THE LOOP FIRE DISASTER

ANGELES NATIONAL FOREST
CALIFORNIA REGION

NOVEMBER 1, 1966

U. S. DEPARTMENT OF AGRICULTURE . FOREST SERVICE . WASHINGTON, D. C.

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This report presents the study made of the Loop Fire Disaster by the Analysis Group. It describes causes and circumstances relating to the tragedy and recommends ways to prevent similar accidents in the future. It may be supplemented later if hospitalized survivors are able to provide additional significant information.

US Department of Agriculture - Forest Service - Washington, D.C.

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FOREWORD

On November 1, 1966, in a canyon near the boundary of the Angeles National Forest, California, a flareup on the Loop Fire overran the Forest Service's El Cariso "Hot Shot" Crew, burned to death 10 firefighters and inflicted critical to minor injuries on 12 others. One of these critically injured men died at the Los Angeles County General Hospital on November 6. Three members of this crew and a Forest Service Division Boss were in the upper part of the disaster canyon and were not injured.

This tragedy occurred on the southeast corner of the Loop Fire in the lower end of a "chimney" canyon. The area in which the men were trapped was about 30 feet wide and 200 feet long. The lead man of the El Cariso Crew, Gordon King, was within 300 feet of the end of Los Angeles County Fire Department's bulldozer fireline at the time the fire flared up and made its run.

1. Killed in action in line of duty

Name and Age	Position in El Cariso Hot Shot Crew
Barnhill, Kenneth - 19	Crewman
Chee, Raymond - 23	Crew Boss
Figlo, John P. - 18	Crewman
Hill, Joel A. - 19	Crewman
Moore, Daniel J. - 21	Crewman
Moreland, James A. - 22	Crewman
Verdugo, John D. - 19	Crewman
Waller, William J. - 21	Crewman
White, Michael R. - 20	Crewman
White, Stephen - 18	Crewman

2. Critically or seriously injured in line of duty

Bowman, Steven R. - 23	Crewman
Chase, Patrick D. - 19	Squad Boss
Chounard, Robert S. - 18	Crewman
Cosgrove, Edward P. - 22	Crew Boss
Danner, Frederick E. - 18	Crewman

King, Gordon H. - 32	Superintendent
Leak, Richard A. - 19	Foreman
Shilcutt, Carl J. - 26	Crewman (Died in hospital November 6, 1966)
Smalls, Joseph - 24	Crewman
Smith, Gerald K. - 19	Crewman
Spady, Glen M. - 22	Crewman

3. Slightly injured in line of duty

Burchett, Warren P. - 32	Assistant Superintendent

4. Uninjured or out-patient examination and treatment

Moore, John H. - 23	Foreman
Parshall, William U. - 19	Crewman
Seewald, Rodney S. - 19	Squad Boss

	Position on fire Regular Forest Service Job
Westmoreland, William C. - 29	Division Boss Tujunga Ranger District, Fire Prevention Officer, Angeles National Forest

The Office of the Chief, U. S. Forest Service, was notified on the evening of November 1 as soon as the Angeles National Forest and California Region determined positive facts about the disaster.

On the morning of November 2, Chief of the Forest Service, Edward P. Cliff, appointed a Fire Analysis Group to study this disastrous fire. (Appendix A) He directed the group to make a thorough and comprehensive analysis of the circumstances and situations relating to this tragedy: to get the facts - what happened, how and why; to study and evaluate these facts and formulate sound conclusions and recommendations as to how could the final outcome, or any of the occurrences or situations leading up to it, could have been avoided. Above all, the group was to follow every possible lead and determine how we can tighten up our safeguards to prevent a similar disaster in the future. Appendix B explains the group's organization and procedure.

THE LOOP FIRE

Following is a reconstruction of the Loop Fire including control action.

1. General Description

The Loop Fire started at 5:19 a.m., November 1, 1966, from a faulty electric distribution line within the Department of Army's Los Pinetos Nike Site on National Forest Land under special use permit. Santa Ana winds of up to an estimated 60 miles per hour were occurring at this time. Before being controlled at 1 p.m. on November 2, the fire burned 2,028 acres with a nine-mile perimeter. (Appendices C & D)

The burned area was within the Tujunga Ranger District, Angeles National Forest, and on adjoining land protected by Los Angeles City Fire Department and the Los Angeles County Fire Department. The fire started on an exposed ridge top at the head of Loop Canyon and spread rapidly down to the Urban Area between the Pacoima Dam and the Olive View Sanitarium in the mouth of Wilson Canyon. This area was designated as Division "C". (Appendix E)

The City and County forces had responsibilities for fire suppression in Division "C". For a time the Veterans Administration Hospital, Olive View Sanitarium and residences along the front were threatened. Evacuation of threatened installations was accomplished in an orderly manner. People returned soon after the fire was secured along this front.

Personnel and equipment were furnished by Los Angeles County Fire Department to help the Forest Service on other Divisions of the fire even though they were fighting another major fire near Chatsworth.

During the morning the fire repeatedly threatened installations at the Nike Site. These fire runs were met and controlled with no fire damage to any of the structures. Prior hazard reduction work by the Army - especially brush clearance at the request of the Forest Service - assisted in preventing destruction of

facilities. Some bad moments were experienced when Army personnel didn't have room in the silo for a Nike missile stored above ground and which would explode at 120° temperature. This problem was finally solved by the Commanding Officer moving the missile underground on the elevator.

Total forces to control the fire included 880 men, 62 tankers, 6 tractors, 5 helicopters and 7 air tankers. All of the workers doing line construction were members of trained organized fire suppression crews. These included 6 "Hot Shot" crews, Porterville crews (80 men) and Job Corps (60 men) employed by the Forest Service and 7 Camp Crews of Los Angeles County Fire Department.

The estimated suppression cost of this fire was $76,000. Total watershed damage was $468,204.

2. Control Action

The fire was discovered at 5:19 a.m. November 1, 1966, immediately after ignition by the Lookout Observer at Mendenhall Peak and she reported by radio at 5:20 a.m. to the Little Tujunga and Bear Divide Stations. Initial attack was at 5:36 a.m. First reinforcements arrived at 6 a.m. and by that time others were on their way to the fire.

At about 6 a.m. the fire's potential was recognized by Tujunga District Ranger, Jesse J. Barton, and William R. C. Beaty, Staff Fire Control Officer for the Angeles National Forest. Los Angeles County and City Fire Departments were immediately notified and took appropriate action. Ranger Barton and Tujunga District Fire Control Officer Hugh Masterson utilized the forces arriving on the fire and held it at the Nike Site. Barton was Fire Boss until relieved by Beaty at 8 a.m. He and Masterson directed operations working the north and east lines and they held the north edge along the Santa Clara fuelbreak. Meanwhile, Barton assigned Tujunga District Prevention Officer William C. Westmoreland to the east line as Division Boss.

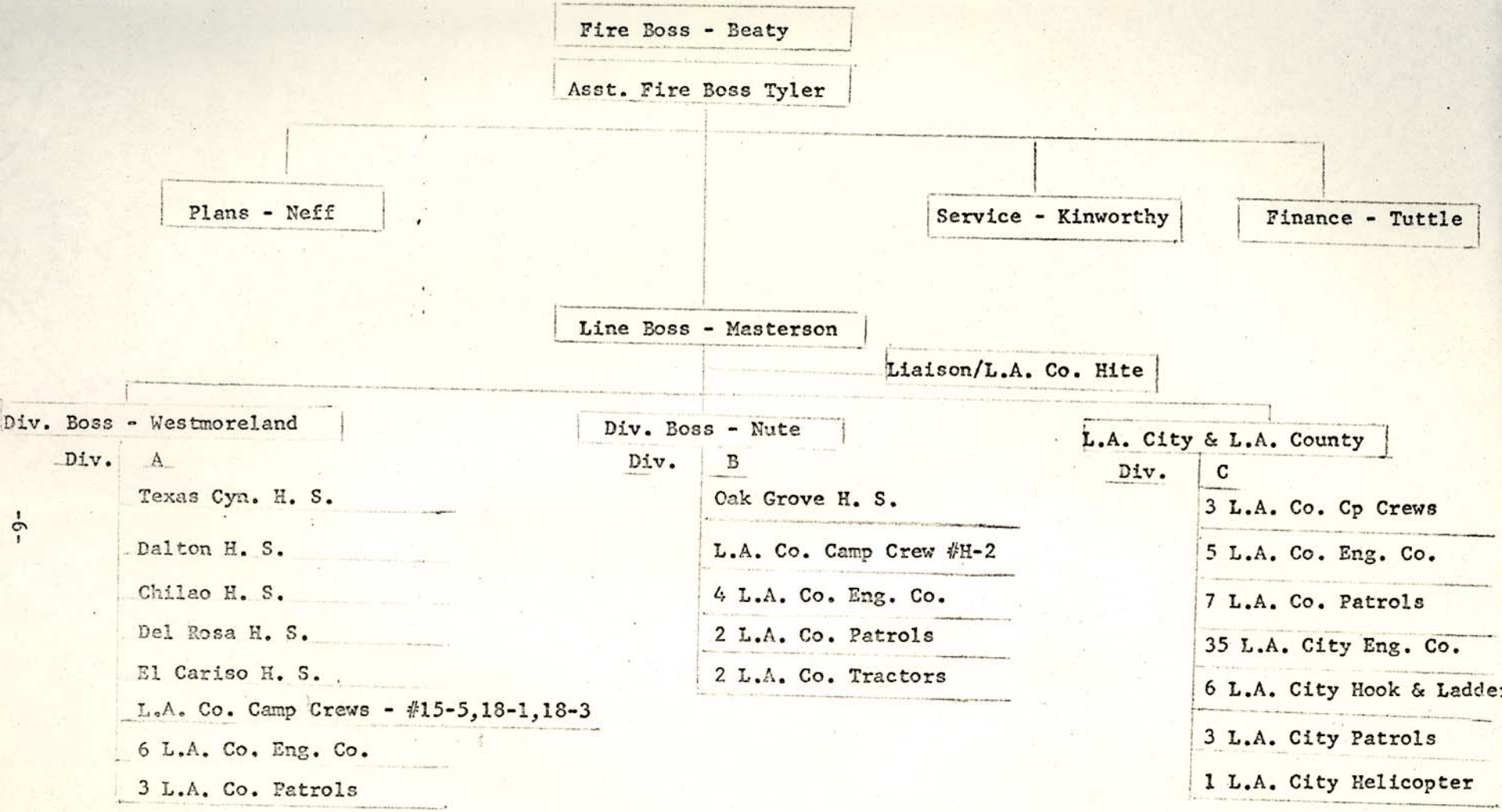
Beaty advised Barton at about 8 a.m. that he was taking over the fire as Fire Boss and assigned Barton to inventory all forces

