

Downhill Line Construction Review



Appendix I—Downhill and Indirect Line Construction

CDF Firefighting Guidelines 7070.2

(October 2002)

Downhill/indirect line construction in steep terrain and fast burning fuels shall be done with extreme caution. Direct attack methods shall be used whenever possible.

Direct attack was possible but indirect attack was selected because the Helitack Captain considered it more expedient.

The following guidelines shall be followed before firefighting commences:

- The decision to fight fire downhill is made by a competent firefighter after thorough scouting.
Helitack Captain and Firefighters had received training in downhill line construction. Thorough scouting was not completed –walked upper part of line to be constructed only, visually observed the lower portion.
- Downhill line construction shall not be attempted when fire is present directly below the proposed starting point.
When downhill line construction began fire was below the road but not directly below crew.
- The fire-line shall not lie in or adjacent to a chimney or chute that could burn out while members are in the vicinity.
No chutes or chimneys present but slope was very steep.
- Communication is established between the members working downhill and members working uphill from below. When neither group can adequately observe the fire, communications will be established between the members and supervising overhead. At this time a lookout with communications will be posted where the fire's behavior can be seen.
Not applicable.
- Members will be able to rapidly reach a zone of safety from any point along the line if the fire unexpectedly crosses below them.
Steep slopes, loose soil and brush/young oaks were primary contributors to unsuccessful escape. Very steep. Uphill route was fireline with loose soil and poor footing. Two downhill routes were used – (1) very steep to almost vertical near river (2) steep dirt chute.
- A downhill line shall be securely anchored at the top. Avoid under-slung line.
Line was anchored at road on right flank above the heel of the fire at the only place they could anchor for downhill line construction. The anchor point was less than optimal.
The scraped portion of the line that had been completed down from the road was not under-slung.
- Full compliance with "The Standard Fire Orders" is assured.
See discussion under "Ten Standard Fire Orders"

If possible line firing should be done as the line progresses, beginning from the anchor point at the top.

Crew was in the process of line firing when flareup occurred.

Reference: Section 7013.1.1

7070-5

Downhill Line Construction Checklist USFS Fireline Handbook (NFES 0065)

Downhill fireline construction is hazardous in steep terrain, fast burning fuels, or rapidly changing weather. Downhill fireline construction should not be attempted unless there is no tactical alternative.

The tactical alternatives were to go direct with water support from copter or engine hose-lay or to withdraw from this assignment at this location.

When building downhill fireline, the following is required:

- Crews, supervisor(s) and fireline overhead will discuss assignments prior to committing crew(s).
The IC and Helitack Captain discussed the assignment to anchor the right flank. (What was said and what was heard may have been different; there was no follow up with each other on action initiated.)
- Responsible overhead individual will stay with job until completed (TFLD or ICT4 qualified or higher).
The Incident Commander was qualified ICT3 but not present during the downhill line construction and may not have been aware that it was occurring. Captain Winger was Type 1 Fire Crew Captain qualified.
- Decision will be made after proposed fireline has been scouted by supervisor(s) of involved crew(s).
Helitack Captain and Firefighters had received training in downhill line construction. Thorough scouting was not completed –Helitack Captain walked upper part of line only, visually observed the lower section.
- LCES will be coordinated for all personnel involved.
Crews Supervisor(s) is in direct contact with lookout that can see the fire.
Everyone on the helitack crew could see the entire section of the fire they were working on and considered themselves to always be each others lookout. (A dedicated lookout was not posted prior to initiation of line construction.)
Communications is established between all crews.
Not applicable
- Rapid access to safety zone(s) in case fire crosses below crew(s)
Steep slopes, loose soil and brush/young oaks were primary contributors to unsuccessful escape. Very steep, uphill route was fireline with loose soil and poor footing. Two downhill routes were used – (1) very steep to almost vertical near river (2) steep dirt chute.
- Direct attack will be used whenever possible; the fireline should be completed between anchor points before being fired out.
Direct attack was possible but indirect attack was selected because the Helitack Captain considered it more expedient and wanted to keep the crew out of the smoke and heat. Crew was in the process of line firing when flareup occurred.
- Fireline will not lie in or adjacent to a chute or chimney.
No chutes or chimneys were present but slope was very steep.
- Starting point will be anchored for crew(s) building fireline down from top.
Line was anchored at road on right flank above the heel of the fire at the only place they could anchor for downhill line construction. The anchor point was less than optimal.
- Bottom of the fire will be monitored; if the potential exists for the fire to spread, action will be taken to secure the fire edge.
The bottom of the fire was observable by the crew and not being monitored by anyone else except periodically by air attack. The potential for the fire to spread existed but no action was taken to secure fire edge.

