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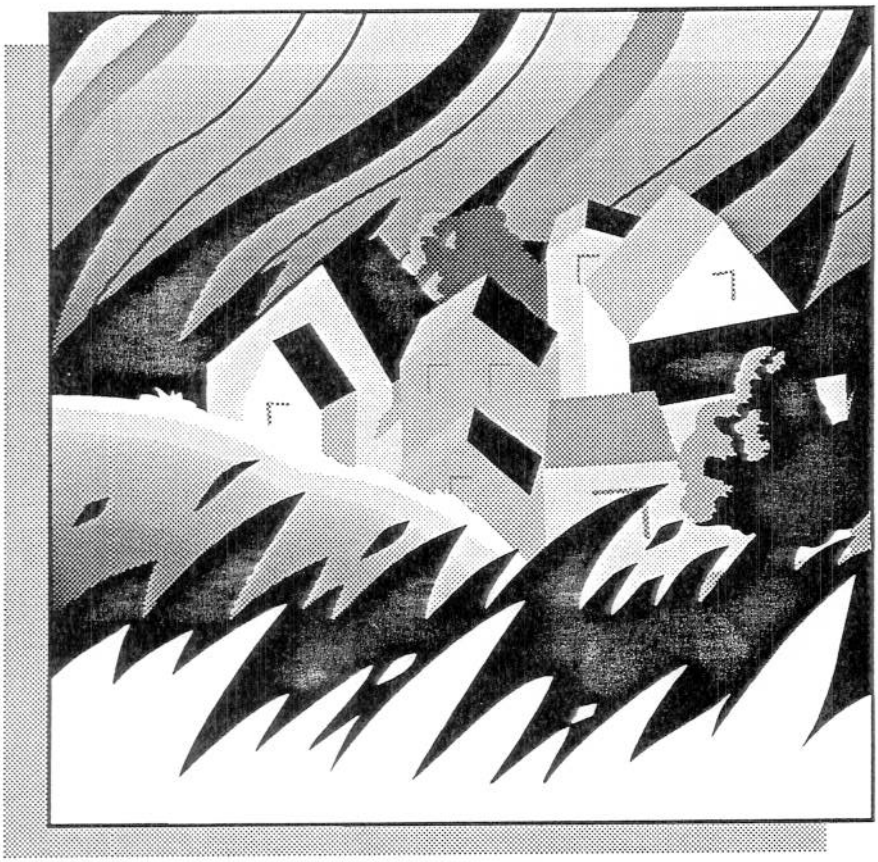
Emergency Services

The East Bay Hills Fire

A Multi-Agency Review of the October 1991 Fire in the Oakland/Berkeley Hills



East Bay Hills Fire Operations Review Group

State of California
Governor's Office of Emergency Services

Pete Wilson
Governor

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California Office of Emergency Services

To Readers of this Report:

The calamity in the hills of Oakland and Berkeley on Sunday, October 20, 1991, was California's most devastating fire since the conflagration that ravaged San Francisco in 1906.

In preparing this report, careful attention has been paid to issues raised by residents and the media regarding circumstances surrounding the fire.

We believe this report is a definitive account of public agency emergency operations related to the East Bay hills fire. It may not, however, answer every question.

Our focus is toward the future, toward lessons that should be learned by all fire agencies, emergency services personnel, elected officials, and the public.

Two fundamental points need to be made:

1. **In the absence of aggressive fire mitigation efforts, public safety officials may again face circumstances as overwhelming as those encountered on October 20.**

An earlier report published by the Office of Emergency Services and the Federal Emergency Management Agency -- ***Hazard Mitigation Report for the East Bay Fire in the Oakland - Berkeley Hills*** -- details mitigation measures to reduce fire risk in California's most vulnerable communities.

2. **When truly catastrophic events happen, standard methods for managing large-scale emergencies may prove inadequate.**

Public safety agencies at all levels -- fire, police, emergency services, emergency medical -- should develop protocols for quick identification of potentially catastrophic situations, and institutionalize procedures for rapid assignment of resources and personnel based upon meaningful damage assessments.

The Office of Emergency Services will accelerate work with agencies throughout California to enhance our ability to respond to potentially catastrophic events.

Richard Andrews, Ph.D.
Director

THE EAST BAY HILLS FIRE

Report to:

Elihu Harris,
Mayor of Oakland

&

Loni Hancock,
Mayor of Berkeley

from the

East Bay Hills Fire
Operations Review Group

of the

Governor's Office of Emergency Services

February 27, 1992

COMMENDATIONS

Members of the community and public safety personnel responded with inspiring dedication and heroism on October 20, 1991.

The exceptional performances of these individuals -- too numerous to be each mentioned -- prevented a much larger loss of life and property.

The efforts of residents and public safety officials were undertaken under extremely difficult, often life-threatening circumstances. People did the best they could, working long hours in an environment that included searing heat and flames, blinding smoke and sometimes erratic, hazardous fire behavior.

The fire-fighting abilities of individual engine companies, from Oakland and Berkeley, other responding jurisdictions, the California Department of Forestry and Fire Protection and East Bay Regional Parks District, attests to their collective experience and dedication.

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PREFACE

On October 25, 1991, in a letter to Governor Pete Wilson, Oakland Mayor Elihu Harris asked the state to conduct a review of the operational effectiveness of fire, police and emergency management response to the East Bay hills fire. The review concentrates on four aspects of response: policies, procedures, equipment and training. The Mayors of Oakland and Berkeley constituted separate task forces to receive and consider input from citizens and community-based groups on the fire response.

The Governor's Office of Emergency Services (OES) was assigned the responsibility for the conduct of this review. OES is a state agency, reporting directly to the Governor, responsible for coordination of emergency planning, response and recovery. OES is not a regulatory agency. It plays a key role in coordinating training and mutual aid response related to all emergencies.

OES empaneled a review group composed of individuals with broad experience in the fire service, law enforcement and emergency services disciplines. The group began work on November 8, 1991.

Initially the group reviewed all printed accounts related to this incident. This material yielded a list of potential issues: concerns voiced by citizens; potential discrepancies in inter-agency coordination; and difficulties in managing an emergency of this size and scope. Eventually, an outline was developed from this long list. Outline headings are reflected as sections in this report.

The work was divided among group members. They reviewed logs and records, conducted interviews, and received briefings on equipment and systems in place at the time of the fire. Over 75 individuals involved in response were interviewed. Simultaneously, a written survey was disseminated to fire agencies that sent resources to the fire, including the cities originally with jurisdiction over it. Over 400 survey responses were eventually received. With information gathered in this manner, and from the experience of group members, this report chronicles what happened and formulates realistic recommendations.

The report is organized in a manner consistent with the time-sequence involved in response to this emergency. However, this is not chronological in every case. It begins with a discussion of the preparations and conditions present in each department prior to the fire. Since fire response begins with a call to some communications center, these sites, and communications capability in general, are considered next.

Alarm is considered next. The Saturday fire, and the adequacy of mop-up related to it, is discussed in the mop-up segment of this report which appears later.

Strategy and tactics are considered next, with discussion of actual decision making and coordination. The Mutual Aid System and the Incident Command System are then discussed with emphasis on the relationship between these systems and their components.

Evacuations, a critical action in major fires, receives specific consideration. This is followed by discussion of the use of volunteers, the mop-up process, and demobilization.

The final issues considered are those related to public information, law enforcement, and emergency management.

In each case, the information records significant activities, processes or issues which led the group to suggest specific recommendations. In some cases, a general theme emerged that necessitated a recommendation.

This report is prepared in the spirit of improving the fire service and public safety within not only Oakland and Berkeley, but throughout California. The goal of the review is to enhance response to future emergencies.

Michael Guerin
Review Group Chair

ACKNOWLEDGEMENTS

This report could not have been produced without the cooperation of the fire departments of the affected communities, the East Bay Regional Park District, and Lawrence Livermore Lab. The generous help offered by individual members of those departments was invaluable in forming a comprehensive understanding of what went on during the October 20th fire.

The detail and depth provided by all the departments that responded to the review group's questionnaire is also greatly appreciated.

The task of assembling and sifting all the findings fell to the members of the East Bay Hills Fire Operations Review Group. Together members of the group have over 500 years of experience in firefighting and fire management, including both wildland and urban expertise.

REVIEW GROUP

- **Michael Brady**, Chief of the Hazardous Materials Section for OES's California Specialized Training Institute.
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- **Michael Guerin**, OES Assistant Director responsible for Response and Recovery.

We are grateful to all who helped the group gather, review, and interpret data. Karen Coombs, Frank Potter and Bruce Gadbois of CSTI contributed to the survey design and analysis.

We would especially like to acknowledge the following: Laura Ghilardi, word processing; Sarah Nathe, editing; and Sue Dubie-Holbrook, printing/assembly of this document.

EXECUTIVE SUMMARY

A. SCOPE OF REPORT

This report is intended as a review of the operations of all agencies that responded to the October 20, 1991, fire in the East Bay hills. In keeping with the request that occasioned it, the report concentrates primarily on training, procedures, equipment, and policies.

The report is organized in sections that address operations in each arena of fire fighting, from training and preparedness to mop-up and demobilization. Although the focus is on fire organizations, public information, law enforcement, and emergency management operations are also reviewed.

The material presented here was gathered as thoroughly as possible. It does not depict each front of the fire at every moment. Nor does it adequately represent how much was going on simultaneously as the fire raged.

The order imposed on the material is intended to allow for evaluation of major issues, and statement of significant recommendations. It is roughly chronological, from the beginning of the fire to demobilization some days later.

To make the recommendations most obvious, they are listed below in summary form, and in the order in which they appear in the report.

B. RECOMMENDATIONS

1. Preparedness

- Improve public safety agencies' understanding of the national fire danger rating system. Components related to ignition, spotting potential, expected rates of spread, and fire behavior are pertinent to wildland intermix fires.

- Develop local emergency action plans that deal effectively with "red flag" program. Urban fire departments with hillside/wildland intermix areas should train staff in the application of the national fire danger rating system.

- Revise local hillside/intermix fire plans in light of the experience of October 19-20, 1991. Fire hazard mitigation measures are essential.

- Coordinate plans and mitigation measures with other jurisdictions and government levels. See the joint federal, state, local *Hazard Mitigation Report for the East Bay Fire*, issued by FEMA and OES, for greater detail.

- Make wildland fire control a component of scheduled training.

2. Communications

- Assign a supervising fire dispatcher to be present in dispatch centers at all times. A working knowledge of fire terminology and mutual aid procedures is important to handle complex or large emergencies.

- Separate fire and police dispatch functions whenever possible. This assures that the fire dispatcher is knowledgeable and paying undivided attention.

- Train fire dispatchers in terminology, mobilization of fire and support service apparatus, and air operation deployment. An ability to keep track of resources and their locations is also necessary.

- Train dispatchers in initiating mutual aid requests and recognizing the "intent" of mutual aid requests.

- Plan to allocate radio frequencies by function, operational division, and support service. Monitor each frequency at the command center.

- Set up dedicated "outgoing only" telephone lines in dispatch centers. Do not list or post the outgoing line numbers.

- Conduct frequent interagency radio communication exercises. All fire departments in an area should participate.

3. Strategy and Tactics

- Expand operational level command staff to meet recognized standards for span of control in fire fighting. One chief officer for each five to eight operational companies is optimal.

- Appoint a deputy chief to enhance interplatoon coordination and insure unity of command concepts.

- Recognize the limitations of air tankers and water-dropping helicopters. Agencies with those resources should provide all urban fire departments with guidelines for safe & effective air operations.

- Develop a more expedient means of adapting hydrant outlets from 3" to 2-1/2" National Standard Thread. Investigate the feasibility of installing adapters with break-away caps.

- Upgrade the water grid sufficiently to produce a fire flow consistent with building density and size.

- Install a permanent auxiliary pumping system for refilling all upper water zones in hill areas.

- Maintain a list of locally available water tenders at all fire dispatch centers.

4. Mutual Aid System

- Prepare all fire service agencies for "worst case" scenarios, particularly fires, earthquakes, hazardous material and mass casualty incidents.

- Increase the response speed and capability of California's mutual aid systems.

- Improve inter-regional alerting protocols.

- Hold more frequent mutual aid mobilization exercises. Design them to be real-time.

- Include a designated strike team leader in all prearranged strike team consignments.

- Begin moving requested resources immediately.

- All fire departments should plan for receiving mutual aid from many participants. Include in plans reporting, staging, deployment, supporting and demobilization protocols.

- Make exercises for wildland/structural fires part of the regular training schedule. Interagency, multiple company exercises should be held yearly.

- Establish automatic mutual aid, boundary drops, and interagency response for mutual threat zones, including multi-disciplinary incidents.

- Familiarize all personnel with protocols, procedures and terminology for requesting air support.

5. Incident Command System

- Provide training to all local emergency response personnel in the ICS system. Personnel outside emergency services should also be trained in the areas of logistics and finance.

- Schedule increased interdepartmental drills in ICS.

- Reduce incompatibility in communications systems at all levels, and between local and state agencies.

- Include in ICS training and drills opportunities to learn and practice the transition from single resource to multi-agency incident. Both command and support staff benefit from working on this complex set of procedures.

- Design exercises to allow all officers to gain experience in all operational roles.

- Include a communications function in the ICS structure.

- Plan for early information/intelligence gathering and procedures for sharing with Emergency Operations Center and media.

6. Evacuations

- Clarify in each jurisdiction which agencies have statutory authority to order and supervise evacuation.

- Equip all fire vehicles with loudspeakers so that firefighters can inform citizens of need for evacuation.

- Schedule information exchanges among all operational level fire and police personnel from all jurisdictions in a mutual threat zone. Discuss local procedures, authority, and automatic mutual aid agreements.

- Use the Emergency Broadcast System (EBS) and Emergency Digital Information System (EDIS) to its fullest benefit.

- Conduct public information campaigns throughout California on evacuation issues.

7. Volunteers

- Plan and prepare to deal with and use spontaneous volunteers and resources early in an incident.

- Create an organizational element in fire departments to manage and use voluntary resources.

- Develop a policy in every emergency organization to promote and use volunteers.

8. Mop-up

- Make wildland fire mop-up techniques a component of scheduled training.

9. Demobilization

- An independent committee of the Fire and Rescue Mutual Aid System is studying this issue and will make recommendations at a later date.

10. Emergency Public Information

- Dispatch a trained Public Information Officer (PIO) immediately to any major incident. Give public information provision a high priority.
- Include a team of PIO's in the emergency response plan for every city and county.
- Equip the PIO team with a mobile and EOC information center, complete with staff, phones, and fax machines.
- Plan to provide media reporters with access to information, whether by phone or by entrance to the disaster area.
- Train law enforcement personnel from all cities in recognizing the access rights of media representatives.

11. Emergency Management

- Enhance multi-discipline coordination, particularly between fire, law, and emergency services agencies at all levels.
- OES should develop formal mutual aid procedures for emergency services personnel.

THE FIRE

The October 20, 1991 fire started in the Oakland hills north of the Caldecott Tunnel, near Buckingham Boulevard. This is a residential area of Oakland, with houses built rather densely, some on steep hill slopes, and many surrounded by abundant shrubbery and trees. In this area there have been other major fires: most notably, one in September of 1970 that burned more than 200 acres in roughly the same neighborhood and destroyed 37 homes; and the infamous September, 1923 fire which burned through the Berkeley hills and down into the city, destroying over 600 homes in an hour.

The structures in the hills are mostly wood frame; their siding is wood panel, wood shake, or stucco; and their roofing is wood shake, ceramic tile, asphalt shingle, or other forms involving rock and asphalt.

The fire began at or near the location of a three-acre fire on the previous day. Because there was no wind on Saturday, the 19th, the small fire was controlled with relative ease. Firefighters doused the burn area with water before they left late in the evening of the 19th.

By 8:30 a.m. the next morning, Oakland Fire Department personnel were on the scene continuing mop-up of the Saturday fire. They were dealing with a few flare-ups--successfully--when, at about 10:45 a.m., a spark from within the burn area was blown by gusting northeast winds to a fuel-rich spot just out of the burn area. The same winds worked like a bellows on the spark and the fire was out of control in a few minutes.

The East Bay hills blaze was a classic canyon-influenced fire. The high tops of Claremont, Grizzly, and Swainland (Horse) ridges and Upper Rockridge hill form a horseshoe-shaped bowl. After ignition, the fire ran up toward Grizzly Peak Boulevard, as canyon fires tend to do. The strong northeast wind simultaneously blew it down toward Buckingham Boulevard. The thermal column from the fire quickly reached a thermal inversion layer at around 3,500 feet. This layer effectively put a lid on the bowl and trapped the heat; this preheated all the fuels within the bowl and made ignition more likely.

