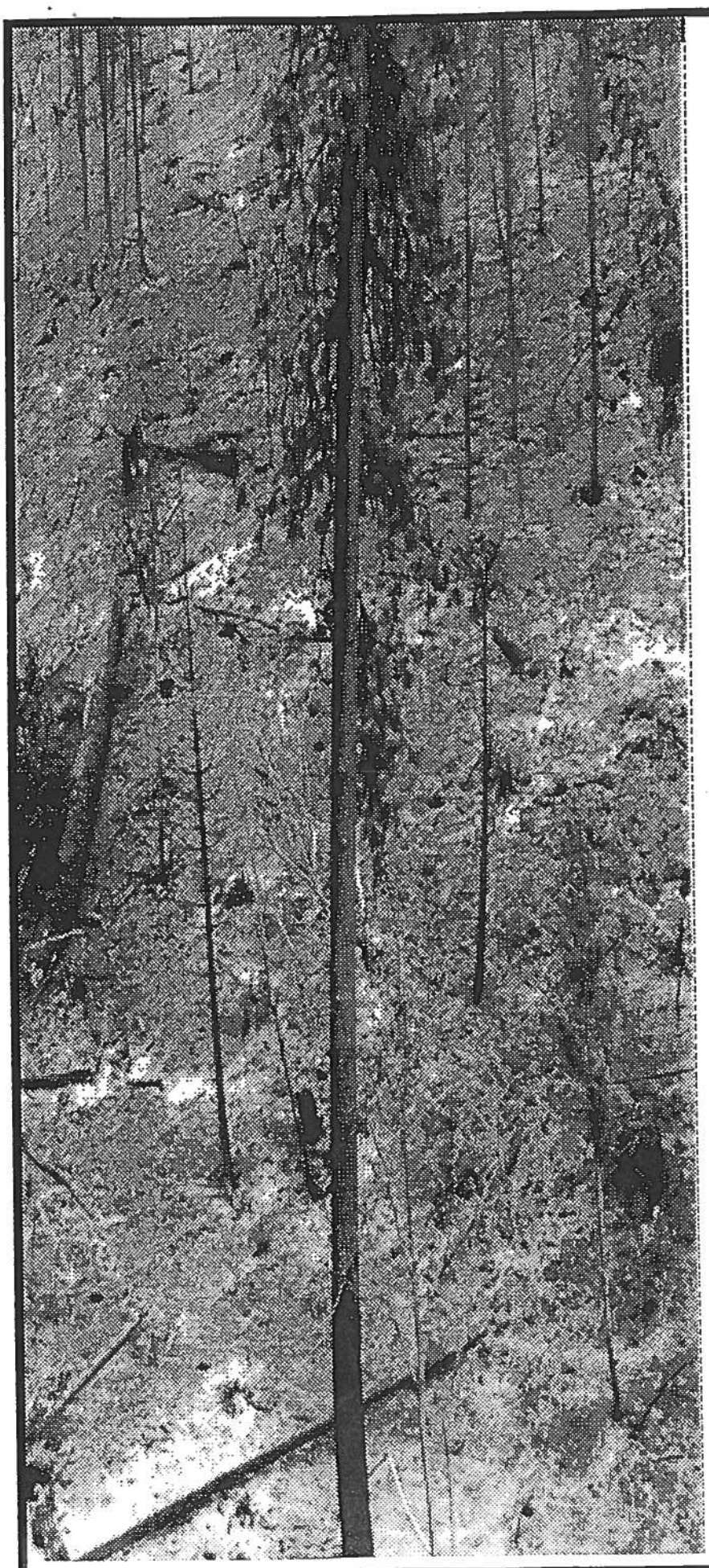

Fire Entrapment Investigation

Idaho City Complex

Rabbit Creek Fire

August 28, 1994

Boise National Forest

Idaho City Complex
Rabbit Creek Fire
Fire Entrapment Investigation Report

September 5, 1994

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UNITED STATES DEPARTMENT OF AGRICULTURE
BOISE NATIONAL FOREST
1750 FRONT STREET
BOISE, IDAHO 83702 (208-364-4100)

Idaho City Complex

Fire Entrapment Investigation

September 1, 1994

The Idaho City Complex is made up of the Bannock Creek, Rabbit Creek, and Bear River Fires on the Boise National Forest. On August 28, 1994 an engine crew assigned to the Idaho City Complex deployed their shelters. As a result of the shelter deployment, I am establishing an Interagency Fire Entrapment Investigation Team. The team of Roy Johnson (Team Leader), Bill Casey (Safety), Maggie Gross (Meteorologist), Tim Sexton (Fire Behavior Analyst), and Mark Loseke (Engine Foreman) is delegated the authority to conduct an investigation of the entrapment that occurred on the Idaho City Complex. The team shall conduct the investigation in accordance with the National Wildfire Coordinating Group's (NWCG) Fire Entrapment Investigation and Review Guidelines. The Fire Entrapment Investigation Team is responsible for:

1. Conducting the investigation, listing the findings and causal factors, developing recommendations for corrective actions and preparing the final report.

