

CALIFORNIA FIRE

SEQUENCE OF EVENTS

JUNE 27, 1990

1317 FIRE OCCURRED AT THE INTERSECTION OF CALIFORNIA AND SIMPSON
STREETS (SEC 25 TWS 5S RGE 2W) THOMAS BROS 75 C 3

FIRE NUMBER 914

ORDER NUMBER RRU 26012

1440 (TIME APPROXIMATE) BURN-OVER ACCIDENT OCCURRED

1442 HEMET VALLEY AMBULANCES ORDERED (2)

MERCY AIR AND LIFEFLIGHT ORDERED

ORDER FOR ACCIDENT INVESTIGATION TEAM. TWO PEOPLE ATTACHED
AT THIS TIME ARE BRUCE COWIE AND WALT FEATHER

1730 COWIE ARRIVES ON SCENE

MEETS WITH BILL HARKEY AND WAYNE MURRAY

MEETS WITH DAVE PARKS

1815 HARKEY ASSIGNED TO TEAM - ACCOMPANIES COWIE TO SCENE TO
BEGIN SITE INVESTIGATION. CENTRAL DIVISION HEADQUARTERS,
RRU, IS SELECTED AS ACCIDENT INVESTIGATION HEADQUARTERS

PARKS GIVEN ASSIGNMENT OF ARIAL PHOTOGRAPHY

1900 COMPLETED ARIAL PHOTOGRAPHY

1915 COWIE CONTACTED LT. ELLIS (CDC LIAISON) REQUESTING THAT A
CRITICAL INCIDENT STRESS DEBRIEFING TEAM BE CONVENED AT
BAUTISTA TO DEBRIEF CREW 3

2000 INCIDENT STRESS DEBRIEFING TEAM CONVENED AT RYAN FIELD
STATION, #27. MEMBERS COUNSELED

STRIKE TEAM 9410 C
ENGINE CREW 3172, FAE CHAVEZ
VOLUNTEERS FROM STATION 27 (2)
KEN MELLO, BC, RRU

2300 ACCIDENT SCENE SECURED, IC CONFERRED WITH AND DAY'S
ACTIVITIES TERMINATED

JUNE 28, 1990

0730 MADDIE BURTT ASSIGNED AS TRANSCRIBER AND RECORDER, CHRIS WURZELL AND MIKE MATA ASSIGNED AS INVESTIGATOR AND UNION REP RESPECTIVELY. DAN OLIVER ASSIGNED AS SAFETY REPRESENTATIVE

0830 INTRODUCTION OF PARTICIPANTS WITH ALL EXCEPT OLIVER IN ATTENDANCE INCLUDING COWIE, HARKEY, WURZELL, MATA, BURTT AND PRATHER

SPECIFIC ASSIGNMENTS

TEAM #1 HARKEY AND PRATHER

TEAM #2 WURZELL, MATA

COORDINATING - COWIE

SAFETY REP - OLIVER

LT. DURLEY - CDC LIAISON

TRANSCRIPTION AND RECORDING - BURTT

PLANNING MEETING DISCUSSING NEEDS ENSUED

INTERVIEWING

PHOTOGRAPHING

GATHERING TRAINING RECORDS

PHYSICAL EVIDENCE AND SITE DIAGRAMS

0930 FC TWARDOWSKI BRIEFS TEAM ON HIS OBSERVATIONS AS INITIAL ATTACK ENGINE

1000 (TIME APPROXIMATE) CDC ORGANIZES A TEAM OF CORRECTIONAL COUNSELORS TO DISCUSS INCIDENT WITH CREW 3 (NOT A TRAINED CRITICAL INCIDENT STRESS DEBRIEFING TEAM)

1030 INVESTIGATION TEAM PROCEEDED TO SITE

PHOTOGRAPHED AND MAPPED ACCIDENT SITE

1230 CAL OSHA REPRESENTATIVE DICK STONE MEETS WITH TEAM CONCERNING SAFETY EQUIPMENT

1330 DURLEY DEPARTED SITE TO RETURN TO CAMP (TERMINATED FROM TEAM AS CDC LIAISON)

1500 OLIVER ARRIVED

TEAM RETURNS TO CENTRAL DIVISION HEADQUARTERS

INTERVIEWED MELLOW AND CHAVEZ FOR SITE RECONSTRUCTION AND
SEQUENCE ESTABLISHMENT

1545 FLEW SITE AND PHOTOGRAPHED, WURZELL, HUDDLE

1645 ARIAL VIDEO TAPE OF INCIDENT AND ACCIDENT SITES WAS REVIEWED

1715 END TAPE REVIEW AND CONTINUED INCIDENT AND SITE
RECONSTRUCTION

1900 BREAK FOR DINNER, STRIKE TEAM 9410 C REQUESTED THROUGH RRU
TO PROCEED TO HEADQUARTERS (RYAN) TO BE INTERVIEWED BY TEAM

2030 ST 9410 C ARRIVED, ONE INTERVIEW TEAM WAS FORMED TO
FACILITATE REPRESENTATION DUE TO THE FACT THAT MEMBERS OF ST
9410 C REQUESTED A UNION REPRESENTATIVE

INTERVIEWING OF MEMBERS ENSUED AND CONTINUED UNTIL 0045
HOURS 6/29, ACTIVITIES FOR DAY WERE CONCLUDED

JUNE 29, 1990

0900 CONTACTED CDC FOR BAUTISTA CREW 3 AVAILABILITY FOR INTERVIEW. TIME WAS SET FOR 1300

1000 BC MELLO FORMALLY INTERVIEWED

1100 FAE CHAVEZ FORMALLY INTERVIEWED

1130 COWIE CONTACTED CDC FOR THEIR REPRESENTATIVES ON THE INTERVIEW PANELS

1200 LUNCH BREAK

1230 BEGIN PRE ACCIDENT AND POST ACCIDENT VIDEO TAPE EDITING - HUDDLE, PRATHER, CHAVEZ

1315 BAUTISTA CREW 3 AND COUNSELORS ARRIVE. ONGOING EVALUATION AND DISCUSSION WITH CREW BY COWIE COVERED A 4 HOUR PERIOD OF TIME. SERGEANT SAUNDERS AND THE THREE COUNSELORS AGREED THAT THESE DISCUSSIONS RELIEVED MUCH TENSION ON THE CREW OVER THEIR RECENT EXPERIENCE AND THE LOSS OF THEIR FELLOW CREW MEMBER. THE INMATES INDICATED THAT THEIR EMOTIONAL NEEDS HAD NOT BEEN ADDRESSED PRIOR TO THIS.

1400 INTERVIEWED MEMBERS OF BAUTISTA CREW 3.

TEAM 1, PANEL

HARKEY
OLIVER
PRATHER
WALKER, GLORIA (COUNSELOR)
SIGSBEE (OBSERVER)

INTERVIEWEES

NUNEZ
EVANS
PEREZ
MARTINEZ, S
JACKSON
ENRIQUEZ

TEAM 2, PANEL

WURZELL
MATA
WILSON (OBSERVER)
(COUNSELOR)
CDC SERGEANT

INTERVIEWEES

DIXON
MARTINEZ, M
DAVIS, S
TUFUGA
CRAWFORD
SIMONIAN

1700 CONCLUDE INTERVIEWS

REVISIT SITE TO DISCUSS EVENTS AND LOCATIONS

HARKEY, WURZELL, MATA, OLIVER, PRATHER, SIGSBEE, WILSON

1730 FINISH PRE ACCIDENT AND POST ACCIDENT VIDEO TAPE EDITING

1830 TEAM REJOINS COWIE AT CENTRAL DIVISION HEADQUARTERS TO
DISCUSS FINDINGS AND ESTABLISH ITINERARY FOR FOLLOWING DAYS

1920 ADJOURNED FOR DAY

JUNE 30, 1990

- 0800 TEAM RECONVENES AND CONSOLIDATES INFORMATION, REVIEWS PRIOR SEQUENCE OF EVENTS, LISTS AND PRIORITIZES NEEDED ACTIVITIES
- DAWN AMMONS ARRIVED FOR WORD PROCESSING (TAPE TRANSCRIPTION)
- 1145 COWIE CALLED RAINBOW CAMP TO ARRANGE FOR GRAPHIC ARTIST
- WURZELL RECEIVES PERMISSION TO PHOTOGRAPH DECEASED AND TIMES FOR INTERVIEWS AT SHERMAN OAKS
- 1100 DONNA KIDD ARRIVED FOR WORD PROCESSING (TAPE TRANSCRIPTION)
- 1200 DAVID MATIS, FORESTER II, ARRIVED FOR FUEL AND TOPOGRAPHIC EVALUATION
- 1230 LUNCH BREAK
- 1310 MATA DEPARTS FOR REGION OFFICE, LOGISTICAL RUN
- 1330 HARKEY DEPARTS FOR SCENE OF ACCIDENT TO COORDINATE FUEL ANALYSIS AND TO CONTINUE MAP AND DIAGRAM ACTIVITIES
- COWIE DEPARTS FOR BAUTISTA
- 1345 WURZELL DEPARTS FOR FULLERTON TO TAKE PICTURES OF THE DECEASED
- 1500 PRATHER COMPLETES SEQUENCE OF EVENTS AND SIDE LETTER AND FAX TRANSMITS SAME TO REGION OFFICE FOR FORWARDING TO SACRAMENTO
- 1530 HARKEY RETURNS TO CENTRAL DIVISION
- MATA RETURNS TO CENTRAL DIVISION WITH WEATHER INFORMATION AND AN ADDITIONAL TRANSCRIPTION MACHINE
- 1700 COWIE RETURNS TO CENTRAL DIVISION
- MATIS RETURNS TO CENTRAL DIVISION, AND COMPLETES A REPORT ON HIS FIELD FINDINGS IN REGARD TO FUEL LOADING, RATIO, TYPE AND MOISTURE. HE LEAVES TWO SAMPLES OF LIVE FUEL TO BE TRANSPORTED TO ANZA STATION FOR ANALYSIS
- 1800 COWIE RECEIVES CONFIRMATION FROM RAINBOW CAMP THAT A GRAPHIC ARTIST WILL BE TRANSPORTED TO CENTRAL DIVISION AT 1000 HOURS ON 7/1