10 Standard Firefighting Orders



■ Standard Firefighting Orders ■

| Standard | In Compliance | Non-compliance | Not Applicable | Notes | Causative | Contributory | Non-Contributory | Unrelated safety issue |
|--|---------------|----------------|----------------|--|-----------|--------------|------------------|------------------------|
| FIRE BEHAVIOR | | | | | | | | |
| 1. Keep informed on fire weather conditions and forecasts | H404 | | | General weather yes. | ✓ | | | |
| | IC | | | | ✓ | | | |
| | AA440 | | | | | | ✓ | |
| | E43 | | | | | | ✓ | |
| 2. Know what your fire is doing at all times. | H404 | | | Visual observation in work area. In contact with AA440. | | | ✓ | |
| | IC | | | Moving to better vantage point | | | ✓ | |
| | AA440 | | | | | | ✓ | |
| | E43 | | | | | | ✓ | |
| 3. Base all actions on current and expected fire behavior. | H404 | | | | | ✓ | | |
| | IC | | | Most knowledge/ history of fires in canyon | | ✓ | | |
| | AA440 | | | 9 years experience at Columbia | | | | |
| | E43 | | | Cautious about fire in bottom of canyon because of limited turn-arounds, long route out. | | | ✓ | |

| Standard | In Compliance | Non-compliance | Not Applicable | Notes | Causative | Contributory | Non-Contributory | Unrelated safety issue |
|--|---------------|----------------|----------------|--|-----------|--------------|------------------|------------------------|
| FIRELINE SAFETY | | | | | | | | |
| 4. Identify escape routes and safety zones, and make them known. | H404 | | | Up line to road, down to river, the black. (escape route to road was compromised by flare-up; escape route of Andahl & Winger was through fire to river) | ✓ | | | |
| | | | IC | | | | ✓ | |
| | | | E43 | | | | ✓ | |
| 5. Post a lookout when there is possible danger. | H404 | | | Everyone considered themselves to be lookouts, and Winger gave instructions to Boatman to get backpack pump at road, hold the line, & watch the crew. (Lookout not Boatman's primary duty. Lookout not posted prior to initiation of line construction.) | | | ✓ | |
| | IC | | | Relies on AA440 | | | ✓ | |
| | | | AA440 | | | | ✓ | |
| 6. Be alert. Keep calm. Think clearly. Act decisively. | | | E43 | Not engaged | | | ✓ | |
| | H404 | | | | | | ✓ | |
| | IC | | | | | | ✓ | |
| | AA440 | | | | | | ✓ | |
| | E43 | | | | | | ✓ | |

| Standard | In Compliance | Non-compliance | Not Applicable | Notes | Causative | Contributory | Non-Contributory | Unrelated safety issue |
|---|---------------|----------------|----------------|--|-----------|--------------|------------------|------------------------|
| ORGANIZATIONAL CONTROL | | | | | | | | |
| 7. Maintain prompt communication with your forces, your supervisor, and adjoining forces. | H404 | | | During line construction communicated with crew but did not communicate with supervisor that line construction was downhill or indirect. Not aware of adjoining forces. There was a face-to-face briefing with IC (Div. 4) prior to engagement. No attempts or failures of communication capability noted. | | ✓ | | |
| | IC | | | There was a face-to-face briefing with Captain Winger and E43 prior to engagement. No additional communication to Captain. Constant communication with AA440. | | ✓ | | |
| | AA440 | | | In frequent communication with IC, operational aircraft, & E42. | | | ✓ | |
| | E43 | | | Had face-to-face with IC prior to engagement; chose to make face-to-face communication with helicopter crew rather than radio. Did not contact adjoining force and advise of presence. | | ✓ | | |
| | Dispatch | | | (It is not clear that all resources responding were aware of other resources responding. Check-ins with dispatch not verifiable with information | | | | |

