



## Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA

### SUMMARY

On September 12, 2004, a 24-year-old female career fire fighter (the victim) died while conducting an initial attack at a wildland fire. A Helitack crew responded in a helicopter to a wildland fire in a remote river drainage with slopes ranging from 80 to 120 percent. The crew began constructing an indirect downhill handline from a forest service road in an attempt to establish an anchor point at the river. A wind shift caused the fire to make an upslope run into the crew. Four crew members ran downhill toward the river while the victim and another fire fighter ran uphill toward another crew member standing on the road. The victim was overrun by fire and later pronounced dead at the scene.

NIOSH investigators concluded that, to minimize the risk of similar occurrences, fire departments and fire service agencies should

- *ensure that crews are able to reach a safety zone(s) quickly when deciding to construct a downhill/indirect handline in steep terrain.*



*Incident scene*

- *ensure that officers establish an initial attack plan that allows for the fire to be fought aggressively, but provides for the protection and safety of fire fighters first.*
- *ensure that crews fully comply with “The Standard Fire Orders”.*
- *ensure that individual crews establish Lookouts, Communications, Escape Routes and Safety Zones (LCES) prior to fighting the fire.*

### INTRODUCTION

On September 12, 2004, a 24-year-old female career fire fighter (the victim) died while conducting an initial attack at a wildland fire. On September 14, 2004, the U.S. Fire Administration notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On November 16-17, 2004, a Safety and Occupational Health Specialist and the Senior Investigator from the NIOSH Fire Fighter Fatality Investigation and Prevention Program investigated this incident. A meeting was conducted with the state agency

The **Fire Fighter Fatality Investigation and Prevention Program** is conducted by the National Institute for Occupational Safety and Health (NIOSH). The purpose of the program is to determine factors that cause or contribute to fire fighter deaths suffered in the line of duty. Identification of causal and contributing factors enable researchers and safety specialists to develop strategies for preventing future similar incidents. The program does not seek to determine fault or place blame on fire departments or individual fire fighters. To request additional copies of this report (specify the case number shown in the shield above), other fatality investigation reports, or further information, visit the Program Website at [www.cdc.gov/niosh/firehome.html](http://www.cdc.gov/niosh/firehome.html) or call toll free **1-800-35-NIOSH**



***Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA***

representatives that included a conference call with two additional state agency representatives and a U.S. Forest Service (USFS) representative also investigating this incident. Interviews were conducted with the helicopter flight officers and a fire fighter involved in this incident. On December 8, 2004, a phone interview was conducted with an additional fire fighter from the Helitack crew involved in this incident. The NIOSH investigators reviewed the training records for the victim and the crew members and the victim's autopsy report and death certificate. NIOSH investigators also reviewed the department's fireground standard operating procedures (SOPs) and the state agency's incident report. The state agency unit involved in this incident is comprised of 138 permanent uniformed fire fighters and 140 seasonal fire fighters serving a population of approximately 103,500 in a geographical area of about 4,400 square miles.

A glossary of terms used in this report is included as an appendix to this report.

**Training and Experience**

The victim was a fire fighter who had approximately 4 fire seasons of wildland fire fighting experience with an engine crew and 6 months of experience with this Helitack crew. The victim had the following training/qualifications with the state agency: Fire Fighter I Basic, Advanced Fire Fighter I and Basic Helitack. The victim also had National Wildfire Coordinating Group (NWCG) S-212 Wildfire Power Saw training.

**Helitack Crew Experience**

Note: The Helitack crew members were employed by the state agency at the time of the incident. Some of the members have prior experience working with the USFS.

Helitack Pilot – Full time pilot with the state agency for 5 years and a Lieutenant for 10 fire seasons.

Helitack Captain #1 – Helitack Captain for 11 years, Engineer for 6 years and Hotshot Captain with the USFS for 10 years.

Helitack Captain #2 – Helitack Captain for 8 weeks, Captain for 2 years, Engineer and Paramedic for 2 years, and Fire Fighter for 5 years.

Fire Fighter #1 – Helitack for 2 fire seasons, Engine Company for 1 fire season, USFS Hotshot crew for 2 fire seasons and a USFS Hand crew for 1 fire season.

Fire Fighter #2 – Helitack for 1 fire season and Engine Company for 3 fire seasons.

Fire Fighter #3 – Helitack for 5 months, Engine Company for 3 fire seasons and Tanker Base for 1 fire season.

Fire Fighter #4 – Helitack for 6 fire seasons and Engine Company for 4 fire seasons.

Fire Fighter #5 – Helitack for 2 fire seasons and Engine Company for 4 fire seasons.

**Equipment and Personnel**

The fire was reported at approximately 1233 hours with a dispatch and response at approximately 1245 hours consisting of 2 chief officers (one from the USFS and one from the state agency), 6 engines, 1 water tender, Air Attack 440 (twin-engine fixed-wing aircraft with a pilot and Air Tactical Group Supervisor), Air Tankers 82 and 83 (Type III [S-2]) and Copter 404.