1815 (TIME APPROXIMATE) MATIS DEPARTS THE INCIDENT

MATA COMPLETES SCHEDULING OF VOLUNTEERS AND FIREFIGHTERS ON ENGINE 3172 FOR INTERVIEW, CONTACTS CDFEA REP FERGUSON TO REPRESENT THE FIRE FIGHTERS DURING THE INTERVIEW (DUE TO HIS ASSIGNMENT TO SHERMAN OAKS ON 7/1) AND DEPARTS FOR HOME

2030 COWIE, HARKEY AND PRATHER COMPLETE THE ROUGH DRAFT OF THE FIRE INCIDENT CHRONO AND DEPART

*JULY 1, 1990

0730 COWIE, HARKEY AND PRATHER MEET AT CENTRAL DIVISION TO BEGIN DOCUMENTING FINDINGS.

0830 WURZELL ARRIVED

DAILY BRIEFING, ORGANIZATION AND PRIORITIZATION

0900 KIDD AND AMMON ARRIVE FOR TRANSCRIPTION

1000 MATA, WURZELL AND PRATHER TO SHERMAN OAKS BURN CENTER TO INTERVIEW ZAY, DAVIS AND FRIIS

GRAPHIC ARTIST ARRIVES FROM RAINBOW TO ASSIST WITH DIAGRAMS

1100 INTERVIEW VOLUNTEER GARCIA

1130 INTERVIEW VOLUNTEER FORNES

1300 TWARDOWSKI CONFERS WITH TEAM IN REFERENCE TO SEQUENCE OF EVENTS ON FIRE INCIDENT

1400 INTERVIEW WITH FIREFIGHTER

CHAVEZ CHECKS SEQUENCE OF EVENTS ON FIRE INCIDENT

1430 COWIE DEPARTS FOR BAUTISTA TO ATTEND MEMORIAL CEREMONY FOR FERRERA

1500 HARKEY TO REGION OFFICE

1730 COWIE RETURNS TO CENTRAL DIVISION, PICKS UP BONNIE MATHEWS AND ATTENDS CRITICAL INCIDENT STRESS DEBRIEFING AT BAUTISTA

2000 HARKEY RETURNS TO CENTRAL DIVISION

WURZELL AND PRATHER RETURN TO CENTRAL DIVISION

2030 COWIE AND MATHEWS RETURNS TO CENTRAL DIVISION

TEAM CONFERS ON ACTIVITIES OF DAY AND ITINERARY FOR 7/2

2130 TEAM TERMINATES DAY'S ACTIVITIES

JULY 2, 1990

0800 COWIE, WURZELL, HARKEY AND PRATHER AT CENTRAL DIVISION OFFICE

MATA AT RIVERSIDE BLUEPRINT

0920 MATA RETURNS TO CENTRAL DIVISION OFFICE

1000 HEADQUARTERS FOR INVESTIGATION TEAM IS MOVED FROM CENTRAL DIVISION OFFICE TO THE TRAINING CENTER WHICH IS ALSO IN THE RYAN COMPLEX

1115 BAUTISTA CREW 3 ARRIVES AT TRAINING CENTER. THE CREW IS TO BE USED AT THE SITE TO RECONSTRUCT AND PHOTOGRAPH ACTIVITIES SURROUNDING THE ACCIDENT

1125 COMPUTER AND TECHNICIAN ARRIVES FROM REGION OFFICE. BOTH TRANSCRIBERS AND THE TEAM WILL BE WORKING OUT OF THE TRAINING CENTER

1135 WURZELL, HARKEY, TED HEWITT (VIDEO TECH), AND BAUTISTA CREW 3 DEPART FOR ACCIDENT SITE

1210 COWIE DEPARTS FOR ACCIDENT SITE

1320 SITE RECONSTRUCTION WASHES DUE TO RELUCTANCE OF MOST INMATES TO PARTICIPATE AND ALL PERSONNEL DEPART SCENE

1445 TEAM CONVENES FOR FORMATTING DISCUSSIONS. LAW ENFORCEMENT CASE REPORT FORMAT IS SELECTED OVER USFS ACCIDENT REVIEW FORMAT. WURZELL NAMED LEAD INVESTIGATOR AND WILL BE RESPONSIBLE FOR PRODUCTION OF FINAL REPORT

1500 MATA AND PRATHER PROCEED TO SITE TO MAP AND DIAGRAM

HARKEY AND WURZELL CLASIFY AND PHOTOGRAPH EVIDENCE COLLECTED AT SCENE

1545 OLIVER RETURNS FROM SACRAMENTO

1730 MATA AND PRATHER COMPLETE FIELD SKETCHES AND RETURN TO THE TRAINING CENTER

TEAM DEBRIEFS DAY, SETS PRIORITIES FOR 7/3 AND CONTINUES WORK ON DIAGRAMS AND COMPLETES PHOTO LOG

1930 TEAM CONCLUDES DAY'S ACTIVITIES

JULY 3, 1990

0630 BURTT ARRIVES AT TRAINING CENTER TO CONTINUE TRANSCRIPTIONS

COWIE ARRIVES AT TRAINING CENTER TO ORGANIZE DAY'S
ACTIVITIES DUE TO HIS REQUIRED ABSENCE FOR REMAINDER OF
MORNING

0700 OLIVER AND PRATHER ARRIVE AT TRAINING CENTER, WORK ON
CONTACTS AND SEQUENC OF EVENTS

0730 HARKEY, WURZELL, KIDD, AND JANE LACKEY ARRIVE AT TRAINING
CENTER AND COMMENCE WORK ON TRANSCRIPTIONS AND LOGISTICS

1000 ADDITIONAL WORK STATION SET UP FOR TRANSCRIPTION

COMPUTER WORK STATION SET UP FOR TEAM MEMBER USE

HARKEY AND WURZELL CONTINUE WORK ON EVIDENCE

MATA BEGINS THREAT LOG

1115 COWIE RETURNS TO TRAINING CENTER

1300 BRIEFING AND PRIORITIES

1430 COWIE TO BAUTISTA FOR ESCAPE CARDS

1600 COWIE RETURNS TO TRAINING CENTER

MATA RETURNS TO THE TRAINING CENTER

BURT DEPARTS

1815 KIDD AND LACKEY DEPART

2000 MATA CONTINUES FIELD EVALUATION OF DAMAGES AND THREATS

2030 SET PRIORITIES FOR BRIEFING DISCUSSION ON 7/4/90

2200 CONCLUDE DAY'S ACTIVITIES

JULY 4, 1990

0615 BURTT ARRIVES AT TRAINING CENTER AND CONTINUES TRANSCRIPTION

0700 COWIE ARRIVES AT TRAINING CENTER

0715 HARKEY ARRIVES AT TRAINING CENTER

0730 WURZELL, OLIVER AND PRATHER ARRIVE AT TRAINING CENTER

0800 BRIEFING

CHRONO LOG

NARRATIVE

DIAGRAM AND MAP DEPICTION NEEDS

DEBRIEF 7/3

SUPPLIES NEEDED

STATUS OF PHOTO AND EVIDENCE LOGS

DOCUMENTATION UNIT SUPPORT NEEDS AND UPDATE

NEED FOR TAPE REVIEW OF INCIDENT ON ECC MACHINE TO

ESTABLISH TIMES OF EVENTS

NEED TO DEVELOP A LIST OF SUSPECTED CRITICAL FACTORS

NEED TO DEVELOP A BRIEF

0920 COWIE CONTACTS LARRY BENSON TO ORGANIZE LOGISTIC NEEDS

BURTT, KIDD AND LACKEY WILL REMAIN WITH THE TEAM

TWO OR THREE KELLY GIRLS WILL BE REAINED FOR TRANSCRIPTION.