2. The Team will brief the Incident Commander and me on their preliminary findings on Monday, September 5.

3. By September 10, 1994 the Team's final report and recommendations for corrective actions will be submitted to the Boise National Forest.

Upon receipt, I will submit a copy of the Interagency Fire Entrapment Investigation Team's final report and recommendations to Bill Sommers, Chairman of the NWCG.

Cathy Barbouletos

Catherine Barbouletos
Forest Supervisor
Boise National Forest

INCIDENT OVERVIEW

- **BACKGROUND**

  - Idaho has experienced severe drought conditions throughout the summer of 1994. Due to the extreme dryness, infrequent lightning storms have caused hundreds of fires. Many of these fires have escaped initial attack and have required Incident Management Teams and thousands of fire suppression personnel to effectively suppress them. In addition to agency personnel seven Military Battalions have been used in suppressing fires. Many fire personnel have been involved in suppression activities since spring, when extremely dry conditions in the southwest required early mobilization of resources.

  - The Boise National Forest has also experienced a severe season. As of September 3, 1994, the Forest had burned 151,720 acres with 129 fires occurring. Fuels in the forest are extremely dry, with fine fuel moisture frequently measured at two and three percent and large fuel moisture at six to seven percent. Temperatures have been hotter-than-normal and in many areas of the forest no significant rainfall has occurred since June.

  - Eight fires were started by lightning on July 28. These fires were the Bannock Cr., Meadown Cr., Short Cr., Rabbit Cr. and four fires on the North Fork of the Boise River. These fires have since combined into one. This complex of fires was originally staffed by a Type II Incident Management Team. This team was replaced by a Type I team. Due to the duration of the fires, two consecutive Type I teams have also been assigned to manage this complex which had grown to 74,980 acres on the day the deployment occurred. As is typical during an extreme fire season such as this one, numerous resources from many federal agencies including the military, and private contractors were being utilized in the suppression of this fire.

- **DESCRIPTION OF INCIDENT**

  - The following account describes the events that occurred on division BB that day. (Refer to 3-D Figure of Shelter Deployment Area, page 7.)

  - **0530** - Morning briefing from Incident Management Team. The morning Fire Behavior Forecast highlighted the possibility of spot fires and the probability of fire runs in the afternoon.

  - **0600** - Engine 692 traveled to Division BB.

  - **0830** - Suppression resources arrived at BB to begin daily suppression activities. The mission for the day was to "mop-up 100 ft. in, east of DP 90, engines were to patrol and assist in mop up." Engine 692 was to assist in mop up.

  - The night crews working this division had completed a burnout along road 251L and the possibility of spot fires had been addressed in the morning briefing.

- Division BB covers a rather large area from Grand Mountain to Swanholm Peak a distance of several miles. It was necessary to further break down the area by dividing the division at the 327 road. Division Supervisor Chris Colton was assigned the area west of road 327 and Division Supervisor Carl Dammann the area east of road 327 where the incident occurred. The operating area of those personnel involved in this review ended up being between DP 90 and DP 88. The elevation at DP 90 is approximately 5,300 ft. and DP 88 is slightly over 6,000 ft. Road 251L formed the eastern edge of the fire perimeter.

- During the morning hours, Engine 692 and crew worked the spot fire (spot #1) and hot spots up and down road 251L.

