



Office of the City Manager

CONSENT CALENDAR
October 5, 2021

To: Honorable Mayor and Members of the City Council
From: Dee Williams-Ridley, City Manager
Submitted by: Jennifer A. Louis, Interim Chief of Police
Abraham Roman, Interim Fire Chief
Subject: Waiver of Sanctuary City Ordinance for Motorola Solutions Lease

RECOMMENDATION

Adopt a Resolution waiving the contract prohibition of Berkeley Municipal Code Chapter 13.105, Sanctuary City Contracting, in order to enter into a Public Safety Radio System lease with Motorola Solutions, Incorporated.

FISCAL IMPACTS OF RECOMMENDATION

The approval of this waiver now will allow the City of Berkeley to save \$1 million dollars.

CURRENT SITUATION AND ITS EFFECTS

The Public Safety Radio System is a Strategic Plan Priority Project, advancing our goals to provide state-of-the-art, well-maintained infrastructure, amenities, and facilities, provide an efficient and financially-healthy City government, and create a resilient, safe, connected, and prepared city.

In order to provide effective and expeditious public safety services for the City of Berkeley, the Police and Fire Departments rely on multiband portable and mobile radio communications to ensure emergency services can be delivered to the City of Berkeley and other regional partners. The preeminent provider of radio communications equipment is Motorola Solutions Incorporated. While Motorola Solutions Incorporated has several divisions within their organization, the radio system and equipment will not be accessible to the United States, Immigrations and Customs Enforcement (ICE) officials. However, Vigilant Solutions is an independently operated subsidiary of Motorola Solutions Incorporated. Vigilant Solutions provides services to the ICE organization. Pursuant to Chapter 13.105, the Sanctuary City Contracting Ordinance, the Council must grant a waiver in order for the City to contract with Motorola Solutions Incorporated.

BACKGROUND

The Police and Fire Department currently use Motorola manufactured portable and mobile radios. Radio communication is critical to providing emergency response services to the City of Berkeley. The majority of the current public safety Motorola radios were purchased in December of 2011 and have exceeded their useful life. Additionally, radio replacement parts will no longer be manufactured, making radio repairs nearly impossible. Furthermore, radios will need to be encryption enabled to be compliant with the California Department of Justice mandates that all transmissions of personal identifiable information and criminal justice information be encrypted to reduce the unauthorized use of confidential information over the public safety radio systems statewide. The Fire Department also has an urgent need to expand the number of radios assigned to support the department redesign. These radios will be used to support enhanced operations in fire prevention, wildland urban interface prevention, and the expanding number of ambulances that will be deployed in FY22-23.

The City of Berkeley is a member agency of the East Bay Regional Communications System Authority (EBRCSA). EBRCSA is a radio communications network system built by Motorola to provide interoperability for emergency responders and others on the network in Alameda and Contra Costa counties. The original purchase was as a result of an extensive RFP process in which Motorola was the only respondent that could implement the scope and magnitude of the project. All Sheriff, Police, Fire, and EMS agencies in Alameda and Contra Costa Counties are part of EBRCSA network; with the exception of Bay Area Regional Transit Police. Several agencies in Solano County have joined EBRCSA as well. The Berkeley Police and Fire 911-Dispatch radio consoles were also built by EBRCSA with Motorola equipment. EBRCSA owns and maintains the Dispatch consoles. EBRCSA contracts with Motorola for repairs and hardware and software upgrades to the Dispatch consoles.

The lack of radio communication between public safety agencies during major fire events, most notably the 1991 Tunnel Fire was the impetus – which took a decade to implement - behind the initiative to create a radio communications system with reliable, regional, radio interoperability between police and fire responders. There are several pivotal documents that were created following the tunnel fire that are relevant to understanding the scope of not participating in the established regional communications system.

From the United States Fire Administration's (USFA) Technical Report Series, *"The Oakland and East Bay Regional Park District units were having difficulty coordinating their efforts, since each agency's units were on their own radio channels. Passing messages via the dispatchers, then by telephone from one communications center to the other, proved to be a problem."* When responding companies were asked to use the few mutual aid channels that were common to all agencies, *"The mutual aid radio channel was hopelessly jammed with communications, and they were unable to make contact with the Command Post."* This resulted in chaos as *"It was difficult to determine*

resource deployment because so many units were engaged in actions that were unknown to the Command Post. They were engaged in different areas, had no radio contact with the command structure, and were operating on their own initiative.”

The USFA report goes on to state *“The shortcomings of the communications system were also a major obstacle to effective incident management. The radio system proved to be inadequate for the scale of operations that was necessary, even for the initial stages of the incident. These factors made effective coordination or control of the mutual aid resources that arrived during the first five hours impossible.”* With the frequency of large, disastrous fires that sweep through entire cities become more commonplace, maintaining every operational advantage that has been hard found for following loss of life and property is essential to our mission moving forward. *“When the fire spread into the City of Berkeley...with the Berkeley Fire Department units utilizing their own radio system. This meant that there were [two] incident commands...working with four separate communications centers and unable to effectively communicate with each other.”*

In a report published by the National Fire Protection Association (NFPA) titled “The Oakland Berkeley Hills Fire”, it is made clear that the previous radio communications systems were unable to handle *“...the sudden and massive buildup of fire fighters summoned to the fire front neighboring departments...”* Additionally the EBSCRA system has near universal coverage in all operational areas of Alameda and Contra Costa Counties, whereas *“The steep hills interfered with radio transmissions, especially those from hand-held radios. Finally, communications between Oakland and Berkeley. were hampered...”* because of inadequate communications technology.