A CLEAN UP CREW FROM CENTRAL DIVISION WILL PROCEED TO THE
ACCIDENT AND TREATMENT SITES AND REMOVE DEBRIS

0930 MATA TO SCENE FOR MAP AND DIAGRAM INFORMATION

1030 MATA RETURNS, CONTACTS FC DONALDSON AT SHERMAN OAKS FOR AN
UPDATE ON THE INJURED PEOPLE

1115 REQUEST FOR ADDITIONAL CLERICAL

1250 REQUEST FOR CLERICAL GRANTED BY CHIEF ENGLE

1300 MATA TO SITE MAPPING AND DIAGRAM

1430 MATA RETURNS

TEAM WORKS ON DOCUMENTATION

1700 TEAM CONCLUDES ACTIVITIES FOR DAY

JULY 5, 1990

0630 COWIE ARRIVES AT TRAINING CENTER

0715 HARKEY ARRIVES

0930 HARKEY, MATA AND OLIVER INTERVIEW JIM REEDER, BATTALION 11A

0830 BRIEFING AND SUMMARIZING. IT IS DECIDED THAT THE FOLLOWING INTERVIEWS WILL BE SCHEDULED

RANDY WILSON, BATTALION CHIEF OF BAUTISTA

ROGER ZAY, RE-INTERVIEW ON SOME ISSUES NOT ADDRESSED IN ORIGINAL INTERVIEW

DISCUSSED PRELIMINARY FINDINGS

WURZELL COORDINATES TRANSCRIPTION, SETS UP COMPUTER TERMINAL, DOES OPERATION FILING, MAKES CONTACT WITH HOSPITAL AND DETERMINES THAT PERRY IS STILL VERY CRITICAL AND CONTACTS DONALDSON TO ARRANGE ZAY INTERVIEW

1020 HARKEY AND MATA DEPART FOR TEMECULA TO INTERVIEW FFI VINK OF ENG. 3172

1230 RETURNED FROM VINK INTERVIEW

1300 PRATHER COMPLETES ROUGH DRAFT OF SUMMARY REPORT (GREEN SHEET) AND BEGINS REVIEWING TESTIMONY

COWIE DEPARTS FOR REGION OFFICE TO BRIEF CHIEF DYKES

1500 OLIVER DISCUSSES COMPLETION OF NECESSARY STATE COMP BENEFITS FORMS WITH CAPTAIN DONALDSON

1630 OLIVER AND MATA DEPART FOR HEMET AMBULANCE TO ASCERTAIN DISPATCH TIMES

1700 COWIE RETURNS AND BRIEFS TEAM ON DIRECTION FROM THE CHIEF

1800 COWIE, WURZELL AND HARKEY DEPART

1900 OLIVER AND MATA RETURN TO THE TRAINING CENTER

2000 CHATMAN (TRANSCRIBER), OLIVER, MATA AND PRATHER QUIT FOR DAY

JULY 6, 1990

0700 COWIE, WURZELL AND PRATHER MEET WITH CHIEF DYKES AND ACCOMPANY HIM TO THE SCENE OF THE ACCIDENT. TEAM MEMBERS BRIEFED THE CHIEF ON FACTS THAT HAD BEEN ESTABLISHED TO DATE.

0715 HARKEY ARRIVES AT THE TRAINING CENTER

0815 MATA AND WES RANDOLF (CDFEA REPRESENTATIVE FOR THE ZAY RE-INTERVIEW) ARRIVE. THE TEAM REASSEMBLES AT THE TRAINING CENTER AND A PLANNING MEETING IS HELD. SUBJECTS:

REPORT ATTACHMENT SCHEDULE
LASER PRINTS
TRANSCRIPTION ACTIVITY
VINK, WILSON INTERVIEWS (DONE)
SEQUENCE OF EVENTS FOR 7/5 (DONE)
INTERVIEWS TO BE COMPLETED

ASSIGNMENTS:

SHERMAN OAKS - WURZELL, RANDOLF, MATA, OLIVER
FORMALIZE PHOTO/EVIDENCE LOG - HARKEY
PROCESS EVIDENCE
ONGOING DOCUMENTATION
ROUGH OUT FINDINGS - PRATHER

0915 WURZELL, OLIVER, MATA AND RANDOLF DEPART FOR SHERMAN OAKS TO RE-INTERVIEW ZAY

1040 COWIE CONTACTED CHIEF DYKES CONCERNING INVESTIGATIVE PROCEDURES

1130 PRATHER CONTACTS WURZELL AT SHERMAN OAKS CONCERNING ADDITIONAL NEEDS FOR TESTIMONY.

1500 INTERVIEW TEAM RETURNS FROM SHERMAN OAKS

1800 EVIDENCE LOG COMPLETED

1830 REVIEW OF FINDINGS

1930 DAY CONCLUDED

JULY 7, 1990

0645 COWIE ARRIVES AT TRAINING CENTER, BEGINS TESTIMONY REVIEW

WURZELL ARRIVES AND ORGANIZES DATA ENTRY SYSTEM

0745 OLIVER AND PRATHER ARRIVE, BEGIN TESTIMONY REVIEW AND
CONTINUE DEVELOPMENT OF FINDINGS

1040 OLIVER AND MATA DEPART FOR FERRIS FOR ECC TAPE REVIEW

1300 OLIVER PUTS A HOLD ON THE FERRIS DISPATCH TAPES

1335 OLIVER AND MATA RETURN

1430 OLIVER AND MATA DEPART FOR ACCIDENT SITE FOR MAPPING,
PHOTOGRAPHS AND DIAGRAM INFORMATION

1600 WURZELL DEPARTS FOR DAY

1610 TEAM NOTIFIED THAT FERRY HAD DIED AT 1530 HOURS, 7/7/90

1645 OLIVER AND MATA RETURN

Memorandum

To : BOARD OF REVIEW MEMBERS:

Dan Oliver, Dept. Safety Coordinator
 Dan Francis, Dept Training Officer
~~Mike Catlin, " Health & Safety Officer~~
 Jim Dykes, Region Chief (RO III)
 Richard Henry, USFS Director of Aviation
 & Fire Management

Date : November 20, 1990

F1

Telephone: ATSS (8) 492-0179
 (916) 322-0179

From : Department of Forestry and Fire Protection

Subject :

1700 SAFETY
 1710 Investigations and Reports
 California Fire

On November 27, 1990, you will participate in a Board of Review of the California Fire. Attached are several sections of the draft report of the incident that you should review BEFORE the 27th. These sections of the report AND the Board of Review proceedings will be considered confidential.

The primary purpose of the review is to ensure this type of accident does not occur again. A secondary purpose is to finalize the report on the incident.

[Signature]
 William C. Teie
 Chair, Board of Review

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Attachments

Teie

Memorandum

To : Honorable Harold R. Walt
Director
Department of Forestry
and Fire Protection

Date : November 1, 1990

F1

Telephone: ATSS (8) 492-0179
(916) 322-0179

From : Department of Forestry and Fire Protection

Subject : 1700 SAFETY
1710 Investigations and Reports
California Fire

On June 27, 1990, two firefighter-inmates were injured (resulting in deaths) and several other people were injured while battling the California Fire, Riverside Ranger Unit. In an effort to prevent this type of accident from reoccurring, a review will be conducted on November 27, 1990.

The Board of Review will be:

Don Oliver
William C. Teie, Deputy Director for Fire Protection - Chair
Dan Francis, Departmental Training Officer
~~Mike Catlin~~, Departmental Health & Safety Officer *Coordmaker*
Jim Dykes, Region Chief
Richard Henry, USFS Director of Fire & Aviation

The review has been set for November 27, 1990 in Room 1506-12 (large conference room) in the Resources Building. The meeting will begin at 1330 hours.

Dan Lang will invite a representative from CDC. Bruce Cowie, the leader of the investigation team, will report the findings of the investigation.

This is the first review to be conducted under this new policy. So we will not only learn from the incident, we will learn from the process. Anyone is invited to attend (room allowing), but the participation will be strictly controlled.

Original Signed by
Robert E. Paulus
ROBERT E. PAULUS
CHIEF DEPUTY DIRECTOR

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cc: Board of Review Members
Deputy Directors
Region Chiefs
CDFEA (Ron Bywater)

CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION
 TEMPORARY DIRECTIVE

CDF-6 (Rev. 1/89)

APPROVED BY: *J.P. Keating*

RECEIVED *Phill*
 Director's Office
 JUL 31 1990
 California Department of Forestry and Fire Protection

REFERENCE HEALTH AND SAFETY PROCEDURES HANDBOOK 1700	NUMBER 90-32 DISTRIBUTION B,D,F												
SUBJECT 1700 - HEALTH AND SAFETY PROCEDURES HANDBOOK 1713 - Serious Accident Investigation	ISSUE DATE AUG. 1990 EXPIRATION DATE MAR. 1991												
DISTRIBUTION: <table border="0"> <tr> <td>A. All Handbook Libraries</td> <td>G. Division Chiefs - Operations</td> </tr> <tr> <td>B. Holders of Referenced Handbook(s)</td> <td>H. Division Chiefs - Administration</td> </tr> <tr> <td>C. Headquarters Units</td> <td>I. All Dept. Managers and Supervisors</td> </tr> <tr> <td>D. Region Chiefs</td> <td>J. Personnel Assistants</td> </tr> <tr> <td>E. Deputy Chiefs - Management Services</td> <td>K. Finance Specialists</td> </tr> <tr> <td>F. Ranger Unit Chiefs</td> <td>L. All Employees</td> </tr> </table>		A. All Handbook Libraries	G. Division Chiefs - Operations	B. Holders of Referenced Handbook(s)	H. Division Chiefs - Administration	C. Headquarters Units	I. All Dept. Managers and Supervisors	D. Region Chiefs	J. Personnel Assistants	E. Deputy Chiefs - Management Services	K. Finance Specialists	F. Ranger Unit Chiefs	L. All Employees
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E. Deputy Chiefs - Management Services	K. Finance Specialists												
F. Ranger Unit Chiefs	L. All Employees												

The objective of conducting accident investigations is to gather factual information that can be used to determine the most probable cause or causes of an accident in order to prevent similar accidents in the future. The purpose of this temporary directive is to revise CDF policy concerning serious accident investigation and post-investigation procedures to ensure that investigations are used in the department's accident prevention efforts.

SERIOUS ACCIDENT INVESTIGATION POLICY

In the event of a serious accident, the appropriate region chief, after consulting with the Director's Office, will appoint a serious accident investigation team. A serious accident is one which results in serious injury or death to any of the following:

- o A CDF employee.
- o A person working under the direction of a CDF employee.
- o A member of the public when a CDF employee is involved.

A serious injury is an injury that requires hospitalization for more than 24 hours for other than observation, or for any serious degree of permanent disfigurement.

A serious accident is also one which results in major damage to a CDF vehicle or aircraft, or to public property. Other incidents, such as shelter deployment situations, may also be suitable for initiation of a review using these procedures.