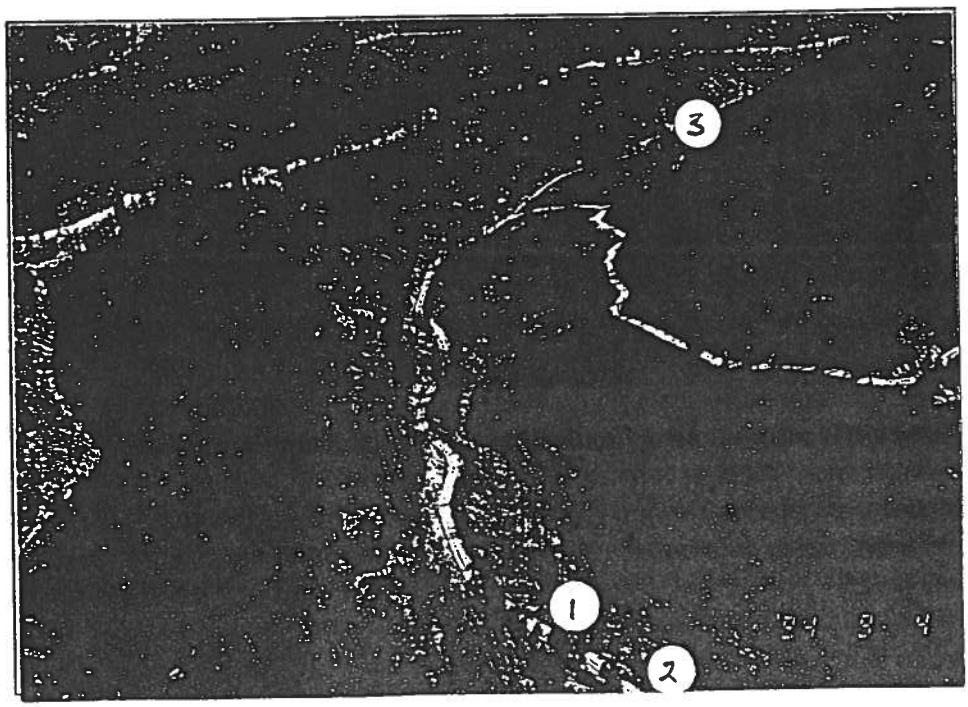
- **1200** - Engine 692 crew broke for lunch, the lunch spot was in the same general area as the shelter deployment. The crew noticed no unusual fire behavior nor any spotting during their lunch break.

- **1300** - Engine traveled down along the 251L road to the 327 road to refill. They had trouble locating a water tender and had to go to the refill area and use the engine pump unit to fill the engine. This took them an unusually long time and it was after 1400 hours before they returned to the line.

- **1430** - Engine 692 returned to division and were assisting the 1st Engineers and two other engines in moping up the lower spot. (spot #1)

- **1500** - Kato Howard, (Military Strike Team Leader, Crew) requested additional assistance, in the form of Engine 692, to help contain the upper spot (spot #3), Engine 692 was directed by Ross Wilmore, (Military Crew Advisor) to move to the upper spot to assist in holding the spot. Before E-692 left the area Wilmore also ensured that the Engine Foreman was monitoring the correct radio frequency and told him that his contact was Kato.

- Engine 692 moved up the road toward the upper spot but was unable to get all the way to the spot because of the narrowness and steepness of the road. The Engine Foreman Rory Peak, was not comfortable with taking his engine up the narrow spur road into the



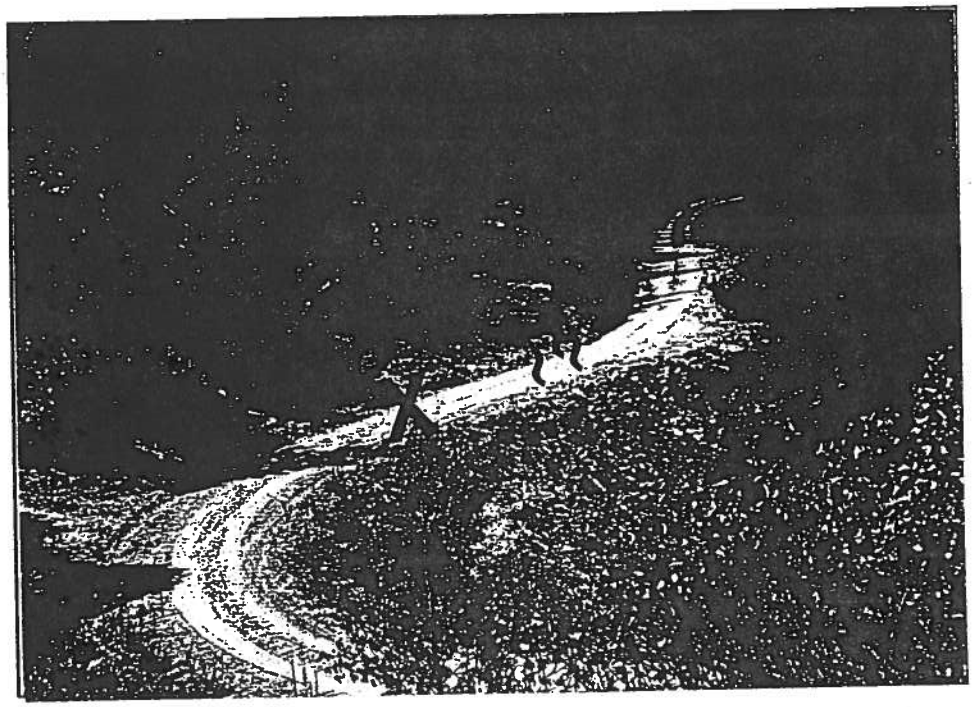
back of the draw.