| Standard | In Compliance | Non-compliance | Not Applicable | Notes | Causative | Contributory | Non-Contributory | Unrelated safety issue |
|--|---------------|----------------|----------------|---|-----------|--------------|------------------|------------------------|
| 8. Give clear instructions and insure they are understood. | H404 | | | Crew understood instructions from Captain regarding line construction objectives. (Boatman not clear on lookout portion of his assignment.) | | ✓ | | |
| | IC | | | IC believes his direction to H404 was to size-up & safely anchor/take action (Winger believed assignment was to anchor from road to river.) IC directed E43 to support helitack crew & scout heel | | ✓ | | |
| | E43 | | | Direction to "Support HC Crew" was not clear. | | ✓ | | |
| | | | | AA440 Anchoring instructions to copter 404 on initial water drops was not clear. | | ✓ | | |
| 9. Maintain control of your forces at all times. | H404 | | | | | | | |
| | IC | | | (Did not identify self as IC to helitack crew. Did no follow-up communication with HC regarding progress, situation, etc.) | | ✓ | | |
| | AA440 E43 | | | | | | ✓ ✓ | |
| IF YOU CONSIDER 1-9, then | | | | | | | | |
| 10. Fight fire aggressively, having provided for safety first. | H404 | | | (All Standards were not considered adequately) | | ✓ | | |
| | IC | | | | | ✓ | | |
| | AA440 | | | | | ✓ | | |
| | E43 | | | | | ✓ | | |

18 Situations that Shout “Watch Out”



Appendix K—18 Situations that Shout “Watch Out”

| Situation | Notes | Causative | Contributory | Non-Contributory | Unrelated Safety Issue |
|---|--|-----------|--------------|------------------|------------------------|
| 1. Fire not scouted & sized up. | IC sized up fire & Captain scouted line. | | ✓ | | |
| 2. In country not seen in daylight. | Not applicable | | | ✓ | |
| 3. Safety zones & escape routes not identified. | Inadequate safety zones & escape routes identified. | | ✓ | | |
| 4. Unfamiliar with weather & local factors influencing fire behavior. | Helitack crew not familiar with local weather factors in the canyon. | | ✓ | | |
| 5. Uninformed on strategy, tactics, & hazards. | Unclear statements on strategy, tactics, and priorities. | | ✓ | | |
| 6. Instructions & assignments not clear. | Instructions between IC and helitack captain not jointly understood. | | ✓ | | |
| 7. No communications link with crew. | Not applicable. | | | ✓ | |
| 8. Constructing fireline without a safe anchor point. | Line was anchored at road on right flank above the heel of the fire at the only place they could anchor for downhill line construction. The anchor point was marginal/less than optimal. | | | ✓ | |
| 9. Building fireline downhill with fire below you. | When downhill line construction began fire was below the road but not directly below crew. | | ✓ | | |
| 10. Attempting a frontal assault on the fire. | Not applicable. | | | ✓ | |
| 11. Unburned fuel between you and the fire. | Indirect line construction was selected tactic. Physical evidence indicates the width of unburned fuel was 7 to 30 feet. Oak and brush presented additional hazards (flare-up of aerial fuels in brush/oak). | ✓ | | | |

| Situation | Notes | Causative | Contributory | Non-Contributory | Unrelated Safety Issue |
|---|--|-----------|--------------|------------------|------------------------|
| 12. Cannot see the main fire, not in contact with anyone who can. | Not applicable. | | | ✓ | |
| 13. On a hillside where rolling material can ignite fuel below you. | Steep slopes, rolling debris potential (rolling rocks observed). | | | ✓ | |
| 14. Weather is getting hotter and drier. | Not present. | | | ✓ | |
| 15. Wind increases and/or changes directions. | No significant change in direction or speed of wind observed in 45 minutes before flare-up event. Sudden, unanticipated shift in wind direction caused flare up. | ✓ | | | |
| 16. Getting frequent spot fires across the line. | Frequent spotting at head; spot on left flank; none on right flank until flare up event. | | | ✓ | |
| 17. Terrain & fuels make escape to safety zones slow & difficult. | Steep slopes, loose soil, and brush/young oaks were primary contributors to unsuccessful escape. | ✓ | | | |
| 18. Taking a nap near the fireline. | Not present. | | | ✓ | |

