USDA Forest Service
Pacific Northwest Region

August 2, 1989

FIRE SHELTER DEPLOYMENT REVIEW

Glacier Complex
Malheur N.F., R6

REVIEW TEAM

Stan Kunzman, Team Leader
Fire Staff Officer
Deschutes National Forest

Wendy Herrett
Deputy Forest Supervisor
Mt. Hood National Forest

Jim Gooder
Safety and Health Manager
Pacific Northwest Region and Station

Paul Solarz
Assistant Fire Management Officer
Umitilla National Forest

Wendy M. Herrett
Team Leader

August 2, 1989
Date

INTRODUCTION:

A Review Team was called together by John Roberts, Assistant Director, Acting for Jim Bates, Director, Aviation and Fire Management, R-6. The Team was asked to review the fire shelter deployment which occured at the Glacier Complex, Fire 96, Malheur National Forest.

The approach the Fire Shelter Deployment Review Team used was interviews of the individuals involved in the incident including members of the Overhead Team and the crew involved. We based the analysis of the deployment situation on the application of the Fire Orders, the 18 Watch Out situations, and the National Wildfire Coordinating Group Fireline Handbook, Line Construction Section 21a.-h. Individuals visited the deployment site. Before leaving, we briefed the Forest Supervisor and Incident Commander of our findings and wrote the Draft Review Report.

It is noted that this National Team has had an excellent safety record over a period of several years in some very complex situations. This incident, while serious, does not detract from the Team's prior record or commitment to a safe work environment for firefighters. Items such as Incident Action Plans and daily briefings all stress safety. The National Team participated openly with the Review Team.

Two areas of possible national concern which surfaced during the review are: 1) the identification of adequate safe zone, and 2) the apparent stigma developing concerning deploying fire shelters.

The size of the safety zone in this incident appeared to be minimally adequate. There is a need to identify how to identify an adequate size of a safety zone and to include this description in National training packages, briefings, interagency meetings, etc.

There appears to be a stigma around deploying fire shelters. Certainly the objective is to work in a safe method so that deployment is not necessary. However, if necessary, the action needs to take place. It appears as if this action indicates a failure has taken place and the individuals involved are set apart by peers and management. This concern may need to be reviewed in a Service-wide context.

A Critical Incident Debriefing Team was used following this deployment. Generally, all felt this service was worthwhile and beneficial. This should be continued on future shelter deployments.

Glacier Complex

Fire 96

July 29, 1989

On Saturday, July 29 at approximately 16:40 PDT, a situation developed which required a 19 person crew and a division group supervisor to deploy shelters in a safety zone. The Crew Boss and Division Supervisor remained outside of the shelters during the deployment. The actual time the crew members were under the fire shelters was approximately 10 minutes. At this time, air attack was able to direct the Division Supervisor and crew to a safe area.

The fire started on July 26, 1989, from an early morning storm. At 0926 on July 26, a fire was reported by Indian Rock lookout in the head of Big Boulder Creek, T. 9S, R. 33 E. Section 36 - SE/NE. The fire had been burning in subalpine fir, Engleman spruce, and lodgepole pine. Dog hair thickets were frequent. A heavy moss component provided a large amount of ladder fuel. Fuels ranged from 5 ton/ac in the 0-3 inch size class to total fuel loads in excess of 50 ton/ac. Pockets of heavier accumulations were scattered throughout the area. Small open wet and dry meadows existed in the fire area - large openings existed along the ridge lines above the fire on the north and east sides. The fire laid in a large bowl with the top approximately 7000 feet with the lowest point approximately 6200 feet elevation.

The Incident Action Plan for day shift called for direct line with the objective of completing the line on the west side of the fire and to begin mop up on flanks and top of the fire.

The crews and Division Supervisor arrived between 1100-1200. After being briefed, they started constructing a fireline along the west side of the fire anchoring at the top of the ridge and heading downhill in a southerly direction. Direct line was being constructed with one foot in the black. Line construction progressed through the afternoon. After the original steep grade, the construction continued on a bench. Safety zones were located along the line with all crews knowledgeable of the location. The line continued on the bench into a hummocky area which had wet meadows in the depressions.

Interviews indicated that small spots were starting up and suppression action was initiated on them starting about 1600. The crews continued constructing line and started down a steep pitch in a very heavy concentration of fuels. The Division Supervisor moved ahead of the crew at this point. The crew continued working downhill as the winds picked up and fire spotting continued. The crew leaders were continually looking for safety zones, identifying them to the crews, as they progressed.

