LOOKOUTS, COMMUNICATION, ESCAPE ROUTES, SAFETY ZONES
"LCES"
Original Document
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"LCES and Other Thoughts"

I have been asked to give input on wildland firefighter safety to the Fire and Aviation Staff - Safety and Training, Washington Office. First, let me say I am honored to be able to contribute at this level. The afternoon of June 26, 1990, as I knelt beside a dead Perryville firefighter, I made a promise to the best of my ability to help end the needless fatalities, and alleviate the near misses, by focusing on training and operations pertinent to these goals.

Throughout my career I have dealt with wildland fire suppression, as a Hotshot Crew Supervisor, with only minor injuries occurring to those I have directly supervised. This is primarily because of two reasons, luck (which cannot be ignored) and basic lessons which I learned from the exceptional firefighters I have had the opportunity to work with. Many of the really valuable suppression lessons I learned were prior to fire shelter requirements.

Subject vs. Objective Hazards

A popular mountaineering test divides the alpinists' hazards into two distinct types: subjective, which one has direct control over (e.g., condition of the equipment, the decision to turn back) and objective hazards which are inherent to the alpine environment (e.g., avalanches, rock fall). Objective hazards are a natural part of the environment. They cannot be eliminated and either one must not go into the environment where they exist or adhere to a procedure where safety from the hazard is assured.

Similarly, the wildland firefighter's hazards are either subjective or objective. Examples of subjective hazards would be working below a dozer constructing fireline or the use of improper techniques while felling a tree. The fireline supervisor has direct control over these types of hazards.

The wildland fire environment has four basic objectives hazards; lightning, fire-weakened timber (standing and lying), rolling rocks and entrapment by running fires. When these hazards exist the options are to not enter the environment or to adhere to a safe procedure. I feel the key to this safe procedure is LCES. Although, the following discussion applies to all objective hazards, we will directly address fire entrapments.

LCES

LCES stands for lookout(s), communication(s), escape routes and safety zone(s). These are the same items stressed in the FIRE ORDERS and "Watchout" Situations. I prefer to look at them from a "systems" point of view, that is, as being interconnected and dependent on each other. It is not only important to evaluate each one of these items individually but also together they must be evaluated as a system. For example, the best safety zone is of no value if your escape route does not offer you timely access when needed.

A key concept – the LCES system is identified to *each firefighter prior* to when it must be used. The nature of wildland fire suppression dictates continuously evaluating and, when necessary, re-establishing LCES as time and fire growth progress. I want to take a minute and briefly review each component and its interconnection with the others.

Lookout(s) or scouts (roving lookouts) need to be in a position where *both* the objective hazard and the firefighter (s) can be seen. Lookouts must be trained to observe the wildland fire environment and to recognize and anticipate wildland fire behavior changes. Each situation determines the number of lookouts that are needed. Because of terrain, cover and fire size one lookout is normally not sufficient. The whole idea is when the objective hazard becomes a danger the lookout relays the information to the firefighter so they can reposition to the safety zone. Actually, each firefighter has the authority to warn others when they notice an objective hazard which becomes a threat to safety.

Communications(s) is the vehicle which delivers the message to the firefighters, alerting of the approaching hazard. As is stated in current training, communications must be prompt and clear. Radios are limited and at some point the warning is delivered by word of mouth. Although more difficult, it is important to maintain promptness and clearness when communication is by word of mouth.

Incident intelligence (regarding wildland fire environment, fire behavior and suppression operations) both to and from Incident Management (i.e. Command & General Staff) is of utmost importance. But I don't view this type of communication a normal component of the LCES system. Entrapment occurs on a fairly site-specific level. Incident intelligence is really used to alert of hazards (e.g.. "Watchout" situations) or to select strategical operations. LCES is primarily a Division function: responsibility should be here.

Escape Routes are the path the firefighter takes from their current locations, exposed to the danger, to an area free from danger. Notice that escape routes is used instead of escape route(s). Unlike the other components, there always must be more than one escape route available to the firefighter. Battlement Creek 1976 is a good example of why another route is needed between the firefighter's location and a safety zone.

Escape routes are probably the most elusive component of LCES. Their effectiveness changes continuously. As the firefighter works along the fire perimeter, fatigue and spatial separation increases the time required to reach the safety zone. The most common escape route (or part of an escape route) is the fireline. On indirect or parallel fireline, situations become compounded. Unless safety zones have been identified ahead, as well as behind, firefighters retreat may not be possible.

Safety Zone(s) are locations where the threatened firefighter may find refuge from the danger. Unfortunately shelter deployment sites have been incorrectly called safety zones. Safety zones should be conceptualized and planned as a location where no shelter is needed. This does not intend for the firefighter to hesitate to deploy their shelter if needed, just if a shelter is deployed the location is not a tree safety zone. Fireline intensity and safety zone topographic location determine safety zone effectiveness.

Again, a key concept – the LCES system is identified prior to when it must be used. That is lookouts must be posted with communications to each firefighter, and a minimum of two escape routes form the firefighter's work location to a safety zone (not a shelter deployment site) every time the firefighter is working around an objective hazard.

Safety and tactics should not be considered as separate entities. As with any task safety and technique necessarily should be integrated. The LCES system should be automatic in any tactical operation where an objective hazard is or could be present.

LCES is just a re-focusing on the essential elements of the FIRE ORDERS. The systems view stresses the importance of the components working together. The LCES system is a result of analyzing fatalities and near misses for over 20 years of active fireline suppression duties. I believe that all firefighters should be given an interconnecting view of *L*ookout(s), *C*ommunications(s), *E*scape routes and *S*afety zone(s).