LCES Review



■ LCES Checklist Summary ■

| Item | In Compliance | Non-compliance | Not Applicable | Notes | Causative | Contributory | Non-Contributory | Unrelated safety issue |
|--|---------------|----------------|----------------|---|-----------|--------------|------------------|------------------------|
| LOOKOUTS | | | | | | | | |
| Competent & trusted individual(s)? | H404 | | | Boatman qualified; not clear he knew he was assigned. No lookout formally designated. | | | | ✓ |
| Watch/ weather kit/IAP? | | | H404 | | | | ✓ | |
| Good vantage and safe location? | H404 | | | | | | ✓ | |
| Knowledge of escape and safety locations? | H404 | | | Lack of clarity on lower escape route. | | ✓ | | |
| Knowledge of crew(s) location or division? | | | IC | Did not know when crew was below road. | | ✓ | | |
| Fire fighter has both authority and responsibility to warn others? | H404 | | ATGS | Thought Helitack crew was above road. | | ✓ | | |
| COMMUNICATIONS | | | | | | | | |
| Radio and Frequencies? | IC & ATGS | | | IC & AA440 communicated on ground tactical 168.200. VHF was used from air-to-air. (potential traffic clutter) | | | | ✓ |
| Map & communication plan? | | | H404 | | | | ✓ | |
| Sound alarm early, not late? | H404 | | | | | | ✓ | |
| Must be able to tell other firefighters of an impending problem. | H404 | | | | | | ✓ | |

| Item | In Compliance | Non-compliance | Not Applicable | Notes | Causative | Contributory | Non-Contributory | Unrelated safety issue |
|---|---------------|----------------|----------------|--|-----------|--------------|------------------|------------------------|
| ESCAPE ROUTES | | | | | | | | |
| Scouted? | | H404 | | Captain walked upper escape route to road; visually assessed lower escape route (may not have been able to see last drop-off to river.) Did not walk lower escape route; did not reassess escape routes. | | ✓ | | |
| Walkable? | | H404 | | Very steep. Uphill route was fireline with loose soil & poor footing. Two downhill routes were used – (1) very steep to almost vertical near river (2) steep dirt chute. | ✓ | | | |
| Close enough? Anticipated ROS | | H404 | | A rate of spread faster than escape time was not anticipated. | ✓ | | | |
| Timed? | | H404 | | Based on interviews there is no indication of discussion regarding timing of escape routes | ✓ | | | |
| Marked? | | | H404 | | | | ✓ | |
| Away from fire head? | | | H404 | | | | ✓ | |
| SAFETY ZONES (no shelters needed) | | | | | | | | |
| Clean burn / Natural/ Man-made / Vehicles. | H404 | | | Road was adequate safety zone once continued into the clean black. River bottom was an adequate natural safety zone. | | | | ✓ |
| Scouted? | H404 | | | Captain scouted safety zone – road [SEE CDF 7070.1.3D for definition]; visually assessed lower safety zone but not on site. | | | | ✓ |
| Large enough? Consider number of people, fuels, flame length. | H404 | | | Upper safety zone was large enough. Lower safety zone was large enough. | | | ✓ | |
| Terrain? Avoid saddles, chutes, box canyons. | H404 | | | | | | ✓ | |
| Snags or rolling rocks? | H404 | | | Upper and lower safety zones had rolling material into safety zones; snag above the road | | | | ✓ |
| All personnel need to be informed. | H404 | | | | | | ✓ | |
| Update throughout the shift. | H404 | | | | | | ✓ | |

California OSHA Investigation Findings



Appendix M—California OSHA Investigation Findings

STATE OF CALIFORNIA
DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

Office: Cal/OSHA
1209 Woodrow, Suite C-4
Modesto, CA 95350
(209) 576-6260

NOTICE OF NO ACCIDENT-RELATED VIOLATION AFTER INVESTIGATION

Calif. Dept. of Forestry
635 N. Santa Rosa
San Luis Obispo, CA 93405



Page 1 of 1

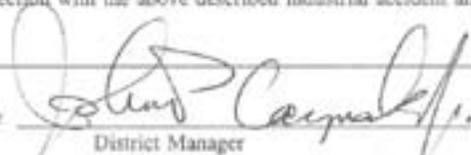
An investigation of an industrial accident or occupational illness was conducted by Michele Grubbs at a place of employment located at Stanislaus Nat'l Forest, Lumsden Rd., Groveland on 09/13/2004.