SERIOUS ACCIDENT INVESTIGATION TEAM

Any serious accident investigation team should consist of at least the following:

- o A team leader;
- o A representative of CDFEA, (as per MOU section 11.08);
- o A representative from the applicable CDF program area (air operations, mobile equipment, CDF Academy, etc.);
- o A representative of other involved agencies, (e.g., an accident involving an inmate -- CDC; a ward -- CYA, or the USFS, etc.);
- o A person with investigative skills/experience that can assist the members in their work; and,
- o Technical experts (this may include personnel from the aircraft maintenance or structural design industry, automotive accident specialists, etc.) as needed for the specific situation.

In no case will anyone involved in the accident, the administrative unit, or the operations at which the accident occurred be included as a team member. A ranger unit point of contact must be designated and made available to assist the team as necessary. The team will work under the direction of the appropriate region chief, or designee.

TEAM RESPONSIBILITIES

The team has four specific functions:

- (1) Prepare a preliminary summary for distribution within 24 hours after arrival at the accident scene.

This summary will provide preliminary information to other units conducting similar operations. It assists management in dispelling rumors based on misinformation about the accident, and when warranted provides preventive/warning/alert information to the field as soon as possible.

The preliminary summary will consist of a short synopsis of the accident and preliminary findings that are readily apparent with emergency recommendations for immediate corrective action when necessary. Since it is preliminary information only, it does not become part of the final report.

The region chief will review the preliminary summary and send it to the Director's Office and all other region and ranger unit managers.

(2) Publish an informational summary report describing the incident. The purpose of this summary is to aid in accident prevention, let interested parties know "what happened," and to be used as a future safety training tool. This summary "green sheet" that has historically been produced by the Academy will now be done by the accident investigation team. It is an accident prevention tool and should not be used to place personal blame. Therefore, individuals' names should not be used. The summary will be sent to the appropriate region chief for review prior to transmittal to the Director's Office and statewide distribution by Forms, Information and Records Management (FIRM). To ensure timely distribution, the summary must be delivered to the Director's Office within seven days of the accident.

(3) Investigate the accident thoroughly and prepare a report outlining its findings and conclusions within 30 days of the accident. The purpose of this report is to develop the facts and present to management a picture of what happened and why. Witness statements, photographs, and all other pertinent information will be included in the report. The accident investigation report format (sample attached) will be followed. The report is sent through the appropriate region chief to the Director's Office to be held for a Board of Review.

(4) Develop "working" recommendations to be considered by the Board of Review. These recommendations are not to be included in the formal investigation report. They will be transmitted to the Director's Office under separate and confidential cover. As a confidential working document, it may contain a description of the most probable cause and causative factors, opinions, and possible management concerns as well as recommendations. Commendations should be considered for employees whose exemplary actions in the incident or rescue operations reduced losses.

BOARD OF REVIEW

A Board of Review will be convened when a serious accident investigation is initiated and the report has been filed with the Director. The Board of Review will include five members. The Chairperson will be the Chief Deputy Director or designee. The other members will typically include a CDF manager (unit chief or higher), the Departmental Safety Coordinator, the Departmental Training Officer, and a management person from an allied agency. All appointments will be made by the Director or Chief Deputy Director. The Board is to invite the ranger unit chief/unit manager and the region chief responsible for the location where the accident occurred to attend and participate in the review. The Board shall:

(1) Review the report. They may accept the report, request additional information, return the report to the investigation team for further work, or commission a second investigative effort.

(2) Review and evaluate the "working" recommendations submitted by the team.

(3) Approve, modify or reject each recommendation and develop an action plan to implement necessary changes in a timely and cost-effective manner.

(4) Approve, modify or reject each recommendation for commendations for exemplary actions by employees involved in the incident or rescue operations when those actions reduced losses.

(5) Obtain the Director's approval of the action plan.

Attachment

ACCIDENT INVESTIGATION REPORT FORMAT

The accident investigation report is to be a narrative document that explains what happened, how it happened, and why it happened. The focus needs to be on how to prevent similar accidents in the future.

The following format will be used in all serious accident investigation reports:

Introduction

A brief statement indicating the date and time of the accident, the numbers of injuries or deaths, the location of the accident, list of accident investigation team members, etc.

Summary of the Accident

A concise description of what happened. The information included in this section must be supported by information found elsewhere in the report.

Findings

The findings should be based on logical conclusions drawn from the total accident report. All findings must be based and supported by fact.

Conclusions

The primary cause and contributing causes are stated in this section. They must be drawn from the points outlined in the Findings Section. The conclusions should be stated clearly and concisely, with little or no discussion.

Appendices

This section should contain all supplemental material such as witness statements, photographs, diagrams, maps, outside agency reports, etc.

Recommendations

Accident prevention recommendations are not included in the formal report. As a confidential "working" document it may contain a description of the most probable cause and causative factors, opinions and possible management concerns and recommendations. Commendations should be considered for employees whose exemplary actions in the incident or rescue operations reduced losses.

The recommendations should be transmitted under separate and confidential cover. The report and the recommendations are sent to the commissioner of the investigation. If a serious accident investigation team was formed the recommendations are submitted to the appropriate region chief before being filed with the Director's Office.

I. INTRODUCTION

This report was constructed by the Accident Investigation Team to document the investigation into the "burnover" accident on the California Fire. Two Fire Crew Firefighters received fatal injuries. A Fire Crew Captain and fourteen Fire Crew Firefighters received burns and/or respiratory injuries.

ACCIDENT SUMMARY

On June 27, 1990, at approximately 1:05 p.m. a fire occurred in wildland south of Olive Avenue at California Avenue, south-west of Hemet. The fire burned approximately 800 acres of dry grass and brush. Seventeen fire personnel received injuries. Of the seventeen fire personnel, two fire crew firefighters succumbed to their injuries. The fire is of undetermined origin, and presently under investigation.

The original suppression plan was to catch the head of the fire near the point of origin, however it quickly became evident the fire was spreading too rapidly for initial attack forces. An alternate plan was developed to include a backfiring operation along a north-south access road approximately one quarter of a mile east of the left flank of the fire.

Battalion 3115 assigned three engines from Strike Team 9410-C and Bautista Crew 3 to rendezvous with Engine 3172 in the saddle at the top of the ridge along the north-south access road. The Engineer on E-3172 met with the resources and described the plan and their assignments.

The backfiring plan was proceeding as planned until fuel and weather conditions created fire behavior which over ran Bautista Crew #3.

The entire crew suffered burns and/or smoke inhalation injuries. Two fire crew firefighters succumbed to their burn injuries at the San Bernardino County Medical Centers, Burn Center.

B. ACCIDENT INVESTIGATION TEAM

On Wednesday, June 28, 1990, the day following the accident, a Multi-Agency Accident Investigation Team met at Riverside Ranger Unit Central Division Headquarters at Ryan Field. They included:

<u>Name</u>	<u>Title</u>	<u>Agency</u>
Bruce Cowie	SFR III	CDF, RO 3 - Team Leader
Walt Prather	SFR II	CDF, Academy
Dan Oliver	Safety Coordinator	CDF, Sacramento
Chris Wurzell	SFR I	CDF, Riverside Ranger Unit
Mike Mata	FC	CDF/CDFEA
Bill Harkey	FC	CDF, Riverside Ranger Unit
Truman Durley*	Lieutenant	CDC, Bautista Camp

*Note: Lt. Durley attended the first day of briefing, returned to camp and was released by CDC from the team. Lt. Ellis, CDC, working out of CDF Region Office replaced Durley.

C. INVESTIGATION TEAM OBJECTIVES

The team was charged with development of findings and construction of a report to be presented to Department Management.

Primary objectives of the investigation were to gather factual information that can be used to determine the most probable cause or causes of the accident in order to prevent similar accidents in the future.

Except for the composition of the team this serious accident investigation was done per Temporary Directive 90-32.

II. NARRATIVE

At approximately 1:10 p.m., June 27, 1990, a citizen reports a "Big ol grass fire" at California and Simpson. The same vegetation fire was reported to the Riverside Ranger Unit's Emergency Command Center by FIRE CAPTAIN KEN TWARDOWSKI (SEE NARRATIVE) at Station 27, Ryan Field. TWARDOWSKI reported the fire could be seen from the station and while responding reported it to be approximately 10 acres and going up the side of the hill near California and Olive Avenues in the Hemet area.

While responding to the fire TWARDOWSKI of Engine 27 saw the fire running toward the top of the hill and ordered additional equipment. TWARDOWSKI commanded the unsuccessful initial attack on the fire. After seeing the fire spread upward and the hoselay having little effect it became evident that more resources would be needed to assist in suppressing the fire.

At approximately 1:17 p.m., June 27, 1990, fire crews and additional engines and were ordered for the fire. Bautista Crew 3 was assigned to the incident at this time.

BATTALION CHIEF 3115 KEN MELLO (SEE INTERVIEW TRANSCRIPT) responded to the incident at 1:24 p.m., June 27, 1990. Mello estimated he was part of the third alarm. On arrival Mello surveyed the scene and assumed command of the incident at TWARDOWSKI'S request.

MELLO observed and used scouts to gather fireline information. After overviewing the fire Mello re-assigned FIRE APPARATUS ENGINEER TIM CHAVEZ (E-3172) (SEE INTERVIEW TRANSCRIPT) who was involved in structure protection to scout the east side of the fire. CHAVEZ was familiar with the area and had been on a fire in the same area two years earlier.

BATTALION CHIEF JAMES REEDER B11A (SEE INTERVIEW TRANSCRIPT) was assigned to scout the south side and assist with CHAVEZ'S backfiring operation. REEDER reported to MELLO there were no structural threats on the south side of the incident. REEDER was unable to access the backfiring operation from the south side.