and their placement and then to work with the Plans Chief upon the latter's arrival. Barton was not rated as a Class I Fire Boss. (Appendix F)

Beaty had previously verified with Masterson that: (1) the west side of the fire was approaching an area burned in 1962; (2) the south side would be taken care of by Los Angeles County and City Fire Departments; (3) all Forest Service effort was to be expended on the north and east sides of the fire. Beaty appointed Masterson as Line Boss and cautioned him not to let anyone get in front of the fire (training on the Angeles emphasizes safety in cold-trailing - "keep one foot in the burn"). Beaty and Masterson continued Westmoreland as Division Boss on the east line. (Figure 1) The north edge of the fire was held on the Santa Clara fuelbreak east to Pre-Attack Plan A30. (Figure 2) A tractor line was constructed to A31 and held. Control on the remainder of the west was obtained through light fuels in the 1962 burned area down to Olive View Sanitarium. County and City crews were holding the south edge of the fire as it backed down to their hose lines and bulldozer line.

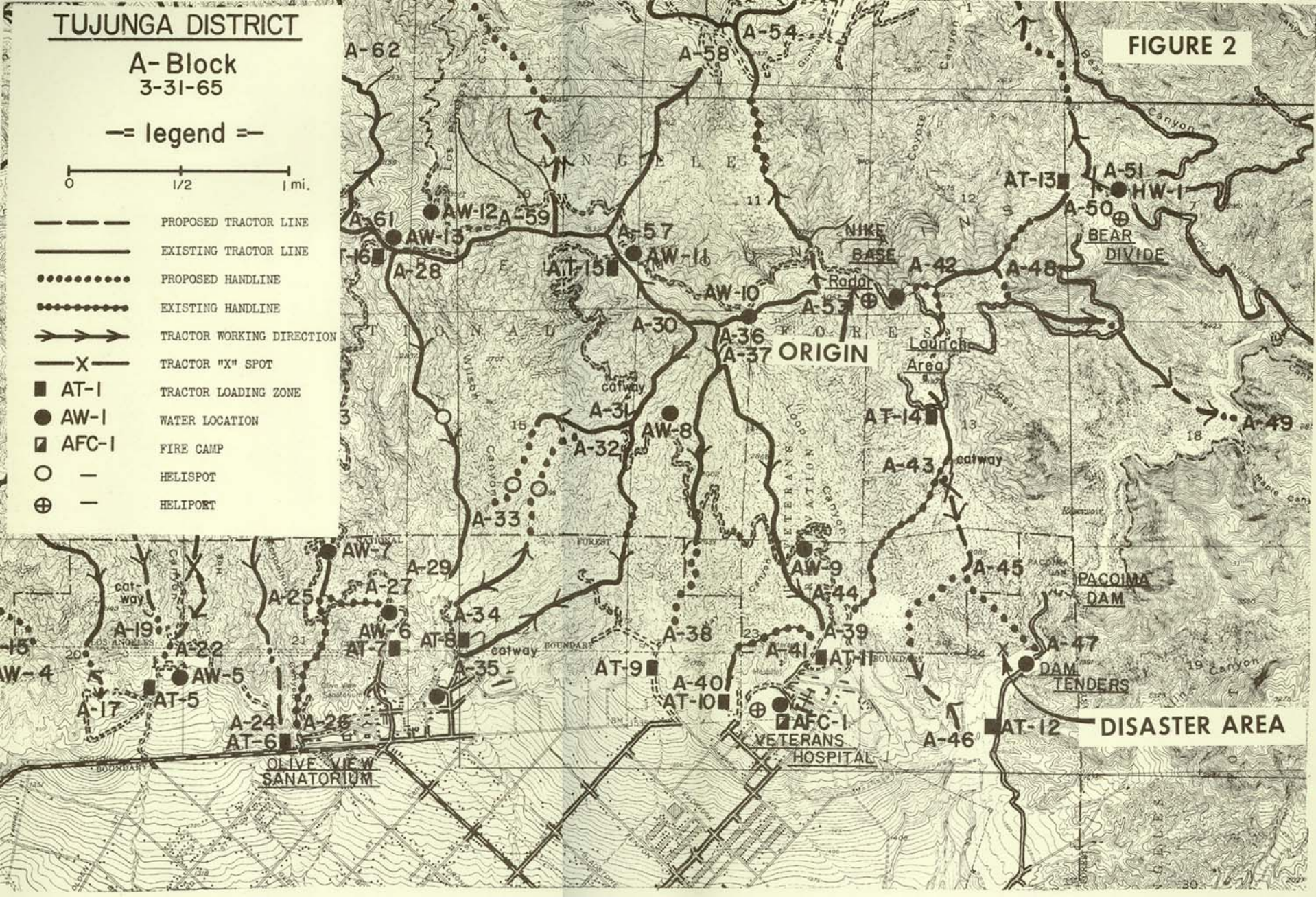
By 2 p.m. County crews were approaching the southeast corner of the fire with their line. Previously at mid-morning, Fire Boss Beaty noticed the wind slacking off and ordered a lead plane and 5 air tankers to work on the east line and slow the spread to east. Beaty appointed Hite as Liaison Officer with the County forces and he arrived at the County's Command Post near the southeast corner of the fire on the Pacoima Canyon Road at 2 p.m.

Meanwhile, Line Boss Masterson and Division Boss Westmoreland with "Hot Shot" crews were building line on the east edge of the fire, moving south from the Nike Site. With the exception of a few slop-overs, the fire was holding along the ridge to a point about 40 chains below Contractor's Point or about to Pre-Attack Plan A45. The big slop-over near Contractor's (A43) was held by the Chilao "Hot Shot" crew and two County crews aided by 5 helicopter tankers. The Dalton "Hot Shot" crew arrived about noon and the Del Rosa "Hot Shot" crew about 1 p.m. Division Boss Westmoreland assigned the Dalton crew to construct line south from the Chilao crew. When the Del Rosa crew arrived, Westmoreland had them go down ahead of the Dalton crew and



ORGANIZATIONAL CHART FOR THE LOOP FIRE

FIGURE 1


TUJUNGA DISTRICT
A- Block
3-31-65
—= legend =—
0
1/2
1 mi.
PROPOSED TRACTOR LINE
EXISTING TRACTOR LINE
PROPOSED HANDLINE
EXISTING HANDLINE
TRACTOR WORKING DIRECTION
TRACTOR "X" SPOT
AT-1 TRACTOR LOADING ZONE
AW-1 WATER LOCATION
AFC-1 FIRE CAMP
HELISPOT
HELIPORT
FIGURE 2
ORIGIN
NIKE BASE
Radar
Launch Area
BEAR DIVIDE
PACOIMA DAM
DAM TENDERS
DISASTER AREA
VETERANS HOSPITAL
OLIVE VIEW SANATORIUM
catway
A-62
A-58
A-54
A-51
A-50
A-61
A-59
A-57
A-28
A-42
A-48
A-30
A-36
A-37
A-31
A-32
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A-17
A-24
A-26
A-46
AW-12
AW-13
AW-11
AW-10
AW-8
AW-7
AW-6
AW-5
AW-9
AT-13
AT-15
AT-14
AT-7
AT-8
AT-9
AT-10
AT-11
AT-12
AT-5
AT-6
HW-1
AFC-1

start constructing line along the fire edge on the ridge (Pre-Attack A43 toward A45. Figure 2)