As the fire swept downslope, driven by the fierce wind, it gained momentum from the continuous cover of coyote brush and trees. The fire moved directly from tree cover to houses along the lower canyon slope. Within 15 minutes of the first house ignition, the fire had gained such intensity that it developed into at least one, and probably two, firestorms. It then swirled up, around, and through Hiller Highlands. An airborne observer described the thermal column as looking and behaving like a tornado.

Airborne flaming material spread the fire across Highway 24, an eight-lane freeway. Both brush and combustible roof coverings on the south side of Highway 24 were ignited. The airborne observer reported 50 or more roofs in Upper Rockridge igniting one after the other, much like lights coming on in rooms as someone races down the hallway flipping on the switches.

The October 20th fire ignited 790 structures in its first hour. In the ten hours that it roared through Oakland and Berkeley's prime hill areas, it torched homes at the rate of one each 11 seconds. It defied every attempt to stop its progress until thousands of firefighters (resident, volunteer, and professional) assembled hundreds of pieces of fire apparatus, and the wind subsided.

That evening the wind subsided and, in some places, changed directions to blow back over the burned area. The fire spread was halted on all fronts, except for a few spot fires along the perimeter, by 9:00 p.m. Sunday evening. Firefighters drew a perimeter around the fire by the pre-dawn hours of Monday, October 21. The fire was declared "contained" on Tuesday afternoon and "under control" on Wednesday morning.

The fire killed 25 people, injured 150, and burned over 1600 acres. It destroyed 3354 single family residences, 456 apartments, and did an estimated $1.5 billion in damages.

As home building continues to spread into the very desirable locations in California's foothills, fires like the East Bay hills fire will become more common. But the urban/wildland interface, or intermix, fire involving homes built near or in brush areas is vastly different from the fires urban firefighters encounter on a daily basis. It also differs from wildland fires in many respects because it involves the very generous fuel supply provided by wood structures.

A fire burning 400 or more homes per hour does not allow for normal fire-fighting tactics -- either urban or wildland. Few if any fire departments have the resources necessary to control such a fire quickly. They must rely on mutual aid. Although California has an excellent master mutual aid plan, it can not respond fast enough in most cases to prevent an intermix fire from destroying many homes.

The East Bay Hills fire is similar in many respects to the Paint fire in Santa Barbara County in July of 1990, and the College hills fire in Glendale in June, 1990. None of the fires is considered large in terms of wildland fires, but each one presented unique challenges to firefighters: water pressure was inadequate; narrow streets quickly became blocked and impeded both ingress and egress; numerous untreated wood roofs contributed to fire spread; most houses were without proper bush clearance; and the fire advanced along multiple fronts.

Complicating the fight against each fire were additional problems: resources were immediately overtaxed; communications were inadequate; extensive evacuations were necessary; the struggle to save houses and groups of houses had to be abandoned in order to consolidate resources or control fire spread; incoming mutual aid units were unfamiliar with the area; and coordination was needed among law enforcement, fire, and other agencies.

The natural forces at work on October 20, 1991 were extreme, but not exceptional for the season, the place, and the ecosystem. The high temperature (92°F) set a record -- by one degree. The relative humidity was very low (16%), as it frequently is in October.

The temperature inversion at about 3500 feet, high winds from the northeast (averaging 20 mph, gusting to 35-50), and dry conditions from a long-term drought were all fairly typical for an autumn day. The only atypical phenomenon was the especially abundant fuel supply provided by a freeze the previous December that killed plants and trees. But the freeze only increased available fuel; it didn't create it.

The conditions were conducive to the conflagration that resulted, but they were not exceptional. They occur in hilly, urban/wildland intermix areas all over the state every autumn. We can do little to control them, but we must be ready for them. We can control construction and subdivision standards. We can adopt and enforce prudent brush, limb, and debris clearance standards. We can widen roads and provide alternate safe routes of access and egress. Or we can continue to pay for our failure to do so through higher fire insurance premiums, taxes, utility bills, and -- from time to time -- death and destruction.

The choice is ours: elected and career public officials, neighborhood groups, and citizens each have a role and a responsibility. The choice is not exclusive to Oakland and Berkeley -- a tour through any of California's hill communities reveals a potential for other tragic urban/wildland intermix conflagrations. How well we heed the lessons from this disastrous fire will determine the safety of future development in California.

I. PREPAREDNESS

A. INCIDENT MANAGEMENT

California's fire service has adopted the Incident Command System (ICS) for all emergency management needs. The system provides for the orderly expansion of emergency management from a single operational unit to a large multifaceted, interdisciplinary and interagency emergency group. Training for implementation of ICS varies greatly on a department-by-department basis throughout the state.

Both Berkeley and Oakland utilize ICS. Berkeley has been utilizing the system for several years. Oakland started implementation and training following the 1989 earthquake. All of Berkeley's Senior Chief Officers have completed the National Fire Academy's "Command and Control" course, which includes ICS. Most of Berkeley's operational level officers have completed the ICS Strike Team Leader course.

Oakland's Training Division provides orientation training for company level officers. Oakland routinely utilizes ICS during multiple-company drills to give chief officers experience in performing the various functional specialties of the system. Oakland's operational level chief officers are all qualified strike team leaders.

Both departments utilize ICS for all emergencies and it is therefore incorporated into training exercises wherever command and control elements are present.

B. WILDLAND TRAINING

Berkeley's training division schedules and monitors company level training. Wildland training is included in the daily training schedule throughout the year. Berkeley participated in interagency wildland exercises with the East Bay Regional Parks in the spring of 1991. Some of Berkeley's company and operational level chief officers participated in a wildland fire mutual aid exercise with Santa Clara County in 1990.

Oakland's training division schedules and monitors company level training. Wildland fire topics are routinely included as a study assignment. Drills (exercises) are scheduled on an as-needed-basis. There had been no recruit classes during 1991 and no wildland exercises were scheduled.

C. MUTUAL AID

Berkeley routinely includes mutual aid training in the schedule for company officers. Oakland's training schedule does not routinely include mutual aid procedures. Personnel often gain practical experience because of their frequent involvement in mutual aid responses.

D. PLANS

Berkeley has a written plan which outlines procedures/actions for hill fire emergencies ("Panoramic Hill Fire Response and Hill Fire Problem").

Oakland has a formally adopted "Hills Plan" which defines operational policies and guidelines for hill fire contingencies. The plan was used on October 20, 1991.

Each of the departments is currently revising its respective hill fire plan.

The "red flag" program is part of the US Weather Bureau fire weather forecast. These fire weather forecasts are used by the National Fire Danger Rating System to generate forecast manning/dispatch indices and weather. In order to use this program, cities need to understand the system and have an action plan for "red flag" watch/warning periods.

E. RECOMMENDATIONS

- There should be a better understanding of the National Fire Danger Rating System. This includes the components related to ignition, spotting potential and expected rates of spread and fire behavior. This includes the need for local emergency action plans that deal effectively with "red flag" programs. Local agencies should make arrangements with the Office of Emergency Services and Department of Forestry and Fire Protection to receive these warnings on a timely basis.

- Urban fire departments, particularly those with wildland intermix fire problems, should have some persons within their departments trained to understand the use and application of the National Fire Danger Rating System.

- Local hillside/intermix fire plans for hazardous fire areas should be revised in light of the information discerned through this fire review. Again, mitigation measures are essential. Response patterns should change as a result of the lessons of this fire. Automatic aid integrated first alarm response zones should be developed and adopted without regard for boundaries.

- This review specifically targeted preparation and operations related to the emergency response to this disaster. There are hazard mitigation issues that cannot be fully separated from this topic. Clearly, topics such as roofing, zones and codes, planning, and others have a direct bearing on fire behavior, and rate of spread. While these issues are mentioned in this report, see the joint federal, state, and local ***Hazard Mitigation Report for the East Bay Fire***, issued by the Federal Emergency Management Agency, for greater detail and recommendations.

- Institute staffing pattern changes to strengthen companies in hazardous fire areas during "red flag" programs.

■ Wildland fire control should become a component of scheduled in-service company training. Training should include all aspects of wildland tactics, i.e., suppression, firebreak construction, cold trailing, hot spotting, safety, and survival techniques.

II. COMMUNICATIONS

The dispatch function and communications between the dispatchers and incident commander were two critical parts of the response. It is appropriate to consider the dispatching in the context of the real working conditions there, rather than in comparison to an ideal environment.

A. DISPATCH

1. Oakland

Normal staffing at Oakland Fire Dispatch is one dispatch supervisor and two dispatchers on day and graveyard shifts and one supervisor and three dispatchers on swing shifts. On October 20, one dispatch supervisor was present; one veteran dispatcher and one with six months experience were on duty. Oakland has the ability to expand to a maximum of six staffed consoles, each with the same capabilities. Fire Dispatch operated on a new Computer Aided Dispatch (CAD) system that had been installed in June. However, this was a replacement for an earlier CAD system and the change did not seem to be a factor.

Basic training for dispatchers is handled in-house, with the majority learning through on-the-job training. There is little formal training on topics such as mutual aid since a Fire Officer is typically called in to the Dispatch Center to handle such matters when needed. Also, Oakland has historically regarded itself as the "big" agency in the East Bay which typically provides mutual aid. Dispatchers rarely handle mutual aid callouts and may not be trained in procedures.

In this case, it appears that adequate personnel responded to dispatch to assist the regular staff; Oakland fire personnel, off-duty dispatchers, and even an ex-employee responded to Dispatch and assisted with the effort there. Problems which developed were generally more related to system capabilities than to personnel.

The volume of traffic generated by the public and by responding elements overloaded all communications systems. No telephone lines are reserved for outgoing calls only. As the available phone lines became flooded with calls coming in, dispatch personnel were unable to access outside lines to make needed calls in a timely manner. Similarly, radio traffic quickly overloaded available frequencies.

It was reported that fire command in the field had considerable difficulty contacting Dispatch at times, often making repeated calls from cellular telephones until finally a line cleared and they could communicate on immediate issues. This delay caused the information flow to be piecemeal. It was difficult to maintain an accurate picture of resources committed or available, and to monitor the progress of the fire itself in all areas.

As one result of the overcrowding of radio channels, field elements turned to self-assigning their units to activities based on their best judgment. They were not part of a centrally directed response. Others turned to alternate means of communicating: using non-fire frequencies or, in at least one case, speaking to an Oakland police officer who relayed information through his Dispatch center to the Fire Dispatch Center. At least one agency, which had Oakland's fire frequencies programmed into their radios, was unable to contact Oakland Fire on those frequencies.

Units from outside jurisdictions were called in through the established Mutual Aid System and by direct requests outside of that system. Others responded of their own volition and assisted in fire-fighting efforts.

2. Berkeley

The City of Berkeley began utilizing civilian dispatchers in the Fire Dispatch Center in 1976. The separate Police and Fire Dispatch centers were combined in 1984 into a joint Public Safety Communications Center. There is one dedicated position for fire dispatching and one for police dispatching. These dispatch positions are supported by at least two additional call takers and a Dispatch Supervisor. Each position is capable of answering telephones, however, radio traffic is handled by the dedicated Police or Fire position.

Five days a week, from 7:00 a.m. to 4:00 p.m., there is a Fire Captain working in the Communications Center to assist in supervising the fire operations. There is also a Senior Public Safety Dispatcher (SPSD) position that has direct supervision responsibility. On the morning of October 20, 1991, there was no supervisor on duty. The staffing that morning included three Public Safety Dispatchers (PSD), and one Police Service Assistant (PSA). The PSA is not trained to operate radio equipment.

The Berkeley Dispatch log clearly indicates the person answering calls was not familiar with fire terminology. The log indicates that the Communications Center was aware of Oakland's Saturday fire, but not where it was located, although Berkeley sent two engine companies and a chief officer into Oakland to assist on the fire. The Communications Center was aware that Oakland Fire Department was working the same fire on Sunday morning.

As the morning of October 20th progressed, people in Berkeley and Oakland, in the vicinity of the fire, started calling Berkeley reporting the fire. It was a warm windy day, and citizens were becoming concerned as the volume of smoke in the area of the fire increased. The Berkeley Dispatcher told callers the fire was in Oakland, and not a problem. As the smoke column expanded, so did the calls. There was no contact made by Berkeley Communications Center or Berkeley Fire Department to question Oakland on the fire conditions. The on duty Berkeley Assistant Chief, after watching the smoke conditions for 30 minutes, decided to take a look, and proceeded into Oakland.

The calls to the Berkeley Communications Center intensified to a nearly unmanageable point. People were calling asking if they should consider evacuating, and were told there was no problem, "Oakland is taking care of it". At 11:41 a.m., a caller asked

were told there was no problem, "Oakland is taking care of it". At 11:41 a.m., a caller asked about the fire location and was told, "it's Oakland's fire, they're taking care of it. That's all the information I have." These answers were given without contacting Oakland Fire Department. At 12:34 p.m., after the second alarm had been requested, citizens were advised, "there have been no evacuations, as far as I know". This information was given even though the first Berkeley Fire Department officer on the scene had told the dispatcher, at 12:16 p.m., to have the Police Department begin immediate evacuation of the area.

Communications to Oakland Fire Department were hampered because the direct-dial TAC (Tactical) Line which usually links East Bay fire departments was not operational. The TAC line is a direct-dial line connecting 12 East Bay agencies. The line had been non-operational for approximately two weeks prior to the fire. The microwave path for the TAC line had been disrupted because of new construction between the line-of-sight microwave towers. Rerouting of the transmission loop is expected to take several months to complete.

B. ALARMS

It is customary fire service practice to number sequentially, as alarms, the requests for, and dispatch of, resources. Each subsequent alarm after the first is generally filled by a like complement of resources, i.e, engines, trucks, tank wagons and patrol wagons. Both Berkeley and Oakland follow these common practices. For example, if the first alarm assignment is for three engines, one truck and a Chief, the second alarm will be filled by three engines, one truck, and, where available, another Chief.

1. Oakland

Within a period of 24 minutes (11:02 am to 11:26 am) Oakland's *Tunnel Command transmitted SECOND through SIXTH ALARMS. Upon dispatch of the SIXTH alarm assignment, committed resources included three Chief Officers, 19 Engines, three truck companies, three brush/patrol wagons, and one command van. On the THIRD alarm (11:04 a.m.), the incident commander requested a California Department of Forestry (CDF) response. Standard CDF response to an urban-wildland mutual aid request is one helitac unit, two engines, one dozer and one Battalion Chief. A CDF helitac unit includes pilot, co-pilot observer, a crew chief and eight Firefighters.

On the SIXTH alarm, the Incident Commander also requested five mutual aid engines. The mutual aid request was filled through Oakland Fire Department Communication Center by direct contact with Alameda, Alameda Naval Air Station, Emeryville, Lawrence Berkeley Lab, and San Leandro. Everyone associated with Oakland's command-communication structure assumed that Berkeley was already involved.

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*The Incident Commander dubbed this the "Tunnel Fire" due to the proximity of the Caldecott Tunnel.

Oakland's SECOND ALARM was transmitted by the Company Officer of Engine 19. No reporting location was specified, but there had been sufficient radio traffic from the fire scene as to leave no doubt about the location of need. Subsequent alarm assignments were directed to the Incident Command Post on Grizzly Peak Boulevard near Marlborough Terrace. The FOURTH ALARM (between 11:15 a.m. and 11:25 a.m.) assignment was redirected to the Parkwood Apartments. The SIXTH ALARM assignment was redirected to Bay Forest Drive.

The redirections resulted from the rapidly changing conditions. Some responding units were reassigned to the upper Rockridge area, others couldn't get through the evacuation congestion and closed roads. In seeking alternate routes, they encountered fire conditions requiring defensive fire-fighting to protect evacuees and preserve a route of escape.

From about the time of the FOURTH ALARM, Oakland's two radio frequencies were saturated. There was a constant stream of communication, unit-to-unit, unit-to-command, command-to-unit, command-to-communication center, and communication center-to-command. There was a lot of signal over-riding (mobile overpowering portables) and some lost transmissions due to topographical interference.

Throughout the first 12 hours of heavy operations, communications were the most persistent problem. Individual companies often could not communicate with either their Division Chief or the Incident Command Post. This inability to communicate often necessitated independent and uncoordinated action. On at least one occasion, in the upper Rockridge area, a Division Chief's request for resources was lost and may have contributed to forced withdrawal from a perimeter control line along Ocean View.