At approximately 1:33 p.m., June 27, 1990, while the scouting was occurring, Strike Team 9410-C arrived at scene with Strike Team Leader BATTALION CHIEF WILLIAM MEERS (SEE INTERVIEW TRANSCRIPT). MEERS and MELLO discussed the possibility of a firing operation to control the fire. Strike Team 9410-C participated in a hoselay just after they arrived.

CHAVEZ was given the assignment to scout ahead of the fire and develop a plan of action to control the eastward progress of the fire. At approximately 2:11 p.m., June 27, 1990, CHAVEZ reported to MELLO with a plan and requested a fire crew. The request was granted.

At approximately 2:14 p.m., June 27, 1990, FIRE CREW CAPTAIN ROGER ZAY (SEE INTERVIEW TRANSCRIPTS) arrived at the fire and conferred with MELLO. ZAY was assigned to assist CHAVEZ with the backfiring plan. ZAY drove up the north-south access road to the saddle and parked the Crew Carrying Vehicle (CCV). The CCV was blocking vehicle access south of the saddle. While spotting the CCV, E-3172 was backed into causing damage to left chock block holder. Zay met with CHAVEZ and was given the details of his assignment. ZAY was directed to relieve the engine crew of their handline assignment and send them back to E-3172.

The plan consisted of backfiring the west side of a north-south access road that ran from the valley floor on the north to within approximately 200' feet of an old burn that occurred two years before. The old burn went to the valley floor on the south. The initial plan was to use a fire crew to construct a handline that had been started by the crew of E-3172 from the cul-de-sac to the old burn. The initial plan also called for the fire crew to backfire on the west side of the road starting where the handline met the old burn and proceeded to the saddle. Engine 3172 was to backfire along the west side of the north-south access road starting at the saddle north to the valley floor. ZAY requested two fire engines to support the operation. At that time the plan was changed. ZAY'S fire crew would continue their initial assignment. Engine 3172 would backfire along the west side of the road, starting at the saddle backfiring until tied in with ZAY'S backfire. Two engines would be requested to backfire from the saddle to the valley floor on the north.

ZAY off loaded the crew from the CCV and while talking with CHAVEZ, a Tactical Frequency was established. ZAY did a radio check with CHAVEZ on their handie-talkies and confirmed communications. Bautista Crew 3 departed to the cul-de-sac area.

CHAVEZ requested two fire engines from the Incident Commander and was sent three fire engines from Strike Team 9410-C. ZAY informed the fire crew that the cul-de-sac was to be used as a safety zone. The fire crew was instructed to widen the handline from the cul-de-sac to the old burn. ZAY unsuccessfully attempted to communicate with E-3172. ZAY changed the handie-talkie battery and communications were re-established.

CHAVEZ met with a representative of the three engines (E-4376, E-4379, and E-4384) from Strike Team 9410-C and gave instructions to backfire the road from the saddle north, down to the road at the base of the hill.

At approximately 2:43 p.m., June 27, 1990, CHAVEZ started backfiring from the saddle south to the cul-de-sac, first firing out behind Bautista Crew 3's CCV, working south heading down slope to the cul-de-sac. CHAVEZ used a Very pistol to ignite the hillside across the drainage to develop "a Cone of Fire" that would pull the backfire from the roadside and drainage to the hillside west of the road.

ZAY started backfiring by trying to burn out the corner of the handline at the old burn. ZAY had trouble getting the backfire to spread in the light fuel when a spot fire occurred in grass across the control line. ZAY called for the First Pulaski, First McCloud, and First Hot Shovel. FIRE CREW FIREFIGHTER AARON PERRY (DECEASED, NO TRANSCRIPT AVAILABLE), FIRE CREW FIREFIGHTER VICTOR FERRERA (DECEASED, NO TRANSCRIPT AVAILABLE), FIRE CREW FIREFIGHTER STEVE MARTINEZ (SEE INTERVIEW TRANSCRIPT), and FIRE CREW FIREFIGHTER SEAN DAVIS (SEE INTERVIEW TRANSCRIPT) responded to suppress the spot fire.

Shortly after CHAVEZ started firing, members of Bautista Crew 3 told ZAY to look over at the engine's firing operation. They (E-3172) were shooting flares onto the hillside west of the road. ZAY thought two Very rounds had been fired.

Fire behavior conditions became erratic at this time. A segment of the main fire was observed backing down the ridge toward the valley floor at the mouth of the drainage. Another portion of the main fire made it's way over the saddle west of the cul-de-sac and was working its way down hill. ZAY and members of Bautista Crew 3 could see fire whirls on the hillside west of them and at the mouth of the drainage. Members of the fire crew voiced concerns about the crew's safety to ZAY.

The three engines from Strike Team 9410-C started firing from the saddle north towards the valley floor. Their backfires were backing down hill slowly into the wind.

ZAY was trying to get the backfire started while the fire crew firefighters assigned to the spot fire were still committed. A finger of flame shot across the drainage below the cul-de-sac from the west. The crew became greatly concerned about the fires coming at them and asked ZAY if they could leave to the safety zone. ZAY stated that he was in charge and would make the decision when to leave. ZAY continued to backfire with little success. ZAY sent EVANS (SEE INTERVIEW TRANSCRIPT) to check out the road

as an escape route to the fire engine. ZAY ordered a retreat as he began running down the handline to the cul-de-sac, discarding a lighted fusee and passing fire crew firefighters. A second spot fire jumped the control line behind ZAY. Twelve fire crew firefighters and ZAY were able to make it back to the safety zone. EVANS reported to ZAY that flames were over the road and he could not see the engine. ZAY then gave the order to deploy fire shelters as the fire swept over the safety zone.

As the fire swept over the safety zone ZAY, FIRE CREW FIREFIGHTER DREW FRIIS (SEE INTERVIEW TRANSCRIPT), FIRE CREW FIREFIGHTER JERONIMO NUNEZ (SEE INTERVIEW TRANSCRIPT) and S. MARTINEZ laid on the ground on the east side of the safety zone. Before laying down FRIIS and ZAY tried to open FRIIS' fire shelter but dropped it. The flames covered most of the safety zone. ZAY saw members of the fire crew fleeing the east side of the safety zone running up the ridge. ZAY hollered to the fleeing crew not to run.

FERRERA, PERRY, S. MARTINEZ, and S. DAVIS who had continued to work on the original spot fire, along with FIRE CREW FIREFIGHTER DANNY SIMONIAN (SEE TRANSCRIPT) and FIRE CREW FIREFIGHTER MANUEL ENRIQUEZ (SEE TRANSCRIPT) who were working at the top of the handline at the time the order to retreat was given by ZAY, were confronted by the second spot fire on the way down the handline. S. DAVIS and S. MARTINEZ made their way through the spot fire to follow the first wave of personnel to the safety zone. FERRERA, PERRY, ENRIQUEZ, and SIMONIAN skirted the upper portion of the spot fire and saw the safety zone being swept by flames. FERRERA, PERRY, ENRIQUEZ and SIMONIAN skirted the upper portion of the spot fire and saw the safety zone with flames on it. ENRIQUEZ pulled his fire shelter out of his pack while running down into the drainage and up the other side.

PERRY received burns while skirting the spot fire but made it to the ridge on the other side of the drainage. PERRY then turned and went back down into the drainage and was over run by the fire.

FERRERA, ENRIQUEZ and SIMONIAN continued up the ridge with fire just a few feet behind them. The trio reached a shelf on the upper 1/3 of the ridge where FERRERA and SIMONIAN attempted to remove the fire shelters from their backpacks. ENRIQUEZ was carrying his shelter from where he took his pack off near the bottom of the drainage. The fire was too close for them to deploy their fire shelters and they continued to run up the ridge. FERRERA did not continue his escape. He partially deployed his fire shelter and was over run by the fire. ENRIQUEZ and SIMONIAN continue their ascent up the ridge. A changing wind shifted the flame front away from them and they out flanked the fire.

The nine fire crew firefighters fled from the area of the safety zone in two waves. One group consisting of FIRE CREW FIREFIGHTER TONY JOHNSON (SEE INTERVIEW TRANSCRIPT), FIRE CREW FIREFIGHTER DUANE DAVIS (SEE INTERVIEW TRANSCRIPT), FIRE CREW FIREFIGHTER GREGORY DIXON (SEE INTERVIEW TRANSCRIPT), EVANS and FIRE CREW FIREFIGHTER STEVE CRAWFORD (SEE INTERVIEW TRANSCRIPT) went up the ridge east of the safety zone on the right side of the old dozer line. The second group S .DAVIS, FIRE CREW FIREFIGHTER M. MARTINEZ (SEE INTERVIEW TRANSCRIPT), FIRE CREW FIREFIGHTER ISAMAEL PEREZ (SEE INTERVIEW TRANSCRIPT) and FIRE CREW FIREFIGHTER GLENN TUFUGA (SEE INTERVIEW TRANSCRIPT) fled the safety zone area up the east ridge to the left of the old dozer line. Both groups turned left to the north when the flame front shifted away from them and they out flanked the fire. The fleeing fire crew firefighters returned down to the road below seeking assistance for their injuries.

After the fire swept over the safety zone, ZAY used the handie-talkie and called for help. PERRY came walking out of the drainage east of the safety zone asking for help due to his injuries.

At approximately 2:51 p.m., June 27, 1990, CHAVEZ heard the call for help from ZAY and ordered ambulances for the emergency through MELLO. CHAVEZ sent E-3172 firefighters down to the safety zone to assist in the treatment of the injured fire crew firefighters. E-3172 started a hoselay on the east side of the road to help the fire crew fighters on the ridge to escape from the flames. Engine 3172 firefighters provided first aid to PERRY in the safety zone while waiting for an ambulance to transport him.