- During this time, the fire behavior on the spot fires increased substantially. A new spot fire (spot #2) started 50 yards downhill from the lower spot (spot #1) and the two remaining engines supporting operations on this area ran out of water and were pulled off the line. The ground forces attempted to contain the spot with back pack pumps and direct attack, however erratic winds pushed the spots uphill and Ross Wilmore, Military Crew Advisor, was forced to abandon suppression action and move his crews down hill into a safe area.

- Conditions on the upper spot (spot #3) were also rapidly deteriorating. Strike Team Leader Kato Howard was also forced to abandon suppression actions and pull his suppression forces out the area. During this action, a dozer operator was trapped by the advancing fire and evacuated by helicopter to Boise. Multiple retardant drops were also necessary to secure the threatened dozer and keep it from being burned over.

- **1545** - While turning E-692 around, the crew noticed an increase in fire behavior down slope behind them and to their Southeast (the spots where Wilmore was working) and decided to head out of the area down the road. After traveling a few hundred feet down the road Engine 692 finds the way blocked by flames across the road. The Engine Foreman then backed the engine up and parked in an area very close to the turn around point.

- At this time, the Air Tactical Group Supervisor, John Robinson observed the engine parked on the road. He also observed the increased fire activity and attempted to contact the engine by radio. He did not know the vehicle number but was able to obtain the number from Strike Team Leader Haxby. Although he and the Division Supervisor, Strike Team Leader Kato, Strike Team Leader Haxby, and others tried to raise the engine on the radio using numerous frequencies, none were successful. During this time the smoke from the advancing fires spread over the engine and the personnel on the ground and they were no longer visible.



- **1600** - The crew from Engine 692 are outside the engine and observing the fire behavior and direction of spread. They notice the airplane circling overhead and attempt to contact it with their radio. They can hear numerous radio calls attempting to contact them but cannot answer because of all the radio traffic. They spend a few minutes pretreating the area around the truck with foam. They then take out their shelters get into position in the road behind the truck and wait for the flames to come closer. At this time they had their feet and hands into the straps on the corners of the shelter and were waiting to lay down on the ground. While waiting for the fire to come closer they observed that the fire front direction had changed slightly and were moving the flames slightly to the east of there location. This wind switch also changed the direction of the fire along the side of road 251L so that the flames were no longer burning directly across the road but straight up the draw more parallel with the road.