While the fire department is the primary agency responsible for fire suppression and rescue, the police departments are the primary agency responsible for coordinating evacuation. Having common communications between these two professions in these situations is literally critical to protect life. The same NFPA report cites *“The lack of a common radio frequency at the operational level between Oakland fire and police officials hampered evacuation coordination.”*

In *The East Bay Hills Fire A Multi-Agency Review of the October 1991 Fire in the Oakland/Berkeley Hills* written by the California Office of Emergency Services (Cal OES), the impact of uncommon and inadequate radio communications is again highlighted *“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.”* In a startling vision of how significantly challenged the radio communications system became *“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.”

Finally, The Alameda County Grand Jury report issued on June 30, 1993 by the Honorable Joseph J Carson cites that *“The failure of the communications system used by the Oakland Fire Department and the Berkeley Fire Department contributed significantly to the chaos of the situation on October 20, 1991.”*

The Sanctuary City Contracting Ordinance, adopted in 2019, prohibits contracting with an entity that provides services to the United States Immigration and Customs Enforcement Department (ICE) unless a waiver is granted by the Council. Section 13.105.030 provides that a waiver can be granted “...based on a specific determination that no reasonable alternative exists, taking into consideration the following:

1. The intent and purpose of this ordinance;
2. The availability of alternative services, goods and equipment; and
3. Quantifiable additional costs resulting from use of available alternatives

The intent and purpose of the Ordinance is to ensure that the City does not financially support any company that provides services that infringes upon the rights of immigrants. Vigilant Solutions is a wholly owned subsidiary of Motorola Solutions, Inc. Motorola's APX 8000/8500 radios that Berkeley is leasing are a completely separate product line from the Vigilant LPR (license plate recognition) products. The data brokering that Vigilant engages with customers such as ICE does not occur with APX radio products.

With respect to availability of alternate manufactures, as explained above, due to the specialized and proprietary nature of Motorola's equipment, no alternate exists to provide the level of services offered by Motorola. All the public safety agencies currently on the EBRCSA network use Motorola for their primary radios and equipment.

In order to remain reliably and efficiently operable on the EBRCSA system, the Police and Fire Department will need to continue to procure Motorola equipment, such as radios, batteries, related equipment, and software services. Using another radio manufacturer will likely result in unreliable connectivity and functionality on the EBRCSA system. The Global Positioning Services and the Emergency Alert Button will not function on a non-Motorola radio. The Fire Department must use intrinsically safe radios (prevents melting or exploding) for the environment firefighters work in. Motorola provides this verification where other manufacturers may not. With Motorola radios any ongoing software-firmware updates can be done wirelessly. Any other manufactured radios will need to be taken out of service and delivered to radio technicians for service. Moreover, using another manufacturer on the EBRCSA network will likely result in additional costs in the tens of millions to function on a Motorola designed and equipped

infrastructure and would not function efficiently or seamlessly and would likely result in constant on going troubleshooting and reliability problems. Additionally, EBRCSA radio technicians are trained exclusively on Motorola equipment which would limit the ability to troubleshoot issues with a non-Motorola radio product (See Exhibit A).

ENVIRONMENTAL SUSTAINABILITY AND CLIMATE IMPACTS

The ability to push updates to radios over the Motorola secured radio system would save significant staff resources, as well as, associated greenhouse gas emissions savings from not having to deliver each radio to a technician to manually install updates.

RATIONALE FOR RECOMMENDATION

The Berkeley Police and Fire Departments require radio equipment provided by Motorola Solutions, Incorporated and no reliable alternative exists.

ALTERNATIVE ACTIONS CONSIDERED

Alternative actions were considered including as described above and found to be cost prohibitive, not practicable, and potentially catastrophic to public safety needs during a natural disaster.

CONTACT PERSONS

Jennifer A. Louis, Interim Chief of Police, 981-5700
Abraham Roman, Interim Fire Chief, 981-5500

Attachments:

- 1: Resolution
 Exhibit A: EBRCSA Sole Source Letter
- 2: Full Grand Jury Final Report
- 3: Cal OES Report
- 4: USFA Technical Report: The East Bay Hills Fire
- 5: Lease
- 6: Motorola Solutions Quote

RESOLUTION NO. ##,###-N.S.

Waiver of Sanctuary City Ordinance for Motorola Solutions Lease

WHEREAS, Pursuant to Ordinance No. 7650-N.S. and Chapter 13.105, the Sanctuary City Contracting Ordinance, the City Council must determine that no reasonable alternative exists based on consideration of three factors; and

WHEREAS, the three factors: the intent and purpose of the act, the availability of alternative service providers and quantifiable additional costs resulting from the use of alternative providers have all been considered; and

WHEREAS, the use of radio equipment and associated services provided by Motorola Solutions, Incorporated is essential to provide Police, Fire, and Emergency Medical Services to the City of Berkeley, in addition to, regional and statewide partners; and

WHEREAS, contracting with Motorola Solutions Incorporated to lease radio equipment and services will not violate the intent of the Ordinance, as all City of Berkeley emergency services are available to everyone, without consideration of citizenship status, to ensure life-saving response and emergency services; and

WHEREAS, the original purchase was as a result of an extensive RFP process in which Motorola was the only respondent that could implement the scope and magnitude of the project; and

WHEREAS, no other contractors are available who can provide the same equipment and services required by this lease; and

WHEREAS, no other contractor's product will perform with the entire functionality of the equipment and services to work on the EBRCSA system as provided by Motorola Solutions Incorporated under this lease; and

WHEREAS, developing a separate radio system is estimated to cost in excess of \$20 million dollars and result in a loss of interoperability with City of Berkeley Police, Fire, and Emergency Medical Services with local, regional, and state partners previously approved by City Council; and

NOW THEREFORE, BE IT RESOLVED by the Council of the City of Berkeley that a waiver to the "no-contract" provision of the B.M.C. Section 13.105 is approved because no reasonable alternative exists to the radio equipment and services that will be provided under the lease with Motorola Solutions, Incorporated.