The engines from Strike Team 9410-C heard the call for assistance. They were trying to keep the backfires in check when a call for help was heard. Engine crew leaders assigned some of their firefighters to the first aid effort. The remaining engine crew members were used to put out the backfires. The strike team engines were unable to immediately drive down to the accident site until the CCV was moved.

Members of the strike team 9410-C assisted the injured FERRERA. FERRERA was burned and walking down the hillside when the firefighters and firefighter crew members began first aid. While being treated for his injuries, he stood up and began to run, hitting the rescuer in the jaw. FERRERA was tackled and restrained as he left the west side of the safety zone. He was subdued and treated until the ambulance arrived and was transported to the triage area on the valley floor.

Victims were being triaged and treated at the accident site and then transported down to the valley floor at

Warren Road and Simpson Road for medical air or ground transportation to medical facilities.

Bautista 3 crew members were transferred to five medical facilities for treatment:

San Bernardino County Medical Center

FERRERA
PERRY

Sherman Oaks Community Hospital

ZAY
FRIIS
DAVIS

Hemet Valley Hospital

EVANS
ENRIQUEZ
DIXON
PEREZ
TUFUGA

Menifee Valley Hospital

S. DAVIS
M. MARTINEZ
SIMONIAN

Perris Christian Hospital

JOHNSON
S. MARTINEZ
NUNEZ
CRAWFORD

Note: Refer to Appendix "R" for Fire Accident Investigation Sequence of Events for details.

July 23, 1990

FINDINGS OF FACT

- from supporting data (not opinions or recommendations)
- supported by facts (including references)
- divided into subject matter areas
- findings not related to the cause of the accident are omitted

PERSONNEL

Bautista Crew 3 consisted of of Fire Crew Captain Roger Zay and 16 inmates from the California Department of Corrections. (Appendix A)

Bautista Crew 3 was reactivated as a fire crew on May 18, 1990, due to an increase in the number of able bodied fire crew captains at Bautista Camp. (Wilson, Appendix B.16)

Fire Crew Firefighters assigned to Bautista Crew 3 received physical fitness training from the Department of Corrections and the 64 hour Basic Fire Crew Firefighter training from the Department of Forestry prior to being assigned to a fire crew. (Appendix P)

Fire Crew Captain Zay is a type I captain. (Wilson, Appendix B.16)

Fire Crew Captain Zay has two years of experience in supervising crews. (Wilson, Appendix B.16)

Fire Apparatus Engineer Chavez has been a Fire Apparatus Engineer for six years, has completed Strike Team Leader and Advanced Fire Behavior training and is an instructor for Intermediate Fire Behavior. (Appendix N)

Battalion Chief Mello has seven years of experience in the Department and has been a battalion chief for eleven months. (Appendix O)

GROUND AND FUEL FACTORS

The access road is a single lane of natural material and proceeds from the valley floor on the north side of the mountain to a saddle. (Appendix G.4)

The cul-de-sac road is a single lane of natural material and proceeds from the intersection with the access road in the saddle on a down grade of 10 percent to the cul-de-sac (accident site). (Appendix G.11 & 12)

The cul-de-sac road is 680 feet long and 11 feet wide. (Appendix F.6)

The cul-de-sac (safety zone) is a graded, natural material, circular area at the end of the road and is 54 feet in diameter. (Appendix F.6)

Evidence at the site indicates scattered grassy weeds on various parts of the cul-de-sac. The weeds were about 12 to 18 inches in height and were spaced approximately one per square foot. (See photo, Appendix G 29)

Fuel at the accident site was light brush, about 1.5 To 2 feet high, covered about 80% to 90% of the ground and produced 5.87 Tons per acre. (Matis, Appendix J)

The ridge east of the accident site contains slopes of 50 percent. (Matis, Appendix J)

A ravine is on the south side of the ridge and just south of the cul-de-sac. The ravine is part of a drainage that proceeds south west to the valley floor. (Appendix F)

The accident site is at 1800 feet of elevation. (Appendix F)

WEATHER FACTORS

The temperature at the time of the accident was 110 degrees, relative humidity was 9 percent and wind was 12 miles per hour. (Murray, 1420 hours, 6/27/90 at the origin of the fire) (Appendix L 2)

At the time of the fire fuel moisture was 1 percent and fuel temperature was 114 degrees. (1400 Hours, 6/27/90 at Juniper Flats - about 6 miles north of the accident) (Appendix H)

Wind at the top of the ridges was out of the north west. (1400 hours, 6/27/90 at Juniper Flats) (Appendix H)

Wind in the drainage was out of the south west (up canyon). (Zay, Pollock, Appendix A.1, A.1.1, B.13)

FIRE BEHAVIOR

At least 60 fire whirls occurred along the advancing fire front as it backed down a ridge toward the drainage below the accident site. (Zay, Appendix A.1)

The main fire crossed the drainage below the accident site. (Chavez, Appendix B.8, B.8.1)

The fire in the drainage came under the influence of the up-canyon winds, proceeded up the drainage, formed a large fire whirl and swept over the safety zone. (S. Martinez, Garcia, Friis, Appendix A.15)

Flame lengths were estimated at 60 feet as the fire swept over the safety zone. (Zay, Friis, Appendix A.1, A.1.1, A.2)

FIRING PLAN

The firing plan was formulated by Fire Apparatus Engineer Chavez on Engine 3172. (Chavez, Mello, Appendix B.8, B.8.1, B.7)

Resources for implementation of the firing plan were provided by the Incident Commander, Battalion Chief Ken Mello. (Mello, Chavez, Appendix B.7, B.8, B.8.1)

The firing plan called for utilization of an old burn that occurred on August 24, 1988, as a control line. (Chavez, Appendix B.8, B.8.1)

The initial firing plan called for Engine 3172 to backfire from the saddle to the valley on the north via the access road. (Chavez, Appendix B.8, B.8.1)

The initial firing plan called for a fire crew to backfire from the old burn to the saddle. (Chavez, Appendix B.8, B.8.1)

The revised firing plan called for Engine 3172 to fire from the saddle to the fire crew backfire at the drainage. (Chavez, Appendix B.8, B.8.1)

The revised firing plan called for a fire crew to backfire from the old burn north to the bottom of the ravine and to tie in with the Engine 3172 backfire. (Chavez, Appendix B.8, B.8.1)

The revised firing plan called for two engines to backfire from the saddle north along the access road to the valley on the north. (Chavez, Appendix B.8, B.8.1)

EXECUTION

The fire fighters of Engine 3172 started a hand line from the cul-de-sac to the old dozer line. (Chavez, Appendix B.8, B.8.1)

Fire Crew Captain Zay parked the Bautista Crew 3 crew carrying vehicle (CCV) in the intersection of the access road and the cul-de-sac road. (Zay, Chavez, Appendix A.1, A.1.1, B.8, B.8.1)

The Bautista Crew 3 CCV was parked in the clearing (intersection) in such a way as to exclude vehicles from proceeding south on the cul-de-sac road without moving the CCV. (Zay, Chavez, Appendix A.1, A.1.1, B.8, B.8.1)

Fire Apparatus Engineer Chavez met face to face with Fire Crew Captain Zay and advised Fire Crew Captain Zay of the plan. (Chavez, Zay, Appendix B.8, B.8.1, A.1, A.1.1)

During the briefing by Fire Apparatus Engineer Chavez, Fire Crew Captain Zay expressed concern about the safety of performing his portion of the operation and requested fire engine support. (Zay, Chavez, Appendix A.1, A.1.1, B.8, B.8.1)

Fire Apparatus Engineer Chavez revised the initial plan to utilize Engine 3172 to backfire the road from the saddle to tie in with the fire crew backfire. Then to utilize two additional engines to backfire from the saddle to the valley floor on the north. (Chavez, Zay, Appendix B.8, B.8.1, A.1, A.1.1)

Fire Crew Captain Zay and Fire Apparatus Engineer Chavez performed a successful radio check to assure that both handi-talkie radios were operational and on the same channel prior to Bautista Crew 3 departing for the cul-de-sac. (Zay, Chavez, Appendix A.1, A.1.1, B.8, B.8.1)

Fire Crew Captain Zay designated the cul-de-sac as the fire crew safety zone. (Zay, S. Martinez and others, Appendix A.1, A.1.1, A.15)

Bautista Crew 3 relieved the fire fighters of Engine 3172 and widened the handline and the old dozer line from the cul-de-sac to the old burn. (Zay, Friis, Appendix A.1, A.1.1, A.2)

As Bautista Crew 3 began work on the handline, the main fire was showing at the saddle approximately 1800 feet west of their position and was backing down the ridge. (Zay, Johnson, Appendix A.1, A.1.1, A.11)

Successful execution of the firing plan depended upon a coordinated effort between Engine 3172, the three strike team engines and Bautista Crew 3. (Chavez, Appendix B.8, B.8.1)

Fire Apparatus Engineer Chavez backfired around the crew carrying vehicle and proceeded south toward Bautista Crew 3. (Chavez, Appendix B.8, B.8.1)

Fire Apparatus Engineer Chavez utilized a Very pistol, a drip torch and a fusee during backfire operations. (Chavez, Appendix B.8, B.8.1)

Fire Crew Captain Zay experienced problems with the handi-talkie radio and was unable to contact Fire Apparatus Engineer Chavez for a period of time when the handline backfire was about to be ignited. (Zay, Appendix A.1, A.1.1)