The companies on Buckingham Boulevard at and shortly after the blow-up, struggled frantically to control the fire and evacuate the area. As the fire quickly overran two of the four companies, one took refuge in a swimming pool and the other retreated to Engine-8's location at 7235 Buckingham Boulevard. Through an extraordinary effort, crews of Engines 24 and 8 and an East Bay Regional Parks patrol unit managed to save 7200 and 7235 Buckingham Boulevard as the fire roared over and around them. Civilians who were trapped with them were sheltered in the concrete-walled garage of 7235.

Over the next two and a half hours, the fire overran perimeter control efforts on lower Marlborough Terrace, Bay Forest Drive, Broadway Terrace, Buena Vista Avenue and the Parkwood Apartments. The spread was so rapid and of such intensity that there was no opportunity to move fire-fighting resources into the Strathmore Ridge or Hiller Highlands areas. Fire and Police personnel undertook evacuation of those areas at great personal risk. An Oakland Fire Lieutenant recounts a woman standing on a rear deck resisting his evacuation orders as the front of her house caught fire. During the first hour, following full first alarm commitment, a structure ignited at the rate of one each 4.5 seconds.

Mutual Aid frequencies (WHITE Channels) were also saturated quickly as incoming mutual aid units began arriving in numbers. During the early hours of Command Post operation (before 3:00 pm), staffing levels resulted in some WHITE-1 transmissions being

missed. Both Strike Team leaders and Mutual Aid company officers reported difficulty communicating with Oakland's command structure. Of the 372 mutual aid engine companies which responded to this event, 329 were equipped with WHITE FIRE-1, 313 with WHITE FIRE-2, and 301 with WHITE FIRE-3. Oakland's Command Van is equipped for WHITE FIRE-1 and WHITE FIRE-2.

Eagle-5 (East Bay Regional Parks Helicopter) was unable to communicate in a timely manner with Oakland's Command Post on either WHITE or Oakland's fire frequencies. It had to land near the Command Post in order to report. Due to rapidly changing conditions, the airborne observer's information was often negated before it could be delivered. Oakland's fire observer in the Police Department helicopter had similar difficulties. Lack of sufficient command post staff to monitor operational frequencies was the primary cause of this difficulty.

Fireground officers were able to communicate the most critical information. Overrun positions, serious injuries, casualties, water supply problems, evacuation needs, and unit-to unit cautions were communicated. Most radio transmissions were concise and clearly stated.

In reviewing transcripts of emergency tapes, a person unfamiliar with fireground operations, or a particular department's jargon, might conclude that there was confusion, that firefighters' communication was not effective. When the transmissions are tracked, however, it is apparent that meaningful exchanges did take place. Frequent changes in command, command post location and division designations all contributed to an already confusing situation. Due to the magnitude of the emergency, there simply were not enough Oakland Chief Officers to provide adequate division and sector command.

If each of the requests for resources was numbered sequentially as an alarm, the Tunnel Fire would have been a 27-ALARM incident. If the number of alarms was determined by the number of responses equivalent to the FIRST ALARM assignment, it would have been a 107-ALARM event.

The only technical communication problem reported had to do with power supply in Oakland's command van. Batteries for portable radios were in high demand.

2. Berkeley

Berkeley became actively involved at 12:08 p.m., when Berkeley's Engine 3 arrived at Tunnel and Vicente Roads. Upon arrival, the Company Officer reported fire blowing across Tunnel Road 100 feet south of the intersection (in Oakland). He immediately asked for a full FIRST ALARM assignment (2 Engines, 1 Truck). The SECOND ALARM was transmitted at 12:17 p.m. Recall of off-duty Chief Officers and staffing for reserve apparatus was directed at 12:22 p.m. Total recall of off duty personnel was started as soon as reserve apparatus staffing assignments were complete. The THIRD ALARM was transmitted at 12:38 p.m., followed by direct requests to Albany, Emeryville and Lawrence Berkeley Laboratory.

The first attempts to stop the fire's progress were along lower Vicente and Tunnel Roads, where seven roofs ignited almost simultaneously. The fire jumped Tunnel Road about 12:15 p.m. The SECOND ALARM assignment set up along Roble Road at 12:30 p.m., where four roofs ignited by airborne flaming material. At 12:30 p.m., the Tunnel and Vicente line was overrun. Resources were repositioned along Tunnel up Bridge and along Alvarado. Mutual aid resources (Emeryville, Albany, Lawrence Berkeley, Hayward and Alameda Naval Air Station engines and Strike Teams from Contra Costa, Marin and San Francisco) strengthened these operations sufficiently to hold the perimeter lines. Heavy fire-fighting continued into the morning of October 21st.

Chief Cates assumed incident command at 2:27 p.m., and established Division "A" Tunnel Command and Division "B" Roble Command. Evacuation plans for threatened Berkeley areas were completed Deputy Chief Salter and executed by the Berkeley Police Department between 12:30 and 2:00 p.m.

In another action, Berkeley's Engines 7 and 11 were sent to a reported fire at the end of El Camino at 2:00 p.m. The fire involved three houses. Although forced to abandon operations briefly, the firefighters were able to hold the fire with the help of civilians and stop its further extension into either Berkeley or Oakland. By 8:00 p.m., October 20th, all Berkeley's fire line commanders were confident their perimeter lines would hold.

Berkeley's fireground communications were marginally adequate. Only minor delays in transmissions were caused by radio traffic. The tactical line between Berkeley and Oakland was not operational during the fire period.

Unit-to-unit and command-to-unit communications were "clear text" and easily understood. For the most part, Berkeley-Oakland Command Post communications were through cellular phone to Berkeley's Agency Representative at the Oakland Incident Command Post.

C. LOCAL AID, CALL BACK, MOVE UP

Local mutual aid is provided through a formalized Alameda County Fire Mutual Aid Plan. The county is divided into three zones: East, North and South, each with a Zone Coordinator and an alternate Zone Coordinator chosen by the fire chiefs within each zone. Oakland is the North Zone Coordinator, with Naval Air Station Alameda as alternate. Resource allocation is prescribed by jurisdictions within each zone.

Between neighboring jurisdictions, there have historically been strong mutual aid relationships. While no automatic plan is formally adopted, departments frequently cross jurisdictional boundaries and take initial action before arrival of the responsible department. This is particularly common between Berkeley and Oakland and Oakland and San Leandro. During the October 20 fire, San Leandro responded to a 2-Alarm incident in East Oakland and handled the incident without any involvement of Oakland resources.

The mutual assistance relationship between Oakland and San Francisco goes back to the 1860s. Between Berkeley and San Francisco, the relationship dates from 1906. No formalized city-to-city aid agreements have been executed.

Because of mutual threat zones, direct mutual assistance is also common between Alameda and Contra Costa communities. For the October 20 fire, Oakland's first request for mutual aid (11:04 a.m.) went to CDF because of the immediate need for air attack. That request was immediately followed by a request for five mutual aid engine companies. Oakland's Fire Communication Center contacted Alameda, Alameda Naval Air Station, Emeryville, Lawrence Berkeley Lab, and San Leandro.

The request for CDF resources was transmitted to Santa Clara Ranger Unit, Morgan Hill at 11:19 a.m. The Oakland dispatcher's unfamiliarity with air resource terminology (asked for "air operations" which in CDF terminology is the designation for an incidents Air Operations Director) delayed processing the request. At 11:24 a.m., CDF dispatched a Task Force consisting of a helitac unit, two type-3 engines, a dozer and a Battalion Chief. Direct requests were made to Contra Costa (11:34 a.m.) and San Francisco (12:31 p.m.) for 10 engines each.

Oakland's standard operating procedures are to recall Chief Officers on the SECOND ALARM. Recall was started at 11:07 a.m. Recall of off-duty personnel to staff reserve apparatus was started shortly after the THIRD ALARM. General recall followed the FOURTH ALARM and efforts to contact off-duty personnel continued throughout the day. Off-duty personnel continued reporting for duty through 4:00 a.m., on October 21st.

Berkeley made its first requests for mutual aid to Albany (12:55), Emeryville, and Lawrence Berkeley Lab (1:50 p.m.) for one engine from each. On one call (Emeryville) Berkeley's dispatch said, "We need help," to which Emeryville responded, "What kind of help do you want?" Berkeley replied, "Whatever you have."

At 12:22 p.m., Berkeley's Fire Chief directed the recall of chief officers and the "B" platoon for staffing reserve apparatus (3 engines, 1 truck). Response records indicate that reserve apparatus were staffed by 1:30 p.m.

D. RECOMMENDATIONS

■ Dispatch centers in high risk areas need a supervising fire dispatcher on duty at all times to handle multiple alarms or the outbreak of a large-scale emergency. The dispatcher needs thorough working knowledge of fire service terminology and mutual aid mobilization procedures.

■ Berkeley should consider separation of fire from the police dispatch function. The volume of police-related radio and telephone traffic allows little opportunity for cross training. To illustrate this, attention is invited to the Berkeley telephone log transcript for October 20.

- Fire dispatchers need in-depth training in terminology related to the mobilization and movement of mutual aid fire and support service apparatus and equipment. Training should include air operations terminology, and resource status record keeping and tracking designations.

- Dispatchers need training and delegated authority to initiate mutual aid request/response.

- Early allocation of radio frequency by function, operational division and support service is of critical importance. Each frequency needs to be constantly monitored at the command post. Switching from frequency-to-frequency to gain clear air time leaves too much opportunity for missed information. Incident command staff cannot monitor operational frequencies and communicate direction and control information on administrative channels or telephone at the same time.

- Frequency management is critical in a large incident. Engine company personnel and chief officers had a variety of mutual aid fire frequencies available in their radios. Frequency congestion could have been reduced with better distribution of traffic on the available frequencies.

- Dispatch centers need dedicated "outgoing-only" telephone lines with unlisted and unpublished line numbers.

- All fire departments need frequent interagency radio communication training and shared protocols between dispatch centers at all levels. Use of WHITE channels, dedicated tie-lines, or other technologies should be used for real-time emergency information exchange between centers.

III. STRATEGY AND TACTICS

The fundamentals of fire protection are, in order of priority: prevention; protection of life; protection of exposures; confinement, extinguishing, overhaul (mop-up); and investigation. To some degree, all strategic and tactical decisions are made to accomplish one or more of those fundamental goals. Strategic decisions are generally made by the command staff. Tactical decisions, as a rule, are made by engine and truck company officers in order to respond to circumstances or to carry out the strategic decision.

A. INITIAL ATTACK

On October 20, 1991, Engine Companies 19 and 24 arrived at 7185 Marlborough Terrace at approximately 8:30 am. This response included an engine and brush wagon from each station plus an officer and an engineer and two firefighters, for a total of four apparatus and eight personnel. They immediately observed smoke and hot spots from two locations on the fire area from October 19. One was on the Northeast flank and one below the Gwin tank on the east flank. These hot spots were taken care of and the area around them was mopped up, mixing water and mineral soil with the duff (leaves and pine needles that accumulate over the years).

This procedure was followed each time smoke was observed. From about 9:30 to 10:30, no additional smoke was observed. During this period, an East Bay Regional Park (EBRP) engine and brush wagon arrived, and those personnel were directed to pick up hose on the northeast flank of the fire. EBRP assigned two of their personnel to start from the Gwin tank and work down the east flank, dragging hose and watching for hot spots. One EBRP officer was directed to the west flank below Malbrough Terrace to assist in dragging hose down that side.

Both EBRP vehicles went to Buckingham Boulevard and started up the east flank. They immediately noticed hot spots and began wetting these down with a back-pack pump and used a McCloud tool to mix and mop-up. Just after starting this, they observed open flame about 150 feet across the west flank of the fire. The EBRP engine was moved around to the west flank and started a hose line up the hill from Buckingham Boulevard to the flare-up, while the person with the back-pack walked across the hill and started working on the flare up.

About this time, two Oakland firefighters from Engine 19 came down the West flank from the top and helped drag hose from the EBRP engine to put out the flare-up that was inside the old burn about five feet under a pine canopy. There was considerable duff and unburned needle cast from the pine trees in the area. The wind had been blowing and there was considerable build-up of unburned needles on top of the October 19th burn.

When this flare-up was knocked down, they looked back across the fire to the east flank and observed another flare-up with open flames beneath three or four small oak trees. The wind was now much stronger. Two of the EBRP personnel walked across the burn on the contour and started putting out this flare-up, also inside the burn. They had a backpack pump and a McCloud. At this same time, the homeowner from 7151 Buckingham came up the hill with a charged garden hose and helped put out this flare-up.

Within seconds, they noticed another flare-up about 20 feet below them outside the burn. This flare-up began to burn with five-foot high flames and spread down hill towards Buckingham Boulevard and the house at 7151.

By this time, the EBRP engine had been moved back to the east side of 7151 and began working on the fire coming down toward them. Engine 24 arrived at approximately the same time, 11:05 a.m., and spotted at a hydrant in front of 7180 Buckingham Boulevard. This hydrant is just above the turn in the road some distance east of 7151. The wind was so strong that it turned the water stream from a deck gun 90 degrees from the fire. An attempt was made to prevent the fire from engulfing the house at 7151 Buckingham Boulevard without success.

The fire behavior was so extreme that two engine companies and hydrant water were unable to save the house at 7151 Buckingham, but they were able to protect and save one house at 7200, across the street from 7151, and a large four-story shingle structure at 7235 Buckingham Boulevard.

When the house at 7151 Buckingham burned, the fire spread in all directions: uphill to the North and east toward Grizzly Peak; southeast across Buckingham Boulevard toward the Parkwood Apartments complex; uphill west towards Westmoorland, Norfolk and Marlborough Terrace. This all happened in about 20 minutes. During this period, four alarms were sounded. The FIFTH and SIXTH ALARMS were combined and sounded at 11:26 a.m.

B. STRATEGY

Once the fire made its major run, fire resources through local and statewide mutual aid began arriving on the scene. Positive perimeter action began. The fire continued to spread, but the rate of spread was not as drastic as during the first hour.

The command function was very limited during the early period. The two-channel radio system was completely overloaded, as was the telephone system--both land line and cellular. Much of the fire suppression action was undertaken by individual engine captains and lieutenants independently, because they could not communicate with command. This independent action was commendable, but frequently futile since the firefighters could not get additional resources and had to abandon blocks of houses. The Division Chiefs were unable to communicate with units under their command without physically locating them. All of this slowed down perimeter control.

In some cases, strike teams or division supervisors, did not arrive at their assigned divisions because they became involved in other areas that needed direction. Command was unaware that they had not reached their assigned area. The Division Supervisors were unable to communicate with command part of the time. This resulted in some portion of the perimeter having little or no suppression action until late in the day. When the winds began to die down and more resources reported to the Fire Command Center, the Incident Commander was able to develop a strategy and assign Strike Teams and resources where they were needed.

The Command Center, Incident Commander and Operation Section Chief were able to provide direction only when they established radio contact with their Division Supervisor. Sometimes this was accomplished only when the Division Supervisor physically went to the Command Center.

During the last 12 to 15 years, Berkeley and Oakland fire departments have cut personnel, about 30 and 40 percent, respectively. Each department has reduced both the number of in-service fire companies and company level personnel. A reduction from five to four company members is a 25% reduction in it's fireground personnel complement with a corresponding reduction in tactical effectiveness. A reduction from four to three company members reduces by one-third its fireground personnel complement. One company member is always assigned to the engine operation. The fewer firefighters available, the greater the time to deploy effective streams. It is more often necessary to call additional alarms just for staffing. Both departments reinforced operating companies as quickly as possible.

To complete a strategic assignment firefighters often had to drive past threatened homes, sometimes ignoring a home owner's plea for help.

C. TACTICS

Throughout the fire-fighting period, individual and grouped companies did outstanding fire control work. Positions were held to the last possible moment. Hose lines, including 5-inch, were advanced through narrow and often very steep side yards, backyards, pathways up public stairways, and over roofs. Firefighters utilized available labor: residents, military, visiting firefighters, off-duty school teachers and others.

Typically, as companies moved into an area, first efforts were directed to evacuating citizens still there and using handline streams to wet down threatened areas. Most handline nozzles employed were of more than 100 GPM capacity and, where personnel capabilities permitted, of more than 200 gpm. In areas where water supply was sufficient, multiple master streams (+500 GPM) were employed. Direct fire fighting was carried on in conjunction with exposure protection when and where possible and for a number of tactical reasons: (1) some structures could be saved, (2) reduction of heat and flame front, and (3) a reduction in production of large flaming pieces of airborne material.