DESCRIBE THE CONDITION INSPECTED:

Incident on 9/12/04. Injury Illness Prevention Program.

It has been determined that no standard, rule, order or regulation set forth in Title 8, California Code of Regulations, and Division 5 of the California Labor Code, has been violated in connection with the above described industrial accident and/or occupational illness.

Signature: 
Safety Engineer/Industrial Hygienist

Signature: 
District Manager

Date of issuance 03-03-05 Date investigation completed 01/12/2005

This notice is provided to the employer in accordance with the provisions of California Labor Code Section 6318(a). The employer is required to post this notice for three working days.

This notice relates solely and exclusively to the investigation of the industrial accident(s) and/or occupational illness(es) described above. It does not relate to any other conduct, condition or activity existing at the above-described place of employment either on the date of the investigation or presently.

| | | | | |
|--------|----------|--------------------------|---------------------|--|
| 2 | 4 | P9871 | 11-05 | 120141221 |
| Region | District | SE/TH Identification No. | Optional Report No. | CAL/OSHA Form 1 Report No. CAL/OSHA-1708 (08/07/98) |

CDF Blue Sheet/USFS 24-hour Report





Wildland Fire Fatality and Entrapment INITIAL REPORT

Complete this report for fire-related entrapment and/or fatalities. Timely reporting of wildland-related entrapments or fatalities is necessary for the rapid dissemination of accurate information to the fire management community. It will also allow fire safety and equipment specialists to quickly respond to these events as appropriate. This initial report does not replace agency reporting or investigative responsibilities, policies, or procedures. Immediately notify the National Interagency Coordination Center (NICCC). Submit this written report within 24 hours—even if some data are missing—to the address given below.

NICC—National Interagency Fire Center
3833 South Development Ave.
Boise, ID 83705-5354

Phone: 208-387-5400
Fax: 208-387-5414

NICC Intelligence Section
E-mail: nicc_intel@nifc.blm.gov

Submitted by: John Berry and Dan Turner
Agency: US Forest Service/CDF
Phone: 209-533-6981

Position: Accident Investigation Team Leaders
Location: Sonora, California
E-mail: jberry@fs.fed.us
dan.turner@fire.ca.gov

1. General Information

- Date of event 09/12/2004 Time 1345 • Fire name, location, agency, etc.
Tuolumne Incident, Groveland Ranger District,
Stanislaus National Forest, California
- Number of persons involved 7
- Number of: Injuries 6 Fatalities 1

2. Fatalities

- Type of accident:
 - Aircraft
 - Natural (lightning, drowning, etc)
 - Medical (heart, stroke, heat, etc.)
 - Struck by falling object
 - Vehicle
 - Smoke
 - Entrapment
 - Other
- Employing agency CDF
- Unit name: Tuolumne/Calaveras Ranger Unit
- Address 785 Mt. Ranch Rd.
San Andreas, CA 95249
- For further information, contact Fred McVay
Phone 209-754-3831
- Where fatality/entrapment occurred:
 - Fire site
 - Incident base
 - In transit
 - Other

Note: In the event of fatality(s), do not release names until next of kin are notified.

3. Fire-Related Information

- Fuel model G
- Temperature 85 RH 23 Wind 12 mph
- Topography Steep slopes Slope 100%
- Fire size at the time of the incident/accident 15 acres
- Incident management type at the time of the incident/accident: (circle one) 4
- Urban/wildland intermix? yes no
- Cause of fire: Natural Incendiary
 Accidental Unknown

4. Entrapment

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. Note: Engine and dozer burnovers also constitute entrapments.