Fire Crew Captain Zay changed the battery in the handi-talkie radio and re-established communications with Fire Apparatus Engineer Chavez. (Zay, Appendix A.1, A.1.1)

Bautista Crew 3 initiated their backfire at the point where the hand line intersected the old burn. (Zay, Chavez and others, Appendix A.1, A.1.1, B.8, B.8.1)

Fire Crew Captain Zay performed the backfiring duties for Bautista Crew 3. (Zay, Appendix A.1, A.1.1)

Fire Apparatus Engineer Chavez could not observe the approach of the main fire from the saddle west of the cul-de-sac into the drainage due to the existance of a ridge between his position and the fire. (Chavez, Appendix B.8, B.8.1)

Three engines from Strike Team 9410 C arrived at the saddle, received their operational instructions from Fire Apparatus Engineer Chavez, through Fire Apparatus Engineer Williams, and started backfiring. (Regan, Williams, Appendix B.5, B.3)

The three strike team engines began backfiring from the point where Engine 3172 began backfiring, and proceeded north, down the access road. (Chavez, Regan, Appendix B.8, B.8.1, B.5)

Strike Team Leader 9410 C (Meers) observing the firing operation from the valley on the north side of the fire, witnessed a large fire whirl over the ridge in the vicinity of the accident site. (Meers, Appendix B.2)

The backfire from Bautista Crew 3 did not create the black line (burned over area) as had been anticipated. The wind was blowing the backfire back toward the control line. (Zay, S. Martinez and others, Appendix A.1, A.1.1, A.15)

The backfire of Bautista Crew 3 jumped the control line necessitating control action. (Zay, S. Martinez and others, Appendix A.1, A.1.1, A.15)

Fire Crew Firefighter Manuel Enriquez (and several others) approached Fire Crew Captain Zay to warn him of the hazardous conditions (suggesting rapid departure). Fire Crew Captain Zay related that he was the Captain and he would give the orders. (Enriquez, Johnson and others, Appendix A.12, A.12.1, A.11)

Fire Crew Captain Zay noticed three heads of fire with "at least 60 flame tornados" accompanying the main fire front. (Zay, Appendix A.1, A.1.1)

Fire Crew Captain Zay dispatched Fire Crew Firefighter Evans to reconnoiter the escape route back to the fire engine. (Zay, Evans, Appendix A.1, A.1.1, A.4)

Fire Apparatus Engineer Chavez observed the main fire cross the drainage below Bautista Crew 3 and attempted to warn Fire Crew Captain Zay by radio, but no acknowledgment was received. (Chavez, Appendix B.8, B.8.1)

Fire Crew Captain Zay made a final effort to backfire and ordered his fire crew firefighters to the safety zone. (S. Martinez, Crawford, Appendix A.15, A.17)

Fire Crew Captain Zay ran past some fire crew firefighters on his way to the safety zone. (Simonian, Zay, Appendix A.9, A.9.1, A.1, A.1.1)

Fire Crew Firefighter Evans reported back to Fire Crew Captain Zay that the road to the fire engine was covered with fire. (Zay, Evans, Appendix A.1, A.1.1, A.4)

Fire Crew Captain Zay reached the safety zone and ordered fire shelter deployment. (Zay, S. Martinez, Appendix A.1, A.1.1, A.15)

Fire that had crossed below Bautista Crew 3 burned up the drainage and swept (sheeted) over the safety zone. (Chavez and others, Appendix B.8, B.8.1)

Fire Crew Captain Zay wanted to run to Engine 3172, but was cut off by fire on the road and laid down in the upper (north east) side of the cul-de-sac (safety zone). (Zay, Appendix A.1, A.1.1)

Fire Crew Firefighters Friis, Nunez and S. Martinez remained in the safety zone as the fire swept over. (Friis, Nunez and S. Martinez, Appendix A.2, A.16, A.15)

Fire Crew Captain Zay could not reach his fire shelter, as it was in a compartment on his backpack. (Zay, Appendix A.1, A.1.1)

Fire Crew Captain Zay attempted to remove a fire shelter from the web gear (belt) of Fire Crew Firefighter Friis. The two men dropped the fire shelter and it was lost. (Zay, Appendix A.1, A.1.1)

Fire Crew Firefighters stated that they could not deploy their fire shelters due to the location of the shelters on the backpacks and the time involved in removing the backpacks to access the fire shelters. (S. Martinez, Friis and others, Appendix A.15, A.2)

Fire Crew Firefighters stated that they did not have time to deploy fire shelters due to flame impingement on the safety zone. (Tofuga, M. Martinez and others, Appendix A.5, A.7)

Fire Crew Firefighters, D. Davis, Johnson, S. Davis, M. Martinez, Perez, Tofuga, Simonian, Enriquez, Crawford, Evans, Dixon and Ferrera ran up the ridge in an attempt to escape the fire. (D. Davis, Johnson and others, Appendix A.8, A.11)

Fire Crew Firefighter Ferrera, while running up the ridge, attempted to deploy his fire shelter, but was unable to complete the deployment and ended up with the fire shelter wrapped around his legs as he assumed a sitting position and was overrun by fire. (Zay, Friis and Enriquez, Appendix A.1, A.1.1, A.2, A.12)

Fire Crew Firefighter Perry received burn injuries while flanking the second spot fire enroute to the safety zone. (D. Davis, Appendix A.8)

Fire Crew Firefighter Perry attempted to run up the ridge, turned right, and descended into the ravine. (D. Davis, Appendix A.8)

Fire Crew Firefighter Perry, upon returning to the handline in the ravine, was forced up the draw by the fire and was overrun. (D. Davis, Appendix A.8)

Engine 3172 deployed a nose lay to attempt control of the slip over where the main fire had crossed the road above the cul-de-sac. This was an effort to provide an escape route for the fire crew firefighters that were on the ridge. (Chaves, Appendix B.8. B.8.1)

ADDITIONAL FINDINGS

The span of control for Fire Apparatus Engineer Chavez consisted of the supervisors of the three engines from Strike Team 9410 C, the supervisor of Bautista Crew 3 (Fire Crew Captain Zay) and the five fire fighters on Engine 3172. (Chavez, Mello, Appendix B.8, B.8.1, B.7)

The incident had not been divided into divisions. (Mello, Appendix B.7)

Battalion Chief Reeder was assigned to the backfire operation by the Incident Commander. Reeder was unable to reach the location from the south side of the fire before the accident occurred. (Mello, Reeder, Appendix B.7, B.15)

Bautista Crew 3 had not participated in the annual fire preparedness exercise. (Wilson, Appendix B.16)

Fire Crew Captain Zay had not participated in the annual fire preparedness exercise. (Wilson, Appendix B.16)

Bautista Crew 3 was scheduled for one day per week of fire training, which had been preempted for the last three weeks. (Wilson, Appendix B.16)

Bautista Crew 3 had not practiced deploying fire shelters. (Simonian, D. Davis and others, Appendix A.9, A.9.1, A.8)

Documentation certifying Fire Crew Captain Zay as a Type I Captain, FC 212, can not be located. (Wilson, Appendix A.16)

At least one Fire Crew Firefighter had his nomex shroud rolled up in his helmet during the incident. (site investigation)

The old burn did not burn over during or after the blow up. (field observation)

The old burn was not utilized nor considered by Bautista Crew 3 as a safety zone. (Zay, Appendix A.1, A.1.1)

CONCLUSIONS

Caught by erratic fire conditions, Bautista Crew #3 retreated to a safety zone, were unable to deploy fire shelters for lack of time and thirteen of the sixteen fire crew firefighters ran up a ridge ahead of the fire. Both fatalities were unable to reach the safety zone and were in the group of fire crew firefighters that ran up the hill.

Extreme fire weather, shifting wind, one percent fuel moistures, flashy fuels, a pronounced drainage and steep rocky terrain were the natural conditions that sustained the sequence of events leading to the accident.

The presence of 110 degree ambient and 114 fuel temperatures and several fire fronts in the drainage created a strong up canyon draft.

The Bautista Crew #3 escape plan called for the movement of personnel into an area that would eventually be swept with fire (the cul-de-sac).

The backfire that Bautista Crew #3 was attempting had adverse winds and did not progress away from the handline establishing a burned over safety area.

The main fire, pushed by winds that were funneling through the saddle approximately 1800 feet to the west of the cul-de-sac, sent a finger of fire across the drainage below Bautista Crew #3's position, it encountered a strong up canyon draft. This fire then covered the remaining 300 feet to the crew's position, creating a fire whirl that could be seen from the valley on the opposite side of the mountain in a few seconds.

United States
Department of
Agriculture

Forest
Service

Technology &
Development
Center

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Missoula, MT 59801
(406) 329-3900

REPLY TO: 7120
TA&S TE02P16

Date: JUL 24 1990

SUBJECT: Thermal analysis of personal protective equipment used on
California Fire, June 27, 1990

Chris Wurzell, Battalion Chief
California Department of Forestry
1550 East Sixth Street
Beaumont, CA 92223

Dear Chris,

The evidence clothing and equipment have been analyzed and are being
returned separately to your attention. A thermal analysis follows.

Evidence Item #1: 6.0 oz. Orange Nomex Pants, Size XL.

1. About 60% of the back of the pants have been charred to a dark brown. The damage is heaviest in the calf and buttocks area and is heavier on the left leg. Looking on the inside, the double layer seams and areas are not charred and the outside char did not always go through to the inside. The fronts show light charring except for the right leg boot area.
2. This damage indicates cloth temperatures of about 700°F and a heat flux of 5.0 cal/cm². Assuming an average entrapment heat flux of 1 cal/cm²/sec. The damage would have occurred in 5 seconds. In lighter fuels the time would be longer.
3. Since the char doesn't always go through to the inside surface this would indicate either brief flame contact or intense radiation lasting 5-10 seconds.
4. Depending on what was worn underneath the pants, the burns could be extensive (no under clothing), to light (second set of pants on underneath).
5. The pants did a good job of blocking a great deal of heat for a short time. This is all they are designed to do. The overall design used good construction techniques. This fabric is somewhat light if its worn as a single layer, but very adequate as a double layer.