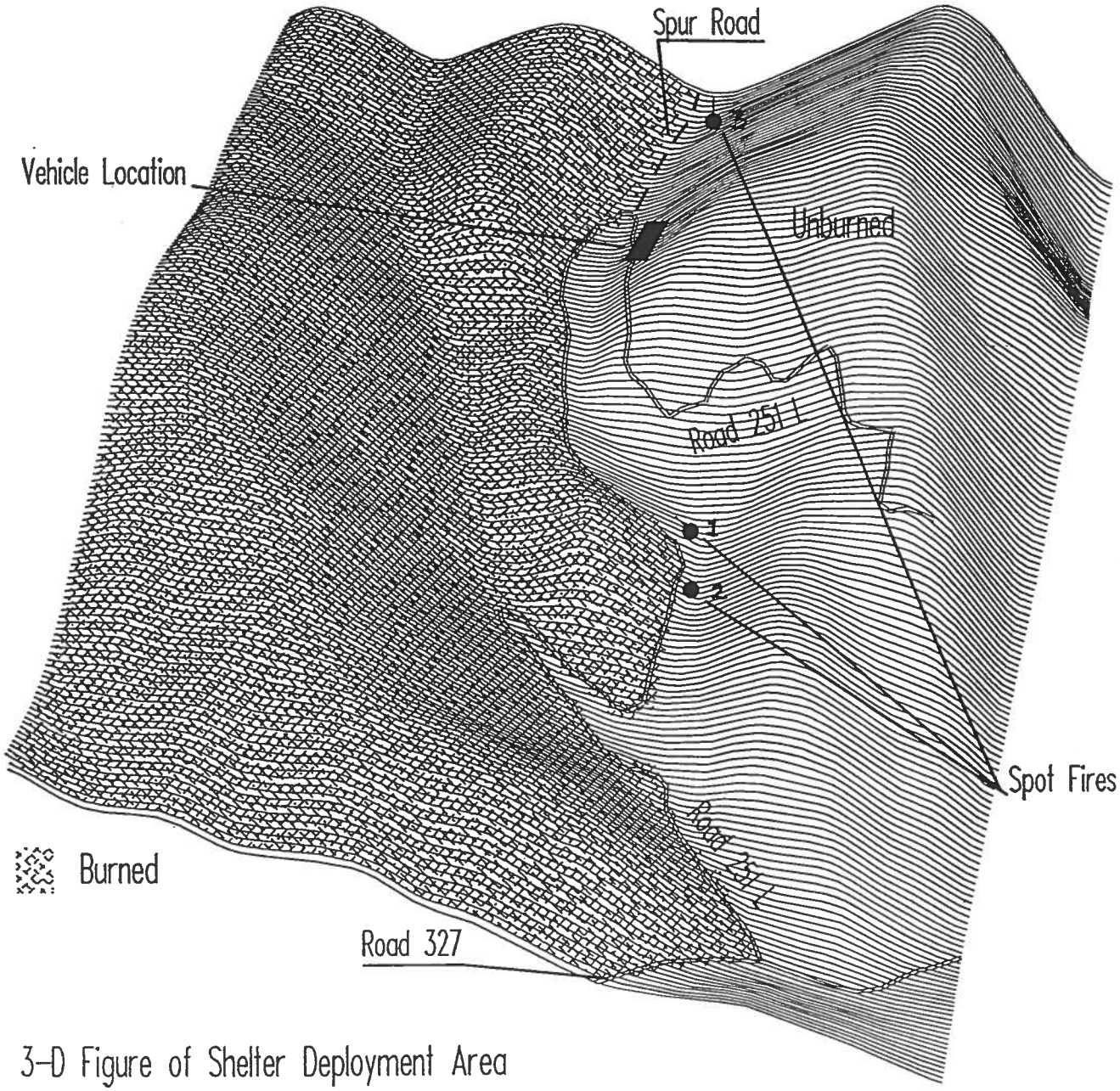
- The Engine Foreman then decided that the engine and crew can safely drive down the road. He has the crew load into the truck and head rapidly down the road, traveling through the area that was too hot minutes earlier. They used one of the opened fire shelters as a shield against the drivers side window while going through the burning area. While traveling down the road they are met by Ross Wilmore who was walking up the road and he notified the others that the engine was okay and out of the fire area.

- **1700** - Engine Crew 692 arrives at road 327 where they spend the rest of their shift.

- **1800** - Engine 692 begins return trip to base camp.

- **2000** - Engine 692 and crew arrives Idaho City. There they turn in their fire shelters to supply and are issued new ones.

Shelter Deployment Area



3-D Figure of Shelter Deployment Area

FINDINGS

FIRE BEHAVIOR

- **FIRE BEHAVIOR (Significantly contributed)**

  - Fuels in the area of the incident consisted of mixed brush (ceanothus, ninebark, etc.) with a scattered conifer reproduction understory, NFFL model 5, with thinning slash interspersed under the conifer overstory (NFFL model II).

  - Fuel moistures were very dry due to the extended drought in Southern Idaho. Fuel moistures at the time of the incident were recorded as:

>	1 Hr. TL	= 3%
>	10 Hr. TL	= 4%
>	100 Hr. TL	= 5%
>	1,000 Hr. TL	= 6-7%
>	Live Fuel Moisture	= 60%

- **WEATHER (Significantly contributed)**

  - Low relative humidity (15%) at the time of the incident promoted the rapid rate of spread from the spot fire below the 251L road up hill toward E-692.
  - The relatively late (1545-1615) onset of afternoon winds at eye level (5 mph), in conjunction with the low relative humidity, increased the fire activity at the lower spot (#1), enabling the fire spread to cross the drainage and run up the slope beneath E-692.

- **TOPOGRAPHY (Significantly contributed)**

  - The incident site lay in a "thermal belt" zone. An area, which over a period of time, experienced the average lowest humidities and the highest temperatures. This implies that fuel moistures were probably lower in this area, compared to areas above and below the site promoting the rapid rate of spread of the fire uphill to the incident site.
  - The deployment occurred on the upper 1/3 of the slope. The distance up drainage from the spot fire to the deployment site was 800 to 1,200 feet. The slope where the event occurred was calculated at 20%.

- **PREDICTED FIRE BEHAVIOR (Did not contribute)**

  - The fire behavior forecast included in the incident action plan for the day shift of the 28th of August, adequately forecasted the fire behavior that occurred on site.

- **OBSERVED FIRE BEHAVIOR (Did not contribute)**

  - The observed fire behavior validated predictions for the day.