Exhibits

A: EBRCSA Sole Source Letter



**East Bay Regional
Communications
System Authority**



Participating agencies include Alameda and Contra Costa Counties and the following cities and special districts: Alameda, Albany, Antioch, Berkeley, Brentwood, Clayton, Concord, Danville, Dublin, El Cerrito, Emeryville, Fremont, Hayward, Hercules, Lafayette, Livermore, Martinez, Moraga, Newark, Oakley, Pinole, Pittsburg, Pleasant Hill, Pleasanton, Richmond, San Leandro, San Pablo, San Ramon, Union City, Walnut Creek, East Bay Regional Park District, Kensington Police Community Services District, Moraga-Orinda Fire District, Rodeo-Hercules Fire District, San Ramon Valley Fire District, University of California, Berkeley and California Department of Transportation

925-803-7802

September 30, 2021

Jennifer Louis, Chief of Police
City of Berkeley
2100 Martin Luther King Jr. Way
Berkeley, CA 94596

RE: East Bay Regional Communication System Authority Sole Source with Motorola Solutions Inc.

Dear Chief Louis,

EBRCSA is a shared communications system which was designed to integrate all radio communications amongst the different public safety groups in Alameda and Contra Costa County. EBRCSA provides interoperability so that in day to day interaction or response to a major emergency Public Safety Groups can communicate with each other without delay in connecting or needing any special equipment. A system of this magnitude was complicated and difficult to build with few companies willing to respond to the Request for Proposal (RFP). The initial Contract for the two-county radio system was done through RFP, via Contra Costa County, and Motorola was the only respondent to the RFP.

The East Bay Regional Communications System Authority (EBRCSA) is a Joint Powers Agreement between Alameda County and Contra County providing a radio communication system for Law Enforcement, Fire, Emergency Medical Services, and County and City Service agencies. EBRCSA has 49 member agencies and approximately 22,000 radios in service.

The design and build of the system were reviewed by an independent engineering firm which supported the proposal for EBRCSA and the contract was awarded to Motorola Solutions Inc. based on the review of the response to the RFP.

Motorola was able to replace the various radio systems used by Public Safety agencies in Alameda and Contra Costa County and construct a two county 700/800 MHz system which now serves every Public Safety Organization in both counties. Bay Area Rapid Transit is the only Public Safety not a member of EBRCSA. Immigration and Customs Enforcement (ICE) is not a member or user of the EBRCSA System

Motorola built a Master Site in Dublin at the Alameda County Sheriff's Office of Emergency Services. The sites which connect to the EBRCSA Master Site are all built with Motorola equipment. Motorola provides, through a Service Update Agreement (SUA), upgrades and refreshment of the technology on

biennial basis. EBRCSA has a maintenance contract with Motorola to provide response when we have a system problem so that we ensure our Public Safety System is always functioning. The dispatch consoles which are used by the City of Berkeley are Motorola MCC 7500 which is the only console which can be used on the EBRCSA Master Site and are maintained by the Alameda County Department of Information Technology.

The EBRCSA system is Project 25 (P25) digital phase II system and any P25 phase II radio can be used on the system. P25 Phase II is a universal standard for radios that can transmit on the EBRCSA system. A caveat to that is a non-Motorola radio will not provide the access to functionality such as Global Positioning Services (GPS) or in some cases the Emergency Alert Button. These and other functions require a Motorola radio as the software for this is a propriety design by Motorola. One example of the Motorola propriety software allows radios to be updated without returning it to the radio shop. Updates can be sent to the radio via the connectivity from the Master Site to the radio. The best way to explain this is similar to downloading an app or software update to your phone.

The Alameda County Radio Shops provides repair and update services to the City of Berkeley radios and dispatch consoles. EBRCSA has recommended that agencies utilize Motorola radios so that we can ensure the technicians are prepared to work on these radios and have enough replacement parts on hand. We do not have parts for radios manufactured by other companies and the technicians are not trained to repair them. Initial and update training is expensive and timely, so we support the Motorola radios which are used by the majority of our members.

Per the Joint Powers Authority Agreement, the Authority is administered by a Board of Directors consisting of 23 Directors and their respective alternates. Directors and alternates are appointed to ensure equal representation from both counties.

The duties of the Board of Directors include oversight of the acquisition of real property; and the planning, designing, financing, regulation, permitting, environmental evaluation, public outreach, construction, operations, and maintenance of the EBRCSA Project, or any identifiable portion of the EBRCSA Project.

EBRCSA is a shared communications system which was designed to integrate all radio communications amongst the different public safety groups. EBRCSA provides interoperability so that in day to day interaction or response to a major emergency Public Safety Groups can communicate with each other without needing any special equipment or delays in connecting. A system of this magnitude was complicated and difficult to build with few companies willing to respond to the Request for Proposal. The Motorola system has been operating and serving EBRCSA since May 2012.

Sincerely,



Tom McCarthy
Executive Director
East Bay Regional Communications System Authority



GRAND JURY

County of Alameda

June 28, 1993

Berkeley Fire Department
Chief Gary Cates
2121 McKinley Ave.
Berkeley, CA 94703

Dear Chief Cates:

Enclosed please find the 1992-93 Alameda County Grand Jury Final Report.

Sincerely,

A handwritten signature in cursive script that reads "William S. Godfrey/jd".

William S. Godfrey, Foreman
1992-93 Alameda County Grand Jury

WSG:jd



GRAND JURY

County of Alameda

June 30, 1993

Honorable Joseph J. Carson
Presiding Judge of the Superior Court
Courthouse
Oakland, CA 94612

Dear Judge Carson:

The 1992-1993 Alameda County Grand Jury is pleased to submit herewith its Final Report.