The heavier the stream, the more effective it was for either area coverage or structural penetration. Streams of less than 75 GPM were not effective in most situations, they lacked both reach and heat absorption capacity. There are several accounts of 500 and greater GPM streams being bent 90° by the wind. Several officers commented that smooth bore nozzles (play pipes) outperformed combination nozzles, particularly where reach was a factor. Handlines of 1-3/4' with 150 to 200 GPM nozzles provided a good screen for firefighters advancing lines through narrow side yards alongside burning structures.

There were a few circumstances -- pressure by owner/occupants, frustration, exhaustion -- in which individual engine companies concentrated their efforts on a single house. Some even went to the point of extensive interior operations, pulling ceilings, working on ventilation and overhaul. During the time they spent within, other houses on either side began burning.

Landscape irrigation systems, lawn sprinklers, and garden hoses (with and without nozzles) were utilized by firefighters to help combat flaming embers and, in at least one case, to provide some exposure protection.

There was success with master streams for both exposure protection and direct attack. Where water supplies were sufficient to support several large streams, in general, perimeter lines were held. In those areas in which water supplies were lost or the distribution system was weak, heavy reliance was placed upon tankers for water supply and heavy streams simply could not be sustained. Preconnected deck guns were the most effective large stream device.

Some type 3 and 4 engine crews were subjected to very high working-space temperatures and high concentrations of fire gases because their hose and nozzle capacity afforded such little thermal displacement. The styles of the nozzles did not permit firefighters to place a cheek alongside to get a breath of cooler-cleaner air.

In one situation, a group of firefighters and civilians tore shingles from a burning roof to halt the fire's spread. Removing fuel from the path of fire is an effective control mechanism. It worked; however, we would not recommend the adoption of this somewhat hazardous technique as SOP.

Wildland tactics were employed wherever advantageous and/or feasible. A fire break (dozer line) was cut from Grizzly Peak Boulevard, to the bottom of Claremont Canyon. CDF and Contra Costa Task Forces worked Claremont Canyon hot spots during both fire fighting and mop-up operations. Trees were felled along upper Marlborough, behind 7235 Buckingham and in several Upper Rockridge area locations to remove burning fuel, enhance exposure protection and to create fuel breaks. The fire's spread rate precluded any consideration of fire break construction by dozers and/or handcrews other than along the east and west flanks until evening.

Narrow crowded roads, steep and narrow side yards, downed power lines, and water supply problems were cited as the most difficult tactical problems to overcome. Several officers mentioned narrow tree-canopied streets as a factor in fire spread and made it

difficult to direct streams for effective exposure control. One fire officer described flames shooting horizontally across Tunnel Road about five feet above the surface and sounding like a jet aircraft on its take-off run. There were a number of hose line failures due to the burning or melting of three and five-inch hose.

1. Perimeter Lines

By 11:30 a.m., the fire had spread into the Parkwood Apartments, had passed through Hiller Highlands and crossed Highway 24 below Lake Temescal. Structures along Contra Costa Road on the south side of Highway 24 were beginning to burn. It is estimated the fire traveled about one mile in 15 to 20 minutes. There was not sufficient time to establish perimeters. The fire continued to spread rapidly. It is difficult to evaluate the initial attack and tactical action during this period because of the fire's extreme rate of spread.

2. Air Attack

Wildland fire agencies utilize air attack for "holding action" until ground resources can arrive on location or to slow the rate of spread in inaccessible areas. Water, with an admixture to increase viscosity, is the fire control medium. The largest air tanker can deliver only 3000 gallons per flight. The average fire department pumper can deliver a like amount of water in three minutes.

The East Bay Regional Parks radio log recorded a message from one of their fire personnel on the fire at 10:52 a.m. asking for Oakland to request air support. The specific request from the EBRP fire person (5669) was, "Talk to Oakland and have them get a helicopter up here and get this area wet down. We are having all kinds of rekindles." This request was followed up at 11:19 a.m., when the EBRP fire person (5675) called EBRP Dispatch and asked them to, "Contact CDF and tell them we're gonna need helicopters out here."

Alma Helitac (a CDF resource) dispatched at 11:26 a.m., and arrived over the fire at approximately 11:55 a.m. Two air tankers and an air attack aircraft were dispatched to the Franklin Canyon fire in Contra Costa County at 11:26 a.m. This fire was six miles northeast of the Oakland hills fire. Tanker 92 departed Fresno with an estimated ETA at Franklin Canyon of 12:26 p.m. Air Tanker 94 and Air Attack 460 departed Salinas with an ETA of 12:18 p.m. for Air Attack 460, and 12:23 p.m. for Air Tanker 94 at the Franklin Canyon fire. At 12:38 p.m., Tankers 92, 94 and the Air Attack were diverted to the Oakland hills fire. Air Attack 460 had to coordinate and gain approval from Oakland radar approach control to enter the area and establish a restricted area. It also had to establish radio contact with Oakland City Fire Department to get directions for the air tankers. This created a time delay.

At 1:02 p.m. and 1:03 p.m., Air Tankers 94 and 92 dropped their respective loads of retardant on the fire and departed for Sonoma County Airport at Santa Rosa to reload and return. They landed at the Sonoma County Airport at 1:27 p.m. and 1:29 p.m., respectively.

At approximately 12:35 p.m., the Oakland Fire Department requested a third air tanker and at 12:39 p.m. Tanker 77 was dispatched from Ukiah Airport with an ETA over the fire of 1:16 p.m. At 2:30 p.m., Oakland Fire Department requested four additional air tankers, and four CDF air tankers were immediately diverted from the Geysers fire north of Santa Rosa. At 3:52 p.m. Oakland Fire Department requested one more air tanker, and the order was filled immediately by CDF. At 4:04 p.m. Oakland requested an additional air tanker and the order was filled by CDF.

Seven helicopters worked on the fire dropping water. An East Bay Regional Park Police helicopter was used over the fire to direct some of the air traffic and provide intelligence. It was unable to communicate over the radio, so it had to land several times in order to pass on information to the Command Center. An Oakland Fire Department captain was used as an observer in this aircraft, as were EBRP personnel. An Oakland Police helicopter was also used, with an Oakland Battalion Chief flying as an observer. This Oakland Police Helicopter's primary function turned out to be evacuation, as it was unable to communicate with the Command Center.

The seven helicopters dropping water dipped it from several locations: Lake Temescal, when they could see to get into it; Lake Merritt; and a pond in the Mountain View Cemetery. The helicopter water drops were used in the Contra Costa Road area near Lake Temescal and along Broadway Terrace--both lower and upper. There was questionable success as many of the drops were observed vaporizing before reaching the fire. Early air tanker drops were made along Swainland Ridge southeast of Highway 24.

Aircraft were largely ineffective during the first three hours (11:00 a.m. to 2:00 p.m.) of the fire, except on the heel of the fire where the fire spread was limited, the visibility was good, and there were no structures. The first three hours of the fire accounted for 60% to 70% of the damage.

The ineffectiveness of aircraft was due to the strong, turbulent winds, low humidities, and continuous fuel chain of tinder-dry vegetation intermixed with structures which created intense heat. The heavy smoke in the fire area made many potential targets difficult to locate for drops. There is debate whether air tankers should be used in such a congested area. The air tankers had to fly out over the city at low elevation after they dropped.

3. Division Assignment

Captain Wylie, Engine 19, was Incident Commander and Division "A", and Lieutenant Dick was Division "B" Sunday morning for the overhaul mop-up of the Saturday fire, beginning at about 8:30 a.m. When the fire on Sunday began to expand at about 11:00 a.m., Battalion Chief Riley was assigned to Division "A" by Incident Commander Don Mathews. Division "A" was loosely located from the Gwin tank down Malbrough Terrace to Buckingham Boulevard. It is not clear if there was a Division "B" at that time.

When the fire expanded and overran the forces on Buckingham Boulevard, the division identity was lost for a period.

When the Command Center was moved to Highway 24 and Broadway, Assistant Chief John Baker became the Incident Commander and Don Mathews was the Operations Chief. The fire had crossed Highway 24. Battalion Chief Neil Honeycutt became Division "A", which was located from Highway 24 to the Rockridge area south of Highway 24, and eventually was expanded through the Claremont Country Club, Clarewood Drive to Hermosa and Arron Street and Broadway Terrace. Division "B" was assigned to Battalion Chief Garcia and was located between Highway 24 and Roble Road.

The Berkeley Fire Department had a Division from Roble Road, across Tunnel Road and up Alvarado Drive to approximate Eucalyptus Path above the Claremont Hotel. This fact was not included as part of the Oakland Command Center division assignment. This did not create problems on the fire scene.

Division "C" was originally assigned to Oakland Fire Captain Parker, and was primarily the Claremont Hotel. A San Francisco Strike Team, under Battalion Chief Paul Tabacco, assigned to this division moved his forces up onto Alvarado and advanced 5" lines up Eucalyptus Path to assist Berkeley along Alvarado and Sunset. This division was later expanded up Claremont Avenue to the junction of Alvarado Road.

Division "D" was from Broadway Terrace to Highway 13; Oakland Fire Department Captain Ready, and Livermore Lab Fire Department Assistant Chief Magee acted as Division Chiefs for this division. There was little contact with the Command Center, so it was unclear who the Division Supervisor on Division "D" was at any given time.

John Eliff, CDF Battalion Chief, was assigned Branch II from Highway 13 to Skyline Grizzly Peak Road. This assignment was not made until late Sunday afternoon around six o'clock. Eliff was under the impression he was Branch Chief for Branch II from Highway 13 to Grizzly Peak; however, he wasn't able to get beyond Skyline and Grizzly Peak Road. Eliff was assisted in this assignment by retired Oakland Fire Department Assistant Chief Al Sigwart.

D. SAFETY AND EQUIPMENT

1. Length of Shift

During the first 24 hours, fire line assignments were long. For example, Engine 24 with Lieutenant Eugene Dick and his "A" shift from station 24 were assigned the Saturday fire on Buckingham Boulevard. They then arrived back on the fire line at 8:30 a.m. Sunday. They remained actively involved on the fire until 1:00 p.m. Monday, when they were told to return to their station to rest. Most of the Oakland Fire Department "A" Shift, on Sunday, had the same lengths of shift.

This was also true of the Berkeley and Piedmont Fire Departments, as well as Mutual Aid strike teams assigned to the October 20, fire.

2. Firefighter Safety

There were 25 fatalities -- 23 civilians, one Oakland Fire officer and one Oakland Police officer. Credit is due to the Oakland Police and the Oakland and Berkeley Fire Departments that there were not more fatalities.

The need for a Safety Officer position was not identified or assigned as part of the Command Structure until after the CDF Incident Management Team arrived at 5:30 p.m. The potential for injuries and accidents was very high due to the incident circumstances and location: the narrow restricted access, destroyed and damaged utilities, the large volume of extremely hazardous, dry fuels, the extreme fire behavior, and rapidly spreading fire.

There was repeated exposure to flames, smoke, downed power lines and hazardous driving conditions at the fire scene. It is amazing that there weren't more accidents and injuries during the period from 11:00 a.m. to 6:00 p.m.

3. Equipment Compatibility and Effectiveness

In most cases, equipment worked well. There were a few reports of fire engine breakdown. Piedmont Engine 3 had to be taken out of service briefly at the Claremont Hotel Division "C", as did Oakland Engine 1 at the Parkwood Apartments. The Piedmont Engine was repaired and returned to service to Division "D" at about 1:30 p.m.

Oakland fire hydrants are each equipped with one or more three-inch national standard thread outlets. Other communities throughout California utilize hydrants with one or more 2-1/2 inch national standard thread outlets. Since 2-1/2 inch is the accepted standard, few of California's engines carry 3" x 2-1/2" adapters. A more expedient means of adapting hydrant outlets from three to 2-1/2 inch NST is needed. This is particularly important on those hydrants not equipped with pumper (steamer) outlets. The group recommends investigating the feasibility of installing 3" F to 2-1/2" M adapter with a break-away cap, the adapter staying on the hydrant at all times. This would solve the adapter problem and allow Oakland to retain the advantages of the three-inch outlets.

There were some operational problems because Mutual Aid engine companies which were supplied by hydrant adapters had to abandon them at some locations. They had to leave hose and hardware or be overrun by the fire. When they needed to hook to hydrants at another location they sometimes couldn't get adapters.

E. WATER AVAILABILITY

Discussions with East Bay Municipal Utility District revealed that nine pressure zones were affected by the fire on October 20, 1991. There are one or more reservoirs within each pressure zone. The reservoirs vary in capacity from 400,000 gallons to over 1,000,000 gallons. The reservoirs are linked by pumping stations which are activated by draw-downs from the individual reservoirs. The basic design of the system capacity is based on three

factors: the operational storage, emergency reserve, and fire flow reserve. The operational storage is based on 0.5 x the maximum daily demand; the emergency reserve is based on 1.0 x the maximum daily demand; and the fire flow reserve is based on supplying 1500 gallons per minute for two hours.

The rapid spread in the early stages of the fire caused power failures and, as houses were destroyed, individual house water service was ruptured. The ruptured water service lines caused a heavy drain on reservoirs. These reservoirs were in the same pressure zone in which hydrant water was essential for fire fighting. There was no auxiliary power supply at any pumping station.

The first power failure within the pressure zones was recorded at 11:35 a.m. in the Amito Cascade pressure zone. This affected the water supply to the Parkwood Apartments complex, and the upper Alvarado, Siler, Rispin and Claremont Avenue areas. The Amito Reservoir was not logged as empty until 2:25 p.m. The Strathmoor and Gwin Reservoirs, which supplied Marlborough Terrace, Norfolk, Strathmoor, and Buckingham Boulevard hydrants, were not reported empty until 3:30 p.m.

When the Parkwood Apartments complex burned, with subsequent ruptured water pipes, there was a major drain on reservoirs in the Amito Pressure Zone. It would be impractical to plan a system that would handle such a demand. Suppression efforts had to be abandoned in the Marlborough Terrace, Norfolk area when hydrants stopped flowing. This was approximately 12:30 p.m.

Fire suppression efforts in the upper Alvarado, Siler, and Rispin areas were slowed when hydrants went dry. Water had to be transported by water tenders and other fire engines to the engine company working in this area.

The fire-fighting efforts in the Buena Vista, Golden Gate, Ocean View, and upper Broadway Terrace areas were slowed by the heavy draw-down on the four-inch main grid. The water supply was not sufficient to maintain the suppression effort. It was necessary to back off block by block until water supply resources were adequate to support necessary heavy fire fighting streams.

Most of the water supply problems experienced in this fire were predictable. Some could have been avoided with automatic standby power or auxiliary pumping installations. The old water mains in upper Rockridge should have been upgraded before building densities reached that which existed at the time of the fire. The rupturing of the hundreds of service connections which drained the Amito Gwin and Strathmore reservoirs could not reasonably have been predicted.

F. RECOMMENDATIONS

■ Oakland's and Berkeley's operational level command staffs are overextended even without a large-scale emergency. The recognized standard for span of control in the

fire service is one chief officer for each five to eight operational companies. Berkeley currently operates seven engines, three trucks, and three ambulances with only one chief officer on duty outside normal business hours. Oakland operates 23 engines, seven trucks, and six tank wagons deployed in three battalions each commanded by a chief officer. Clearly, within each, there is a need for another battalion level division.

- Oakland should consider appointing a Deputy Chief. Currently, Oakland's battalion two is commanded by an assistant chief who also serves as duty chief for the entire city and as department head in the absence of the chief of the department. A deputy chief level position would enhance inter-platoon coordination to insure and better preserve unity of command concepts.

- Investigate the feasibility of installing 3" F to 2-1/2" M adapters with a breakaway cap on all hydrants.

- Agencies providing air tankers and water dropping helicopters should provide urban fire departments with guidelines for safe air operations. These guidelines should spell out the limitations of the aircraft during high winds, smokey conditions and difficult topography.

- Before reconstruction is permitted in the upper Rockridge area, the water grid should be upgraded sufficiently to produce a fire flow consistent with building size and density with no single fire hydrant flowing less than 750 GPM when any two hydrants are flowed simultaneously. Emergency back-up for refilling upper water zones should be changed to a permanently installed auxiliary pumping system. Reliance upon portable/transportable pumps is not realistic for the Oakland-Berkeley hills area. Access cannot be assured.

- All fire departments should maintain, at dispatch center operating positions, a list of locally available water tankers (contractors, aggregate and concrete suppliers).