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**Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA**

Helitack crew:

Copter 404 (Type II) – Helitack Pilot, Helitack Captain #1, Helitack Captain #2, Fire Fighter #1, Fire Fighter #2, victim, Fire Fighter #3, Fire Fighter #4 and Fire Fighter #5.

The fire was under the Command of the USFS.

**Fire**

The fire was approximately 5-10 acres in size at the time Copter 404 flew over the incident scene as part of the crew’s size-up of the fire and terrain. Nothing of concern was noted by the crew upon initial size-up. The fire spread in light, flashy surface fuels at the time of the initial attack with a majority of the fire above the forest service road heading toward the ridgeline (Photo 1). Smoke was blowing lightly up canyon and obscured the left flank of the fire. No spot fires were observed at this time.

**Fuels**

The fuels were predominately oak, mixed brush, leaf litter, and light grass with an oak overstory consistent with Fuel Model 2. The surface fuel layer consisted of oak leaf and pine needle litter and sparse, short, discontinuous cured annual grasses less than 12 inches in height.

One-hour fine fuel moisture was estimated to be 4-5%.<sup>1</sup> Live fuel moisture values at the incident site were estimated to be 61% and 71% for Chamise and Manzanita respectively. *Note: Fuel moisture levels of 60% for Chamise and 80% for Manzanita are often designated as the “critical” fuel moistures for these fuels.*

**Weather**

The temperature ranged from 89-94 degrees Fahrenheit with a relative humidity (RH) of 18-24%. The wind was predominantly steady and up-canyon (out of the west-southwest), estimated to be 3-5 miles per hour.

Ground and air crews reported that the wind remained light and was flowing steadily in an up-canyon direction with no critical fire weather patterns (thunderstorms, frontal passages, etc.) prior to or during the fatal event.

**Topography**

The incident site was located in a major river drainage in the Sierra Nevada range at an elevation of 1,450 feet. The topography in the river canyon is best characterized as having steep, rugged, broken terrain with numerous tributary canyons and ridges with slopes ranging from 80-120 percent. The incident site was located on a west facing slope of 90 percent at the bottom of the river canyon.

**INVESTIGATION**

A fire was spotted by a lookout and reported to Central Dispatch at approximately 1233 hours. Central Dispatch initiated a wildland fire response with equipment and crews responding from five different fire stations and one Air Attack Base.

At approximately 1245 hours, a Helitack crew of nine personnel responded in Copter 404. Helitack Captain #2 along with the victim and five other fire fighters were dropped off on a river bar where they unloaded a chainsaw with saw pack, five hand tools and five backpack pumps. The crew then attached a 324 gallon water bucket to the bottom of Copter 404. The Helitack pilot and Helitack Captain #1 flew Copter 404 up river and began making bucket drops near the forest service road on the right flank of the fire while two air tankers continued retardant drops above the forest service road on the right flank of the fire.

At approximately 1320 hours, the Chief Officer from the USFS (Incident Commander [IC]) arrived on the scene and drove past the Helitack crew who were now making their way up the forest service road. The IC proceeded along the



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**Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA**

road toward the right flank of the fire to conduct his size-up. *Note: The forest service road was located on a steep hillside with an average slope of 90 percent.* He arrived at the right flank of the fire and observed fire burning above and below the road. He continued along the road a short distance then decided to turn around. At approximately 1325 hours, the IC met up with the Helitack crew who were now half way between the landing zone and the incident site. The IC talked face-to-face with Helitack Captain #2 and provided the captain with his assessment of the fire and the topography. Captain #2 was instructed by the IC to “size things up to see if there was some place they could anchor the fire to the river.” *Note: Captain #2 later stated that he understood his instructions to be to “anchor the fire on the right flank, from the road down to the river.”* The IC proceeded down the road to a campground where he could better observe the fire.

Copter 404 made six bucket drops on the right flank of the fire prior to the Helitack crew reaching the incident site at approximately 1335 hours. *Note: These drops were made above the road.* Fire Fighter #1 and Fire Fighter #2 continued east on the forest service road to verify their position in relation to a bridge further up river and to find an access point to the river from the road. They did not find an access point to the river. The two fire fighters returned and met up with the crew at the incident site. Captain #2 then hiked down the hill as part of his size-up and returned to inform the crew that the distance to the river was approximately 300 feet. He identified the safety zones as the forest service road and the river. Captain #2 then decided that an indirect attack would help to keep the crew out of the heat, smoke, and heavy brush and would allow his crew to leave the backpack pumps on the road. The crew was briefed by Captain #2 on the situation and asked if there were any concerns

about their assignment. No concerns were voiced by the crew. Captain #2 directed the fire fighters to leave the backpack pumps (full of water) on the forest service road. Captain #2 radioed Captain #1 in Copter 404 and advised him that the Helitack crew would be building a downhill handline on the right flank of the fire. *Note: The IC did not hear this radio transmission as it is believed that the IC was on the command channel at this time ordering additional resources.*

At approximately 1340 hours, Engine 43 (E-43) arrived at the campground and met with the IC. The IC informed the E-43 Captain that there was a Helitack crew working the right flank of the fire and instructed the Captain to support them.