ENVIRONMENTAL FACTORS

- **WIND (Influenced)**
  - The winds at the incident site were out of the west, northwest at 5 mph, gusting to 8 mph, blowing updrainage, upslope toward the incident site.
- **SMOKE (Did not contribute)**
  - Visibility for E-692 before the deployment occurred was fair; 1/2 to 1 mile to the west and (5 miles) at the lower spot.
- **TEMPERATURE (Influenced)**
  - The dry bulb temperature in the area at 1545 - 1615 was 76 degrees.
- **TERRAIN (Influenced)**
  - The deployment area was situated in the middle of a draw or chute.
  - The slope on the south end of the fire run area averaged 47% with the slopes on the north end of the fire run was side 20%.
- **VISIBILITY (Significantly contributed)**
  - The crew of E-692 could not see directly the spots which were burning below them on the 521L road.
  - The crew did observe smoke from the spots below, but could not see the smoke base.

INCIDENT MANAGEMENT

- **INCIDENT OBJECTIVES (Did not contribute)**
  - The incident was under the direction of the Type I Incident Management Team (Wayne Eddy).
- **STRATEGY (Did not contribute)**
  - The overall strategy on August 28, 1994, was to contain the Rabbit Creek Fire east of the current western perimeter. This strategy did not contribute to the shelter deployment on the Forest Service 251L Road.
- **TACTICS (Significantly contributed)**
  - At approximately 1430 hours, August 28, 1994, the Strike Back Engine (E-692) was ordered up the 251L road to find and contain a spot fire. The 251L road is a narrow

(8ft), dead end road, with very limited turn-outs, (2 in the 1.7 mile distance which comprises the entire length of the road system from the junction of the 327 road to the end of the 251L road). Steep grades and rough waterbars made for difficult traversing for an engine the size of E692, (1971, 1,000 gallon tank, mounted on a single-axle 2 1/2 ton truck). A smaller engine could have maneuvered better.

- **SAFETY BRIEFINGS/MAJOR CONCERNS (Influenced)**

  - Other than the initial briefing (at 0530 hours on August 28, 1994) in base camp by the safety officer, no other safety briefing or major concern was passed on to the E-692.
  - The division supervisor had not been informed of the burn out accomplished on the night of the 27th on Division BB. So the presence of possible spot fires located below the 251L road could not be forwarded to E-692.

- **INSTRUCTIONS GIVEN (Influenced)**

  - The instructions given to E-692 at the beginning of the operational period were to "patrol and hold" the section of 251L road and to "do the same thing as you've done" in previous days.
  - The instructions given to E-692 at approximately 1430 hours were not clear and were not issued from their immediate supervisors.

CONTROL MECHANISMS

- **SPAN OF CONTROL (Did not contribute)**

  - Engine 692 was assigned to a strike team. The strike team was made up of 7 engines or a supervisory ratio of 1:7, which is in the recommended range.

- **COMMUNICATIONS (significantly contributed)**

  - Two engines assigned to Haxby's Strike Team did not have radios. The Division had over 390 people using one tactical frequency.
  - Three military task forces, 4 crews, 7 engines, 4 water tenders, 5 dozers, 4 fallers, field observers, and overhead were assigned to the division. The combination of terrain, numbers, types, and assignments complicated their ability to communicate.
  - The engine foreman was not familiar with other frequencies and their use, i.e., Air-to-Ground, and Command.
  - Repeated attempts by air attack, division supervisor, strike team leaders, and military crew advisors to contact Engine 692 at the time of the incident were unsuccessful.

- **ONGOING EVALUATIONS (influenced)**

  - Supervisors on the three spots that were being worked in the area recognized the critical situation and pulled their resources off the spots. However, no one contacted E-692 to inform them of the fire below making a run.

- **10 STANDARD FIRE ORDERS (significantly contributed)**

  - Four out of the ten Standard Fire Orders were either violated or compromised.

  4. Ensure that instructions are given and understood.

  - Instructions on work assignments were not clear and concise nor were they coordinated with supervisor. The engine was given the general assignment to patrol and assist crews in mop-up. However, they negotiated a more direct assignment of supporting the military in holding spots along road 251L. This resulted in unclear instructions, and the engine being on its own and not accounted for.

  5. Obtain current information on the fire status.

  - E-692 did not know nor were they in direct contact with anyone that could see what was happening below them. When the fire became active below them they were not notified.

  6. Remain in communication with crew members, your supervisor & adjoining forces.

  - E-692 had not been in contact with it's strike team leader since early that morning. The engine had talked to the division supervisor while filling up approximately 1330. They agreed to have the engine work up to the two lower spots along road 251L and support the military. Later the message was passed on for them to continue up road 251L to a spot further up.