• Brief description of the accident : September 12, 2004, Stanislaus National Forest, Goveland Ranger District, A nine person CDF helitack crew was part of an initial attack force responding to the Tuolumne fire around 12:30 PM. Fire was approximately 15 acres in steep terrain with slopes in excess of 100%. Seven crew members were in the process of cutting line when the fire flared up, over running the crew. One fire fighter was killed and 6 others injured. No fire shelters were deployed.

A major accident investigation team made up of California Department of Forestry and Fire Protection(CDF) and US Forest Service is onsite. Dan Turner, Chief, CDF- San Luis Obispo, and John Berry, Eldorado National Forest Supervisor are the Team Leaders for the joint investigation.

The Investigation Team will be gathering facts from the site, weather and other fire behavior information, personal interviews, and other background information. The Team plans on having one report for the two agencies.

JOHN BERRY
Team Leader

DAN TURNER
Team Leader

Entrapment Description

- Person trapped With fire shelter Without fire shelter
- Burns/smoke injuries incurred while in fire shelter Yes No
- Burns/smoke injuries incurred while escaping entrapment Yes No
- Burns/smoke injuries incurred while fighting fire Yes No
- Fire shelter performed satisfactorily Yes No
- Fire shelter was available, but not used Yes No

Personal Protective Equipment Used

- Fire shelter Yes No
- Gloves Yes No
- Protective pants Yes No
- Boots Yes No
- Protective shirt Yes No
- Goggles Yes No
- Face/neck protection Yes No
- Hardhad Yes No

NFES No. 0869

(Revised 2/01)

PMS No. 405-1



United States
Department of
Agriculture

Forest
Service

Washington
Office

14th and Independence Ave. SW.
P.O. Box 96090
Washington, DC 20090-6090

File code: 6730

Date: September 14, 2004

Route to:

Subject: Preliminary (24-Hour) Briefing

To: Regional Forester

THE FOLLOWING INFORMATION IS PRELIMINARY AN SUBJECT TO CHANGE

Location: Stanislaus National Forest

Date of occurrence: September 12, 2004

Time of occurrence: 1345, Fire reported 1233

Team leader: John Berry and Dan Turner

Mission: Initial Attack

Activity: Fire Suppression

Number injured: 6

Number of fatalities: 1

Property damage (such as to vessels, equipment, and structures): none

Narrative: September 12, 2004, Stanislaus National Forest, Goveland Ranger District, A nine person CDF helitack crew was part of an initial attack force responding to the Tuolumne fire around 12:30 PM. Fire was approximately 15 acres in steep terrain with slopes in excess of 100%. Seven crew members were in the process of cutting line when the fire flared up, over running the crew. One fire fighter was killed and 6 others injured. No shelters were deployed.

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The Investigation Team will be gathering facts from the site, weather and other fire behavior information, personal interviews, and other background information. The Team plans on having one report for the two agencies.

JOHN BERRY
Team Leader

DAN TURNER
Team Leader

cc:
Safety Manager Shannon Martinez, Dick King, Larry Crabtree



Caring for the Land and Serving People

CDF Green Sheet/USFS 72-hour Report



**CDF Green Sheet
and
USFS 72 Hour Report**

**California Department of Forestry and Fire Protection
USDA Forest Service**



CDF HELITACK 404 CREW BURNOVER

September 12, 2004

**TUOLUMNE FIRE
CA-STF--2191
STANISLAUS NATIONAL FOREST**

**PACIFIC SOUTHWEST REGION
USDA-FOREST SERVICE**

Lookouts Communications Escape Routes Safety Zones

A Board of Review has not approved this Summary Report. It is intended as a safety and training tool, an aid to preventing future occurrences, and to inform interested parties. Because it is published on a short time frame, the information contained herein is subject to revision as further investigation is conducted and additional information is developed.

SUMMARY

On September 12, 2004 at approximately 1345 hours seven members of CDF Columbia Helitack (Helicopter 404) crew were burned over while constructing fireline from Lumsden Road downhill to the Tuolumne River on a steep slope (80-120%). The fire was located near Lumsden Bridge in the bottom of the Tuolumne River Canyon. The crew had been dropped off by Copter 404 on a gravel bar in the river approximately mile downstream from the fire. The crew met the incident commander (IC) on Lumsden Road before reaching the fire. The helitack captain (HC) received a strategy briefing to establish an anchor point on the right flank. He walked to the fire's edge and assessed the area below the road.