Cheyenne 15, at this time, was constructing fireline below the falling boss, fellers, and Cheyenne 14 and Crew 12. Cheyenne 15 crew leader identified another safety zone along the line where they were working. The Division Supervisor was scouting an area below all the crews and found a spot fire. He

instructed the falling boss and fellers and Cheyenne 14 and Crow 12 to the wet safety zone. Cheyenne 15 crew boss moved his crew to a different safety zone as the Division Supervisor came up the hill and joined them. The Division Supervisor decided that he and Cheyenne 15 would stay in the safety zone that Cheyenne 15 had selected.

There was a rapid increase in intensity of the spot fire, and because of the ladder fuel, the fire was in the crowns within seconds. As the fire ran to the south and east side of the safety zone where Cheyenne 15 and the Division Supervisor were located, the Division Supervisor moved the crew around in the safety zone to keep away from heat and ash. The fire moved around the area. Spots appeared to the west of the location. At this time, the crew members were instructed where to deploy their shelters. The crew deployed shelters while the crew boss and Division Supervisor made sure of the safety of the crew. Shortly after this and just before the crew boss and Division Supervisor crawled under their shelters, air attack contacted the Division Supervisor and instructed that there was an escape route west of their location and led them out by radio. He then moved them to a larger safety zone away from the fire. There were no injuries.

Crews Cheyenne 15 and Crow 12, and the Falling Boss and fellers remained in their safe zone and did not deploy their shelters.

The Incident Commander and Forest Supervisor called for a Critical Incident Stress Debriefing Team which arrived at the Base Camp at 0700.

A recommendation was made that the Critical Incident Stress Debriefing Team remain at the complex an additional day to be available as needed for debriefing.

COMMENDATIONS

Ream, Eichner, and crew bosses kept control.

Ream, Eichner, Brady, Cutler, Aggen, Mahaffey, and crews did extremely well in staying alert, keeping calm, thinking clearly, and acting decisively.

Crew representative and crew boss of Cheyenne 15 were quietly effective during and after the incident.

Crews and Crew leaders appreciated the opportunity for Critical Incident Stress debriefing. Good decision to call in the team!

Eichner demonstrated excellent leadership throughout the incident.

The Forest briefing package for transition was very good.

Mahaffey did an excellent job in sizing up the situation, providing directions out that Eichner felt confident following.

FACTORS

After considering the information gathered during the review of the deployment incident on Fire 96, the review team believes that the shelter deployment was necessary based on the size of the safety zone, fire behavior, and the unknown nature of the fire activity to the west. Because air attack located the crew and was able to see clearly the nature of the fire activity to the west and lead the crew and division supervisor out to a larger safety area out of danger, the deployment could be looked at as unecessary. We believe that the crew and division supervisor made the correct decision to deploy. The review team is concerned that because of the stigma attached to deployment of shelters as meaning a bad mistake was made, and because of peer pressure, that crews might be reluctant to deploy when they believe they need to. This concern is perhaps service wide, not particular to this incident or this team.

The major factors that contributed to the fire shelter deployment were:

1. Specific tactical choices influenced the need for shelter deployment. Fireline was being constructed downhill with fire below. Fireline Handbook guidance on construction of fireline was considered, but several situations existed that were not consistent with handbook guidance. Most significant was that there were unburned fuels between the crews and the fire. They were blacklining as they built line. Fire spotted into a large pocket of fuel below the crews. The intensity increased rapidly. Fire made an uphill run consuming large unburned area of fuel between spot and crew and was outside of line being constructed. The crew had previously identified a safe zone and were in it along with the division supervisor. Two other crews and four fellers and falling boss were in another, slightly larger safety zone approximately 250 feet away. The safety zone where the deployment occurred, was approximately 60 feet by 150 feet in size. Because of the small size, the division supervisor thought they would have to move around the area while deployed, depending on where the fire was burning. If the fire had overtaken them in their shelters, the small size of the safety zone, may have been a factor in the extent of any injury. We believe the only safety zone to be considered as a safety zone are those which do not require the use of shelters for protection. Identification of more adequate safety zones appears to be a training and management need beyond just this fire situation.