6. My opinion, based on analyzing many similar garments, is that the person wearing these was laying down when high radiant heat hit him from the left side. The heat source produced less damage than what other people have survived in even without shelters, if they kept their face in the dirt and protected their airways. This person should have survived in a fire shelter with minor burns.

Evidence Item #2: Fire Shelter. No ID tag.

1. One side of the shelter got very hot, indicating brief flame contact with prolonged flame contact in one corner which started to melt the foil.
2. The other side showed considerably less heat damage with a few small melted areas which may indicate contact with coals rather than flame.
3. The top, 12-18 inches of foil along the ridgeline, is delaminated. The bottom half of the shelter is not delaminated.
4. End flaps showed little damage except corner mentioned in #1.
5. Some folds of the shelter were very bright, indicating they probably were not fully unfolded.
6. The damage pattern would be typical of many recovered shelters if the flame front approached on the damaged side, followed by a ground fire on the same side. Similar damage has been caused by packsacks burning next to the shelters.
7. Temperatures would have been less than 500°F on ends (usually tucked to inside), 600°F for delamination on top, with 1000-1200°F on the hot side and bottom corner.
8. My opinion is that this shelter functioned normally and the occupant should have survived, but with burns on the side of their body towards the hot side. This shelter has more damage than most shelters, but less than many that people have survived in.

Evidence Item #3: 6.0 oz. Orange Nomex Shirt, Size XL.

1. Front of shirt shows little charring or heat set. Tops of both shoulders have brown char. A strap buckle with webbing melted to shirt front as did a canteen cap. Webbing and cap are made of polypropylene. The melted areas did not damage Nomex, showing the heat was only of brief duration.
2. Back of shirt is mostly ok except for brown char on top of shoulders and arms. More damage on left shoulder and arm than on right. Most severe damage was black char on center back collar. There are numerous black plastic melt marks in the waist area.
3. This damage indicates both temperatures of 700°F for the shoulder area and 825°F for the collar area and represent heat fluxes of about 5.0 cal/cm² and 10.0 cal/cm² respectively. The brown char is characteristic of radiation damage, but the black char was probably due to a burning strap.
4. The shirt did a good job of protecting the person. The pattern suggests the person was laying on the ground with a pack on their back, and possibly partially covered by a shelter. If covered by a shelter, then the pattern would indicate their arms and head were outside the shelter. The person probably rolled over on top of the lid and strap for them to stick to their front. This person may have been partially under a shelter when the main fire arrived but outside while it was still hot enough to damage the pack. The shirt would need to heat up to over 500°F to show damage where as the pack straps would start to melt around 340°F. This suggests lower levels of heat in the waist area. The sleeve nylon pile tape melted showing 470°F but was not prolonged since it did not damage the Nomex by it.
5. Since the heaviest charring is in the head area, the person may have breathed in hot gases. Overall the shirt looks good and the person should have survived. It is unclear why heaviest damage is in the area normally protected the most.

Evidence Item #4: Pack System.

1. The cotton canteen cases have faint char (440°F).
2. The polypropylene webbing is melted (340°F).
3. Shoulder strap cover and foam pad are charred (500°F).
4. The belt melted but the hardware did not (340-500°F).
5. The main pack charred in places with some partial melting of nylon components (500°F).
6. Cotton shelter pocket okay but PVC melted inside (340-450°F).
7. All the above suggest the pack was not subjected to very severe temperatures. All these temperatures indicate a heat source that is survivable in a shelter and possibly without one if you protect your airways. May have been worn as ground fire would probably ignited it.

Evidence Item #6: MSA Hard hat.

1. Liner melted near back (340°F).
2. Plastic goggles heat warped (300°F).
3. Polycarbonate hard hat bill warped (300°F).
4. Nomex shroud has slight char (600°F).
5. The outside of the hard hat was heated up to 340°F. The char on the shroud suggests hotter temperatures under the hard hat in the collar area.
6. Hard hat is in good shape and would have protected person wearing it.

Evidence Item #7: Bullard 911-C Hard hat.

1. Liner melted and charred (340-500^oF).
2. Plastic goggles melted (+300^oF).
3. Polycarbonate hard hat shell melted (+300^oF).
4. Nomex shroud charred black with foaming (825^oF with 10.0 cal/cm² heat flux).
5. Pattern is consistent with hard hats dropped on the ground and exposed to light ground fire.
6. If a person was wearing this hard hat under the heat flux necessary to do this damage, they would receive third degree burns in about 1-2 seconds. If it was flame contact damage and they breathed the air it would likely cause death.

Evidence Item #8: Pack System.

1. All the damage similar to item #4 except this pack ignited and partially burned. It was probably exposed to a ground fire.
2. Fire shelter was ANCHOR 8-88, GS-07F-17325. The PVC was black, indicating shelter had extensive abrasion damage prior to entrapment. If used, this shelter would have functioned satisfactorily, except abraded areas were more likely to be damaged by excessive heat.

Evidence Item #9: 6.0 oz. Orange Nomex Shirt #083.

1. Spotty brown char on back with a larger area on left side above waist (600^oF).
2. Heavy black char on left chest and on center placket. Collar points also black. Placket char extends down through multiple layers (825^oF).
3. Zipper was worn open at top and should be closed up in an entrapment. Zipper tape as melted from bottom of front pockets to neck.

4. Heaviest heat damage is to front from chest to neck. This suggests person was standing up in a flame front or breathed in toxic fumes and fell to the ground on their back, and the damage occurred later. Usually people do not survive with this amount of damage in the head area.

Discussion

The clothing, PPE and packs indicate temperatures severe enough to cause death, but definitely survivable with fire shelters. This entrapment was probably survivable without shelters if the people protected their airways, however they would have had considerable burns.

One shirt, pair of pants and hard hat all indicated they were subjected to heat that caused some damage but it was still within the protection limits of those items so the person should have survived, especially in a fire shelter. The other shirt, pack sack and hard hat all showed both hotter temperatures and more prolonged heat. This PPE was starting to fail and so it was outside its design limits and no longer fully protecting the person. Since the PPE and shirt could have been damaged worse this would indicate the heat source was within the operational range of a fire shelter.

The deployed fire shelter showed flame contact and a prolonged heat source in one corner. It should have protected the occupant, however, the person likely received burns through the foil in the hotter areas. The foil tears easily once the glass cloth has delaminated. It is not clear if the foil tore during the entrapment or later through repeated handling.

The above analysis should be viewed as a best guess rather than absolute. A more accurate assessment could have been made if I knew which clothing, PPE and shelter belonged together. Also under clothing is also valuable as are body burns. This evidence helps determine if the damage was due to a short intense heat source versus a lower, prolonged heat source. We are trying to encourage investigation teams to recover all these items since they give a much more accurate assessment when correlated together.

Recommendations

1. The clothing design and seam construction are within industry quality standards. The weight of the cloth is on the light side if worn alone but offers full protection if worn over a t-shirt and light pants. We recommend a minimum of 6.0 oz./square yard for the protective fabric and an undergarment of 3 oz./sq.yd. so the total is over 8.0 oz./sq.yd. The 8.0 oz./sq.yd. is the "magic" number that prevents most radiation burns, except during very intense flame overs.
2. The pack webbing was melting well below the melt/char limits of the other components and appears to have contributed to the thermal hazard. I recommend replacing it with similar nylon webbing.
3. The fire shelters are melted to the pack pockets in the samples sent. Since this occurred prior to trying to deploy, it represents a potential hazard. It is difficult to extract the shelter when the PVC case is melted to the pocket. Using the new liners would help solve this problem or heavier pocket fabric.

The fire shelters showed signs of abrasion damage that occurs while carrying them. I would strongly recommend buying liners for all fire shelters. They will double the wear life of shelter or more. This represents a 50% reduction in shelter costs and the shelter is more likely to be in better condition if it has to be used. The abrasion suggests the shelters are not being inspected every two weeks as recommended.

4. These people had fire shelters and needed them but did not or were not able to use them. This was due, in part, to being unable to reach them while carrying the packs on-the-run. Since shelter location contributed to the hazard, as it did on the recent Dude Fire, I would recommend shelters only be carried where they can be easily reached without taking the packs off.
5. In conjunction with #4, people are waiting too long to get their fire shelters out. While trying to escape quickly, the extra burden of running with a pack on is questionable. As a group, these people waited too long to get their shelters, which is a training problem.

Letter Chris Wuzell

DRAFT 18-1

6. While trying to escape an entrapment protecting your airways is critical. When overrun by a fire, it is more important to get face down on the ground than to deploy your shelter. The shelter can be deployed while lying down and we now recommend everyone practice deploying while laying down as part of their training.
7. Since many people are making errors during entrapments, this may reflect that all the wildland firefighting agencies need to put more time and emphasis on fire shelter training.
8. I have sent 10 copies of our latest (June 1990) fire shelter publication to Dan Olliver and have enclosed a copy. Please review this publication in light of this incident and send me any comments within 6-8 weeks. We are planning a revision later this year to stress areas where we feel mistakes are being made during deployments.

Thank you for allowing us to analyze these items. Our goal is to make all the clothing and equipment better and to continually improve the training materials.

Sincerely,

TED PUTNAM
Equipment Specialist