Although not to be characterized as "mundane," many routine matters came before the Grand Jury this past year. We can proudly and honestly report that every person or group that called for our help heard from us. Obviously some requests were given more attention than others, but, no request was ignored. Time spent on each matter was determined by the Grand Jury.

Perhaps the greatest amount of time and energy was spent on the Oakland-Berkeley Firestorm. To complete that final report has been very difficult. Many reports from many different agencies went into the making. The Grand Jury Committees of Government and Law and Justice felt very strongly that the entire county is looking and waiting for the Grand Jury report. The result is a report put together with a great deal of care, concern, and time.

The recommendations given in the enclosed Final Report were very carefully structured with full knowledge of the budget restraints. In observing the various county agencies, we are truly concerned about the publicized \$175,000,000 county government budget "shortfall." If this money (or even more) is withheld from the county, the unincorporated areas of fire and police safety could be seriously impaired. Jails, especially Santa Rita, will not be able to hold convicted criminals, and many misdemeanor offenses will have to be ignored by both law enforcement and the District Attorney's Office. Criminal gangs, many of which have a large juvenile membership, are not only getting larger but much more defiant than ever before. (Although Judge Sweeney is doing an outstanding job, the help that he must have may shrink to the point of non-existence - which could soon prove disastrous.)

Without equivocation, I believe that the District Attorney's office handling of criminal hearings has been outstanding. Although the

Grand Jury had at times, prior to voting, great and sometimes heated discussions, not once did we deliver to the District Attorney a negative vote. This, in my opinion, is due to the investigation and presentations by Mr. Walthall and other Deputy District Attorneys. In more than 20 hearings, this Grand Jury returned over 100 indictments.

"Good judgement requires that the utmost discretion be used by Grand Jurors in their inquiries." The 1992/1993 Grand Jury subscribes 100% to this axiom. Persons who testify before the Grand Jury are not sworn to secrecy, as are the members of the Grand Jury, and unfortunately there are leaks. Several times this past year the Grand Jury has been accused of leaking secret or confidential information. I am confident the holes in the dike were not the making of the Grand Jury.

As you know, Mr. Stacy Walthall, Esq., is outstanding in his assignment as legal advisor to the Grand Jury. His help, wisdom, and sensitivity, joined with a true sense of care and concern for his fellow man, could not be improved upon. Mrs. Alicia Sandoval is, we believe, the finest Secretary in the Alameda County System. Here again we could not ask for more. As for you, Judge Carson, we truly appreciate your open-door policy for the Grand Jurors and also appreciate your giving us your timely presence when the Grand Jury had a true bill to present. As for me, I felt truly proud to serve my county as a Grand Juror; I thank you, Your Honor, for your appointment of me as Foreman. I considered this assignment the peak of my many years in the public sector.

Sincerely,



William S. Godfrey, Foreman
Alameda County Grand Jury

1992-1993 ALAMEDA COUNTY GRAND JURY

<u>NAME</u>	<u>CITY</u>	<u>NOMINATING JUDGE</u>
Pamela Bartko*	Berkeley	Michael Ballachey
Robert Bernard*	San Leandro	Richard Haugner
William Cabral	San Leandro	Raymond Marsh
David B. Castro	Livermore	Alfred Delucchi
Jack E. Conner	Castro Valley	Raymond Marsh
Lee Emerson	Piedmont	Jeffrey Horner
Nancy Falk	Berkeley	Michael Ballachey
William S. Godfrey*	Alameda	Richard Bartalini
Evelyn Hegstrom	Castro Valley	Alfred Delucchi
Jerry R. Jacobs	Oakland	Dawn Girard
Janet King	Oakland	Stanley Golde
Margaret A. Lewis	Fremont	Ronald Sabraw
William Love	Oakland	Gordon Baranco
James F. McNeill	Oakland	Richard Bartalini
Donald G. Miller	Livermore	John Sutter
Edwin J. Suchman*	San Leandro	James Carson
Abigail Wagg	Oakland	Roderic Duncan
Kathleen Walsh*	Oakland	William McKinstry
Robert H. Warwick*	Oakland	John Sutter

OFFICERS

William S. Godfrey, Foreman
Pamela Bartko, Forewoman Pro Tem
Kathleen Walsh, Secretary

* Held over by Presiding Judge Joseph J. Carson

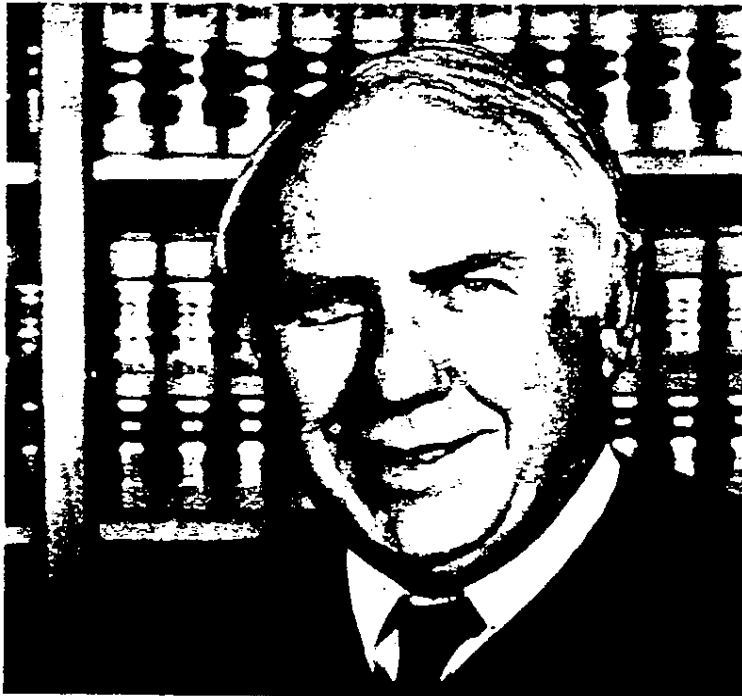


1992-1993 ALAMEDA COUNTY GRAND JURY

Front Row: William Cabral, Alicia Sandoval, Kathleen Walsh, Margaret A. Lewis, Edwin J. Suchman, Evelyn Hegstrom, Judge Joseph Carson, Nancy Falk, Donald G. Miller, Pamela Bartko, William S. Godfrey.