   In this situation no strike team leader or field observer was available. This meant that the division supervisor was responsible for performing the duties and responsibilities of both the division supervisor and the strike team leader. In addition, this situation placed more responsibility on the crew boss. Even though it may not be uncommon for a division supervisor to supervise three crews, the combination of extremely dry conditions, fuels and downhill line construction created a difficult situation for one individual to manage and provide a proper margin of safety. This margin of

safety includes the decision to stop line building and move crews out of the area when conditions warrant.

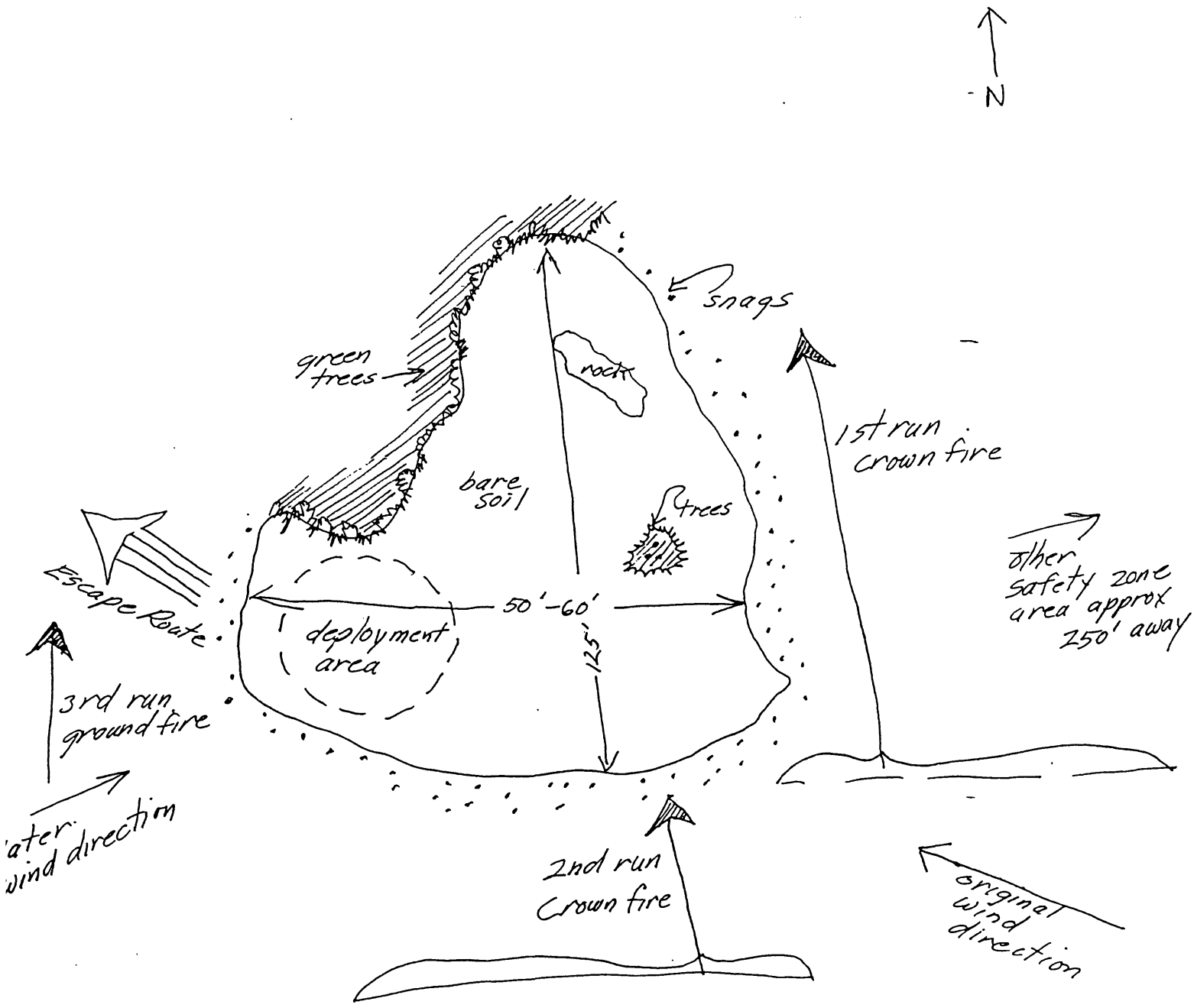
The lack of additional information about other, larger potential safety zones (in some cases 100-200 feet away) beyond the immediate line construction area, and limited information about terrain and fuel to the west of the deployment area, were factors in the decision to deploy.