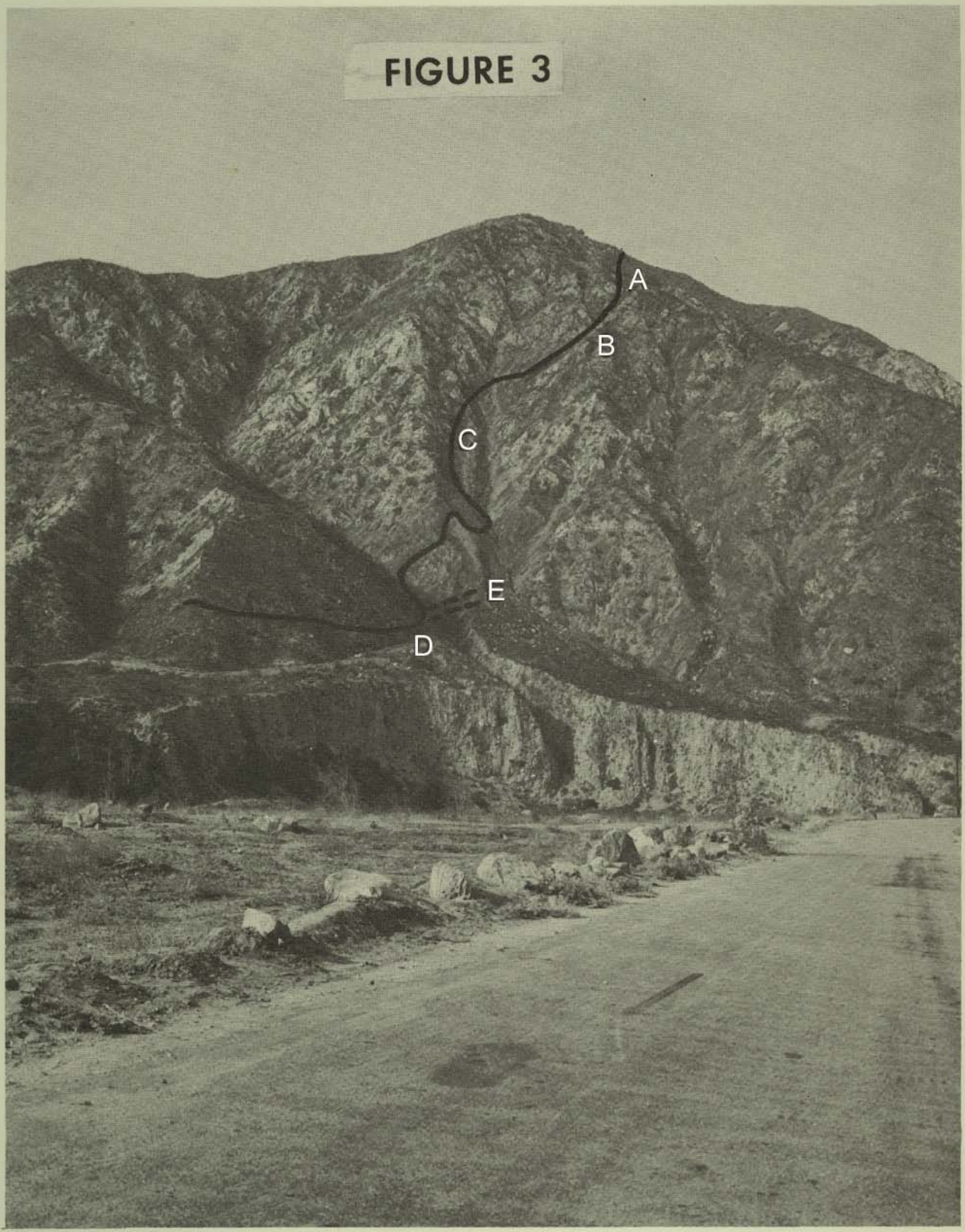
Division Boss Westmoreland was on another part of the line above Contractor's Point when the El Cariso "Hot Shot" crew arrived on the fire at Contractor's Point at 2:30 p.m. In Westmoreland's absence, Line Boss Hugh Masterson briefed Gordon King, the Superintendent. His instructions were "to leap-frog the Del Rosa crew and to cold-trail the fire edge if possible, mentioning the steep terrain beyond the point (A45) where we could observe the Del Rosa Crew working." Masterson also mentioned that "the main ridge (A45 to A47 but not identified to King as such) could be used as an alternate if impossible to follow the burned edge." Masterson said that "there would be lots of rocks rolling and might be a few runs." Masterson told the Analysis Group that he did not elaborate since he had confidence (and still does) in King's ability as a firefighter and leader.

King and his assistant, Burchett, had organized their "Hot Shots" into two crews instead of the normal three crews as they were less than full strength at the time of this fire call. Foreman Leak was in charge of the lead crew and Foreman Moore in charge of the rear crew. They left their fire shelters on their truck. Their fire resistant shirts had worn out and were not replaced prior to this fire call. Angeles National Forest radios were not available for assignment to King as the last one at Contractor's Point had been previously given to the Del Rosa crew.

King led his crew to the point (A45) as instructed by Masterson. King and Burchett held the crew at a small bench below this point (Point A, Figure 3) until King had decided that it was possible to "cold-trail" the fire down into the "chimney" canyon. King could see the County tractors and crews working the lower edge of the fire eastward toward the lower end of a deep canyon immediately west of the "chimney" canyon and believed he could tie in with them.

At about 2:45 p.m. or shortly before, Masterson requested Westmoreland (who was equipped with a radio) to go down the east line and make sure the crews were lined out. Westmoreland

FIGURE 3



checked each crew and caught up with the tail end of the El Cariso crew on the point on the ridge (Point A, Figure 3) where the fireline descended into the "chimney" canyon.

At 3 p.m. King led the first units of his crew carefully down and across a steep, rocky face along the edge of the fire where a "fire retardant" line had been established by air tankers. Others of his crew followed in small groups. Division Boss Westmoreland was unable to contact King, as King was already well down in the canyon and did not have a radio. Westmoreland contacted Woody Hite, Liaison Officer at the County's Command Post, which was visible below on the Pacoima Road. Hite told Westmoreland that King and his men were headed into the right place and that they would be able to go down the rocky chute in the chimney canyon with their line. Superintendent King was picking the same route on his own and in accordance with Masterson's instructions. Westmoreland waited on Point A until the last of the El Cariso crew had cleared the rock face.

Meanwhile, the Del Rosa crew came down to Point A. Westmoreland told them to stand by at this place until he checked to see if this was the best way down. He would then call them on the radio and inform them to either come down and leap-frog the El Cariso crew or to go down the ridge (to A47, Figure 2) and come in from below to meet the El Cariso crew.

Westmoreland then proceeded down the rock face. When he was about half-way down the face, he could look down the chimney canyon most of the way. (Point B, Figure 3) Most of King's crew had crossed the rock slide at the head of the chute and had worked their way down a small bench that paralleled the chute. (Point C, Figure 3 is in the middle of the bench.) The fire had backed down to the bench and gone out. He stated it was not a clean burn.

Meanwhile, at 3:30 p.m. the County had decided that it was impossible to carry their line eastward across the deep gully west of the "chimney" canyon down which King was leading his crew. (Point D, Figure 3) To cross with bulldozers would have taken several hours. Fire in the gully and nearly vertical walls prevented hand crews from crossing.

At 3:35 p.m. or shortly after, the fire crossed the deep gully, burned up the steep 50 foot slope on the east side and established a hot spot in the chimney canyon below King. (Point E, Figure 3) After burning for about seven minutes, the fire flashed up the "chimney" and overran the men.

Details of this disaster will be covered later in this report. While rescue operations were going on, the fire burned up to the ridge between A45 and A47 near the Del Rosa crew who began constructing a line down the ridge as the fire progressed near the top and before 7 p.m. had completed a line on the fire edge down to A47. From this point, Los Angeles County and City forces built line along the foothills to connect with the point where the deep gully had previously halted their line construction.

FATAL FLAREUP

The fire build-up leading to the tragedy occurred between 3:30 and 4:00 on the afternoon of November 1, 1966. The fatal flash up the chimney probably occurred around 3:50 p.m. The men were burned between 3:47 and 3:55. The rescue operations started between 3:55 and 4:00.