IV. MUTUAL AID SYSTEM

A. BACKGROUND

The provision of mutual aid is an evolutionary process. The jurisdiction in which an emergency arises first commits its own resources. It the obtains additional resources first from neighboring jurisdictions, and then (sequentially) from the Operational Area, Region and Inter-region system until there are resources sufficient to deal with the emergency. Inter-regional resources are mobilized through the State Fire and Rescue Coordinator, Office of Emergency Services.

Mutual Aid is mobilized in accordance with the California Fire and Rescue Mutual Aid Plan. The state is divided into six Mutual Aid Regions. Each of the several counties within a region is an Operational Area. Fire chiefs within each Operational Area elect a fire chief from among them to serve as the Operational Area Coordinator. The fire department of which the Operational Area Coordinator is Chief is generally the area's Dispatch Center. Regional Coordinators are chosen by the Area Coordinators within each region.

The statewide mutual aid system is structured in a manner which insures mobilization of sufficient resources without reducing to an unacceptable level of risk the fire and rescue resources within any Operational Area. All mutual aid requests are channeled through the Operational Area Coordinator. Chief John Sharry, Lawrence Livermore Laboratory Fire Department, is the Operational Area Coordinator for Alameda County. That Department's Dispatch Center serves as the Operational Area Dispatch Center (LAB).

Requests for fire and rescue resources must specify the quantity, classification (kind), and type (capacity/capability) of each resource, a specific reporting location, reporting frequency and travel directions. Resource classification and typing are in accordance with the FIRESCOPE-developed ***Incident Command System (ICS) Operations Guide***. The most commonly requested fire mutual aid resources are engine companies. Mobilization of engine companies is normally in groups of five, each with a Chief Officer in command. Such a resource group is designated a Strike Team and the group's Chief Officer is the Strike Team Leader. When dissimilar resources are grouped for mobilization or deployment purposes, they are designated a Task Force. The officer in command of a task force is the Task Force Leader.

To speed the mobilization process, most Operational Areas have predesignated Strike Team composition and Strike Team Leader sources. Each zone in Alameda County has developed predesignated strike teams.

B. SYSTEM USE ON OCTOBER 20

The first request to mutual aid coordinator dispatch on October 20 was received at 11:40 a.m., from Oakland's Fire Communication Office. The request stated "We have a major wildland fire out of control and we need five strike teams." There followed a four-minute exchange between the coordinator and Oakland in order for the dispatcher to get information sufficient to start mobilization, i.e., classification, type, and reporting location.

Due to radio and telephone traffic and established mutual aid mobilization protocol, there followed a seven-minute time lapse before the mutual aid coordinator started notifying resource suppliers. It is noteworthy that the mutual aid coordinator instituted protocol changes to speed mobilization while this emergency was unfolding.

During the period between 11:40 a.m., October 20th, and 5:00 p.m., October 23rd, the mutual aid coordinator processed 17 requests. Requests included 88 engine strike teams (440 engine companies and 88 Chief Officers), six air tankers, 16 helitac units, eight communication resources, two management teams and support, two mechanics and two search and rescue teams. This is the largest mobilization of mutual aid resources for a single fire in the history of the system.

Alameda County East and South Zone provided six engine strike teams. Mutual Aid Regions II, III, IV AND V provided engine strike teams as follows: Region II - 33; Region III - 10; Region IV - 18; and Region V - 10.

Regional and inter-regional mobilization included resources from 244 local; 4 military and two statewide agencies. The total number of personnel responding with these resources was 1,539. Thirty of the strike teams mobilized were for "planned need." The period from the time of request to the time of assembly at rendezvous varied from 51 minutes to two hours and 51 minutes. Travel time from rendezvous to reporting location ranged from 34 minutes to six hours and 50 minutes. Distance traveled from home town to reporting location ranged from 12 to 365 miles.

Twenty-seven strike teams responded directly to the fire. Thirty-eight reported to a staging area and nine reported to the Mobilization Center. Those reporting directly to the incident responded Code 3 (emergency, red lights and sirens). Of those reporting directly, two reported to Division Commands, seven received assignments at the Incident Command Post, and two reported to Branch Managers. Other teams received assignments by radio, at time of departure from the rendezvous point, or by direct contact with a host department's representative upon or shortly after arrival.

Of the individual units responding, 204 (69%) were assigned a travel frequency. One hundred seventy-one (59%) were provided with an incident reporting frequency. Two hundred fifty-nine (90%) were able to communicate with the Strike Team Leader by radio. Two hundred forty-four were equipped for WHITE-1 communication. Thirty-six of the responding units felt their assignment instructions were not clearly stated. Twenty-nine units had radio communication difficulty resulting from poor radio procedure; 46 units reported

radio communication problems as a result of not having the proper frequencies. Sixteen units reported radio equipment failure.

Seventeen of the responding units had difficulties within their strike team. A variety of factors contributed to these few difficulties: exhaustion, rumors, confusion, injuries, and failure to follow instructions.

Eighty-eight percent of the engine companies actively engaged in fire fighting and were able to complete their assignment. Downed power lines were the most common operational problems (185), with water supply (165) and narrow steep roadways (132) running a close second and third. Lack of proper adapters and hydrants without sufficient residual pressure or running dry were, in that order, the most commonly voiced water supply problems. Many companies reported no contact with command structure after initial assignments.

At least one strike team was not given an assignment for more than 24 hours after arrival. Many reported three to nine-hour waits.

There were a few incidents in which Strike Team Leaders would not allow one or more of their engine companies to be utilized as single resource(s). In crossing an area enroute to assignment, this is a commendable and totally correct posture for a Strike Team Leader; however, when the Strike Team has reported to a Division or Sector Chief and particular objectives can best be accomplished by deployment in other than strike team configuration, it is important that Division and Sector Chiefs have the latitude to order the change. It is the responsibility of both officers to reunite strike team components at the earliest practical moment.

A number of Strike Team Leaders were puzzled that more of them were not given Sector or Division Chief roles in those areas which could not be adequately covered by the host department.

Despite difficulties experienced, mutual aid resources were effectively deployed. Where necessary, strike team leaders took the initiative to organize and coordinate perimeter defense operations. Cooperation between individuals and groups was exemplary.

C. RECOMMENDATIONS

- All fire service agencies, even the largest, must develop protocols and plan for "worst case" scenarios.

- There is a universal need for more frequent mutual aid mobilization exercises. Exercises need to be real time. Rendezvous inspection, travel frequency assignment, and in-transit communication practice should be included.

- The prearranged strike team commitments should include a strike team leader designee. A rotating schedule among operational area/zone providers should be developed.

- OES should develop procedures and technology to optimize the speed and capability of the state's mutual aid systems, particularly in catastrophic situations.

- Improve inter-regional alerting protocols. More lead time is needed for resources likely to be mobilized.

- When specialized resources are requested, those receiving such requests should begin moving the resource(s) immediately, clarifying details with the requestor only after initiating response.

- All fire departments need to plan for receiving massive mutual aid, including ordering, reporting, staging, deployment, supporting and demobilization protocols.

- Interagency multiple company exercises for wildland-structural mix fire operations must become part of the regular training schedule. All operational level personnel should attend at least one such exercise each year. Exercise should include a briefing of company level personnel on what to expect on a large scale incident.

- Cities and state agencies should establish automatic mutual aid, boundary drops, and interagency response protocols for mutual threat zones.

- All agencies should become thoroughly familiar with the protocols, procedures and terminology used to request air support.

V. INCIDENT COMMAND SYSTEM

The Incident Command System (ICS) was developed by the U.S. Forest Service and participating fire agencies in Southern California during the 1970s. The California Department of Forestry, Office of Emergency Services, Los Angeles City and the County of Los Angeles, Orange, Santa Barbara, and Ventura Fire Departments all participated. This system resulted in unification and coordination between multiple jurisdictions and agencies. It was designed to function in all-risk emergency incident situations such as floods, earthquakes, and chemical spills and has been adopted by most local government fire agencies. This fact is shown in the results of the survey of the fire agencies that took part in the October 20 fire.

The departments that responded to the fire report that 97% have adopted ICS and use it routinely in their daily responses. The departments all show that they received basic training in ICS, and that many departments have expanded their training into other areas of the ICS. However, most of the training at local government level has been in the area of day-to-day operations. Most local jurisdictional incidents are of a short duration and do not require the need for the prolonged planning and logistics support that is often required on major wildland fires and other types of major disasters.

It is unusual for local government agencies to have an incident such as the East Bay Hills fire which requires a total effort for several days. In such situations, local government agencies ordinarily request assistance through the Office of Emergency Services (OES) Master Mutual Aid Agreement, as was done in this incident. As the magnitude of the fire became apparent, an incident management team was requested to assist in the management; this was not fully in-place until late on Sunday afternoon. Below is a breakdown of each function of ICS, with indications of strengths and weaknesses on October 20.

A. COMMAND FUNCTION

In Berkeley and Oakland, transition of command was an evolutionary process. Each utilized the Incident Command System which prescribes that the Incident Commander is the first arriving company officer, then the first arriving Chief Officer, then the Senior Chief Officers in order of rank. The Tunnel Fire transition was:

OAKLAND: Lt. Wylie --> A/C Mathews --> A/C Baker --> Chief Ewell

BERKELEY: Lt. Corrigan --> Capt Orth --> A/C Dismuke --> Chief Cates

The final evolution was to establish the joint command about 5:30 p.m. when the California Department of Forestry management team arrived.

Berkeley's transition was relatively smooth. Operating units were aware of command shifts. The area of operations was not extensive.

Oakland's transition was complex and somewhat confusing during the half-hour following the blow-up. Lt. Wylie used "Tunnel Command", "Engine 19" and "Pumper 19" interchangeably as his identifier depending upon his function at the time of a transmission. The command post location selected by A/C Mathews was overrun before it could be fully established, radio frequencies were completely overloaded, and both the second and third command post sites proved untenable shortly after people arrived.

The organizational Incident Command Post was located on Highway 24 just west of the Caldecott Tunnel. The chiefs or their representatives from the cities involved were at the Incident Command Post operating together when the CDF Incident Management Team arrived, at approximately 1730 hours on October 20, 1991. At that time the incident was already organized into three branches and approximately nine divisions. When all members of the management team had arrived, they conferred with the chiefs of the respective agencies involved to determine the needs and priorities necessary to organize and manage the incident under a unified command system.

Prior to 1730 hours on October 20, 1991, the incident command function operated with the Incident Commander and the Operations Section Chief. During this period, some of the duties of the Planning Section Chief and Logistics Section Chief were done by the Incident Commander and the Operations Section Chief, with the assistance from company officers. These positions were not filled until the CDF incident management team arrived.

There were two apparent problems to deal with. The first was the need to provide accurate and timely information to the public, media, members of the city councils, mayors' offices, and other legislative bodies. It was necessary to appoint an Incident Information Officer immediately to work for the Incident Commander so that information could be supplied to the media and other people involved in an efficient and timely manner. This information office was established in the City of Oakland. All requests for information were routed through the unified information system in order to maintain legitimacy and accuracy until the incident was demobilized.

The second need was for a Safety Officer. Due to the narrow and/or restricted streets and access, destroyed and damaged utilities, aerial fuels, and the fast- moving wind-driven fires, a large number of fire service accidents, injuries or deaths were possible. To remedy this situation, the Safety Officer was given authority to stop any incident activity he deemed unsafe.

B. OPERATIONS SECTION

When the Incident Management Team arrived, the Operations Section Chief was located with the Incident Commander and was verifying all of his moves with the Incident Commander. It was necessary to order additional overhead staff to provide relief for people who had been on scene since the beginning of the incident. The Operations Chiefs, Branch Directors, and Division Supervisors were all relieved by late evening on the 20th and most of these positions were filled by CDF overhead staff. When local government personnel were rested, they returned to their assignments. Within three shifts, the cities had staffed all line overhead positions and were satisfied with the interaction of the other incident management sections.

C. PLANNING SECTION

The Planning Section was set up once the Incident Management Team was in place. This section was staffed by CDF personnel during the first three shifts. Local personnel were also assigned to the Planning Section and through a training process learned the function and duties of the Section. By the third shift, the city personnel took on the responsibility of formulating and documenting the plan and conducting all meetings. The incident was basically managed by the cities from that point on. However, CDF continued to handle the demobilization process because of the number of resources assigned to the incident, and CDF's recognized capability in this regard.

A major obstacle encountered by the Planning Section was the scarcity of information on initial attack resources, i.e., what resources had been ordered, and by whom. Since the bulk of the resources came through the mutual aid system, the Planning Section was eventually able to find and account for all resources by the end of the second shift. The perimeter map of the fire was easy to establish, but the collection of data on lost and damaged structures required a large commitment of personnel. An accurate assessment proved to be the largest hurdle for the planning section's situation status unit.

D. LOGISTICS SECTION

The logistics needs for this incident were especially difficult. The Incident Command Post and Base Camp had to be moved during the incident and 375+ engines and 2,000+ personnel had to be cared for. CDF staff were assigned to the Logistics Section since most local government agencies do not have personnel that are trained for that assignment in a major incident. Routinely, they do not have the need to provide long-term housing, bedding, and maintenance of equipment in the quantities required.

Local government agencies, including public works and other city/county departments, should be provided with ICS logistics training. This would provide a trained cadre that would be available to support the logistics functions of major incidents in a much more efficient manner.

E. FINANCE SECTION

Determining who pays for what and who has the authority to decide was likewise difficult. When numerous entities are required to work together, there is a critical need to establish a clear and concise procedure for determining who pays for what and who has the authority to authorize those payments. Local government agencies, both fire and non-fire, should make ICS Finance Section training mandatory for personnel who are in positions that may involve working with financial commitments between agencies.

To further complicate this function, a thorough knowledge of state and federal disaster proclamations and accompanying funding requirements is necessary.

F. RECOMMENDATIONS

- In this incident the ICS functioned as it should. However, more training on major incident management is required. More inter- and intra-departmental training sessions and drills using the ICS are indicated.

- Incompatible communications systems reduced the overall effectiveness of the Incident Command System. While not specifically a function of ICS, communications capabilities always play a major part in successful command and control of any incident.

- The ICS organizational structure should include a communications function with responsibility for frequency allocation and management.

- Frequent exercises in the transition from single resource to large multi-agency incidents are needed to hone the skills of both command and support staff. Particular attention should be directed toward establishment and staffing of operations, logistics, finance and planning sections and to internal command post communication.

- Exercises should include establishment of branches, division, and sectors within the operations section to provide an opportunity for officers to gain practical experience in those operational roles.

- More attention should be paid to the critical interface between the field functions (Incident Command, Incident Command Post) and the Emergency Operating Center. Information and intelligence must be shared as it is gathered.

VI. EVACUATIONS

Residents evacuated for three reasons: the fire department ordered them; the police department ordered them; or they decided on their own. During the early stages of the incident in the City of Oakland, evacuation was primarily initiated by the Fire Department personnel. However, the intensity of the situation motivated a number of residents in the immediate area to leave their homes of their own accord.

Within the three cities involved, evacuation is the primary responsibility of the local Police Department. As the incident progressed and the dangers became apparent, the Police Departments assumed this role.

Both fire and police personnel would benefit from joint training centered around statutes and authority to effect evacuation. The public believes the Fire Department is responsible for fire evacuation.

Evacuations were done on a one-on-one basis by residents and officials, door-to-door. Public address systems were used where available and practical. During the early stages of the incident in Oakland, Fire and Police Field Commanders had to make decisions between concentrating on evacuation or fire control efforts. Most chose fire control efforts in an attempt to abate the immediate danger. Non-ambulatory residents had to be identified by word of mouth and transported to a safe area by passing motorists. By late Sunday afternoon, evacuation efforts were more organized. Areas were blocked off and perimeter control established by the Police. Entry was denied to all but emergency personnel. Residents were evacuated to pre-identified areas.

Although fire personnel are not primarily responsible for evacuation, the fact remains that they will have continued involvement. The public address system is an effective tool, but some engine companies did not have public address systems.

A. WHAT HINDERED EVACUATIONS

1. Fire Behavior

Fire and Police Department personnel, as well as residents, were not accustomed to dealing with such extreme fire conditions. High winds moving dense smoke made it extremely difficult to determine exactly where the fire was. Residents did not know which way to go to get out of danger. Fire personnel could see only what was burning in their immediate area, which made it difficult to know where to send residents and where to move to their next assignment.