2. The span of control was a factor in that distance and other demands from other fires in the complex for operations and planning involvement, limited the amount of team interaction to discuss on the ground situations, strategy and tactics for Fire 96. The benefit of team interaction is that more factors can be assessed and possibly a better decision can be reached for the situation at hand. More complete knowledge of the on the ground situation, may have resulted in choosing a different tactic that would not have resulted in a need for a deployment.

Distance from the main fire camp for supplying resources was not considered a factor in this deployment.

Glacier Complex, Fire 96, 7/29/89

Deployment Area Diagram



APPENDIX MATERIAL

Fire Orders

1. Fight fire aggressively, but provide safety first.

   Fire 96, aggressive fire fighting; tactic - downhill fireline construction; they were looking for safety zones continually as they moved downhill, communicated these to each other and flagged them.

2. Initiate all action based on current and expected fire behavior.

   Actions were based on current observations.

3. Recognize current weather conditions and obtain forecasts.

   - Conditions and forecasts obtained. Complex wide - not specific to #96.

   - It was warmer at night at #96 than in main fire camp.

   - Fire lookout was providing hourly weather observations to #96 (more often often if conditions warranted).

   - Fire lookout stated that the winds were often different down in the bowl where fire located over the 25 years he had staffed the lookout.

   - Wind directions and velocity changed at 4:00 and 5:00 p.m. He tried radioing this between information to Jackson, but they were busy dealing with the situation.

   - 1600 R.H. 18 SW 8-12 gusts to 18 between 1600 and 1700 winds changed to SE with gusts 25-30 mph.

Ensure instructions are given and understood.

   - Crew Boss Cheyenne 15 says only briefing he got was at main fire camp and tent was too crowded to hear.

   - Ream and Eichner say that all crew bosses and felling bosses were briefed just before they headed down the hill to build line. Safety zones were specifically discussed.

   - Obtain current information on fire status.

      - Eichner talked to Ream and got a briefing.

      - Crew boss said he had talked to Eichner.

      - Eichner was constantly moving throughout the division to comminicate with crews. Crow 12 and Cheyenne 14 did not have radios.

- Remain in communications with crew members, your supervisor, and your adjoining forces.

  - Communication between Ream and Eichner by radio. Between Eichner and Cheyenne 15 and Aggen by radio. Eichner had to keep Cheyenne 14 and Crow 12 fairly close to be able to communicate with them by moving to see them (no radios). Eichner was in contact with other forces by radio.

  - Both Ream and Eichner had tried to obtain more radios. -None were available. Crew boss made three attempts to get other radios. Crew representative had also tried unsuccessfully.

  - Eichner felt limited radios was a problem both work and safety wise.

  - Eichner said he would have liked to have both a strike team leader and a field observer. This would have allowed him more time to manage in accordance with his responsibilities.

Determine safety zones and escape routes.

- This was covered in a briefing and put into practice all along the line. They identified ones that they could readily see. Those beyond the immediate working zone were not identified. Some larger areas were just beyond those that were identified.

- Assumption was that escape routes were thought about and discussed when safe zones were identified. There were many safe zones identified along the line.

- Establish lookouts in potentially hazardous situations.

  - Jackson's role as lookout with vantage point above fire. Indian Rock lookout also was used. Ream also was with Jackson observing the entire area.

  - Eichner was trying to assume a field observer role among many other roles.

  - It appears that the crews did not post lookouts. Crew boss and crew representative did some of this.

Retain control at all times.

- Eichner and Crew bosses and Ream kept control in their roles.

Stay alert, keep calm, think clearly, act decisively.

- Ream, Eichner, Brady, Cutler, Aggen, Mahaffey, and crews did extremely well in this fire order.

Watch Out Situations

1. Fire not scouted and sized up.

   - Eichner's first day on the fire. As he was locating the line, he was sizing up fuels, and the terrain situation.

   - The only scouting by Operations Chief and Branch Director seems to be by air.

2. In country not seen in daylight.
   N/A

3. Safety zones and escape routes not identified.

   - Were identified.

   - Safety zones minimally acceptable in terms of size.

4. Unfamiliar with weather and local factors influencing fire behavior.

   - They were using the lookout on at least an hourly basis to determine local weather conditions and to compensate for the broader incident information that was available.

