had argued that crewmembers did not feel free to question the authority of the foreman without the fear of losing their jobs. Today, overhead members encourage their groundpounders to question their superiors. If an individual feels nervous about being sent into a certain situation, or thinks that following orders will put him or her in jeopardy, they have the right to refuse to follow that specific order without fear of losing their job. In most cases, a threatened mutiny would force the overhead team to assess a situation more carefully—which is never a bad idea. Today's Forest Service stresses the notion that safety of firefighters comes first; trees and private property a distant second. That's the rule everybody follows—or else.

Of course, nature will continue to ambush wildland firefighters no matter how careful they are. No matter how many theories man develops, Nature will find ways to subvert them. The only way to utterly insure that no human being ever perishes again in a wildfire is to stop fighting these fires. No matter how much prescribed burning or mechanical thinning public agencies and private owners execute in the forests, wildfires will continue to blow up in the future under the right weather conditions. Humans may mitigate the potential for crown fires, but we will never completely control the situation.

Based on excerpts from: *A Great Day to Fight Fire: Mann Gulch, 1949* (Univ. of Oklahoma Press, 2006)

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