2. Ingress/Egress

The fire was in a mountainous area with limited access. Most of the roads leading into the fire area were narrow and winding, and many terminated in cul-de-sacs. In some

cases, fire apparatus could not pass one another on the same road. Around large apartment complexes, where roads were considered to be fully adequate, traffic jams resulted from the mass of people moving to a safe area. Downed power lines significantly impeded evacuation efforts. In some cases, fire apparatus and private vehicles were trapped in areas for several hours. Smoke severely limited vision and further complicated any movement in the fire area. These conditions, coupled with the fact that many fire personnel from out of the area were not familiar with the complex road system, caused a number of people to become disoriented and lost in their attempts to evacuate or find their next assignment.

3. Public Perceptions

Some residents simply did not understand the gravity of the situation, refusing to evacuate until the last possible moment. Evacuees were not instructed before, during, or after how to leave their homes--whether to lock doors, leave windows open or leave keys in vehicles.

4. Communications

During the early stages of the fire, communications between Oakland operational level fire and police personnel was on a one-on-one basis. Having no common radio frequency significantly affected the evacuation process. Adjustments to the evacuation efforts in anticipation of the fire movement therefore were slow and irregular. It should be noted the common frequencies are available at the Chief Officer level.

Because of the firespread pattern, Berkeley and Piedmont had more time to anticipate evacuation needs and put plans in effect. Discussions with representatives from all three departments make it evident that there was very little if any communication before or during the incident regarding plans or need for evacuation.

All entities would benefit from an informational exchange meeting well in advance of the next disaster. Such a meeting should include levels of responsibility, authorities, local procedures, automatic/mutual aid agreements, and plans.

The Emergency Broadcast System (EBS) was not used by any entity involved in the fire. After discussions with representatives from all three cities, it is apparent there is a need for more training in this area. (See the EBS discussion in the Emergency Management section.)

5. Re-entry into Restricted Areas

After initial evacuation some people returned to their residences despite the efforts of public officials to keep them out. The residents wanted to check on lost or unaccounted-for friends or relatives, remove additional items from their homes, or see if their homes had burned. This increased the number of people in the area and required re-evacuation.

6. Unauthorized Observers

Despite efforts by police and fire officials, on-lookers became a problem. The fire activity was highly publicized on local television and radio stations. The knowledge of the

activity was enough to attract curious folks from outside the area. These people had no specific destination and added to the traffic congestion in the fire area.

7. Limited Resources

Both Police and Fire Department resources were overwhelmed. When personnel were available to commit to a given area, evacuation and security efforts were successful. But the rapidly changing fire conditions made it extremely difficult to distribute resources effectively.

8. Security/Looters

Fire Department personnel observed a few civilians posing as volunteers to gain access to the fire area, then taking the opportunity to commit robbery/burglary. When possible, fire or police officials took action to remove the offenders.

B. EXISTING PLANS

The City of Oakland has an evacuation plan written in 1980. The Cities of Berkeley and Piedmont did not have a written evacuation plan in place at the time of the incident. City officials utilized a general disaster preparedness plan as a foundation for evacuation efforts.

C. RECOMMENDATIONS

- Both fire and police personnel would benefit from joint training on statutes and authority to effect evacuation.

- Though fire personnel are not primarily responsible for evacuation, the fact remains they will continue to have involvement. A loud speaker system should be on fire apparatus to accomplish this.

- Oakland and Berkeley operational level police and fire personnel should jointly resolve issues of responsibility, authority, local procedures, automatic mutual aid agreements and plans.

VII. VOLUNTEERS

Firefighters, police officers, and individual members of the community responded with inspiring dedication and heroism to fire-related tasks on October 20, 1991. To examine the role and actions of those who volunteered their skills and services during the initial operational period of the fire, random interviews were conducted.

Several California statutes govern the use of volunteer firefighters during local emergencies. The legal liabilities that are assumed and the various protections provided under California law are designed to protect the service requester and individual volunteer. These statutes may be found in the *California Labor Code* and *Government Codes*. Volunteers historically have been used during major emergencies.

A. OFFICIAL VOLUNTEERS

The Alameda County Sheriff's Department administers the County Office Of Emergency Services Volunteer Fire Department. The Sheriff's Search and Rescue Organization also operates under this organizational structure. The firefighters are classed as volunteers and the search and rescue members are considered disaster workers under the *Government Code*. Both of these organizations were called to respond to the fire shortly after noon October 20, 1991.

The Alameda County OES Volunteer firefighters responded as parts of three separate Task Forces drawn from the county East Mutual Aid Zone. The volunteers supplied two wildland patrols and a structural engine. They made a significant contribution to the early fire control efforts in the Broadway Terrace area of Oakland and in the City of Berkeley.

Members of the Alameda County Sheriff's Department Search and Rescue Organization were dispatched to Oakland, where they worked to establish the main "Incident Staging Area" in Raimondi Park at 18th and Wood Street. They staffed the "check-in" function at staging supporting several Oakland Fire Department personnel from 1430 Hrs through 2400 Hrs, October 20, 1991. They were then relieved by elements of the Overhead Management Team. During the early phase of the incident, a massive influx of resources was organized, inventoried, and assigned to provide for the final containment of the Fire.

Several jurisdictions within Alameda County have enhanced their Emergency Dispatching Function through the application of Computer Aided Dispatching Systems. The cities of Oakland and Livermore use a common manufacturer's hardware and software system in their geographically separate emergency dispatching activities for fire departments. Several "CAD-Qualified Emergency Dispatchers" offered to go to Oakland and assist the Oakland Fire Department dispatchers with the "Call Taker Function" the afternoon of October 20, 1991.

B. SPONTANEOUS VOLUNTEERS

Spontaneous volunteers from the threatened communities also came forward to help with fire-fighting at the engine company level. They worked on the fire perimeter, receiving guidance from members of the Oakland, Berkeley, and Piedmont Fire Departments.

A Berkeley Fire Department Officer recognized the need for immediate assistance to supplement the city's on-duty firefighters. At the Berkeley Staging Area he assigned a significant number of "spontaneous volunteers" to assist in the fire control efforts. The news media photographically documented their stand to slow the westerly spread of fire on Alvarado Road.

When the fire threatened to spread through the neighborhood located along Florence, Modoc and Morpeth Street, south of Broadway Terrace, five additional spontaneous volunteers came forward to help in slowing the fire's progress. Four of them were from the Alameda Naval Air Station and one was a Marine Corps officer related to a resident. They worked collectively and separately to extinguish at least five separate roof and landscaping fires with borrowed garden hoses and shovels. Any one of the spot fires would have significantly increased the number of dwellings lost. Firefighters in this area had no one else to turn to for additional help.

C. RECOMMENDATIONS

- The Incident Commander and command structure must be prepared to deal with the spontaneous voluntary offers of help and resources early in an incident.

- Planning for how to organize and where to focus the profuse outpouring of spontaneous help should create an incident organizational element to accept the voluntary resources.

- A policy should be developed and widely communicated throughout each emergency organization providing for the successful use of volunteers during major incidents.

VIII. MOP-UP

A. SATURDAY

In reviewing mop-up operations, it is necessary to examine both the conflagration of October 20th and the fire of Saturday, October 19th. The Saturday fire was discovered and reported by an East Bay Regional Park (EBRP) helicopter pilot on an overflight about 11:45 a.m. In his report to EBRP, he described a fire in what appeared to be a pile of scrap lumber. The exact location turned out to be in the rear of 7151 Buckingham Boulevard. The fire went from one to five alarms within 30 minutes. It burned off an area of no more than three acres before being brought under control in about three hours by an aggressive attack from 16 engine companies, four patrol wagons, and a helitac unit. All engines were released by 6:30 p.m. Both Oakland and East Bay Park District personnel returned to the fire during the course of the evening to check for hot spots.

In controlling the Saturday fire, great reliance was placed upon wet lines around the perimeter. Only one section of fire line (cold trail) construction was undertaken about 350 feet downward from Grizzly Peak Boulevard along the eastern flanks (CDF helitac crew). The rest of the perimeter was thoroughly soaked with hose lines and helicopter water drops. Within and just outside the burn along the east, south and west flanks there was fairly dense coverage by Monterey pines. Duff under these pine trees was cited by firefighters as having been a foot or more deep.

After having suffered the heat of fire, pine trees produce greater than normal needle cast, which adds fresh kindling to the accumulated duff. When a fire moves through duff, the top layer burns freely. As the fire penetrates into the more compacted material, it begins to starve for oxygen and is reduced to smoldering. When water is applied to the surface, flames are extinguished. The water combines with ash and charcoal to form a crust, but smoldering continues under the crust. Smoldering in such crust-protected material may continue for days, and sometimes weeks.

There were several flare-ups during Sunday morning's mop-up in heavy duff under trees. Crews were treating (mixing duff, water, and soil) these areas when the flare-up started the conflagration outside the Saturday burn.

B. MONDAY AND THEREAFTER

Mop-up operations commence when the fire is pronounced "contained"--usually at a point when new ignitions appear unlikely and perimeter control lines are well-established. Mop-up operations were coordinated through the relocated Incident Command Post at Alameda Naval Air Station. The ICS was kept intact. Operations were divided among three Branches, eight Divisions, with 12 Strike Teams assigned to each 12-hour work period. Operations were well-organized and coordinated. Division chiefs were briefed, radio frequency assignments made, safety hazards identified, and weather conditions discussed. Objectives for each work period were explained and, insofar as could be determined, met.

Mop-up was an orderly site-by-site operation to locate and extinguish remaining hot spots. Considerable digging through and movement of debris was involved. Anything salvageable found was carefully set aside and called to the attention of patrol officers. In a few circumstances, salvageable items were given to, or left in the custody of an identified owner or occupant.

From 8:00 a.m., October 21, through demobilization of mutual aid resources on October 24, Strike Team leaders and company officers expressed approval of the mop-up operations management. Reports simply stated "operations went smoothly and without incidents."

C. RECOMMENDATIONS

- Mop-up techniques and standard practices should be incorporated in the training of all companies in areas with wildland intermix fire zones.

IX. DEMOBILIZATION

Demobilization actually commenced while fire fighting was still very heavy. A few in-county resources were released between 9:00 p.m., October 20th and 8:00 a.m., the 21st as more mutual aid became available. This normal action is taken to restore depleted resources in nearby communities. Those first released were committed early in the fire fight and had been working hard.

A formalized Demobilization Center was established as an extension of the base camp operation at N.A.S. Alameda. All out-of-county resources were processed through the center. The demobilization process includes:

(1) Ascertaining that personnel are properly rested for the trip home,

(2) Determining need for any medical attention,

(3) Inventorying to discover damaged or lost equipment,

(4) Inspecting of vehicles to determine whether or not they are roadworthy. Making needed repairs when necessary and practicable,

(5) Inspecting safety and emergency warning devices to insure proper operation,

(6) Checking fuels and lubricants, replenishing as needed, and

(7) Offering stress counseling, if available.

On a large-scale operation such as the East Bay hills fire, demobilization is both necessary and time-consuming. It is an invariably frustrating process to firefighters who are ready to go home. There are also inevitable differences of opinion between vehicle inspectors/mechanics and unit officers as to the operational safety/reliability of a particular unit.

During the Demobilization Center's period of operation, it inspected, serviced and fueled 424 vehicles. Release dates:

October 20: 2 Engine Strike Teams
October 21: 1 Engine Strike Team
October 22: 12 Engine Strike Teams
October 23: 34 Engine Strike Teams, 1 Water Tanker
October 24: 22 Engine Strike Teams
October 27: 1 Support Unit
October 28: 1 Support Unit
October 29: 2 Engine Strike Teams

The most common comment from Strike Team officers was, "considering the magnitude of the task, demobilization went fairly quick and appeared to be well-organized. Some of the complaints expressed were "held too long in demob," "not on a more distance-first basis," "release time takes too long," "damaged hose not replaced," "releases not based upon provider's need," and "demobilization not well-organized, difficult to get a mechanic."

The safety check discovered problems in 151 units; 146 mechanical problems were corrected, and 72 non-safety related problems were deferred. One hundred five (46%) units were surveyed for damage before release. Fourteen units were not able to travel home with their strike team because of mechanical problems which couldn't be resolved by release time. Thirty-five units necessitated repair arrangements by the provider.

Of those surveyed, 174 officers felt demobilization was smooth and orderly, and 20 felt it was not well-organized. Twenty-one had no opinion.

X. EMERGENCY PUBLIC INFORMATION

The problems in disseminating emergency public information during the East Bay hills fire were not new, nor were they unique to the incident. The following is based on interviews with public information officers and the media involved in the fire. They had much to suggest about information coordination and local agency response.

According to both the media and Oakland Public Information Officers, the City of Oakland has an excellent plan for the dissemination of information in a crisis. However, in the East Bay hills fire, there were very few people who were *trained* in, or *knew and understood* the plan. The plan was not followed during the course of the fire. Almost all the activities were reactive.

A. AS IT HAPPENED

Because the fire started on a Sunday, a day in which there were no Public Information Officers on duty, an Oakland fire captain (whose normal job is Communications Officer) was appointed Public Information Officer by the Incident Commander. He was designated early (about a half an hour into the operation), but he was the only person involved for quite some time. He had no crisis communications training. City of Oakland Public Information Officers reported to the Oakland EOC from their homes, and this took considerable time.

The public information effort is often indicative of the efficient flow of information within an operation. Since communication and coordination were major problems in the operation, public information suffered also. It was very difficult for Public Information Officers to obtain and verify information. Calls from the media into Oakland Dispatch flooded telephone lines. A Fire Captain said the calls affected Oakland's ability to deal with the emergency. It was difficult to release available information through normal channels because phone lines were jammed.

An Information Center was set up at Fire Station #19, a couple of blocks from the main Command Post, about 6:00 a.m. the second day. This decision was made because the Public Information Officers were concerned that the Command Post might have to be moved and the Information Center would have to be moved also. It was also selected because it had telephones, bathrooms and other amenities. Cellular-1 brought in 20 cellular phones. Public Information Officers then called the major media outlets and provided them with the numbers. One captain said he didn't feel there were enough Public Information Officers at the Information Center and that contradictory information was released. However, reporters complained that there was **no** information available at the Information Center.

The first news conference was first held between 4:00 and 5:00 p.m. The Public Information Officer said he got most of his information from listening to Fire Department frequencies. He also faxed Incident Command System information forms to the media, but

some information was incorrect. In his words, "Everything that could go wrong, went wrong."

A California Department of Forestry firefighter trained as a Public Information Officer was sent to the fire about 2:00 p.m. the first day. He was first put in Operations, but about midnight he was asked to help the Oakland Fire Department Public Information Officer. The California Department of Forestry's first course of action was to ask for more Public Information Officers.

Oakland Public Information Officers who reported to the Emergency Operations Center were greeted by pandemonium. They also found the flow of communications frustrating. Furthermore, the city had a new mayor and staff, none of whom were familiar with the Oakland plan or had training. Briefings for reporters were held on the sidewalk in front of the EOC. Oakland's plan does not address mutual aid for Public Information Officers. Mutual aid coordination from San Mateo County was offered, but no response was received from Oakland.

Elected officials were briefed by staff able to get information quickly, but when information was presented by the Mayor at a news conference it was the first many Public Information Officers had heard of it. All Public Information Officers should be in the communication and information loop. City Public Information Officers tried to schedule regular briefings, using the Coroner's Office as the sole source of information on number of fatalities.

B. MEDIA ACCESS

Unlike the Cypress freeway collapse in the Loma Prieta earthquake, the fire was not contained to a relatively small area. There were many information sources for reporters. Various cities were releasing information and denying access to the media. Oakland Public Information Officers said the media were generally ignorant of the type and level of fire. Members of Bay Area media organizations complained of many roadblocks in their effort to broadcast life-saving information. One radio news director said he felt there was no organized effort to get information to the media. He also felt the City's Emergency Public Information plan was not followed. He also said his reporters were not allowed access to the Command Post, Highway 24, and other areas, as allowed under 409.5 (d) of the *California Penal Code*. The news director also said he heard dispatch tapes of the Police Department saying reporters will not be allowed access; he also heard callers to 9-1-1 asking for information and being told to listen to radio and television.

The radio news director said he felt the Public Information Officers were kept out of the loop of information and that emergency public information was not high enough priority. He didn't think the Emergency Broadcast System should have been activated, but that the newer, Emergency Digital Information System should have been. He would have liked to have had updates every 15 minutes.

A television news director said his station had information gathering problems right away. He said the public had a need to know, not a right to know. He felt better information flow could have saved lives and that section 409.5 (d) of the *California Penal*

Code needs to be explained to the troops in the field. (It allows media access to disaster scenes.)