The Helitack crew began constructing the indirect handline, beginning at the forest service road (approximately 260 feet above the river), in an attempt to establish an anchor point at the river (Diagram and Photo 1). The crew’s handline was approximately 6 to 30 feet from the fire’s edge, downhill in an oak overstory with brush fuels (Photo 2). The fire was backing into an up-canyon wind with flame lengths of approximately 6 to 12-inches. The sawyer (Fire Fighter #4) and his swamper (Fire Fighter #5) were the first down the hill clearing brush while the rest of the crew followed them, constructing the handline (Diagram).

At approximately 1342 hours, the E-43 Captain had the driver spot the apparatus along the road just to the west of the Helitack crew. The E-43 Captain and a fire fighter proceeded on foot toward the incident site.

Captain #2 directed Fire Fighter #2 to burn-out the fuel between the fire’s edge and the handline. Using a fusee, Fire Fighter #2 began putting fire on the ground where the handline met the road. He worked his way down the handline,



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**Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA**

approximately 25 feet, where he met up with the victim.

At approximately 1345 hours, the Helitack crew continued working the handline and was unaware of an increase in fire activity above the road. Captain #2 directed Fire Fighter #1, Fire Fighter #2 and the victim to utilize a backpack pump to prevent any slopover along the handline. Fire Fighter #1 hiked up the handline to the road to retrieve a backpack pump. Fire Fighter #1 encountered the E-43 Captain on the road and discussed the handline construction. The E-43 Captain told the E-43 fire fighter that they would not commit the E-43 crew to the handline due to the steep terrain (90 percent slope).

At approximately 1346 hours, the wind shifted, causing the fire to make an upslope run into the crew. Fire Fighter #2 saw the flare-up below him and yelled “wind change.” Captain #2 saw the flare-up above him and yelled “emergency action.” Captain #2, Fire Fighter #3, Fire Fighter #4 and Fire Fighter #5 ran downhill while the victim, following directly behind Fire Fighter #2, ran uphill toward the road. The victim was approximately five feet from the edge of the road when she was overrun by the fire (Diagram). Fire Fighter #2 narrowly escaped the fire as he reached the road.

Captain #2 radioed Copter 404 and reported that Helitack 404 had been burned over with crew members sustaining injuries. Captain #2 requested immediate assistance with bucket drops. The flare-up was over within 30 seconds and reverted to a backing fire.

Fire Fighter #2 radioed Captain #2 and reported that the victim was missing. An immediate search began below the road near the handline. Smoke in the area limited visibility as the crew members yelled the victim’s name. At approximately 1354

hours, Fire Fighter #1 and Fire Fighter #2 located the victim’s body that had come to final rest approximately 90 feet below the forest service road (Diagram and Photo 3). Initial assessment by the crew members determined that the victim was deceased.

A number of factors contributed to the fatal event. The factors include, but are not limited to, the steep terrain (difficulty in reaching safety zones up a 90% slope in a timely manner), the sudden change in wind direction, the unburned fuel between the handline and the fire, and available resources (Copter 404 and Engine 43) in the area that were not utilized in support of establishing the handline and an anchor point at the river.

**INJURIES**

Helitack Captain – minor burns to the face.  
Fire Fighter #2 – smoke inhalation.  
Fire Fighter #3 – small second degree burn to left wrist and a small second degree burn to nose.

**CAUSE OF DEATH**

The autopsy report listed the cause of death as inhalation of products of combustion.

**RECOMMENDATIONS/DISCUSSION**

***Recommendation #1: Fire departments and fire service agencies should ensure that crews are able to reach a safety zone(s) quickly when deciding to construct a downhill/indirect handline in steep terrain.***

Discussion: Downhill handline construction is hazardous in steep terrain, fast-burning fuels, or rapidly changing weather. Downhill handline construction should not be attempted unless there is no tactical alternative. Direct attack methods should be used whenever possible.<sup>2,3,4</sup> The NWCG Incident Response Pocket Guide provides an outline of minimum requirements when building a downhill handline: "Crew supervisor(s)



**Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA**

and fireline overhead will discuss assignments prior to committing crew(s), a qualified overhead individual will stay with job until completed, the decision will be made after proposed handline has been scouted by supervisor(s) of involved crew(s), and lookouts, communications, escape routes and safety zones (LCES) will be coordinated for all personnel involved."<sup>4</sup>