Division Operations

Establishing a Lookout position in the Operations function has its merits. The Lookout(s) would be assigned directly to the Division Supervisor. They would have only one responsibility, albeit an important one. Lookouts keep one eye on the fire and the other on the Division's firefighters.

Commonly, Weather Watchers, and Field Observers are incorrectly assigned lookout duties. Division Supervisors should solicit input from these sources for their decisions, but these positions are in the Planning sections, not Operations. Lookouts need to be identified prior to tactical deployment of suppression resources and they need to give their undivided attention to the Division's objective hazards and firefighter locations.

Ideally each crew would establish lookouts in potentially hazardous situations. But, this requires the ability to identify these situations and to establish adequate (in amount and location) lookouts for the situation. Additionally, all too often crew supervisors hesitate to remove a crewmember from fireline production and assign them the position of lookout. They do not realize that the assignment of lookouts is not only their authority but also their responsibility.

Incident Management, thru Operations and Planning, would identify the operation's "Watchout" Situations, divisions on which they are (or could) occur and assign qualified lookouts to the Division Supervisor.

Span of Control

Span of control depends directly on the quality of resources and their capabilities. 3-5 subordinates to each supervisor may be sufficient for a static environment where they is direct access to each subordinate; but in the active wildland fire environment experienced leadership

is necessary on a tighter ratio. Jerry Monosmith presented solutions via the geographical breakdown of a division into “segments”.

Crucial to any solution is the definition of “experienced”. How would you define experienced?

Many reason have been given for the lack of experience including an organization’s inability for employee retention and insufficient BASIC supervision skill development.

Downhill/Indirect Firelines

The two situations that firefighters traditionally have found themselves getting into trouble are downhill and indirect fireline operations. The lessons learned on the Loop Fire (‘66) developed awareness, and consequential guidelines, for downhill fireline construction. Since then downhill operations have been safer; everyone agrees the only one who works in a chimney is Santa Claus, and he does it in the dead of winter. Unfortunately, we still have a ways to go (i.e., Battlement Creek ’76).

Indirect firelines are a different story. In the last half of the 1980’s all the entrapments have occurred during indirect operations. Extreme fire behavior with active spotting has put more reliance on indirect strategies. With indirect fireline the firefighter finds themselves removed from the best safety zone, the burn, as well as unable to see the objective hazard.

“Floating Division”

A floating division is the planned division during an indirect operation that exists initially only on paper (a map). It is not anchored. Wildland fire suppression tactics stress the importance of beginning construction at an anchor point (point where there is the least chance of being outflanked). To safely deploy resources on a “floating” division it is extremely important that the division is initially anchored and that the anchor point is also a safety zone. Only then can resources begin work developing the LCES system as they progress.

The success of the operation depends on the safety of personnel and the ability to hold the fireline. It is crucial that indirect fireline location is determined after careful analysis of wildland fire behavior possibilities including that behavior which will results if the fire enters the third-dimension (crowning/spotting from both wind-driven and plume-dominated fires). All too often the full possibilities are not incorporate in location decisions.

Wildland/Urban Interface

Suppression in the wildland/urban interface presents its own unique set of problems. The choice of fireline location is often influenced by the homes which stand between the fire front and a “better” option. Often the standard tactics of anchoring at the rear (or heel) and flanking will leave improvements in the path of the wind-driven fire.

The lack of an ideal fireline location does not in itself constitute unsafe indirect strategy. The “urgency” of the operation causes a break down in solid tactics. During interface suppression operations, maybe more than any operation, the LCES system must be in place.

With the rapid spread rates reached by wind-driven fires only two options are available. The traditional “anchor and flank” strategy or the unorthodox protection of improvements and resources as the wildfire spreads past. The last dictates the necessity for a “defensible space” around each improvement sufficient to serve also as a safety zone, a true safety zone. Unless this precaution has been made the risk to defending the improvement may not be worth the operation.

Judgment Errors

John Dill, head rock climbing rescue ranger in Yosemite NP, recently made an analysis of errors in judgment made preceding an accident. He found three reasons which contribute to the accidents; ignorance, casualness and distraction. After thinking about the firefighter’s environment and accidents these same reasons were found to correspond. Allow me to take a moment and help draw the correlations.

Ignorance: Unfortunately, we still have firefighters and fireline supervisors who still end up in wildland fire situations that call for skills and knowledge beyond their level of training. I know it is stressed over and over, but the BASICS, basic wildland fire behavior, basic suppression skills, need to be learned and reviewed. Yet many of the entrapments are the result of no lookouts or an insufficient safety zone, a lack of basics.

Casualness: The rock climber standing at the base of a couple thousand-foot granite walls in Yosemite is reassured in their decision to undertake a challenging ascent because of the helicopter which is poised less than a mile from the proposed ascent. We are doing the same. The situation is viewed more casually because we have an option if the tactic fails – our fire shelter.

Another way casualness enters our environment is through the reinforcement of improper tactics since the fire does not “blowup” while we are working the fireline the first few, or several times. But then we find ourselves entrapped because the familiar situation changes and our reliance on improper tactics just doesn’t work this time.

Distraction: Often I have been told that was it not for the on-the-job training that was given by a Division Supervisor the hazard would not have been noticed and tactics would not have been adjusted. Distraction is a very very real problem for firefighters. Fatigue and carbon monoxide do not help with the decision making process either. Fireline personnel should be continually monitoring each other and remain open to communication and others evaluation of the situation at hand.