Beyond the requirements of the media, these comments accentuate the need for rapid, accurate sharing of incident information among and between all parties involved or impacted.

C. RECOMMENDATIONS

■ Part of the initial dispatch of resources to any major incident should automatically be a trained Public Information Officer team. The quicker a Public Information Officer team can get to a scene and set up operations, the better the information effort will be.

■ A 25-30 person trained Public Information Officer team should be in the plan for every city and county. Team members will typically work in the field, at the EOC, the Command Post, phone banks, and in dispatch, answering media and public inquiries.

■ An equipped mobile and EOC Information Center is critical as a base of operations for the team. Adequate staff, cellular phones, fax machines and ham radio operators are important.

■ Media should have access to information. Whether that access is by phone, fax, or by entrance into the disaster area (under 409.5(d) PC), reporters must be able to obtain information.

■ Most importantly, emergency public information must be given a high priority by all involved. A coordinated effort, by a trained team able to obtain information from all involved, is the key.

■ An attorney representing the media reported that both Oakland and Berkeley have written "letters of understanding" to the media that state law enforcement personnel from those cities will respect the spirit of 409.5 (d) of the Penal Code. Enhanced training is required statewide.

XI. LAW ENFORCEMENT OPERATIONS

This report is partially derived from recorded logs, reports, transcriptions, and other printed information from the City of Oakland Police Department, the City of Berkeley Police Department, the Alameda County Sheriff's Department, and the Governor's Office of Emergency Services, Law Enforcement Division. Ranking officers on duty during the period of the firestorm were also interviewed.

A. IMMEDIATE RESPONSE

1. Departments Involved

The City of Oakland Police Department is comprised of 652 sworn officers and 359 non-sworn civilians. The department serves a highly urbanized area. The Patrol Division forms three watch platoons which provide law enforcement services for five designated districts.

The City of Berkeley Police Department is one of only four California law enforcement agencies accredited by the nationally recognized Commission on Accreditation for Law Enforcement Agencies, Inc. The department's 132 sworn officers and 12 non-sworn employees provide the citizens of Berkeley with programs focused on its unique suburban, residential, university environment. Those services include patrol requiring four shifts daily to service the city's 11.4 square miles and 102,724 residents.

2. Fire Event

The fire was noted by an Oakland patrol unit investigating a traffic accident and fatality in the Marlborough Terrace area of the Oakland Hills at approximately 10:58 a.m. Sunday morning. Fire units from the Oakland Fire Department had been working early Sunday morning to drown hot spots and embers within the burned areas of Saturday's brush fire. Darkened skies over the East Bay Hills area had been observed by a Berkeley Patrol Division Lieutenant on his arrival at the Berkeley Hall of Justice at approximately 11:00 a.m. This Lieutenant passed on these observations to the Berkeley Communications Center. The Lieutenant was told that the rekindled fire was confined to the city of Oakland. At about the same time, the Oakland Patrol Unit in the Marlborough Terrace area heard radio reports that the Oakland Fire Department was dispatching additional units to the vicinity of Saturday evening's brush fire along Grizzly Peak and Tunnel Road.

3. Initial Law Enforcement Activities

By noon, the police departments and fire services of both cities were still actively trying to assess the scope of the fire. The City Manager of Berkeley confirms the early call-out for the Chief of Police, City Manager, and other off-duty department personnel. By 12:11 p.m., all available on-duty patrol units were staging and being deployed to control heavy vehicle and pedestrian traffic which had rapidly grown in the area of the Claremont

Hotel. The Fire Department ordered the evacuation of homes in the affected area of Berkeley at 12:17 p.m., ten minutes following the first telephone call for 911 assistance. By 12:38 p.m. all of Berkeley's law enforcement and fire-fighting personnel were fully committed to combating the fire and carrying out evacuation orders.

In the city of Oakland, police patrol units were being dispatched to District II, the area of the fire's origin, to control traffic and crowds. Several patrol units with officers unfamiliar with the street layout became lost. One such unit, descending the area through dense smoke, stopped to pick up two elderly females with their pets. The unit then inched its way to safety assisted by radio communications with Oakland Dispatch and other nearby mobile police units. An Oakland Police Officer perished during the first hour of evacuations.

Getting an overview of the devastating fire was a real problem for the Oakland Police Department. Deputy Chief Tom Donahue, in charge of Oakland Police Department Operations, stated that had he had a total picture of the fire from the air, it would have greatly assisted law enforcement's initial response to affected areas.

The Oakland Police Department evacuated over 5,000 people during the first hours of the fire. Officers made door-to-door evacuation orders. Motor units were especially useful in maneuvering through the logjam of abandoned vehicles and fleeing pedestrians. The added missions of traffic and access control, perimeter security depleted the department's personnel resources by late afternoon. The Alameda County Sheriff's Department, having mutual aid coordination responsibilities, responded to Chief Hart's request for assistance immediately upon request.

B. LAW ENFORCEMENT MUTUAL AID

The Law Enforcement Operational Area Coordinator, Sheriff Plummer, provided initial mutual aid responders from his own department along with officer elements from several Alameda County police departments. Access control and anti-looting patrol activities became primary tasks for mutual aid responders. The influx of these fresh resources allowed Oakland Police Department to relieve its personnel, some of whom had been on line since the beginning of the morning shift. The City of Berkeley Police Department was also augmented by mutual aid forces.

The common missions of access control, anti-looting, perimeter security and further evacuations transcended jurisdictional lines. Units of responding mutual aid officers could be observed in both Oakland and Berkeley supplanting the beleaguered police forces of both cities.

Staging and briefings of mutual aid responders were accomplished at the Convention Center. This facility was distant from the firestorm scene and afforded some advantages for arriving responder units and the Oakland Police Department:

- No added traffic within the fire area;
- No interference with on-going fire fighting and evacuations;
- Provided necessary shelter for off-duty elements.

Alameda Co Sheriffs's Department	280	State OES, Region II	
		Contra Costa County	61
Police Departments - Alameda County		Marin County	31
Alameda	19	San Francisco Police	22
Emeryville	4	San Mateo County	73
Fremont	14	Santa Clara County	53
Hayward	36	Solano County	74
Livermore	23	Sonoma County	20
Newark	8	SUB-TOTAL	334
Pleasanton	8		
San Leandro	16	Alameda Co Sheriff's Dept	280
Union City	19	Alameda Co Cities	153
B.A.R.T.	6	Out-of-County Departments	334
SUB-TOTAL	153	TOTAL	767

1. Command and Control

Maintaining direction and control of law enforcement and other response resources was an initial problem. This was largely due to a lack of information and the flow of information in the first hours of the fire. This was especially true in the City of Oakland. Radio frequencies used by fire services and police elements were taxed to maximum capacity. As is the case in most emergencies, those radio frequencies specifically set aside for emergency/disaster use are generally used daily for non-emergency purposes; their primary function as an emergency response frequency is negated when most needed.

A common Emergency Operation Center (EOC) was not established early during the firestorm. In Oakland, the fire services Field Command Post was mobile and changed location several times. The Oakland Police Department retained its operations from headquarters until eventually moving its field base of operations to the Rockridge B.A.R.T. Station. It was later moved again to a local school building. The City of Oakland EOC, which opened at Fire Station #1, was yet a third point of coordination. Direction and control becomes complicated, at best, with such wide-flung locations attempting resources coordination and decision-making.

In Berkeley the EOC was fully activated by mid-afternoon, though some of the EOC staff, including the City Manager and the Chief of Police, had been there earlier as the fire was evolving.

Communication was a continual problem and presented an obstacle throughout the event. Personal liaison among agencies provided some assistance in information flow and exchange.

2. Coroner Operations

The Alameda County Sheriff's Department mission includes coroner responsibilities. The Sheriff's Coroner's Bureau was solely responsible for the task of recovering the remains

of victims of the Oakland hills fire in the Cities of Berkeley and Oakland. The coroner is responsible for the dignified recovery of the dead; securing personal belongings; and determining the cause, mode, and manner of death.

The Sheriff's Coroner's Bureau was alerted to the fire by Alameda County Dispatch at 1400 hours on Sunday afternoon, October 20, 1991. On-duty staff at the bureau were ordered to remain on duty and call-out was begun for off-duty personnel to form 12 hour shifts. Call-out and response occurred without problems; facilities equipment and supplies on hand were considered adequate at the time of notification. The morgue's refrigeration unit capacity was at 66%. The usual capacity of 45 spaces could be doubled, if need be, with slight alteration to the available floor space.

The bureau's emergency event staff needs were met by on-duty bureau personnel, all of whom participated in emergency operations during the Loma Prieta earthquake two years earlier. Commander Cain and staff supervisors implemented standing bureau plans which included:

- Contact with contract pathologists, odontologists, and anthropologists, notifying them of the possibilities for their services.
- Requesting additional deputies for the exterior security of the 4th Street coroner's facility.
- Added photographers for on-site recoveries; courier function for dental records or odontology reports deliveries from dentists offices and hospitals.
- Continuity of normal Public Administrator duties during the emergency event.

Field operations were conducted exceptionally well. There was no shortage of supplies or equipment, and all recovery equipment functioned properly. No delays were due to lack of staff or needed equipment. Replacement consumable supplies were ordered as on-hand items were used. Due to the nature of the recoveries, a special requirement developed for sieve equipment for use in the fire's rubble. The department's carpenter shop constructed several archaeological field sieves on short notice. These improvised items proved invaluable in uncovering identifiable remains. From October 20 through 28 the Coroner's Bureau completed 71 deceased recoveries:

- 25 fire victims
- 12 non-human remains recovered from the incident
- 34 non-fire deceased recoveries

Crisis counselors were at the bureau throughout the emergency period. The focus of their attention was toward victim families. They were extremely busy on some days; the service they provided freed coroner personnel from these duties. In addition to assisting in mitigating families' immediate grief, they also established themselves as a source for follow-up counseling for many victims' families.

Mobile radio for coroner's operations is confined to the local government frequency. During normal operations, day-to-day use of this frequency is heavy. During the emergency,

the frequency was described as congested. Static feedback also added to mobile radio communication difficulty. Cellular phones offered the best alternative to mobile radio outside of a dedicated coroner's frequency. The phones worked very well except battery power placed a limit on availability. The inadequate number of cellular phones also limited their effective use.

Power was interrupted for a short while on October 20; this posed no significant threat to operations. Lacking adequate data base and spread sheet software programs made access to on-hand information take longer than was necessary.

Sequencing of forensic services became a concern for pathologists. In a few instances, odontologists and anthropologists examined remains before pathology services were concluded. While this did not present major problems or delays in the identification process, it did raise questions of procedure.

3. Victim Recovery

The bodies of the first known victims were recovered and identities determined the first evening of the fire. With the memory of the Loma Prieta earthquake and the Cypress Street freeway structure collapse still fresh, the Alameda County Sheriff and Coroner requested mutual aid assistance for the thorough search of the burned area.

Search and rescue units, largely a volunteer force, were alerted to the task as early as Sunday night. Full planning for recovery was undertaken by a combined group of sheriff's deputies and department volunteers. Inter-regional resources were identified and requested for search operations to begin on Tuesday, October 22, 1991. Units and departments included are set forth in the following table.

LIST OF PARTICIPANTS IN SEARCH OPERATIONS

AGENCY		STAFF	HOURS
ALAMEDA COUNTY		79 (volunteers) 45 (paid)	893.75 438.25
	SUB-TOTAL	**124**	**1,331.00**
BAMRU		31	317.25
Cal ESAR		43	437.00
CARDA		70 /33 dogs	697.25
Contra Costa		30	285.25
EBRPD		33	350.00
El Dorado County		19	134.75
Marin County		12	93.00
Placer County		32	296.25
San Mateo County		65	700.75
Santa Clara County		99	1,007.25
Santa Cruz County		33	351.50
Sonoma County		43	406.25
WOOF		14 /14 dogs	131.50
Fire Services		71	588.25
State OES		15	111.00
MISC		29	135.75
	TOTALS	**762**	**7,374.00**

As outlined in the plan, the charred residences of persons listed as missing would be searched first. An extensive base of operation was established on lands of East Bay Regional Parks. This Command Post, established at Lake Temescal, provided a command center, staging area, and all the needed functions of a base camp. These facilities would be used through Saturday, October 26, 1991.

Aided with search dogs trained in disaster recoveries, ground searchers labored on hands and knees for four consecutive days, sifting through ash, soot and debris. By October 26, the remains of the last victim of the firestorm were recovered. The Sheriff's Coroner function was completed Monday, October 28.

XII. EMERGENCY MANAGEMENT

The fire unfolded so rapidly that it was difficult for the emergency management system, despite plans, training and professional personnel, to keep up. The command, control and coordination mechanisms at the intra and inter-governmental levels were not fully functional until well into the emergency.

A. NOTIFICATIONS

Inter-agency notification appears to have been problematic. Due to the speed of the fire's spread, interagency notifications were often slow. Some agencies first became aware of the fire's destruction through media accounts, rather than through official notification channels. This led to staff and agencies attempting telephone contact with emergency dispatch centers which were already overloaded with emergency calls. More effective notification systems, capable of rapid reaction, should be developed.

In an attempt to gather timely, accurate information, the State Office of Emergency Services (OES) sent liaison representatives to local Emergency Operations Centers (EOCs). These individuals functioned as "eyes and ears" to better understand the nature of the emergency, and the types of assistance required to deal with the emergency. Some representatives were also dispatched to field command posts, again due to lack of information flow among sites and agencies.

B. EMERGENCY BROADCAST SYSTEM

Oakland chose not to use the Emergency Broadcast System due to its perceived inefficiency. The capability existed for Oakland to put out a single announcement or evacuation order. Individual stations may decline to broadcast local EBS messages; however, federal regulation stipulates that every broadcast station must be equipped and ready to receive an EBS message.

Completely overhauled in 1990, the EBS system was specifically authorized for this particular type of use. Oakland was authorized to activate local EBS directly without having to go through either the county or the state.

C. SHELTERING NOTIFICATION

Within 24 hours of the event, approximately 5,000 persons were evacuated and in need of shelter. Eleven shelters were set up by the American Red Cross. Some residents were allowed to return to inspect damage after evacuating the area. Having dealt with similar problems in the past, Oakland and the Red Cross worked around the clock to place evacuees into shelters. The process was slow because setting up evacuation centers takes time and it was difficult to remove persons from the fire area.

D. RECOVERY

Because of Oakland's experience during Loma Prieta, the city established separate groups to deal with recovery issues. Six policy groups were established to streamline operations; clean-up, erosion, economics, public safety, rebuilding, and communications. These groups met daily and involved six or more representatives of the 18 departments that were involved in these policy groups.

E. RECOMMENDATIONS

To a great extent, the early functions of emergency management were handled by law enforcement and fire services. Overall emergency coordination is, however, a shared responsibility, among and between departments and disciplines. Key aspects requiring improvement are the development and sharing of information, including provision of timely and appropriate emergency information to the public, and the facilitation of coordinated, **multi-disciplinary** response to large-scale emergencies.

- Another issue is the need for the fire service and law enforcement decision and coordination centers to better communicate and coordinate with the overall emergency management function. Comments and observations indicate that the systems, though inter-related, often failed to coordinate information, activities and planning with other agencies in different disciplines.

- Local emergency management staff from each community were overwhelmed. Oakland responded by accepting emergency managers from Santa Clara and Contra Costa as mutual aid staffing. This concept has been employed on a limited basis in other emergencies, and should be expanded statewide. A more formal process for tasking and assignments is needed.

- The Emergency Broadcasting System (EBS) and Emergency Digital Information System (EDIS) need to be marketed so that they are used to their fullest benefit.