Back Row: Lee Emerson, Jerry R. Jacobs, Abigail Wagg, Robert H. Warwick, Jack E. Conner, David B. Castro, James F. McNeill, Stacy Wathall, William Love.

Not pictured: Janet King



The Honorable Joseph J. Carson
Presiding Judge of the Superior Court
July 1, 1992 - June 30, 1993

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 Jack E. Conner, Co-Chair
 William Cabral
 David B. Castro
 Nancy Falk
 Jerry R. Jacobs
 Janet King
 Margaret A. Lewis
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Robert H. Warwick, Chair
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 Abigail Wagg, CoChair-Law
 Kathleen Walsh
 Robert H. Warwick

TABLE OF CONTENTS

LETTER OF TRANSMITTAL i

1992-1993 ALAMEDA COUNTY GRAND JURY iii

GRAND JURY PHOTOGRAPH iv

PRESIDING JUDGE OF THE SUPERIOR COURT v

GRAND JURY COMMITTEES vi

CRIMINAL CASES 1

EDUCATION COMMITTEE 2

FINANCE COMMITTEE 6

 Audit of Alameda County 6

GOVERNMENT/LAW AND JUSTICE COMMITTEE 8

 County Bond Issue..... 8

 Appendix #1..... 10

 Oakland Tunnel Fire, October, 1991..... 11

 Touraine Hotel..... 21

 Law and Justice Report..... 25

HEALTH AND SOCIAL SERVICES COMMITTEE 26

 Social Services Agency Restructuring..... 26

 Foster Care..... 29

OAKLAND TUNNEL FIRE, OCTOBER, 1991**Introduction:**

Because of numerous citizen complaints the Grand Jury undertook an independent review of the events leading up to, and the subsequent suppression attempts by Bay Area public agencies during the firestorm that devastated parts of Oakland and Berkeley between Saturday, October 19, 1991, and Wednesday, October 23, 1991.

Purpose:

The Grand Jury makes four recommendations that will make the job of our emergency services better organized and more efficient when the next major emergency strikes the Bay Area. The Grand Jury is aware of the many changes which have been instituted since the fire and supports those changes. The attention here is to focus on the events which occurred during the firestorm.

In pointing out problems faced by the fire and police departments of the East Bay at each stage of the fire, it is not the intent of the Grand Jury to detract from the heroic efforts made by public-safety personnel and many volunteers who fought the blaze.

Procedures:

The Grand Jury examined written and oral complaints of private citizens; after-action reports of major agencies responding to the firestorm; and testimony of private citizens, commanders of the Oakland and Berkeley Fire Departments, the Oakland Police Chief, and several professional firefighters who were involved in suppression efforts. Representatives of Pacific Gas & Electricity (PG&E) and East Bay Municipal Utility District (EBMUD) also testified. Members of the Grand Jury visited the Oakland Fire Department Command Center, hill-area firehouses in both Oakland and Berkeley, and the Oakland Fire Department Training Center, and

reviewed emergency plans which had been formulated in response to fires of earlier years.

Chronology:

On Saturday, October 19, 1991, the California Department of Forestry issued a "Red Flag Warning" because low humidity, high temperature, and the expectation of strong wind threatened great danger of fire in the woodlands.

About noon a fire was reported in some of the steepest land in the Oakland hills, near Buckingham Way and Marlborough Terrace. Firefighters from Oakland, the East Bay Regional Park District, and the California Department of Forestry cooperated to suppress the fire. At about 6:30 p.m. they believed that the fire was out, but left hoses and other equipment at the site. A firefighter from a nearby station made a routine inspection about an hour later, but found no hot spots. The fire department made no more inspections that night.

On Sunday morning the CDF "Red Flag Warning" was still in effect. The Assistant Chief on site, who was effectively in command of the Oakland Fire Department, went to the site of the hill fire; some Oakland firefighters were there to retrieve equipment. Before 9:00 a.m. they saw hot spots--smoke and embers--and stayed to suppress them. They had help from East Bay Regional Parks firefighters.

From that time on things happened so rapidly that it was not possible to keep an accurate time-log. About 9:30 a.m., the Assistant Chief on site declared "an extreme fire hazard" in the hills; by 10:30 a.m. several companies were again suppressing hot spots, and one was reporting "open flame" at the bottom of the burned area.

Before 11:00 a.m. firefighters were reporting that residences were burning. This was no longer just a woodland fire. The First Alarm

went out at 10:58 a.m.

The progress of the fire, and its overwhelming growth, can be read in the times of successive alarms: Second Alarm 11:04 a.m.; Third Alarm 11:07 a.m.; Fourth, 11:15 a.m. The Assistant Chief on site saw that a firestorm was in progress; he skipped the Fifth Alarm and went, at 11:26, directly to the Sixth Alarm, the highest in the system.