The fire situation at approximately 3:30 p.m. was as follows: The burned edge which was being cold-trailed down the west side of the rock chute in the chimney canyon crossed the ridge to the west and dipped into the adjacent deep gully; thence up to the end of the cat line; then west to point high on the adjoining ridge. This approximation of the fire edge is depicted on the photograph. (Line A, Figure 4)

The terrain was too steep to cold trail from the chimney canyon into the deep gully to the west and the bottom of this gully was obviously a difficult and dangerous place to hold the fire. This left a stretch of open line between a point at the end of a natural clear area referred to in our analysis as the "diamond" and the cat line across the adjacent deep gully to the west. To close this open line without cold trailing into the deep gully required building and holding line 50 to 100 feet away from the fire's edge, from the diamond along the east edge of the deep gully to a point opposite the cat line (Line B, Figure 4).

FIGURE 4
A
A
3
2
C
1
B

The distance between the cat line close to the edge of the fire on the opposite draw and the edge near the "diamond" is approximately 500 feet. Of this 500 feet, 300 feet had a natural opening from 3 feet to 10 feet wide. The remaining distance at the lower end included some 200 feet of light brush cover near the edge of the steep gully. Here the fuel was sparse and a fireline could have been constructed through it rapidly. The El Cariso crew probably had the capacity to cut this 200 feet of line through to the gully edge in possibly 10 to 15 minutes. Details of the cover within the chimney canyon on the chamise bench below it is covered in a detailed report on fire behavior which is Appendix I.

The behavior of the fire at this time was observed by Superintendent King from the "diamond," Division Boss Westmoreland from the ridge above it, Los Angeles County Fire Chief Hayes from the cat line, Coordinator Hite and others from the Command Post in the Pacoima Canyon. The fire was in a static situation with hot spots on the west side and near the bottom of the deep gully 150 feet from the cat line. The winds were blowing from the southeast in a favorable direction to close the gap between the edges of the fire. Until the fire crossed the gully, none of the above men considered any of the problems developing in the activity of the fire to be a threat to King's crew. At this time, radio communications between King and Westmoreland or Hite would probably not have changed subsequent actions. A sector boss or scout not specifically concerned with crew supervision might have been closer to the contact point and sensed the danger. However, Captain Hayes was close and he did not sense the danger to the El Cariso Crew.

At 3:30 p.m. two critical decisions were made: one by Captain Hayes in charge of the County Crew working north to meet the El Cariso Crew; and one by King, Superintendent of the El Cariso Crew, working down to join the County.

Captain Hayes decided that it would be unsafe and time consuming to attempt to cross the deep gully immediately ahead of the bulldozer. He sent the Los Angeles County hand crew out and around with orders to scout the opportunities of meeting King from the east side of the deep gully. King decided to cut straight down along Line B to meet the bulldozer firebreak. He was aware

that the bulldozer cannot cross the gully but he was unaware the County crew had pulled out and went around to attempt to meet him on the east side of the deep gully.

A short time later, possibly within 5 minutes, the fire started to cross the bottom of the steep gully.

A helicopter water drop by Pilot Troy Cook was made on the fire toward the bottom of the canyon about this time. (Figure 5) When Cook returned between 6 and 10 minutes later, the fire had crossed the draw under King and the chimney canyon had burned out.

The period of 6 to 10 minutes between drops by Troy covers the whole period wherein the fire crossed the draw, made a run to the "diamond" area and flashed up the chimney canyon. The approximate time is confirmed by Westmoreland.

Within this period of time, the fire was seen to cross the gully - burn up the slope and create a hot spot in the mouth of the chimney canyon. (See Line C, Figure 4) King, according to his press statement that night, was approximately 60 feet from the fire as it spread across the mouth. Toward the end of this period, the fire developed in the bottom of the chimney canyon and the major flareup occurred, trapping the 10 men found in the chute and developing sufficient heat and flame to severely burn the men above the "diamond" area.

When the hot spot flared up, King, who was leading, had little or no time to do any more than yell at his followers to move out. He himself made one effort to go to his left around the fire and immediately realized he should change his course. He veered to his right, dashed through the flames and rolled, badly burned, out of the fire on the lower edge. (Point + -1, Figure 4)

Rescue operations by helicopter began within 10 minutes of the time the flash fire went up the chimney canyon. Helicopter Pilot Cook and King describe the "diamond" area as being surrounded by fire when the helicopter hovered to pick up the first survivors. This operation was continued with great courage and skill, bringing in all the survivors from the diamond area to the Command Post in a matter of minutes.

FIGURE 5

The terrain was so steep (65-95 %) that the helicopters were unable to land. The pilots had to avoid the flames, keep their rotors away from the men and the slope above while continuing to fly the machine.

THE CAUSE OF THE FLAREUP

The immediate cause of the flareup resulted from the fire becoming established on the east side of the deep gully separated by a small ridge from the chimney canyon and the takeover of topography in influencing the fire's behavior.

The spread up the east side of the gully took about 1 minute after which the fire burned in a small area for at least 7 minutes building up intense heat. This leads us to conclude that there were 3 possible causes of this spread.

1. Normal spread into the canyon bottom under moderate Santa Ana conditions.

2. Localized convection currents increased the fire movement into the gully (see estimated local air movement in attached study).

3. The helicopter in dropping water could possibly have fanned the fire.

A contributing cause to the explosiveness of the flareup was the radiation of heat from the fire prior to 3:30 p.m. on the west side of the gully to the fuel on the east side of the gully.

Weather and fuel conditions were analyzed and are discussed in the fire behavior section and Appendix I. In the most general terms, the behavior could be considered normal for moderate Santa Ana conditions.

CAUSES AND CIRCUMSTANCES RELATING TO THE ACCIDENT

The accident resulted from 21 men, including the Superintendent of the El Cariso Crew, being in an area of unburned fuel and

hazardous topography with no positive means of escape at the time the flareup occurred. Possibly some of the men, perhaps half, were still on edge of the burn in the chimney canyon. We assume, because King was not too clear in our discussion with him, that the diamond shape clear area was established as the emergency survival area. (Point + -2, Figure 4) At approximately 3:30 p.m. King took Chee and Moreland with him down toward the end of the cat line. Witness saw 6 to 8 men follow diagonally down into the chute. According to our time estimates, we presume it was at this time, while in the chute, he saw the hot spot and moved toward it.

Possibly 7 minutes later, when the flareup occurred, King called to the men with him to "move out." The remainder of the crew at this particular time were strung out up the chute above the diamond area. We assume that 11 of the crew moved toward the diamond area, or an area just above it. Ten stayed in or went into the rock chute and did not survive. (Point 3, Figure 4) Protective suits or tents would have lessened the severity of injuries to those near the diamond, but probably would not have saved the 10 men in the chute. We think King decided to go down toward the cat line with 2 men before the fire crossed the gully and that it did cross moments later. His decision was based on the fact that they were in light fuel, had a very favorable wind, no sign of fire activity on his side of the slope into the deep gully to the right and a natural break existed most of the way to the cat line which was clearly visible at the bottom of the canyon.

We must conclude from the statements of the survivors, including King and his assistant, that safety was uppermost in his mind when he crossed the head of chimney canyon and went on down the bench on the right side of the rock chute, but he was not concerned with the fire as a hazard. Similarly, when King started down from the diamond area, he had convinced himself after considering alternatives, that it was a cinch and a relatively easy job to cut line through the unburned brush toward the cat line. Thus, we believe he made a decision in which he thought everything was in his favor and that it was less of a risk than following the edge of the fire into the head of the adjoining deep gully to his right. This action would also have put him in a hazardous position in relation

to the fire on the other side of the deep gully should a blowup have occurred in that canyon below.

In view of past practices, given the conditions as he saw them when he weighed the alternatives, this was not an unusual risk to take.

FIRE WEATHER AND FIRE BEHAVIOR

1. Weather

Fire danger in the San Gabriel Mountains was above normal much of the 1966 fire season. Six Santa Ana periods occurred during latter portions of September and October. The last period began on October 28 and the greatest intensity occurred on November 1, the day the fire started.

The Fire Weather Forecaster issued the following special forecast at 8:30 a.m., November 1, for the fire area:

"Loop Fire

Santa Ana conditions with winds NE to E 30, gusts to 50, decreasing this afternoon and Wednesday. Maximum temperature 95, minimum relative humidity 10 percent."

Northeast winds continued throughout the day. Wind speeds were high during the early morning and the forenoon. In the nearby San Fernando Valley, winds of 24 to 28 mph were recorded at 4 a.m. and from 13 to 36 mph at 1 p.m. One report from the fireline said the gusts were "strong enough to blow a man down if he did not brace himself."

Winds decreased during the afternoon but remained from the northeast. Fixed-wing aircraft and helicopters were able to fly. On the east side of the fire, a northeast wind of only 8 mph with gusts to 12 mph was measured at 2:30 p.m. There was considerable channeling of the wind and eddies were caused by the topography.

Temperatures at lower elevations were in the 90's and at higher elevations in the 70's or low 80's. Relative humidity

was 10 - 15 percent. Fuel stick moisture percents were 3.0 to 4.0. Ignition Indexes 1/ varied from 76 to 93 which meant that almost every firebrand could start a fire in light fuels. Burning Indexes 1/ were "Extreme."