  9. Remain in control at all times.

  - Engine 692 was a contract engine assigned to a strike team. It was working the area with engine 452 of it's strike team. They were separated from there strike team leader and had been briefed early that morning. At the time of the incident the strike team leader, and division supervisor did not know of their specific location or assignment. The engine was operating as a single resource with very little supervision.

- **WATCHOUT SITUATIONS (significantly contributed)**

  6. Instructions and assignments not clear.

  - Instructions for work assignments were not coming through the strike team leader. The instructions were given to the engine from other sources rather than the division supervisor, or strike team leader. This resulted in the independent actions and the supervisors not knowing their location nor their critical situation.

  7. No communication link with crew members and supervisors.

  - E-692 did not maintain communication with it's strike team leader, division supervisor, or adjoining resources. Their primary contact during the incident was with a leader of a military crew advisor working in the general area. The lack of direct communication

resulted in their supervisors not knowing the critical situation, warning them of the fire behavior below them, or advising them of how to escape. Air attack by chance noticed an engine parked in a draw with a flaming front advancing toward it. Air attack attempted to contact the engine with no success then informed the division supervisor.

11. **Unburned fuel between you and the fire.**

- Two spots were below road 251L when the E-692 was asked to work another spot up the road. Road 251L is a dead end road that works its way up the drainage through numerous gullies and washes. The road had a heavy concentration of unburned fuels below it.

12. **Cannot see main fire & not in contact with anyone that can.**

- E-692 worked its's way up road 251L. They could not see the spot fires below them and were not notified when the spots combined and made their run up the drainage.

14. **Weather was getting hotter and dryer.**

- Over the past two days as the sun hit the slopes and the humidity fell the fire became much more active. With spots below and knowledge of fire behavior from previous days the fire activity could have been predicted.

INVOLVED PERSONNEL PROFILES

- **TRAINING/QUALIFICATIONS/PHYSICAL FITNESS (did not contribute)**

  - The firefighters qualification cards showed that they were qualified for the positions they held on the fire.
  - The engine foreman and crew persons were contractors employed by Don Moss, owner of Strike Back Engines, P.O. Box 315, Dayville, Oregon 97825.
  - The contractor had issued NWSA Incident Qualification Cards for two of the crewpersons.
  - Rory Peak, the Engine Foreman, was issued card #0924, dated 1994, with a Single Resource Boss, Engine as qualification. His fitness level was a 47.
  - Naomi Peak, a crew person, was issued card #0932 dated 1994 with a Single Resource Boss, Engine as a qualification. Her fitness level was a 47.
  - Jared Peak, the third crew person was issued a card signed by the contractor, qualifying him as a firefighter Type I. There was no fitness score on the card.

- **OPERATIONAL PERIOD LENGTH/FATIGUE (did not contribute)**

  - The crew had worked at different jobs for 45 straight days with only 1-1/2 days off. Not all of this duty was fire line related.

- **ATTITUDES (did not contribute)**

  - Crew attitude was positive, but felt that they may have underestimated the danger associated with working in the area.

- **LEADERSHIP (influenced)**

  - The crew was assigned to a strike team, but were being used as a single resource.
  - Supervision and instruction were not coming from their strike team leader, but from other supervisors on the division.
  - Specific divisional safety briefings were not held prior to beginning shift.

- **EXPERIENCE LEVELS (influenced)**

  - The most experienced crew member had only three seasons experience including only one fire in 1993.
  - One crew member was a first year person with previous experience on fires in western Washington.
  - The crew failed to recognize, and use for a safety zone, a previously burned over area a few hundred feet from their deployment location.

EQUIPMENT

- **AVAILABILITY (did not contribute)**

  - All personnel protective equipment was available and used as intended.

- **PERFORMANCE (did not contribute)**

  - All equipment performed satisfactorily. There were no failures in design or use.

- **CLOTHING AND EQUIPMENT (did not contribute)**

  - All equipment and clothing performed satisfactorily.

- **USED FOR INTENDED PURPOSE (did not contribute)**

  - All equipment and clothing was used for intended purposes.

CAUSAL FACTORS

DIRECT CAUSES

The Investigative Team determined that the direct causes of the fire shelter deployment on the Rabbit Creek Fire are as follows:

- **FUELS**
  - Due to the extended drought in southern Idaho, the fuels were extremely dry and susceptible to rapid rates of spread culminating in short duration crown fire runs.

- **WEATHER**
  - Low relative humidity (15%) occurred on site the day of the incident.
  - The onset (1545 - 1600) of upslope afternoon winds at 5 mph with gusts to 8 mph.

- **VISIBILITY**
  - The crews of E-692 could not see directly, the spots which were burning below the 251L road.