The decision to construct a downhill/indirect handline should be made by a qualified supervisor after evaluating the situation. The crew must be able to rapidly reach a safety zone from any point along the line if the fire unexpectedly crosses below them.<sup>2</sup> Supervisors and fire fighters should look for and avoid the "WATCHOUT SITUATIONS" identified in the NWCG Fireline Handbook when deciding to construct a downhill/indirect handline. Four of the eighteen "WATCHOUT SITUATIONS" that are applicable to this incident are: "(11) Unburned fuel between you and the fire, (13) On a hillside where rolling material can ignite fuel below, (15) Wind increases and/or changes direction, and (17) Terrain or fuels make escape to safety zones difficult."<sup>2</sup>

It is important for fire fighters to readily recognize the following common denominators from past fatal events so that future tragedies can be prevented:

- Most incidents happen on smaller fires or on isolated portions of larger fires.
- Most fires are innocent in appearance before unexpected shifts in wind direction and/or speed result in flare-ups or extreme fire behavior. In some cases, tragedies occur in the mop-up stage.
- Flare-ups generally occur in deceptively light fuels, such as grass and light brush.
- Fires run uphill surprisingly fast in chimneys, saddles, gullies, and on steep slopes.

- Some suppression tools, such as helicopters or airtankers, can adversely affect fire behavior. The blasts of air from low-flying helicopters and airtankers have been known to cause flare-ups.<sup>5</sup>

***Recommendation #2: Fire departments and fire service agencies should ensure that officers establish an initial attack plan that allows for the fire to be fought aggressively, but provides for the protection and safety of fire fighters first.***

Discussion: The NWCG Fireline Handbook's chapter on initial attack states "upon arrival, officers should immediately determine an initial attack plan. This should be done quickly and be based on the initial size-up of the fire. The intent is to get work started in suppressing the fire as soon as possible. The officer must first determine:

- The location of escape routes and safety zones.
- Good anchor points such as roads, burned area, rivers, etc.
- How to attack the fire (direct or indirect).
- Type of control line needed.
- When will the next units arrive?
- Additional resource needs.
- How will topography affect fire behavior?"<sup>2</sup>

The NWCG Fireline Handbook includes an initial safety checklist that should be completed and reviewed as needed or as conditions change. The safety checklist provides a list of questions that require a "yes" or "no" answer that the officer can utilize to ensure that all safety concerns have been addressed and mitigated. Some of the questions in the checklist include: "Do you have a current weather forecast and is it consistent with observed fire weather?", "Are lookouts in place?", "Are the standard fire orders being followed?", and "Do



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**Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA**

you have a complete list of what resources have been ordered for the fire?" An answer of "no" to any of the questions on the checklist requires that the officer take corrective action immediately according to agency guidelines.<sup>2</sup>

**Recommendation #3: Fire departments and fire service agencies should ensure that crews fully comply with "The Standard Fire Orders"**

Discussion: A full list of "The Standard Fire Orders" can be found in Appendix II. The following "Standard Fire Orders" were compromised:

1. Fight fire aggressively but provide for safety first. The initial attack was aggressive but did not provide for an adequate margin of safety.
2. Initiate all action based on current and expected fire behavior. Actions were based on current fire behavior, low-intensity backing fire, without expectations of the fire making an upslope wind-driven run.
4. Ensure instructions are given and understood. There appears to have been a miscommunication between Captain #2 and the IC in that Captain #2 apparently misunderstood the IC's instructions.
7. Determine safety zones and escape routes. Safety zones and escape routes were identified but did not allow for adequate time for escape due to the steep terrain, loose soil conditions and distance required to reach either of the two safety zones identified.<sup>4</sup>

**Recommendation #4: Fire departments and fire service agencies should ensure that individual crews establish Lookouts, Communications, Escape Routes and Safety Zones (LCES) prior to fighting the fire.**

Discussion: LCES is a safety procedure put in place before fighting the fire. It is a self-triggering mechanism that functions sequentially: lookouts assess and reassess the fire environment; lookouts communicate safety threats to each fire fighter; and fire fighters use escape routes and move to safety zones.<sup>4,5</sup>

Identification of escape routes and safety zones is one of the primary responsibilities of any wildland fire fighter working on or near the fireline. The following guidelines can be used when selecting safety zones:

- Avoid locations that are downwind from the fire.
- Avoid locations that are in chimneys, saddles, or narrow canyons.
- Avoid locations that require a steep uphill escape route (greater than 50% slope).
- Take advantage of heat barriers such as lee side of ridges, large rocks, or solid structures.
- Burn out safety zones prior to flame front approach.<sup>4</sup>

The forest service road and the river were identified as the safety zones at this incident. These two sites were located uphill and downhill respectively on a hillside with a 90% slope. The victim and Fire Fighter #2 attempted to run up the hill in an attempt to reach the forest service road.

***Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA***

**REFERENCES**

1. State Agency and the United States Forest Service, Department of Agriculture [2004]. State Agency Green Sheet and USFS 72 hour report.
2. NWCG (National Wildfire Coordinating Group) [2004]. Fireline Handbook (National Wildfire Coordinating Group Handbook 3). Boise, ID: National Wildfire Coordinating Group.
3. IFSTA [2003]. Wildland fire fighting for structural fire fighters. 4<sup>th</sup> ed. Stillwater, OK: International Fire Service Training Association, pp 307.
4. NWCG (National Wildfire Coordinating Group) [2004]. Incident Response Pocket Guide. Boise, ID: National Wildfire Coordinating Group.
5. NFPA [2002]. Standard on fire department occupational safety and health program, Annex E LCES Model. Quincy, MA: National Fire Protection Association. NFPA 1500.

**Additional safety resources for fire fighters who operate in the wildland/urban interface:**

1. The **Wildland Fire Lessons Learned Center** web site: <http://www.wildfirelessons.net/>
2. The **Federal Fire and Aviation Safety Team (FFAST)** and the **National Interagency Fire Center (NIFC)** present the **6 Minutes for Safety** at the following web site [http://www.nifc.gov/sixminutes/dsp\\_discussion.php?id=7](http://www.nifc.gov/sixminutes/dsp_discussion.php?id=7). This site provides a downhill fireline construction checklist.
3. **Wildland fire safety & health reporting network (SAFENET):** This site provides front line fire fighters a mechanism to report unsafe situations. **SAFENET** submissions can be made and read at the following web site <http://safenet.nifc.gov/>

**INVESTIGATOR INFORMATION**

This incident was investigated by Mark McFall, Safety and Occupational Health Specialist, and Richard Braddee, Senior Investigator, Surveillance and Field Investigations Branch, Division of Safety Research, NIOSH. The report was written by Mark McFall.





*Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA*

**Appendix I - Glossary of Terms\***

**Anchor Point:** An advantageous location, usually a barrier to fire spread, from which to start constructing a fireline. The anchor point is used to minimize the chance of being flanked by the fire while the line is being constructed.

**Backfire:** Setting a fire in front of a wildfire to burn up fuel in the path of the advancing flame front and/or to change direction of the force of the fire's convection column.

**Backing Fire:** Fire spreading, or ignited to spread, into (against) the wind or down slope. A fire spreading on level ground in the absence of wind is a backing fire.

**Backpack Pump:** A portable sprayer with hand-pump, fed from a liquid filled container fitted with straps, used mainly in fire and pest control.

**Burning Out:** Setting fire inside a control line between the fire and the control line to remove unburned fuels. Considered a normal part of line construction. Reinforces the control line.

**Fuel Moisture Content:** The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 212 degrees Fahrenheit.

**Direct Attack:** Building a fireline by wetting, smothering or physically separating the burning fuel from unburned fuel. Usually done by hand crews, engines or tractors directly on the fire edge.

**Fine Fuels:** Fast-drying dead or live fuels, generally characterized by a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a timelag of one hour or less. These fuels (grass, leaves, needles, etc.) ignite readily and are consumed rapidly by fire when dry.

**Firing Out:** Act of lighting fire with a torch, fusee, etc., to accomplish burning out or backfiring.

**Flash Fuels:** Highly combustible fine fuels such as grass, leaves, draped pine needles, fern, tree moss and some kinds of slash, which ignite readily and are consumed rapidly when dry.

**Fuel Model:** Simulated fuel complex for which all fuel descriptors required for the solution of a mathematical rate-of-spread model have been specified.

**Fusee:** A colored flare designed as a railway warning device, widely used to ignite backfires and other prescribed fires.

**Green Sheet:** An informational summary report issued by the state agency following a serious accident or fatality to assist with accident prevention and training by providing a brief narrative of



***Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA***

the conditions and sequence of events leading to a serious accident. It is subject to revision as more findings are discovered. It is usually completed within 72 hours of the accident, and is therefore necessarily preliminary in nature and subject to potential inaccuracies.

**Handline:** Fireline constructed with hand tools.

**Helitack:** The utilization of helicopters to transport crews, equipment, and fire retardants or suppressants to the fireline during the initial stages of the fire. The term also refers to the crew that performs helicopter management and attack activities.

**Helitack Crew:** A crew of fire fighters specially trained and certified in the tactical and logistical use of helicopters for fire suppression.

**Indirect Attack:** A method of suppression in which the control line is located some considerable distance away from the fire's active edge. Generally done in the case of a fast-spreading or high-intensity fire and to utilize natural or constructed firebreaks or fuelbreaks and favorable breaks in the topography. The intervening fuel is usually backfired; but occasionally the main fire is allowed to burn to the line, depending on conditions.

**Live Fuels:** Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms, rather than by external weather influences.

**Overhead:** Personnel assigned to supervisory positions, including incident commander, command staff, general staff, branch directors, supervisors, unit leaders, managers and staff.