5. Uninformed of strategy, hazards, and tactics.

   - There appears that overall strategy and briefings were not adequate or heard by crew boss because the tent was not large enough.

   - They were briefed according to the Division Supervisor and Branch Director, but the Crew boss on Cheyenne 15 and the Crew representative said they were not briefed. There appears to be a difference in definition of "briefing" as used between the above folks. Crews knew what they were supposed to do and where to go so they had information.

   - During interviews, people appeared uncomfortable with the tactic of downhill line construction, but when asked, they were reluctant to verify our observation of their concerned reactions and comments.

   - There was concern that they were building new line in the afternoon when winds were erratic. Crews were uncomfortable doing this.

6. Instructors and assignments not clear.

   - Appears to be adequate. Possibly instructions and feedback loop could have been more complete.

   - Primary communications between spike camp and base camp could have been improved, a span of Control issue.
     Holes like no scout, no strike team leader, understanding of on-ground situation not thorough.

7. No communication link with crew members/supervisors.

- Lack of radios required different, more limited means of line building and communication. Much more leg work by Eichner because of lack of radios.

8. Constructing line without safe anchor point.

- Top scab flats were used as anchor point. Line construction was downhill on both flanks. (Second day construction on east flank, first day on west flank).
  Terrain was steep at top, then changed to moderate slope. Became hummocky on benches, then became steep at lower end of fire. Fuels varied from light (7-10 tons/acre) to heavy (50+ tons/ acre.) Some openings - some wet and some dry. Spruce, lodgepole, and subalpine fir. Spanish moss heavy. Large amount of ladder fuel.

9. Building fire line downhill with fire below.

Re: Fireline handbook, pages 20-4, SECTION 21.1, ITEM 10A-H. "A fireline should not be built downhill in steep terrain and fast burning fuels, unless there is no suitable alternative for controlling the fire, and then only when the following safety requirements are adhered to:

a. The decision is made by a competent firefighter after thorough scouting.

- Decision made by competent firefighter from aerial recon.

b. The toe of the fire is anchored.

Toe was not anchored.

c. The fireline does not lie in or adjacent to a chimney or chute that could burn out while crew is in vicinity.

The lower portion of the line was in a draw which approximated a chute.

d. Communications are established between the crew working downhill and the crew working toward them, which may be at the toe of the fire. When neither crew can adequately observe the fire, communications will be established between the crews and a lookout posted where the fire behavior can be seen.

This occurred. Lack of radios made this more difficult.

e. The crew will be able to rapidly reach a zone of safety from any point along the line if the fire unexpectedly crosses below them.

Yes. Adequacy of size of safety zone was a concern.

f. Direct attack will be used whenever possible.

They were using direct attack strategy.

g. If direct attack is not possible, the fireline should be completed between anchor points before beeing fired out. Firing operations should proceed with assured access to the burned out part of the fire line or other safety zones.

Not using indirect strategy. Does not apply.

h. Full compliance with the 10 standard firefighting orders is assured.

See fire order documentation.

10. Attempting frontal attack on fire.

No. They were flanking fire.

11. Unburned fuels between you and fire.

They were black lining as they built line. Fire spotted into large pocket of fuel. Intensity increased rapidly and was below crews. Fire made uphill run consuming large unburned area of fuel between spot and crew and outside of line being constructed.

12. Cannot see main fire, not in contact with anyone who can.

Indirect line stratagy not being used.

13. On a hillside where rolling material can ignite fuel below.

Yes, crews did a very good job of cup trenching to minimize hazards. We do not think rolling material was a factor in this incident.

14. Weather was getting hotter and drier.

Yes, as predicted. They had some crew bosses taking weather as well as lookout.

15. Wind increases and/or changes direction.

- This occurred. Fire lookout tried to let them know but incident occurred so quickly when this happened that they were busy with the incident. They knew and only had time to respond. Cheyenne 15 had been apprehensive about this earlier when wind gusts had begun and there was some torching.

- It is our opinion that the slope was the primary factor in the run, but the wind amplified and caused problems with their safe zones.

- Fire located in a bowl which could cause local eddying or wind changes from gradient means.

16. Getting frequent spot fires across line.

They were starting to get frequent spotting across line.

17. Terrain and fuels make escape to safety zone difficult.

Yes. Combination of both.
Because of hummocky nature of terrain, they had difficulty seeing what was going on.

18. Taking a nap near fire line.

No.