

Safety Zones

November 13, 2001

I am concerned about our use of Safety Zones. I find myself questioning our ability to properly identify adequate Safety Zones as I stand at the deployment site at the Thirtymile fire. I recognize that this deployment site is not a safety zone, nor was it selected as one. But I would like to examine our definition of Safety Zones and how we identify and use them.

Fireline Handbook (September 1998):

An area cleared of flammable materials used for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress so as to maintain a safety zone close at hand allowing the fuels inside the control line to be consumed before going ahead. Safety Zones may also be constructed as integral parts of fuel breaks; they are greatly enlarged areas, which can be used with relative safety by firefighters and their equipment in the event of blowup in the vicinity.

Health and Safety Code Handbook (December 1, 1999)

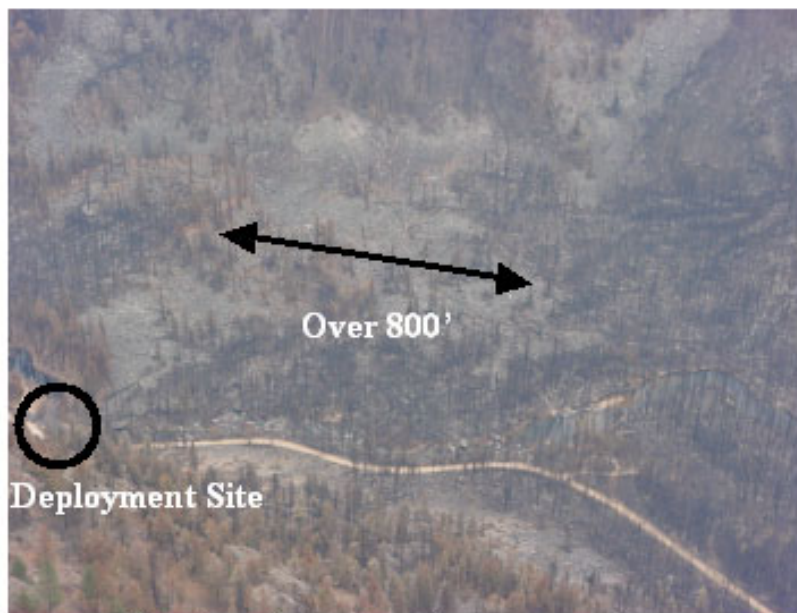
A pre-planned area of sufficient size and suitable location that is expected to protect fire personnel from known hazards without using fire shelters.

- a. Do not consider the fire shelter an alternative to a safety zone.
- b. As a crew boss, safety officer, task force/strike team leader, or division group supervisor, establish and continually inspect escape routes and safety zones and make them known.
- c. Give specific instructions and make sure everyone hears and understands. Have a fail-safe, instantly understood method of notifying personnel when to evacuate.
- d. Maintain control of the crew during evacuation.
- e. Be sure no one is left behind.

I think these definitions and instructions are appropriate for anchor points and areas of black that offer adequate safety and are not likely to experience the impacts of a firestorm as encountered at the head of a blowup situation. We need to re-evaluate the use of Safety Zones in indirect line construction and patchy fuels. Determining adequate Safety Zones generally leaves the firefighter relying on experience, training and the recommendations from research. Research recommendations for size of an adequate safety zone is based on radiant heat flux and the separation distance required to avoid burning a firefighter. The calculation for this is four times the expected flame height for the separation distance, or radius of the Safety Zone.

When I stand at the deployment site at Thirtymile and consider what information the entrapped firefighters had, I find myself feeling pretty secure with this location. I am relying on my fire experience and training at this point. I expect the approaching fire to be drawn in to the very active and high intensity fire across the river from my location. This should effectively direct the heat from the approaching fire away from me. As we all know, my expectations, NWR #6, and the hundreds of firefighters whom have visited the site with me are all wrong. The intense heat from the approaching fire is not drawn across the river, and is not lifted far from the surface, but remains deeply entrenched in the Chewuch River Canyon and actually is redirected toward the deployment site, delivering a fatal impact.

Figure 1



An interesting aspect of this event is the rock slump area across the river from the deployment area (Figure 1). This provides an effective fire barrier for a distance of over 800'. The trees in this area are killed by the heat, but not consumed.

Consider for a moment that we expect a 200' flame height from the approaching fire. That equates to an 800' separation distance. I took a

Figure 2



picture of the heat damage to the trees on the up-canyon side of the rock slump, where we know fire did not consume the crown (Figure 2). The heat was drawn to these trees across the more than 800' barrier by the indrafts created by the fire burning further up the canyon and up the east slope, combined with the afternoon up valley winds. This is a lethal amount of superheated air. Why is the temperature still so high here?

We need to remember that the Safety Zone size calculations are based on radiant heat flux. The flow of heat that froze the trees in Figure 2 is full of convective heat and tremendous turbulence associated with the firestorm occurring. The majority of firefighters who visit this site expect this intense heat to rise, and not stay on the surface.

This is not new to us. Super heated air in a convective flow also killed the firefighters at South Canyon. This was more expected because topography funneled the heat through their deployment area.

My point is that we can only select adequate Safety Zones based on our experience because we need to consider more than radiant heat flux. We have very few firefighters who have experienced this extreme heat and survived, and therefore have little experience to rely on. Good judgment comes from bad experience, and a lot of that comes from bad judgment. Most of us are at the rear of the fire watching these events and really have no idea what is going on at the fire head. We need to be able to estimate where this heat flow is going to occur. In the past I have attempted this and thought that I had a reasonable chance of estimating this correctly. After standing at the deployment site and seeing what occurred, my confidence in my ability to estimate this has been shattered. We are not capable of modeling this with any reliability, and we don't currently include this factor in our firefighter training. I will now have a difficult time assuring firefighters that

selected Safety Zones ahead of a fire will be of an adequate size to provide for their safety, particularly in brush, timber and slash fuel models.

This leads me to the conclusion that the use of Safety Zones in patchy burned fuels and indirect line construction is giving the firefighter a false sense of security and is something we are not capable of adequately defining. It also indicates that we have been incredibly lucky that we have not entrapped more firefighters with fatal consequences. I believe we need to revisit the use of Safety Zones and focus our attention more on anchor points and one foot in the black strategies. If we find it necessary to engage in indirect fireline strategies and tactics, or work through fuels that have burned in a patchy, incomplete burn, we need to utilize disengagement thresholds and admit that we really don't have adequate Safety Zones in those situations.

If we are honest with ourselves we have to admit that we do a lot of firefighting in locations, especially with Smokejumpers and Rappellers, where we have no Safety Zones, according to the definition of safe separation distance. We are setting our firefighters up for failure by continuing this practice. In these situations **I don't think any of us really know if we have adequate Safety Zones or not, so let's quit acting like we do.** I believe it is necessary for us to make some radical changes in our approach to fire suppression, and a good place to start is by **eliminating the traditional use of Safety Zones.** Consider the change in tactics when we inform firefighters that we will no longer use Safety Zones as a means to assure a safe assignment. I guarantee that safer strategies and tactics will be developed.

This will come with a cost. Fires will grow larger and more resources are likely to be lost. But it is time for us to manage our fires with the greatest resource at risk in mind, and that is our firefighters.

Tom Leuschen
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