**Resources:** (1) Personnel, equipment, services and supplies available, or potentially available, for assignment to incidents. Personnel and equipment are described by kind and type, e.g., ground, water, air, etc., and may be used in tactical, support or overhead capacities at an incident. (2) The natural resources of an area, such as timber, grass, watershed values, recreation values, and wildlife habitat.

**Slopovert:** A fire edge that crosses a control line or natural barrier intended to confine the fire. Also called breakover.

**Spot Fires:** Fire ignited outside the perimeter of the main fire by a firebrand.

**Spotting:** Behavior of a fire producing sparks or embers that are carried by the wind and which start new fires beyond the zone of direct ignition by the main fire.

**Swamper:** A worker who assists fallers and/or sawyers by clearing away brush, limbs and small trees. Carries fuels, oil and tools and watches for dangerous situations.



***Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA***

**Type:** Refers to resource capability. A Type 1 resource provides a greater overall capability due to power, size, capacity, etc., than would be found in a Type 2 resource. Resource typing provides managers with additional information in selecting the best resource for the task.

\*The majority of definitions were abstracted from “Glossary of Wildland Fire Terminology,” a publication of the National Wildfire Coordinating Group. This glossary can be found in the **National Wildfire Coordinating Group’s Fireline Handbook** and at the following NWCG web site <http://www.nwcg.gov/pms/pubs/glossary/index.htm>

**APPENDIX II - The Standard Fire Orders**

**F**ight fire aggressively but provide for safety first.

**I**nitiate all action based on current and expected fire behavior.

**R**ecognize current weather conditions and obtain forecasts.

**E**nsure instructions are given and understood.

**O**btain current information on fire status.

**R**emain in communication with crew members, your supervisor, and adjoining forces.

**D**etermine safety zones and escape routes.

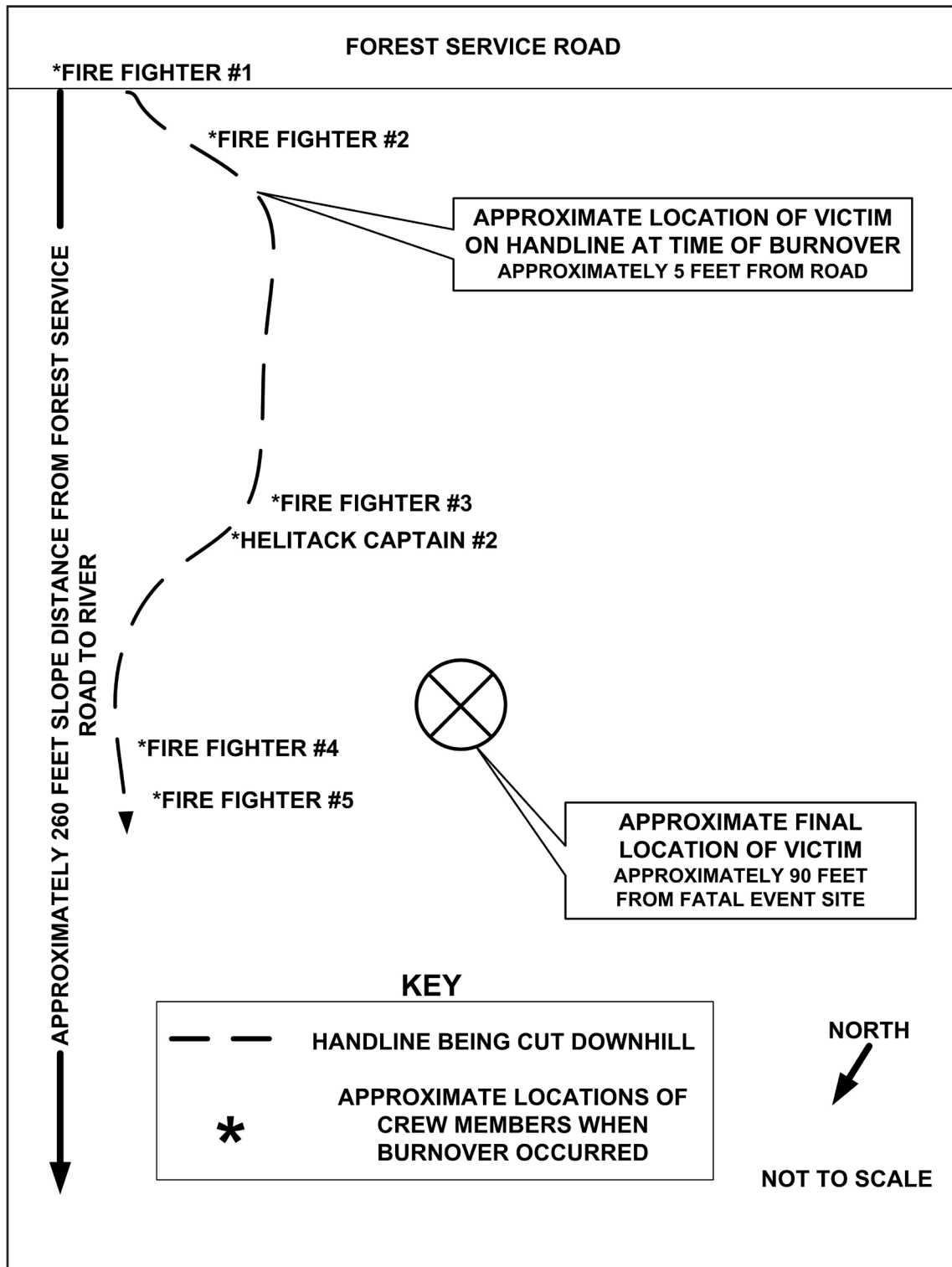
**E**stablish lookouts in potentially hazardous situations.