2. Topography

The lower Pacoima Canyon area consists of steep and broken topography. The gullies have steep, almost sheer, side walls. The fire started near the Los Pinetos Nike Site at about 4,000 feet elevation and burned downhill to about 1,500 feet behind the caretaker's residence at Pacoima Canyon Dam.

The disaster site was about 200 feet elevation above the canyon bottom and 1,000 feet below the main ridge.

Slopes in the chimney varied from 60 to 95 percent. Loose rock made foot travel extremely difficult and hazardous.

3. Fuels

Fuels in the lower Pacoima Canyon area were sparse and consisted chiefly of chamise, sage and sumac. Fuel loading in the main canyon was about .49 pounds per square foot (about 11 tons per acre) which is considered light to moderate.

The moisture of live chamise in Pacoima Canyon on November 1 was about 60 percent which is near the minimum possible for this species.

Sumac and very heavy litter were the most important fuel involved in the accident. The fuel loading was 1.60 per square foot or 35 tons per acre at the lower end of the chimney canyon. There are indications that fuel in the chute burned in about 4 minutes which means that flame temperatures where the men died were probably 2,500° F. or higher.

1/ As described in the Wildland Fire Danger Rating Handbook used by California fire agencies.

4. Fire Behavior

Fire behavior at the Loop Fire was typical of fires starting under Santa Ana conditions. From its origin, the fire was driven by strong northeast winds downhill toward the lower front country.

By early afternoon the fire had become established near the mouth of Pacoima Canyon. Under the slackening Santa Ana wind the fire backed down-slope against the prevailing wind. Burning material rolling down the steep canyons occasionally caused small "fish hook" runs. The fire was being held with little difficulty along the county bulldozer line.

At about 3:35 p.m. the fire crossed the gully at the end of the bulldozer line in the steep draw adjacent to the accident site. Then, a combination of heavier fuels, eddy currents and thermal effects caused a run up the east side of the draw and toward the west edge of the "diamond." Shortly afterwards, the fire "flashed" up the steep, narrow "chute." Sumac bushes and heavy litter in this area provided additional heat, which was all directed up the natural chimney. Heat from the fire in the lower part was sufficient to ignite the sparse fuel patches. Spread of fire to the top of the chimney likely occurred in less than 1 minute.

In summary, the fire behavior situation under Santa Ana conditions hangs in a delicate balance. Any slackening of wind, a surge of heat, an eddy current, the fire reaching different topography, or a combination of 2 or more of these factors can trigger a quick and violent change in the fire behavior. Such an event appears to have been the case in the Loop Fire accident. Appendix I is a detailed fire behavior report.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. Overall action from discovery to final control of the Loop Fire was generally good. Included in this action were some outstanding events in the evacuation of hospital patients, the rescue of the survivors of the Chimney Canyon accident and the coordination of a number of agencies involved in control of the fire and rescue operations.

2. From all that can be determined at this time, there was no evidence of negligence, disobedience or carelessness in the Loop Fire control operation based on present standards and practices.

Recommendations

1. The highly localized decisions and actions which resulted in the tragedy points to the need of: (1) a more specific direction on safe practices in similar topography; (2) specific control of helicopter attack; (3) scheduling of more complete inter and intracrew communication; and (4) sector scouts where inter-regional or interforest crews are involved.

a. Provide a physical checklist for downhill line operations whereby such an operation would be done only when all critical factors are aligned favorably and checked off on the list. This should be more than the standard firefighting orders or 10 rules now in use. Included in this checklist must be the complete factual knowledge that the toe of the fire edge will be held in a safe condition.

b. Increase the use of short range lightweight radio units for intradivision operations or inter-crew operations as a secondary net.

c. Improve intelligence by helicopter or on-the-ground scouting or both at all critical points in

the fire area and particularly where 2 crews are working toward each other.

2. Increase efforts on the development of lightweight flame resistant suits, including face masks and gloves. When satisfactory items have been developed, make their use mandatory by trained men and crews used on interforest and interregion missions.

a. Continue to try and develop more usable fire protective shelters and make them standard equipment for all trained men and crews commonly working in fast fuels.

3. When 2 crews are working toward one another, radio communication must always be provided between them. This requires special arrangements between crews whose radios are on different frequencies.

4. Reexamine the full array of presuppression activities in fast fuel areas and establish the benefits plus or minus of accelerating the fuelbreak system in relation to safety and its place in the balance of all presuppression activities.

5. Make crystal clear in firefighting training that a "chimney", "narrow box canyon" or similar topographic feature is a hazard area even if devoid of fuel.

6. Establish a Task Force to study this incident in relation to the findings of the Fire Task Force of 1957. Develop an action program.

FORM 6200-8 (1/64)
UNITED STATES GOVERNMENT

Memorandum

Department of Agriculture—Forest Service
Washington, D. C. 20250

TO : Hamilton K. Pyles, Deputy Chief

File No. 5130

FROM : Edward P. Cliff, Chief

Date: November 2, 1966

SUBJECT: Suppression (Loop Fire - Angeles National Forest)

Your reference:

I would like to have you serve as Chairman of a Group that will analyze the Loop Fire which occurred on the Angeles National Forest November 1, 1966. I am requesting Alfred E. Spaulding, Deputy Regional Forester, Carl C. Wilson, Fire Research Specialist, and William R. Moore, Assistant Director, Fire Control, in the Washington Office to serve with you. These men have been selected for their technical ability, proven judgment in fire control, and fair-mindedness. I am also asking Ronald G. Metcalf, Forest Service Safety Officer, to work closely with you without serving as an active member of the Group.

This review should follow established principles for analysis as described in the Forest Service Manual. The scope of analysis should be directed to circumstances, events, and causes which led to the tragic loss of 10 fire fighters and severe burns to 12 others. You need not review the entire history and control operations of the fire except, of course, for actions and conditions which relate to the disaster. The results of your deliberations should be summarized in a report as clear-cut and brief as is consistent with the subject and your responsibility, but in any case complete and thorough.

We want facts - what happened, how and why. Then we want those facts studied carefully and evaluated to formulate sound conclusions and recommendations - how could the final outcome, or any of the occurrences or situations leading up to it, have been avoided? What mistakes or weaknesses or oversights are there that can be prevented in the future? You must follow every possible lead to determine how we can tighten up our safeguards to prevent a similar disaster in the future. We cannot return the 10 men to their friends and loved ones but we can do everything in our power to see that similar suffering is never again caused by similar conditions. This obligation is as clear as any ever faced. It will be met. If any person involved in the Forest Service, or outside of it, was negligent we want to know it.

We all know very well that fighting forest fires is dangerous. Because of this, we must use every means to learn what safety precautions are necessary to protect those who undertake the essential job of fighting and stopping fires. We must control fires as promptly and effectively as possible, but human life is never to be knowingly or carelessly subordinated to other values.

I expect the Group to develop its own plan for conducting the review without any influence or interference from other sources. I know you will give county officials and other local people intimately concerned every opportunity to talk with members of the Group and we will invite the Los Angeles County Fire officials to participate with you.

I think you know that Regional Forester Connaughton and his staff can be relied upon to furnish whatever assistance is necessary in preparing statements, records, charts, maps and tables which you will need for study. They can help in arranging interviews, meetings and similar details.

You have full authority to request testimony from any Forest Service employee. You may interview any people outside the Forest Service as you judge necessary to obtain facts. I know you will honor and hear anyone who seeks to testify before your Group.

One final word - you may need to meet and talk with some survivors who are close friends or relatives of the unfortunate victims. If this happens, I will be deeply grateful if you, knowing of their deep sorrow, will treat these people with compassion and thoughtfulness. Nevertheless, within these limits, get the facts.

/s/ Edward P. Cliff

CHIEF'S FIRE ANALYSIS GROUP

1. Organization

a. Members of the Fire Analysis Group:

Chairman — Hamilton K. Pyles, Deputy Chief, U. S. Forest Service, Washington, D. C.

A. E. Spaulding, Deputy Regional Forester U. S. Forest Service, Pacific Northwest Region, Portland, Oregon

Carl C. Wilson, Assistant Director Pacific Southwest Forest & Range Experiment Station, Fire Research Lab., U. S. Forest Service, Riverside, California

William R. Moore, Assistant Director, Division of Fire Control, U. S. Forest Service, Washington, D. C.

George Brunton, Assistant Chief in Charge of the Division of Fire Fighting Services, Los Angeles County Fire Department, Los Angeles, California. (Appointed by County Fire Chief Keith Klinger to participate in this analysis)

b. Others providing major assistance to the Group:

Observer: Ronald G. Metcalf, Director of Safety, U. S. Forest Service, Washington, D. C. (Appointed by Chief, Forest Service)

Observer: Joseph C. Springer, Assistant Deputy State Forester, California - Division of Forestry, Riverside, California (Appointed by State Forester Francis Raymond)

Special Assistant: (Liaison with Forest Service Personnel)	Clem Crouch, Deputy Forest Supervisor, Angeles National Forest, Los Angeles, California (Appointed by Forest Supervisor William Dresser)
Fire Weather and Fire Behavior Team: (U. S. Forest Service Fire Research Specialists)	Clive M. Countryman, Riverside, California Mark J. Schroeder, USWP, Riverside, California Richard C. Rothermel, Missoula, Mont. Michael A. Fosberg, Riverside, Calif.