After discussing the assignment and safety issues, the crew members began constructing indirect handline (7 to 30 feet from the fire's edge) downhill using a chainsaw and hand tools in an oak overstory with brush fuels. The fire was backing into an up-canyon wind. A wind shift occurred causing the fire to change direction and spread upslope into the crew. Three members of the crew simultaneously shouted the alarm. All members of the crew ran toward identified safety zones. Four members of the crew, including the captain, went down to the river; three went up toward Lumsden road. The four firefighters (FF) that went downhill reached their safety zone. Of the three firefighters that went uphill, FF#1 and FF#2 made it to the road. FF#3 was last seen by FF#2 immediately behind him approximately 5 feet from the road. FF#3 did not reach the road. Firefighters on-scene estimated the elapsed time from the wind shift to the burn-over was less than 30 seconds with the total wind event lasting less than 2 minutes. Fire shelters were not deployed.

After reaching the safety zones a crew count determined that FF#3 was missing; an immediate search was begun. FF#3 was located; she was obviously deceased.

The other helitack firefighters received minor to moderate injuries. They received immediate assistance at the scene and were transported to medical facilities in Modesto and Sonora.

CONDITIONS

The fire location is in Tuolumne County at the bottom of the Tuolumne River Canyon (1450' elevation) about three (3) miles east of Groveland, California. The Tuolumne River Canyon is a major Sierra Nevada river drainage that has very steep canyon sides and is 2,000 feet

deep at the accident site. The fire originated near the river _ mile downstream of the Lumsden Bridge.

The fire was first reported by The Stanislaus National Forest (STF) Duckwall Lookout at 1233 hours. STF dispatched a standard wildland fire response. Copter 404 was dispatched to the fire at 1245 hours from their home base in Columbia, California (22 miles northwest of the fire). CDF Air Attack 440, 2 airtankers, and the IC were already at the scene upon the arrival of Copter 404 at approximately 1305 hours. Copter 404 is a UH-1H Super Huey (type 2) helicopter with a crew of nine, consisting of a pilot, two helitack captains, and six firefighters. After dropping off one helitack captain and six firefighters at a landing zone (LZ) about _ mile southwest of the fire, the pilot and one helitack captain remained with the copter and began making water drops up the right flank. At the time of the burn over Copter 404 was working a spot fire off the left flank of the fire.

The crew walked along the road from the LZ to the right flank of the fire (the fire was burning above and below the road). The helitack captain met the IC at Lumsden Road near South Fork Campground and received a briefing on fire conditions and proposed strategy to anchor the right flank. The crew continued up the road to the right flank, evaluated the situation and the proposed assignment to anchor the right flank at the river.

Lumsden road parallels the river. The slope distance is approximately 260 feet from the road down to the river at the accident site. The fire was burning upslope from the river with minimal lateral spread on the right flank. The right flank was backing into a light up-canyon wind with flame lengths of less than 12 inches.

FUEL

During the initial attack, the fire was spreading in light, flashy surface fuels. The fuels were predominately live oak leaf litter, light grass, and mixed brush, with an oak overstory consistent with Fuel Model 2. One-hour fine dead fuel moisture was estimated at 4-5%. Live fuel moisture values at the accident site were unavailable and no representative values were available at the time of this report.

TOPOGRAPHY

The Tuolumne River Canyon is characterized by a meandering river channel with numerous tributary canyons and ridges with slopes ranging from 80-120%. The fire started below Lumsden Road on the south side of the river (north facing slope).

WEATHER

Temperature: 89-94 F

Relative Humidity: 18-24 %

Wind: Predominately steady up-canyon, estimated 3-5 mph (generally WSW). Prior to the burn-over numerous observers (AA, C404 pilot, IC, crew 404) reported that the wind had remained light and steady flowing in an up-canyon direction.

No critical fire weather patterns (thunderstorms, frontal passage, etc.) were in place.