**R**etain control at all times.

**S**tay alert, keep calm, think clearly, act decisively.



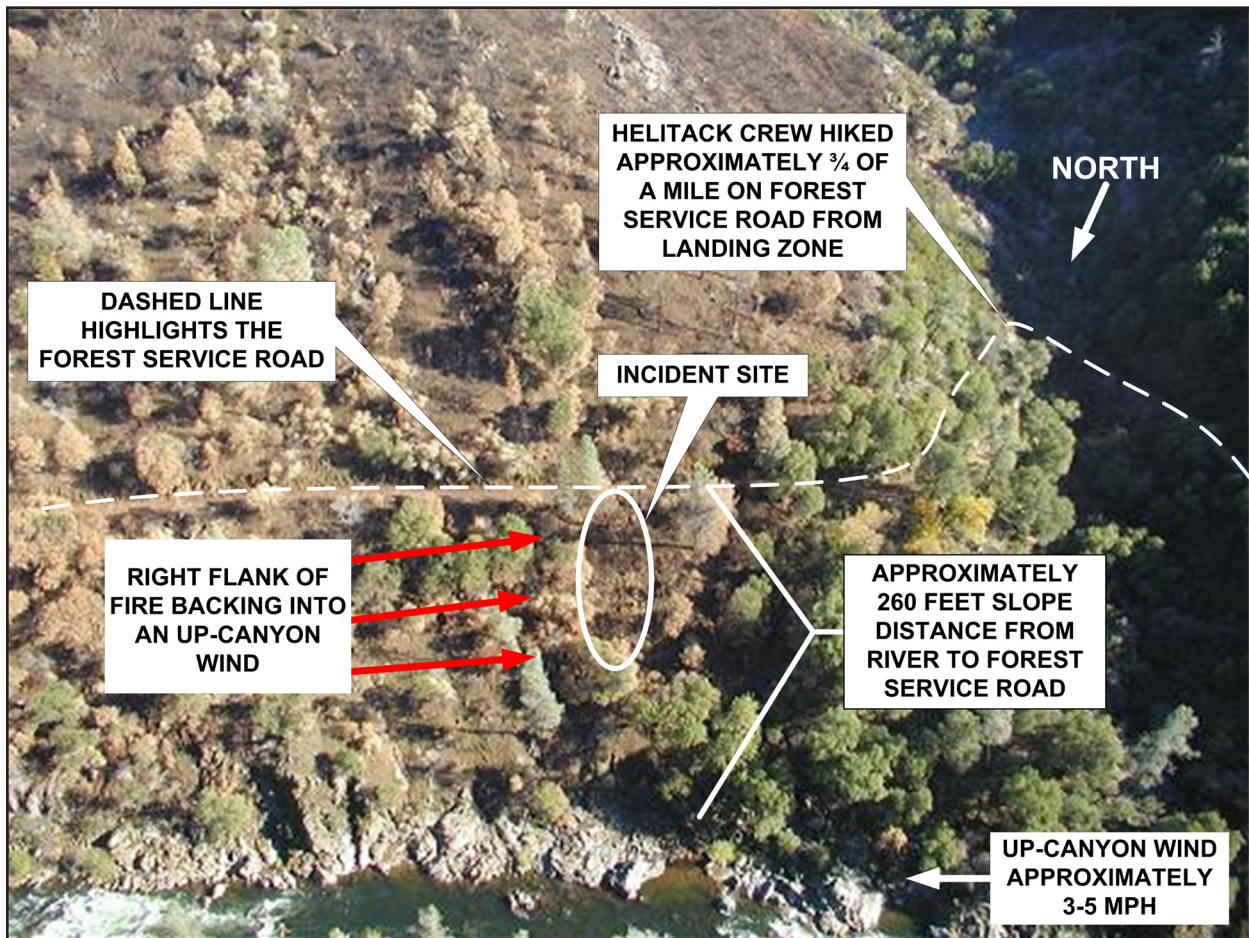
**Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA**