2. Action by the Fire Analysis Group

The Fire Analysis Group assembled in Pasadena at 8:00 a.m. on November 3, 1966. Organization and preliminary plans were agreed to following a briefing of the current situation by William T. Dresser - Angeles Forest Supervisor, Charles A. Connaughton - California Regional Forester, Norman A. Farrell, Fire Chief of California Region, and Don Porter, Angeles Forest Information Officer.

At the request of representatives of news media a brief press conference was held at 9:30 a.m. During the remainder of the day the Group was on the ground studying the accident scene. On November 4 - 8, the group interviewed witnesses who had knowledge of the disaster. Most of these were employees or service contractors of the U. S. Forest Service or Los Angeles County Fire Department. Any of the general public having knowledge of pertinent facts were invited through news media to provide information to the Group and two responded. The El Cariso crew casualties that were still hospitalized on November 8, were in "intensive care" wards. These men were at the immediate scene of the disaster and potentially are key witnesses.

H. K. Pyles, Chairman of the Group, accompanied by Hugh Masterson on November 7 visited with El Cariso crew Superintendent - Gordon King and later recorded pertinent information obtained.

On November 8, attending physicians permitted Bill Riley of the Cleveland National Forest, scheduled as liaison officer at the hospital, to ask Cosgrove, Spady, and Bowman the question, "Did you and the other nine men survive the fire at the location where the helicopters picked you up?" The answer was, "Yes, however, one man walked downhill a little and one man walked uphill a little to the helicopter."

No additional information has been obtained from hospitalized casualties through November 8.

USDA-FOREST SERVICE

INDIVIDUAL FIRE REPORT

RANGER FIRE NO.	NAME OF FIRE
7	Loop
REGION FIRE NO.	SIZE CLASS
	E

MANDATORY ITEMS: Class A- Items 1-39 Class B- Items 1-49b Class C, D and E- Items 1-53

This fire is being reported by the State as its fire. *(Check one)* ☐ Yes ☒ No

1. State [2-3]	2. County	3. Forest [4-5]	4. Ranger District [6-7] or LUP [6-7]
California 4	Los Angeles	Angeles 1	Tujunga 55

5. Supervisor [8-10]	6. Month [11]	Day [12-13]	Year [14]	7. Size Class [15]	8. General cause [16-17]
38	X	1	6	E 5	Other (Nike Site) 69

9. Specific cause: Power-line	[18-19] 32	27. Burning index: 31 / Buildup index: 55	[54-57] 3155
10. Class of people: Permittee	[20] 2	28. Character of fire on arrival: Running	[58] 3
11. Fire started on: National Forest land	[21] 1	29. Topography - vicinity of origin: Ridgetop	[59] 1

	DATE	HOUR	ELAPSED TIME Hours [22-23]	Min. [24-25] / [26-27]
12. Origin *(Check one)* ☒ Known ☐ Guess	11/1	0519	5	
13. Discovered (Item 13 minus 12)	11/1	0519		0
14. Reported (Item 14 minus 13)	11/1	0521		2 [28] / [29-30]
15. Departed	11/1	0522		
16. First attack (Item 16 minus 13)	11/1	0536		17 [31-32] / [33-34]
17. Travel time (Item 16 minus 15)				14 [35] / [36-37]
18. First reinforcements (Item 18 minus 16)	11/1	0600		24 [38] / [39-40]
19. Fire controlled (Item 19 minus 16)	11/2	1300	31 [41-43]	
20. Fire mopped up (Item 20 minus 19)	11/5	1800	77 [44-46]	
21. Fire out	11/6	2200		

30. Slope: 70%	[60] 7	38. Map record: Scale: _____ inches = 1 mile	39. Location description
31. Aspect: S	[61] 2		a. Township: 3N [73-75] 31
32. Elevation: 3900	[62] 4		b. Range: 15W [76-78] 152
33. Cover type - vicinity of origin: Brush on Non Timber Soils	[63-64] 21		c Section: 11 [79-80] 11
34. Specific fuel - point of origin: Grass and Stubble	[65] 0		d Meridian: SB
35. Fuel type prevailing on area - origin to attach: Heavy Chamise and chaparral	[66-67] 24		Alternate description: Use for land not covered by GLO survey
36. Perimeter increase in chains per hour - discovery to attack: 2 acres-17 min-1.33	[68-70] 113		e Latitude [73-76]
37. Forward rate of spread in chains per hour - discovery to attack: 10 chains ÷ 3 - 33 ch.	[71-72] 33		f. Longitude [77-80]

Map Attached

22. Discovered by (Class) Location: Lookout (FS) Mendenhall	[47] 1		
23. Reported to (Class) Location: Suppression Crew Bear Divide	[48] 2		
24. First attack (Kind) Amount: Ground Tankers - 6	[49-50] 36		
25. First reinforcements (Kind) Amount: Ground Tankers 5	[51-52] 35		
26. Hour control zone: 15 minute	[53] 1		
40. Cover type prevailing on burned area: Brush	[18-19] 2	46. Man-hours to control (in tens): 27,280 man hours	[38-41] 2728
41. Area when discovered: Spot	[20-21] 0	47. Mopup in percent of total effort: 2,470 man hours	[42-43] 8
42. Area when attacked: 2 acres	[22-24] 2	48. Percent of perimeter worked by:	
43. Area when controlled: 2028 acres	[25-29] 2028	a Ground tankers and pumpers: 36 tankers - 504 chains	[44] 7
44. Perimeter in chains when controlled	[30-33] 720	b. Ground machines: 6 tractors - 192 chains	[45] 3
45. Maximum number of line workers	[34-37]	c Aerial attack	[46]

5100-29 (6/63)

SUMMARY OF FIRE DAMAGE Class B fires: Items 49a and 49b mandatory. Class C and larger: Items 49a through 53 mandatory.	N.F. LANDS (1)		OTHER LANDS INSIDE F.S. PROTECTION BOUNDARY (2)	
	Acres or Dollars	Code Column	Acres or Dollars	Code Column
49. Acres burned				
a. Noncommercial forest land		[47-51] 1436		[52-56]
b. Commercial forest land		[57-61]		[62-66]
c. Seedlings and saplings destroyed				
50. Volume (MBM) of timber destroyed (growth impact)		[67-71]		[72-76]
51. Value of timber damaged or destroyed (code in hundreds of dollars)				
a. Mortality				
b. Growth loss				
c. Other timber				
d. Total timber damage (a to c, incl.)		[18-22]		[23-27]
52. Value of other damage (nontimber) (code in hundreds of dollars)				
a. Watershed	359,732	[28-32] 3597		[33-36]
b. Recreation		[37-40]		[41-44]
c. Range and wildlife				
d. Improvements	22,535	[45-48] 225		[49-52]
e. Other nontimber				
f. Total nontimber damage (a to e, incl.)	382,267	[53-57] 3823		[58-62]
53. GRAND TOTAL DAMAGE (Items 51d and 52f)		[63-67] 3823		[68-72]

Remarks:

FFF Costs - $76,000

592 acres outside F. S. protection boundary
Watershed damage - $108,472

Dist: Zone, S.O., D.R. (Tujunga)

	DATE	SIGNATURE	TITLE
SUBMITTED →	11/7/66	Jess Barton	District Ranger [or Acting]
APPROVED →	11/7/66	/s/ W. R. Beaty	Forest Supervisor (or Acting)

FORM 6200-8 (1/64)
UNITED STATES GOVERNMENT

Memorandum

Department of Agriculture---Forest Service
San Fernando, California

TO : Forest Supervisor

File No. 5100

FROM : Jesse J. Barton, District Ranger

Date: November 6, 1966

SUBJECT: Fire Control (Narrative Report)
Loop Fire, 11/1/66

Your reference:

1. Summary

A. This fire burned 2028 acres of watershed land in the Loop, May, Wilson and Pacoima canyon drainages. The fire started from a faulty power-line at 5:19 am at the Los Pinetos Army "Nike" site during a Santa Ana wind storm. Wind velocities were estimated from forty to sixty miles per hour. The origin was on an exposed ridge top at the head of Loop Canyon and spread rapidly down the canyon to the Urban area between the Pacoima Dam and the Olive View Sanitarium in the mouth of Wilson Canyon. For a time the V. A. Hospital, Olive View Sanitarium and the houses along the front were threatened.

The fire was held along the Santa Clara ridge on the north and control on the west side was effected in light cover due to an old burned area.