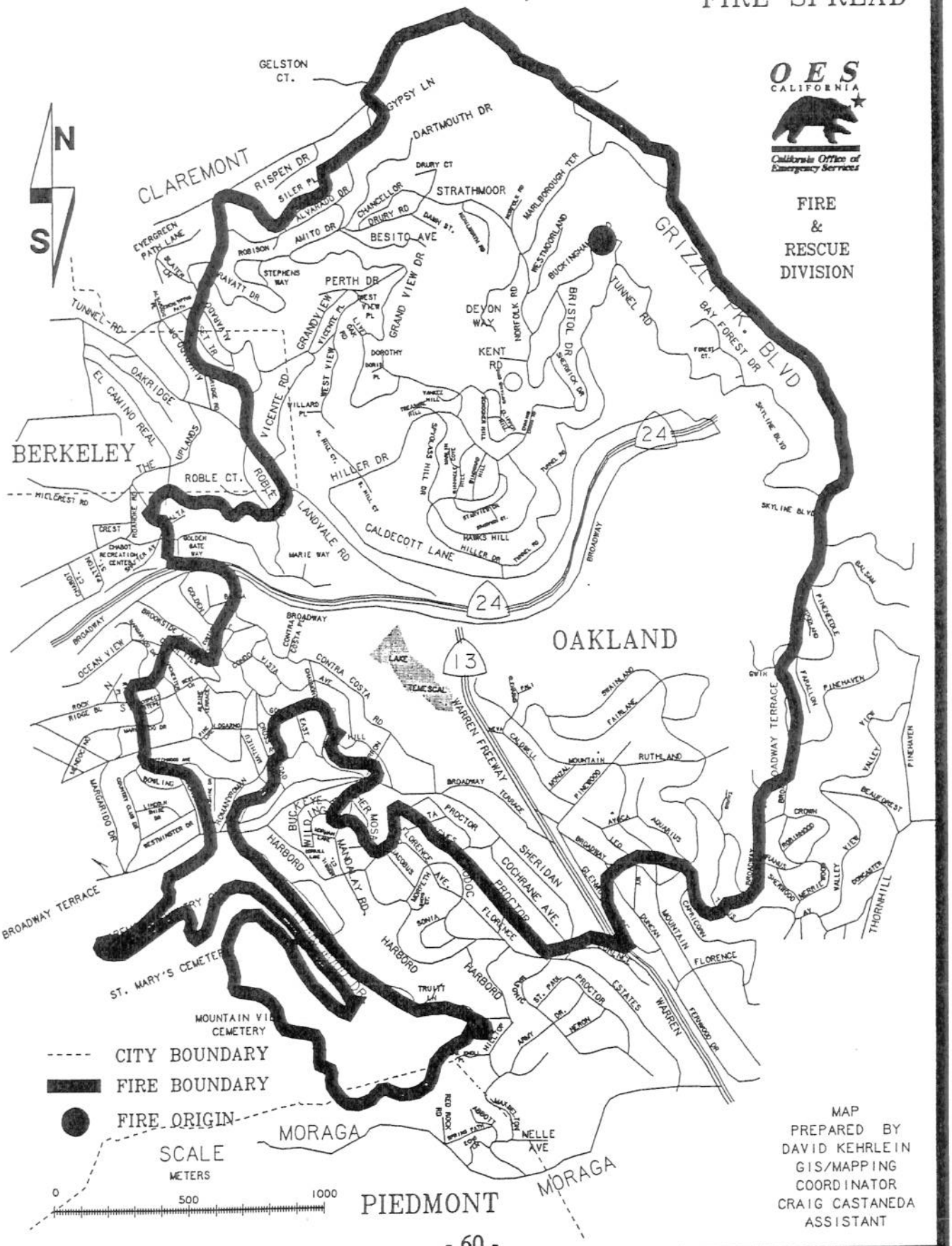
CALIFORNIA'S LARGEST RESIDENTIAL WILDLAND FIRE LOSSES
(Losses in Excess of 50 Structures)

YEAR	NAMES OF FIRE	COUNTY	ACRES BURNED	STRUCTURES DESTROYED
1923	City of Berkeley	Alameda	130	584
1961	Harlow	Mariposa	41,200	106
1961	Bel-Air	Los Angeles	6,090	484
1964	Hanley Series	Napa-Sonoma	71,601	174
1964	Coyote	Santa Barbara	61,000	94
1967	Paseo Grande	Riverside	48,639	61
1970	*California Series	Statewide	576,508	722
1970	Bear	San Bernardino	53,100	54
1977	Sycamore	Santa Barbara	804	234
1978	Creighton Ridge	Sonoma	11,405	64
1980	Stable	San Bernardino	5,482	65
1980	Summit Series	San Bernardino	41,472	355
1981	Atlas Peak	Napa	22,000	69
1982	Dayton Haul	Ventura/L.A.	57,000	65
1985	Lehr	San Diego	200	64
1988	49'er	Nevada	33,500	312
1988	Fern	Shasta	7,800	58
1990	Painted Cave	Santa Barbara	4,900	641
1990	"A" Rock	Mariposa	12,136	66
			SUB-TOTAL	**4,272**
1991	**Oakland Hills**	**Alameda**	**1,600**	**3,354**
			TOTAL:	**7,172**

*A series of 773 separate fires located throughout the length of California occurred over an approximate 10 day period.

OAKLAND/BERKELEY HILLS FIRE OF OCTOBER 20, 1991

ANNEX B
ESTIMATED FIRE SPREAD



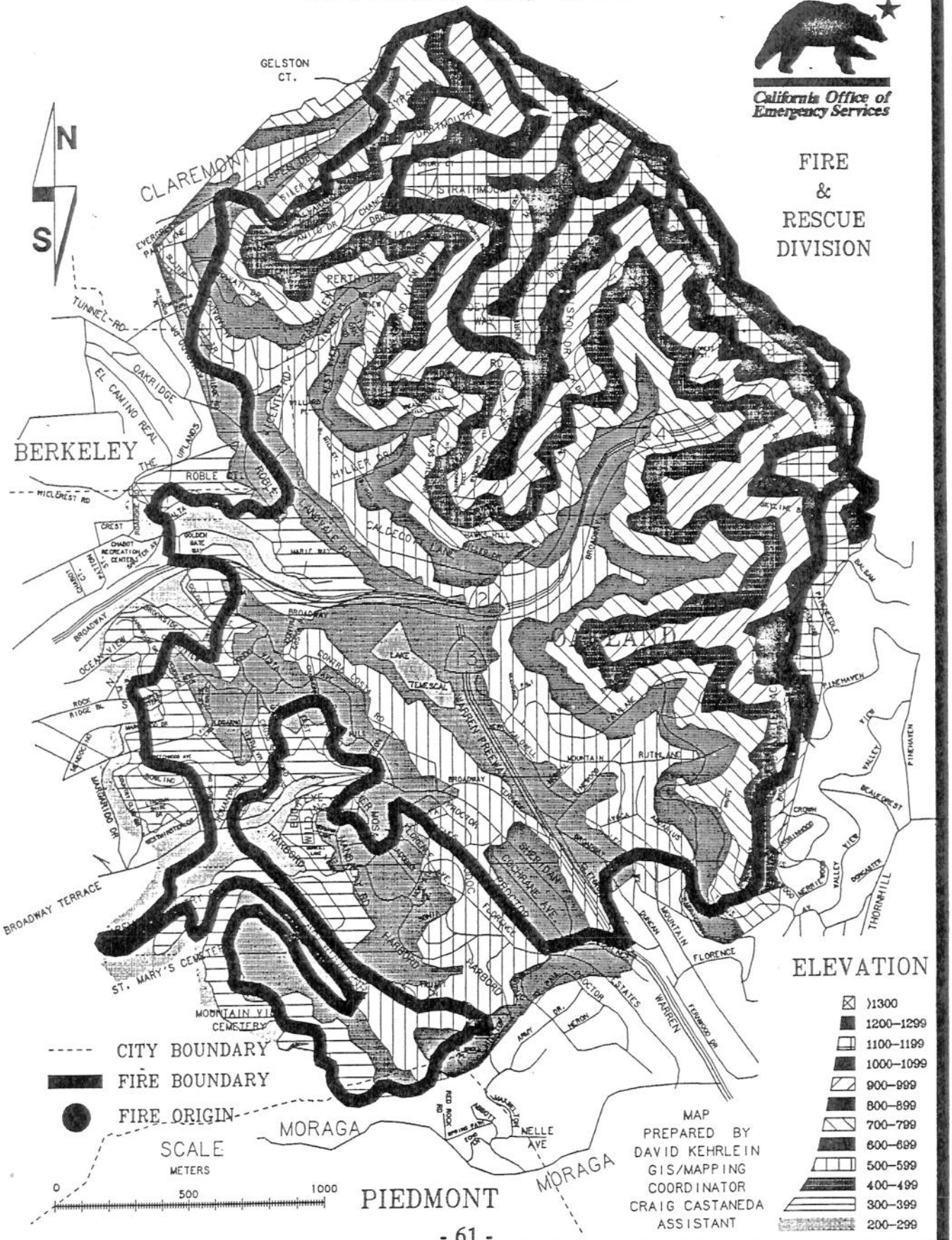
OAKLAND/BERKELEY HILLS FIRE OF OCTOBER 20, 1991

ANNEX C

OES CALIFORNIA

California Office of Emergency Services

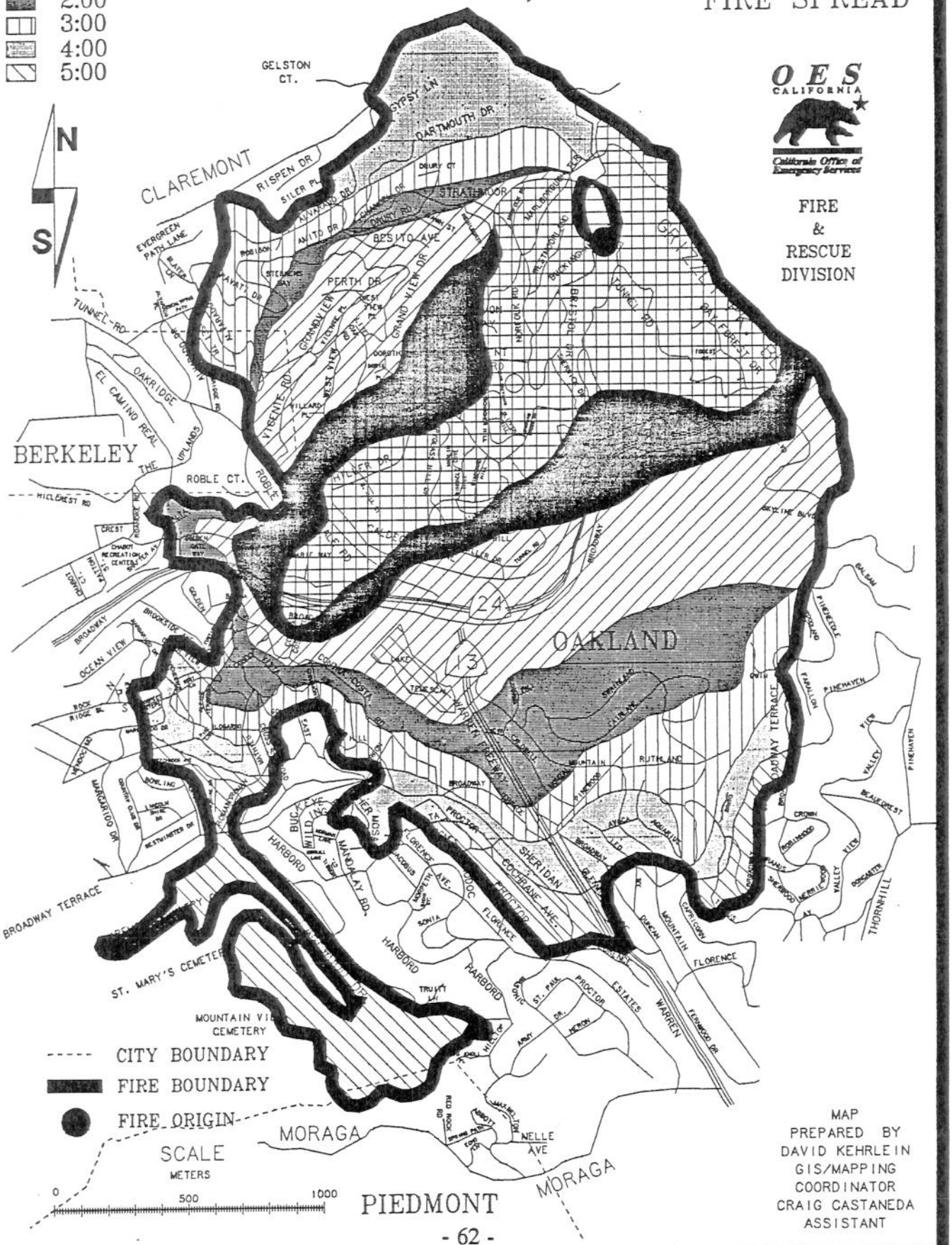
FIRE & RESCUE DIVISION



OAKLAND/BERKELEY HILLS FIRE OF OCTOBER 20, 1991

ANNEX D

ESTIMATED FIRE SPREAD

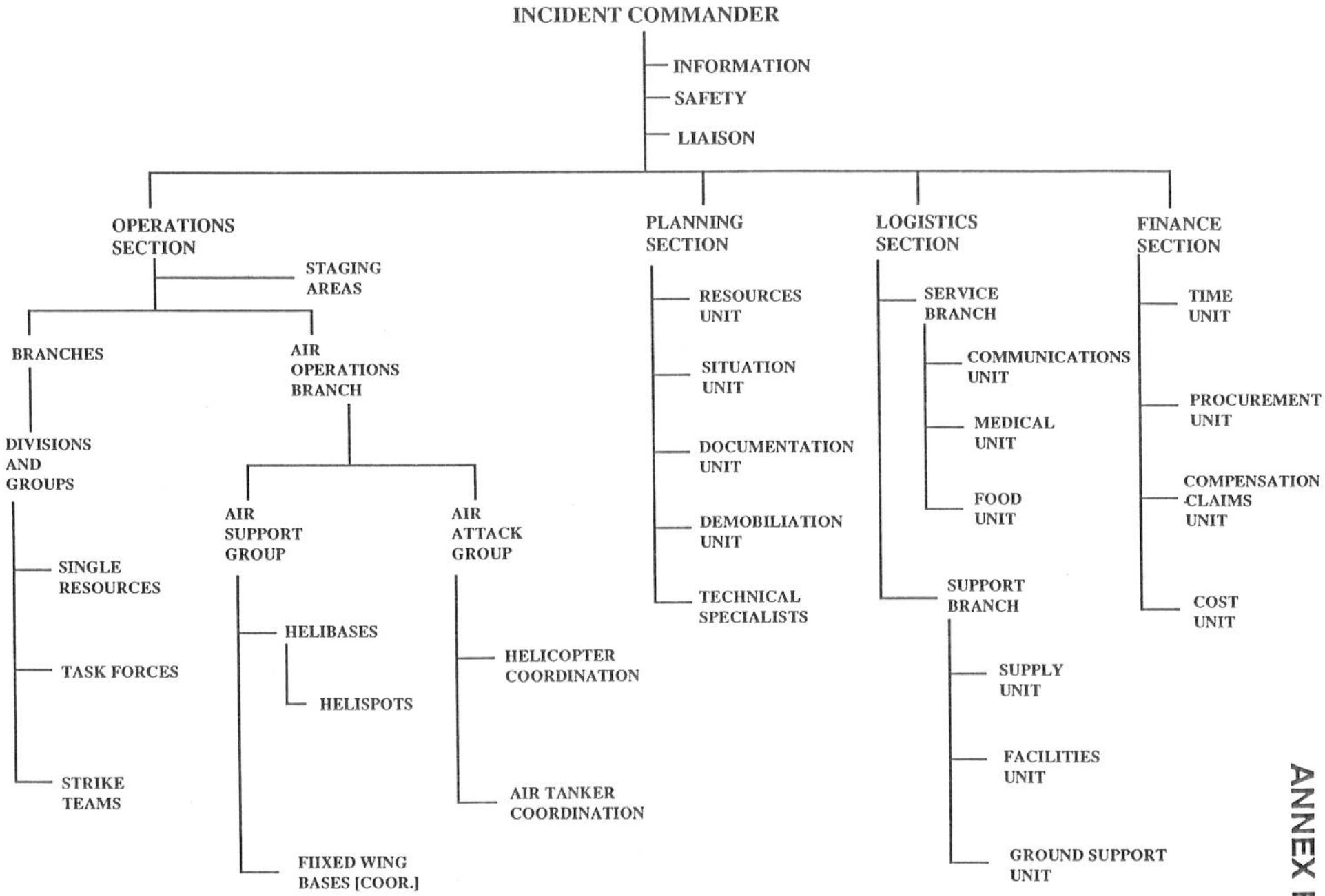


OES CALIFORNIA
California Office of Emergency Services

FIRE & RESCUE DIVISION

MAP PREPARED BY
DAVID KEHRLEIN
GIS/MAPPING COORDINATOR
CRAIG CASTANEDA
ASSISTANT

INCIDENT COMMAND ORGANIZATION



ANNEX E

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