There were no more alarms. The Assistant Chief on site ordered activation of the Hill Area Disaster Plan. He could not see how far the fire had run, nor how fast it was running, but the sketchy reports he did receive made plain that ordinary methods of fighting fires would not be enough.

Debris--some of it burning--was being blown across roads, from hilltop to hilltop, from house to house. Live wires were falling across streets and roads. Fire hydrants ran dry.

Nobody in the area--not the Fire Departments, not the Police Departments, not the Red Cross, certainly not the people whose houses were being burned--had been prepared for a catastrophe as swift, as heavy, as widespread as the one which fell upon them all. Several hundred houses were burned during the first hour.

Before all was over, help had come from not fewer than nine cities, thirty-two counties, six state agencies, and four federal agencies including Yosemite National Park. That Sixth Alarm had the effect of calling in help from surrounding jurisdictions under agreements for mutual response. The California Department of Forestry could not deliver water from the air immediately because their planes were dropping water on a fire near Healdsburg.

The massive aid that came from all of those sources, along with the added equipment, helped greatly in controlling the fire. The

heroism of many of the firefighters, both professional and volunteer, and of people from other agencies, has been reported widely.

A key element which made all of those efforts successful was the change in the weather. The wind shifted, and eventually the fire was brought under control.

Analysis:

During the fire several deficiencies became apparent; and although responsible officials have moved to correct many or most of these, it seems appropriate to pay attention to some which may still need some additional improvement.

COMMUNICATIONS:

1. Communications within the Oakland Fire Department

Imperfect communication between the Assistant Chief and the firefighters on the line, and among firefighters, and among the fire departments from several jurisdictions, hampered the efforts of all, throughout the fire.

The Oakland Fire Dispatch Center had two radio frequencies on which they could communicate with Oakland's thirty-five companies of firefighters, and the several fire departments could communicate on a statewide mutual-aid frequency (the "White Fire" channel).

At the height of the fire, when twenty or thirty or forty speakers might be competing for use of the three frequencies, all radio communication was almost hopelessly jammed. The commanders of engine companies often had to decide for themselves whether to defend endangered houses or to give up that task and save their engines and their fellow firefighters to carry on the work elsewhere.

Contributing to the difficulty in communication was the terrain. In the deep ravines and behind steep hills: the radio waves often failed to reach the antennas, and the transmitters were not powerful enough to overcome that disadvantage.

The workers who were trying to keep track of the progress of the fire could not find out where the fire was, how intense it was, which way it was moving, what structures it had engulfed; often they could not tell which engine it was that had just reported something like "The fire is coming over the hill."

2. Communication among Fire Departments

- A. Dispatchers at the Oakland Fire Department Center had no Standard Operating Procedures to follow in order to request Mutual Aid. They had not been trained in mobilization and movement of mutual-aid units, and they had no recognized authority to command the movements of such units. They were not familiar with air-operations terminology, resource-status record-keeping, and tracking designations.
- B. Mutual Aid from Berkeley was delayed because the Berkeley fire dispatchers assumed early on that Oakland was handling "Oakland's fire." The fact that Berkeley did not receive an early and immediate direct request for assistance from Oakland had a lot to do with the flooding of the Oakland Fire Department communication frequencies, and contributed to Oakland Fire Department dispatch problems.

3. Communications with the public

- A. Once the public became aware of the fire, people began an onslaught of phone calls to the Oakland Fire Department. In a very short period, the phone lines (both incoming and outgoing) reached gridlock. Because of this gridlock and the fact that there were few dedicated outside lines,

vital calls to other emergency agencies were severely hampered.

- B. The rapid and confusing spread of the fire left firemen little time to evacuate citizens. Both police and firemen were hampered by lack of information as to just where citizens should be directed to go. This was due primarily to the poor communication and to the rapid spread of the fire.
- C. This same lack of information was often a problem when the media were left to gather facts from a variety of sources rather than a central source. Misinformation was often relayed as to the path and location of the fire, causing citizens to fear for their friends and family, or to delay evacuation thinking that they were safe.

INCIDENT COMMAND SYSTEM

The Incident Command System (ICS) in place at the time of the fire was severely compromised. This system is designed to provide specific organizational and command procedures to be followed in the event of a crisis, and during the course of daily fire-fighting activities.

The ICS was never able to function at its full capability on October 20, 1991, because of the communications breakdown. Command was difficult to establish, and control was often impossible. The Oakland Fire Department mobile command van fell back three times in the face of the swiftly moving fire, further complicating the field and command officers' struggle to gain information and to direct the efforts of the firefighters.

Continually arriving mutual-aid units added more layers of command personnel needing information and direction. It soon became evident that the ICS plans were not adequate.

MUTUAL AID

Mutual aid is required by state law. However, the Oakland and Berkeley Fire Departments did not have mutual aid agreements for contiguous areas. Citizens who called the Berkeley Fire Department were told that "the fire is in Oakland." A coordinated mutual aid response did not exist.

Firefighters and volunteers responded, often heroically, but lacked overall coordination that an operational mutual-aid training program might have provided.

As a result of the earthquake in 1989, emergency plans were in place; yet during many months preceding the fire, training within the Oakland Fire Department had dropped substantially, as had mutual aid exercises. Additionally, training in wildland fire-fighting was sketchy, and departmental equipment was not complete.

EMERGENCY BROADCAST SYSTEM

The Emergency Broadcast System (EBS) was established by the Federal Communications Commission (FCC) in response to a perceived need to inform citizens in the event of foreign attack. A secondary role for EBS was developed to inform citizens of local emergencies. All radio stations (AM and FM) are required by regulation of the FCC, to take part in the system. However, the FCC does not require that local broadcasters participate by making air time available. When a local disaster occurs participation is voluntary.