*Diagram. Aerial view of incident site at time of burnover*



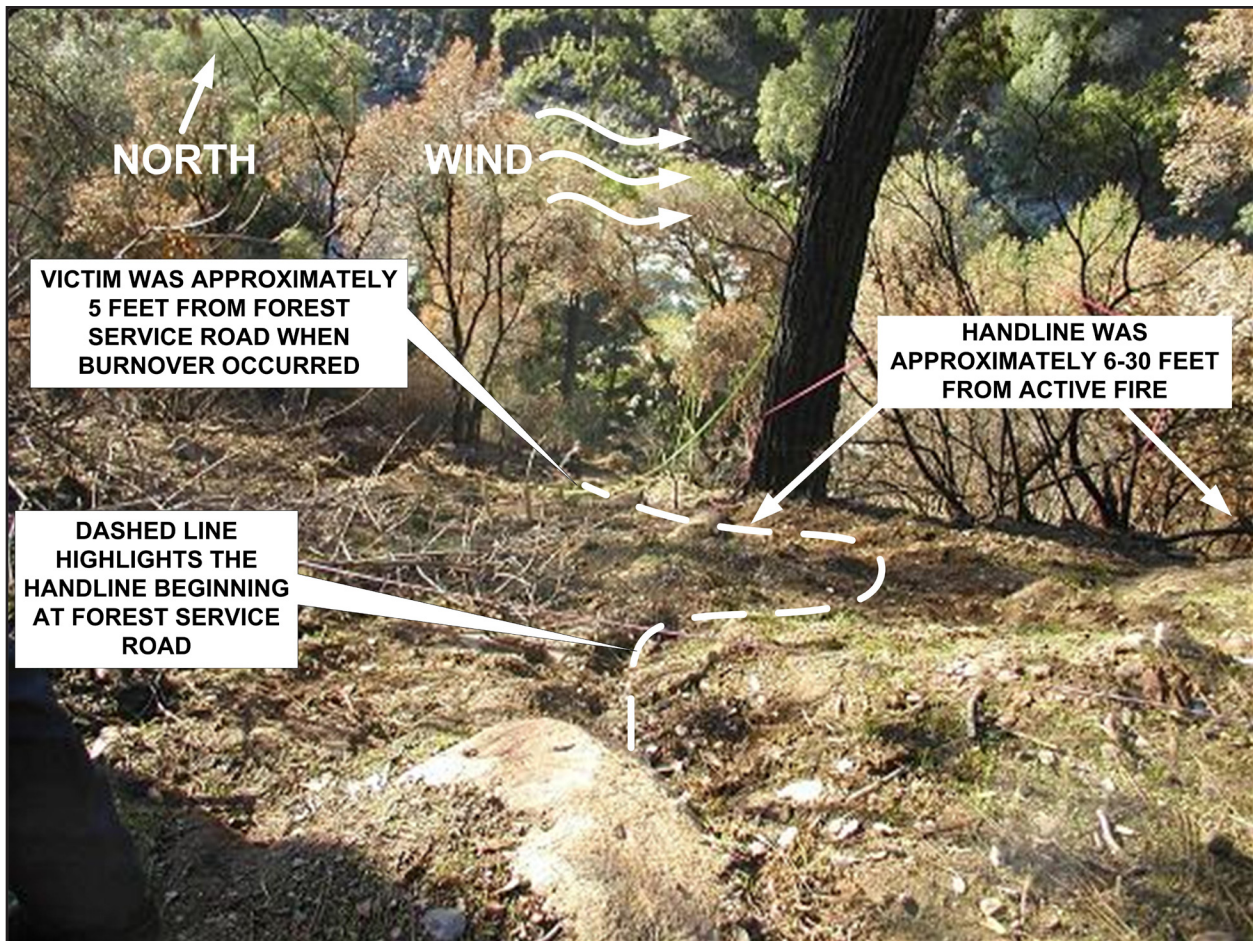
**Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA**



*Photo 1. Aerial view of incident site*



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*Photo 2. View of handline from forest service road*



*Career Helitack Fire Fighter Dies in Burnover During an Initial Attack at a Wildland Fire Operation - CA*



**INVESTIGATOR IS  
STANDING  
APPROXIMATELY  
WHERE THE VICTIM'S  
BODY WAS FOUND**

**FOREST SERVICE ROAD  
APPROXIMATELY 90 FEET  
ABOVE FINAL LOCATION  
OF VICTIM**

**LOOSE ROCK AND SOIL  
CONDITIONS WERE PRESENT  
ON THE HANDLINE AT THE  
TIME OF THE INCIDENT**



*Photo 3. Uphill view of handline*

**U. S. Department of Health and Human Services**  
Public Health Service  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health  
4676 Columbia Parkway, MS C-13  
Cincinnati, OH 45226-1998

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