B. During the morning as the fire spread further down into Loop Canyon, numerous hot runs bumped up against the buildings at the Radar, Administrative and Launch areas at the "Nike" missile site. These runs were met and controlled as they came out with no fire damage to any of the structures. Some bad moments were experienced for awhile due to a "Nike" missile that the Army claimed they didn't have room for in the silo, and which they said, would explode at 120° temperature. This problem was finally solved by the Army C. O. by moving it underground on the elevator.

C. As new runs developed, the fire hit the ridge west of Cougar Canyon and pumping equipment managed to catch all the spots and slop-overs out to Contractor's point. From this point on, it was a handline show because the two tractors could not work past a narrow, rocky portion of the ridge about one chain south of the end of the road. Several slop-overs varying in size from a half acre to several acres were worked on by the Chilao, Dalton, Del Rosa and two L. A. County Camp crews, augmented by hose lines from pumpers at Contractor's point. All of these slop-overs were picked up and encircled. When the El Cariso crew arrived they were instructed to leap-frog the other crews and push south and build cold trail along the fire edge, if possible. The main ridge was an alternate if the cold trail could not be built. At approximately 4:00 pm, this crew was over run by fire in a draw above Pacoima Canyon. Having lost this line the Fire Boss instructed the Line Boss to back up to the main ridge and have the Del Rosa crew construct the line into the bottom. This was done and the fire burned out this corner with no further problems developing.

D. The fire along the bottom on the south side was met and stopped by a combination of Los Angeles City and County forces.

II. CONDITIONS

A. Cause

Investigation shows that the fire resulted from a faulty electric distribution line operating internally within the Nike Base.

The Department of Army maintains the power system beyond the commercial meters at the perimeter of the missile site. It is a non-ground-sensitive line. The high winds caused the wires to cross on the span immediately north of the fire's origin. Back-feed from this short reached a loose connector at the nearest pole, also causing the line to arc at this point.

Chips of hot metal slag from the connector were borne by the strong winds away from the base of the pole and into dry grass fuels nearby. The fire started and spread into heavy brush fuels.

B. Weather

The weather forcast for Area 655 was, Clear, Temperature-73°, Humidity-12% and wind-Northeast 10 m.p.h. The fire plan for the main division was plan 8 estimated the previous day.

Actually, the temperature and humidity was about as predicted, but the velocity of the wind was from 40 to 60 m.p.h. at the time of origin and this tapered off during the mid-morning hours. By the middle of the afternoon it was blowing from the east and northeast about 15 to 20 m.p.h. Also, at times this would drop off to an almost dead calm.

C. Preparedness

Stations were manned in accordance with current instructions and the predicted fire plan. All personnel, except for a few recently employed crewmen, were well trained and even these men had received fire fighting instructions and worked under the direct supervision of competent overhead.

D. Initial Action

The fire was discovered immediately by the Lookout Observer at Mendenhall Peak and she radioed the Little Tujunga and Bear Divide Stations. The initial attack forces were started within a few minutes. The Dispatcher was notified on the telephone by the District Fire Control Officer and Vetter Mt. Lookout. He sent all available follow-up forces and notified the Los Angeles County and City Fire Departments.

The first units on the fire, pumper 5-10 and patrol 5-10 from Bear Divide Station, worked on a spot fire above the road in grass on the Santa Clara fuelbreak and were successful in confining it to a small area. They also followed the fire out to the radar site, keeping the fire on the south side of the mountain. On arrival of the District Fire Control Officer, and several minutes later, pumper 5-4 from Little Tujunga, several attempts were made to flank the fire on the east side, but after being run out several times, this was given up.

Upon the arrival of the District Ranger, plans were formulated by him and the D. F. C. O. to try to hold the north and east sides of the fire. As additional pumpers and crews arrived, they were given assignments to assure the success of this operation.

III. Prevention

The Loop Fire originated on National Forest land under Special Use Permit to the United States Department of the Army. The case designation for this use is statedspecifically as follows:

2720
U. S. Department of the Army
Los Pinetos Defense Area, L.A.-94
Military Maneuver and Bivouac, 9/21/55

The site is given a thorough annual fire prevention inspection each spring. This year the initial check was made on May 17, 1966. As is the usual custom with the missile sites, the inspection was a joint tour, with both the Forest Service and Department of the Army participating. William C. Westmoreland, Jr. represented the Forest Service, while Assistant Chief Joe Hendricks, a civilian employee, represented the Army.

Such inspections usually result in an inspection check list being drawn up for action by the permittee to correct hazardous conditions. In this case, however, the inspecting officers mutually agreed that general conditions were entirely satisfactory, and seasonal hazard reduction work was progressing according to schedule. No formal list was drafted. Periodic routine checks (at least bi-weekly frequency) were made by the Bear Divide Forest Service Patrolman following the original inspection to assure prevention safety.

On November 1, 1966, all hazard reduction work had been completed since June. An excellent job by the Army, especially in brush clearance, allowed the fire control forces to protect the Los Pinetos buildings and facilities without loss of any kind.

The cause of the Loop Fire has now been tied to a malfunctioning connector on the Army's private distribution line. Trouble on the power line had been noted on at least four occasions by Army personnel situated on sentry duty at the guard post next to the fire's origin. Arcing on the line had been reported at the pole nearest the sentry post. The information had been passed on to the Army CQ each time, to be relayed to the Fort MacArthur Post Engineer for maintenance. The most recent report came from the same sentry, PFC Ubie Watson, who was on duty when the Loop Fire started. He noted and reported arcing at this pole when moist, cloudy conditions prevailed in early October.

The Post Engineer was made aware of the trouble by telephone only. No written notice or record was made by the Missile Battery personnel, because each time they were assured that the situation would be corrected, and in the Post Engineer's estimation, the arcing did not constitute a serious fire or communications problem. The Forest Service was not advised. These actions are documented by written statements from the Army personnel involved.

Brush clearance at the base of the faulty pole was to mineral soil for a distance of 12 feet in all directions but to the north, where a 20 foot paved road lies adjacent. The strong Santa Ana winds evidently carried tiny pieces of hot metal slag beyond these standard clearing limits, thus starting the Loop Fire.

Had corrective maintenance action been taken by the Post Engineer upon repeated warning by the Nike Site Command, the Loop Fire could have been prevented.

IV. Line Action

A. Organization

The following line organization was set up to handle the fire.

Fire Boss - Beaty (Took over from Barton)
Line Boss - Masterson
Division Bosses - Nute and Westmoreland

Air Officer - Bowser
Tanker Boss - Myrick
L.A. Co. Coordinator - Chief Seemore

Total Forest Service forces included overhead, 6 hot-shot crews, Porterville crews (80 men), Job Corps crews (60 men), 7 Class I tankers, 5 Class III tankers, 6 Nurse tankers, 4 tractors, 2 luber trucks, and fire camp facilitating personnel. Aircraft included - 5 helicopters, 1 lead plane and 7 air tankers.

B. Cooperation

1. Personnel and equipment were furnished by the Los Angeles County Fire Department to help the Forest Service in spite of the fact that they had their hands full helping the City Fire Department protect the 2 Hospitals and the many houses along the southern perimeter of the fire, and later, fighting another major blaze near Chatsworth. The tankers and camp crews were very effective on the east and west lines. Their two tractors constructed the line from Loop Saddle to May Canyon fire road that was later fired out and controlled by the Oak Grove hot-shot crew.

2. L.A. County and L.A. City assumed full responsibility for Division "C" across the bottom of the fire.

C. Air Attack

Due to the strong winds, aircraft could not be used until late in the morning. The air tankers were pressed into service when the winds lessened and made some good drops on the east side of the fire, slowing the spread so that crews could be safely sent into construct line. Better results could have obtained if the terrain had not been so steep and the air so turbulent.

D. Helicopter Use

The helicopters were used to work on the deep slop-overs where the air tankers couldn't get low enough to reach and helped to hold these until the crews encircled them. They also were very effective in helping to remove the injured men of the El Cariso Crew from the line.

E. Safety

Other than the incident when the fire over-ran the El Cariso crew, burns and injuries were held down to a minimum. All men were constantly aware of safety and took action to keep out of the way of the many fast runs made by the fire. They were working under extreme hazardous conditions, especially during the early morning hours of the first day. The wind was blowing so hard that it was difficult to keep your balance and stay on your feet, let alone fight fire. This, coupled with the steep terrain and loose rubble and rocks on the slopes, plus the heavy mixed-type fuels made it hard to back-track once you committed yourself.

The fire roads at times were clogged with vehicles, but to my knowledge, no reportable vehicular accidents occurred.

F. Pre-Attack Benefits

The pre-attack program has once again proven itself. Without the presence of the Santa Clara fuelbreak, it would have been impossible to keep the fire on the south side of the Los Pinetos ridge. It provided safe access along the ridge and even though spots occurred in the grass on the break and in the brush on the north side, the firefighters were able to jump on them fast and control them. Firebreak ridges were easily found because they were plainly marked on the ground as well as the map. The cisterns provided all the water needed until nurse-rigs could take over the job of supplying the tankers.