Neither the local police departments nor the Oakland Fire Department tried to use the EBS during the firestorm, October 20, 1991. As the fire rapidly spread there was little opportunity to issue a general warning or an evacuation order. The failure to use the EBS was a result of the structure of the system, not of the local government officials who had the responsibility to use the system. Moreover, layers of bureaucracy inhibit swift use of the

EBS in a local emergency.

WATER SUPPLY

The Berkeley/Oakland hills area has enough water-tank capacity to extinguish several simultaneous house fires. The ability to replenish the tanks is restricted by pumping capacity. The delivery of the water from the tanks is by gravity, and varies from area to area depending on the size of pipes and pressure within the system.

During the Oakland Tunnel Fire, the water supply was not enough to extinguish the hundreds of simultaneous house-fires, and was hopelessly inadequate for the added burden of the forest fire. The fire destroyed the electrical connections serving the pumping systems for several tanks. The tanks therefore were not refilled. During the fire several areas lacked adequate pressure. EBMUD has corrected many deficiencies and has reported the changes to the public. A State law now requires that all hose connections be standard; EBMUD is complying with this law.

Findings and Recommendations:

1. Other issues remain that the Grand Jury believes need to be addressed by the citizens of the communities, local governments, and public safety agencies. For instance, streets in the fire area are likely to remain too narrow and too easily obstructed.

The recommendations must be supported by budget allocations made by local jurisdictions. The community at large must share the responsibility for its own safety and must be willing to raise revenue to accomplish this result.

RECOMMENDATION #93-5: That all local jurisdictions within Alameda County allocate and commit sufficient resources to ensure that the necessary personnel, equipment, and training are in place and ready to respond to future disasters.

2. The standards of the National Fire Protection Association require that Oakland have at least 500 firefighters, and that Berkeley have at least 135. They now have 477 and 122.

RECOMMENDATION #93-6: That Oakland hire twenty-four additional firefighters and Berkeley hire thirteen additional firefighters.

3. Emergency plans are required by statute to be formulated to handle contingencies. These plans are not always kept up to date. Also there must be training to provide a thorough understanding of plans and of individual responsibilities of all public employees.

RECOMMENDATION #93-7: That all Offices of Emergency Services suggest and require emergency plan updates and regularly scheduled training for all Government employees.

4. The failure of the communications network used by the Oakland Fire Department and the Berkeley Fire Department contributed significantly to the chaos of the situation on October 20, 1991. In addition, dispatchers were unfamiliar with terminology that would translate orders from the field command to timely responses by base personnel.

RECOMMENDATION #93-8: That training of all personnel in the newly established 800MHZ system be given priority, and that all jurisdictions establish regular training exercises in communicating with all agencies involved in an emergency response.

CONCLUSIONS

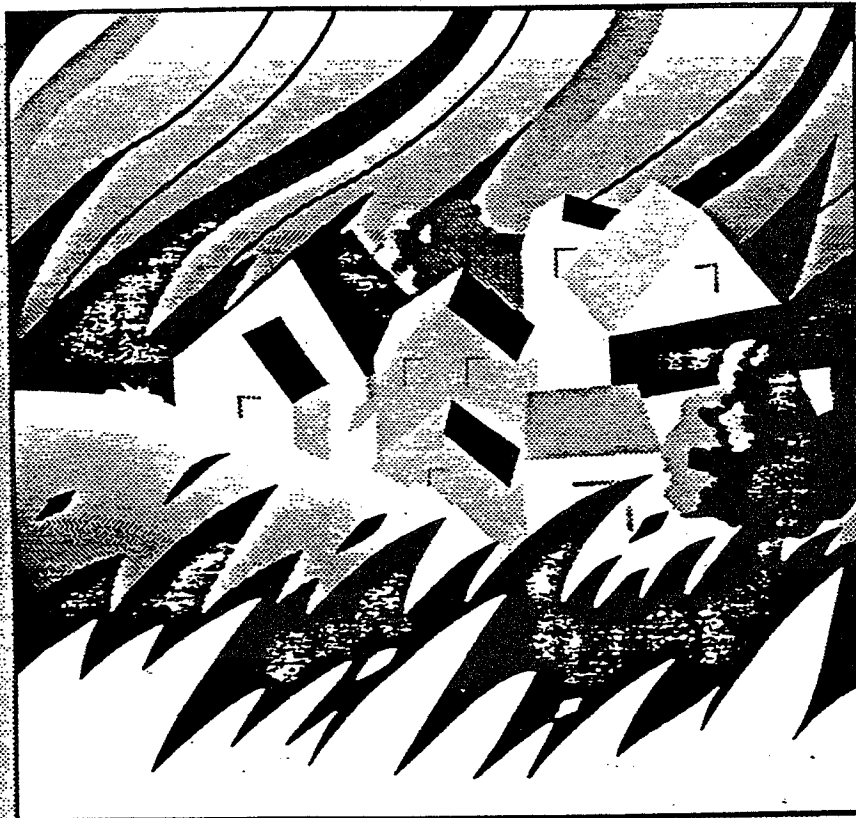
This was not the first catastrophic fire in the East Bay hills. In recent years several agencies have issued cautionary proposals and have urged measures for preventing such disaster. In particular, the report of the Blue Ribbon Fire Prevention Committee -in 1982!- points out the danger of allowing fuel to build up under trees,

in vacant lots, and especially on hillsides and in ravines. Proposition 13, adopted in 1978, has severely limited the ability of fire departments and other public agencies to carry out the recommended preventive measure. The public has paid a high price for this limitation of funds. The Oakland Tunnel Fire of 1991 destroyed 3,354 residences and killed twenty-five citizens of the Bay Area, and cost at least \$1,500,000,000. It is clear that the present leadership is very much aware of the lessons and the mistakes of the past. The challenge for the future is to make certain that this present awareness by the leadership group is not diminished in any way, but kept alive and sharpened in the years to come.