- **TOPOGRAPHY**
  - Incident was situated in a "thermal belt" which contained the highest temperatures and lowest relative humidity compared to areas above and below the site.
  - The deployment site occurred on the upper one third of the ridge in the middle of a draw or a chute.
  - Slopes below the deployment site ranged from 20% on the north side to 47% on the south side.

- **INCIDENT MANAGEMENT**
  - The 251L road was too narrow, steep, and with too few turnouts for E-692 to maneuver quickly and avoid the entrapment.
  - There was no safety briefing given or major concerns were raised to E-692 other than the 0530 briefing by the Incident Safety Officer.
  - Two engines were assigned to the Strike Team without radios. This resulted in the STL remaining with the engine.
  - Due to the broken terrain, and an abundance of personnel on Division BB,the communication between supervisors and E-692 were poor.
  - Four of the 10 Standard Fire Orders were either violated or compromised.
  - Five of the 18 Watch Out Situations were not recognized, or proper action was not taken.
  - The crew failed to recognize, and use as an escape zone, a previously burned over area a few hundred feet from their deployment location.
  - The most experienced member of the E-692 had limited fire experience (3 years).

RECOMMENDATIONS

- **RECOMMENDATIONS FOR ALL OPERATIONAL PERSONNEL**

  - A Strict Adherence to the 10 Standard Firefighting Orders. In particular:

    > #4. Ensure instructions are given and understood. The instructions were neither clear to E-692, nor were they issued from the proper line supervisor. The instructions issued to E-692 were from the Military Crew Advisor and not from the Strike Team Leader Engines.

    > #5. Obtain current information on fire status. If E-692 would have obtained information on the status of the spots below road 251L (spot #1), he would have received the warning that the fire had spotted across the draw and was running toward his location, and been able to evacuate and avoid the entrapment and shelter deployment.

    > #6. Remain in communication with crew members, your supervisor, and adjoining forces. Had communication been maintained between E-692 and his Strike Team Leader and the forces suppressing the spot fire below them (spot #1) notice would have been given advising him of the escape of the spot and an earlier evacuation of E-692 from the deployment area could have been accomplished.

    > #9. Remain in control at all times. Had the Strike Team Leader, Engine been in control of E-692 at all times, E-692 would have been ordered to evacuate sooner and thus avoided the entrapment.

  - A heightened awareness of the 18 Watch Out Situations. Especially:

    > #6 Instructions and assignment not clear. (This item explained in detail above in #4 of the 10 Standard Fire Fighting Orders.)

    > #7 No communication link between crew and supervisors. (This item explained in detail above in #6 of the 10 Standard Fire Fighting Orders.)

    > #11 Unburned fuel between you and the fire. If E-692 had been more aware of this situation they would not have traveled as far up the 251L road or remained there as long as they had.

    > #12 Cannot see the main fire and not in communication with anyone who can. Had E-692 realized or been informed of the situation that was developing below them, a speedy evacuation of the 251L road could have been accomplished.

    > #14 Weather getting warmer and drier. Had E-692 been aware of the weather situation a quick evacuation could have taken place and avoided the entrapment.

- A separate, additional safety/operations briefing should occur between Division Supervisors, Strike Team Leaders and assigned resources with site specific information for their operational locations, prior to start of shift.

- Ensure that all resources are knowledgeable and competent with the use of the radio system, i.e., command as well as the tactical frequencies.

- If possible, secure additional tactical frequencies when divisions are occupied by substantial numbers of personnel and resources, so clear avenues of communications exist.

- Advance to establish check-in and inspection procedures would ensure that firefighters are qualified, and engines meet standards.

- If supervisors are not comfortable with, or do not feel that any fire employees are adequately trained or have sufficient fire knowledge to accomplish their assigned task, that the resources be released or reassigned to less hazardous duty.

- The Division BB supervisors should have acted in a more timely manner in reporting the entrapment and deployment to the Incident Management team.

• RECOMMENDATIONS FOR INCIDENT MANAGEMENT TEAMS

Fire entrapments are considered a situation where personnel are unexpectedly caught in a fire-behavior related, life threatening position where escape routes or safety zones are absent, inadequate or have been compromised. An entrapment may or may not include deployment of a fire shelter for it's intended purpose. They include "near misses."

- Incident Management Teams should complete and submit a Wildland Fire Entrapment/Fatality Initial Report (NFES Form #0869) to the Agency Administrator, and the National Interagency Coordination Center within 24 hours of entrapment notification.

- Incident Management Teams should utilize NWCG's Fire Entrapment Investigation and Review Guidelines. These guidelines outline the roles and responsibilities of the Incident Management Team, Agency Administrator, Entrapment Investigation Team, and NWCG's Safety and Health Working Team.