The "A" Block maps and notes were recently revised and had current information on them. These were used very effectively in briefing or debriefing men, especially after the first shift, when thermofax copies were passed out to line overhead along with their assignment sheets. This, I'm sure prevented much confusion.

V. Financial

A. The suppression costs of this fire were $76,000.00. Damage to the watershed inside the forest was $359,732.00, outside

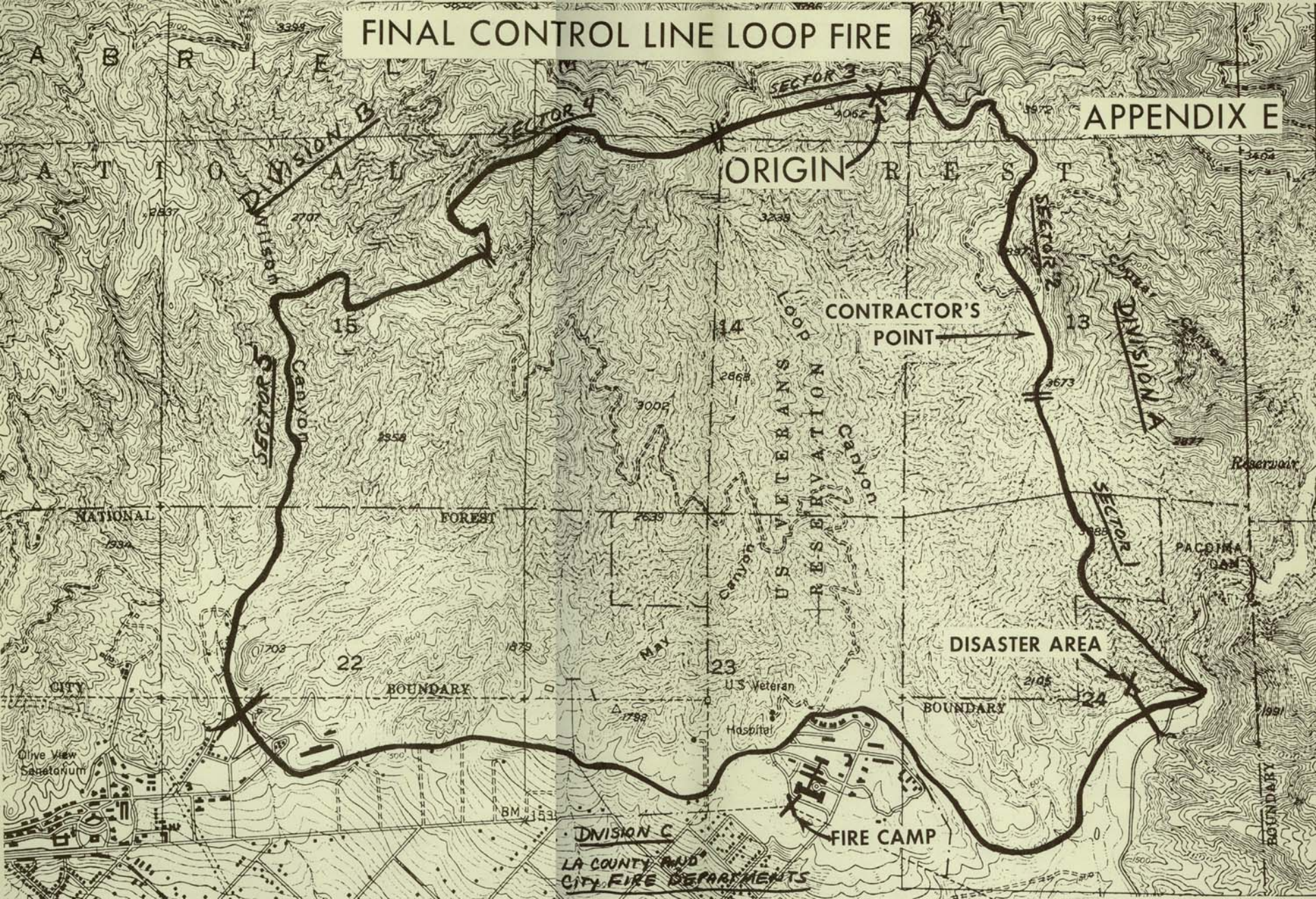
the forest was $108,472.00, for a total watershed damage of $468,204.00.

B. Private land was all outside the Forest Service Protection Boundary.

/s/ JESSE J. BARTON

FINAL CONTROL LINE LOOP FIRE

APPENDIX E



FIRE EXPERIENCE AND RED CARD RATINGS

I. Hugh Masterson

Fire Boss II - 29 years Forest Service experience. All in Fire Control.

II. Bill Westmoreland

Division Boss - 11 years Forest Service experience. All in Fire Control.

III. Woody Hite

Line Boss I - 12 years Forest Service experience. All in Fire Control.

IV. Jesse Barton

Division Fire Boss II - Nine years Forest Service experience, three years Fire Control.

V. Ed Mannetter

Nine years Forest Service experience. Recreation Area Director is his assignment at present time. Following is his experience record on Fire jobs:

25 shifts as a Safety Officer
23 shifts as a Crew Boss
20 shifts as a Camp Officer

The above experience has been accumulated since 1957 all Class E Fires.

VI. Bill Beaty

Fire Boss I - 20 years Forest Service experience. 19 years in Fire Control.

VII. Fred Tyler

Fire Boss I - 20 years Forest Service experience. All in Fire Control.

Line up of El Cariso men as they went down chute

1.	King		
2.	*Chee	Brush Hook	
3.	*Moorland	" "	
4.	*White, M.	" "	
5.	*Figlo	" "	
6.	*Waller	" "	
7.	*Hill	Shovel	
8.	Leak [1/]	Foreman	
9.	*White, S.	Shovel	Hot Spotting Team #1
10.	Cosgrove	Pulaski	
11.	Chase	Shovel	
12.	**Shilcutt	Pulaski	
13.	*Verdugo	"	
14.	*Moore, D.	Shovel	
15.	*Barnhill	Shovel	
16.	Danner	Shovel	Hot Spotting Team #2
17.	Spady	Pulaski	
18.	Small	"	
19.	Chounard	Shovel	
20.	Bowman	McLeod	

APPENDIX H

ACTION FOLLOWING THE TRAGEDY

1. Action by Forest Service Hospitals

When it was determined that there were a number of injured being taken to the Pacoima Memorial Luthern Hospital for emergency treatment, Angeles Forest Administrative Officer Roger S. Fischer immediately dispatched Administrative Assistant J. Bernard Armstrong to cover. He was instructed to keep in constant touch in case any of the injured passed away. At that point, another Administrative Assistant, William B. Kemps, was dispatched to Holy Cross Hospital to cover the injured there. As time progressed and as men were transferred to Los Angeles County Hospital, the following schedules were established:

Holy Cross: William B. Kemps, until all but one man was transferred (Danner).

Los Angeles County: Days - Personnel Officer, Timothy P. Walker; Nights - Administrative Assistant, J. Bernard Armstrong.

As the days and nights wore on, a change was made at Los Angeles County: Days - William B. Kemps; Nights - Timothy P. Walker

Telephone contact was maintained to Holy Cross for Danner and Good Samaritan after Gordon King was transferred there.

It was felt that the morale of the injured boys would improve if a Cleveland National Forest man who knew the boys was on hand. Then another change was made.

Days: Bill Riley, Assistant Fire Control Officer, Trabuco Ranger District. Nights: Administrative Assistant, William B. Kemps.

This schedule is planned through November 9, 1966, after which only a day schedule will be maintained. This, of course, is only if the men progress as satisfactorily as they have to this time. Telephone contact with Holy Cross (Danner) and Good Samaritan (King) is expected to be maintained.

2. Action by Forest Service at Funerals

After a final determination was made of funeral arrangements, Angeles National Forest personnel were assigned to represent the forest.

Funeral of:	Date:	Place:	Attended by:
Stephen White Michael White	11-5-66	San Diego	Don K. Porter, Public Information Officer, Angeles
Kenneth Barnhill	11-5-66	National City	Frederick Tyler, Asst. Fire Control Staff Officer, Angeles
John Verdugo	11-7-66	San Diego	Lawrence Wade, Asst. Lands Staff Officer, Angeles

John Figlo	11-5-66	Fallbrook	Robert Reese, Watershed Staff Officer, Angeles
William Waller	11-7-66	Los Angeles	William T. Dresser, Forest Supervisor, Angeles
Joel Hill	11-5-66	Santa Ana	David Waite, Asst. Recreation Staff, Angeles
Daniel Moore	11-5-66	Corona	William R. C. Beaty, Fire Control Officer, Angeles
Raymond Chee	11-8-66	Fort Defiance, Arizona	W. L. Phillips Region 3 Representative
James Moreland	11-7-66	San Diego	No Angeles Representative - information received too late
Carl Shillcutt	11-5-66	Houston, Texas	No Angeles Representative - information on viewing received too late.