SEQUENCE OF EVENTS

The tactic selected to establish the anchor at the river was indirect line construction to take advantage of sparse fuel and natural barriers. Five backpack pumps were staged on the edge of the road. The crew began using one chainsaw and handtools to construct line downhill from the road to the end of the vegetation (slope distance of 180 feet). The fire was backing into an up-canyon wind. The initial point of the handline was approximately 7 feet from the fire's edge at the road; as the handline progressed, the distance from the edge of the fire widened to approximately 30 feet. After line construction began the firing out operation started. At approximately 1345 hours an abrupt wind shift occurred. The 90-120 degree windshift changed the fire spread from a cross-slope backing fire to an upslope head fire. The wind event triggering the flare-up lasted less than 2 minutes and the actual flare-up lasted approximately 30 seconds; then fire behavior returned to a backing fire influenced by the up-canyon wind.

The crew's tool order consisted of FF#6 (chainsaw), FF#5 (swamper), helitack captain (HC) with scraping tool, FF#4 (scraping tool), FF#3 (scraping tool), FF#2 (scraping tool, fusee, and handie talkie), and FF#1 (back pump). The chain saw cut line extended approximately 120 feet and the scraped portion extended approximately 40 feet. At this point FF #2 had fired out approximately 10 feet of line. The HC directed FF#1 to retrieve a backpack pump to support the

firing operation. FF#1 returned to the road to put on the backpack pump. FF#2 stopped firing and was standing next to FF#3. STF Engine 43 had arrived at a turn-around on Lumsden Road down canyon _ mile from the accident site. The captain and a firefighter from Engine 43 walked the road from the turnaround to the right flank and arrived seconds prior to the burn over.

FF#5 noticed a wind shift and saw a sheet of fire coming upslope toward him and yelled to FF#6 to go downhill. Simultaneously FF#2 warned of the wind shift and turned uphill along with FF#3 and began escaping up to the road (approximately 20 to 30 feet away). HC yelled a warning; FF#4 saw a hole in the flames and ran downhill through the fire followed by the HC. FF#1 heard yelling and turned to face the hand line. He saw a run of fire heading up the hand line and yelled for the crew to get out of there. FF#1 saw the lower crew members scattering downhill. FF#2 rolled over the lip of the road within the oncoming flame front as the fire hit the road. Although FF#2 and FF#3 were together within 5 feet of the road, FF#3 did not arrive at the road.

FF#1 ended up on the road to the southwest toward STF Engine 43; FF#2 rolled into the inside cutbank of the road, jumped up and ran into the black staying on the road. After going through the flames, FF#4 rolled down the steep rocky embankment toward the river. HC, FF#5, and FF#6 ended up in the safety area at the river. During this event the STF engine 43 captain and firefighter backed off toward the turn-around.

HC identified FF#4, FF#5, and FF#6 along the river and contacted FF#2 by radio. The two separate groups did a crew count and discovered that FF#1 and FF#2 were accounted for and FF#3 was missing. They began an immediate search and called for bucket drops and assistance in the search. Copter 404 responded from the spot fire on the left flank, refilled the bucket near Lumsden Bridge, and flew _ mile west to the accident site. When Copter 404 arrived, the fire behavior had subsided to its previous backing condition. Copter 404 began making bucket drops to cool the area so the search could proceed. As the heat and smoke conditions subsided HC, FF#1, FF#2, FF#5, and FF#6 began a grid search. Engine 43 arrived at the right flank to assist in the search. As the smoke cleared and bucket drops cooled the area, the searchers discovered the body of FF#3 located in the newly burned area approximately 100 feet below the road.

Injuries

- HC had minor burns to the head and face.
- FF#1 had no reported physical injuries.
- FF#2 was treated for smoke inhalation and minor burns.
- FF#3 was deceased.
- FF#4 was treated for one fractured ankle and one broken rib; one twisted ankle, and abrasions.
- FF#5 had no reported physical injuries.
- FF#6 had no reported physical injuries.
- All surviving crew members were transported to hospitals for observation and treatment.

Safety Issues for Review

- 10 Standard Orders
- 18 Situations that Shout Watch Out
- LCES
- Downhill Line Construction Guidelines.