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

Richard Andrews, Ph.D.
Director, Office of Emergency Services

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

STATE OF CALIFORNIA



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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

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

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.

TABLE OF CONTENTS

	<u>Page</u>
PREFACE	iv
ACKNOWLEDGEMENTS	vi
EXECUTIVE SUMMARY	1
THE FIRE	6
I. PREPAREDNESS	9
II. COMMUNICATIONS	12
III. STRATEGY AND TACTICS	20
IV. MUTUAL AID SYSTEM	30
V. INCIDENT COMMAND SYSTEM	35
VI. EVACUATIONS	39
VII. VOLUNTEERS	42
VIII. MOP-UP	44
IX. DEMOBILIZATION	46
X. EMERGENCY PUBLIC INFORMATION	48
XI. LAW ENFORCEMENT OPERATIONS	51
XII. EMERGENCY MANAGEMENT	57
ANNEX	59
BIBLIOGRAPHY	64

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.

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.
- Tom de Bakker, Deputy State Fire Marshal for the California State Fire Marshal's Office.
- Denise Knight, Deputy State Fire Marshal for the California State Fire Marshal's Office.
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- Gerald Newcombe, Vice-Chair of the State Board of Fire Services.
- Loren Poore, Chair of the Interagency Wildland Fire Prevention Committee and the Wildland Arson Response Group.

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REVIEW GROUP CHAIR

- 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.

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.

- 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.

- 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.

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

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 ¹Tunnel 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.

¹The 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 its 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 then 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 forty-four (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.

EAST BAY HILLS FIRE MUTUAL AID RESPONDERS

AHWANEE FD
 ALAMEDA CFW
 ALAMEDA FD
 ALAMEDA NAS
 ALBANY FD
 ALTO RICHARDSON BAY FPD
 AMADOR FPD
 AMERICAN CANYON FPD
 AMERICAN RIVER FPD
 ANDERSON FPD
 APTOS/LA SELVA FPD
 AROMAS TRI CO FPD
 ARTOIS FPD
 BELLEVUE FPD
 BENICIA FD
 BETHEL ISLAND FPD
 BOULDER CREEK FPD
 BRANCIORTE FPD
 BURBANK-PARADISE FPD
 BURLINGAME FD
 BURNEY FPD
 BUTTE CO FD
 BYRON FD
 CALAVERAS FD
 CALAVERAS CO FD
 CAMPBELL FD
 CASTRO VALLEY FPD
 CDF-MAD/MERCED/MAR
 CENTRAL FPD
 CERES DPS
 CHICO FD
 CLEMENTS RURAL FPD
 CLOVIS FD
 COLMA FPD
 COLOMA LOTUS FPD
 COLUSA RURAL FPD
 CONTRA COSTA CO FD
 COPPEROPOLIS FPD
 CORDELIA FPD
 CORTE MADERA FD
 COTATI FPD
 COTTONWOOD FPD
 COURTLAND FPD
 CROCKETT-CARQ FPD
 DALY CITY FD
 DEFENDER FD
 DELTA FPD
 (SACRAMENTO CO)
 DELTA FPD
 (SAN JOAQUIN CO)
 DIXON FD
 DORRIS FD
 DOUGHTERY REG FA
 DRY CREEK VOL FPD
 EAST BAY REGIONAL PARK
 EAST DIABLO FPD
 EL CERRITO FD
 EL DORADO CO FPD
 EL MEDIO FPD
 ELK GROVE CSD
 ESCALON CONS FPD
 EXETER FD
 FAIR OAKS FPD

FAIRFIELD DPS
 FAIRVIEW FPD
 FIG GARDEN FPD
 FLORIN FPD
 FOLSOM FD
 FOLSOM PRISON FD
 FOSTER CITY FD
 FREMONT FD
 FRESNO FD
 GALT FD
 GEORGETOWN FPD
 GILROY FD
 GUSTINE VOL FD
 HALF MOON BAY FPD
 HAMILTON CITY FD
 HAPPY CAMP FPD
 HAYWARD FD
 HEALDSBURG FD
 HILLSBOROUGH FD
 HUGHSON FPD
 INDUSTRIAL FPD
 ISLETON FD
 JACKSON FD
 JACKSON VALLEY FPD
 KANAWHA FPD
 KENTFIELD FPD
 KERN CO FD
 KINGS CO FD
 KLAMATH RIVER VOL FD
 LAKE VALLEY FPD
 LARKSPUR FD
 LAWRENCE-BERK LAB FD
 LAWRENCE-LIV LAB FD
 LIBERTY RURAL FPD
 LINDA FD
 LIVE OAK FD
 LIVE OAK, CSA #A
 LIVERMORE FD
 LOCKHEED FD
 LOS ALTOS FD
 MADERA FD
 MADERA CO FD
 MANTECA FD
 MANTECA-LATHROP FPD
 MARE ISLAND FD
 MARIN CO FD
 MARINWOOD FD
 MARYSVILLE FD
 MAXWELL FPD
 MENLO PARK FPD
 MERCED CO FD
 MERCED FD
 MERIDIAN FD
 MID-VALLEY FPD
 MILL VALLEY FD
 MILLBRAE FD
 MILLVILLE VFC
 MILPITAS FD
 MODESTO FD
 MOFFETT FIELD FD
 MORAGA FPD
 MORGAN HILL CITY FD
 MOUNTAIN GATE FD

MOUNTAIN VIEW FD
 MT SHASTA VISTA FC
 MURPHYS FPD
 NAPA CO FD
 NAPA FD
 NAVAL AIR STATION FD
 NAVAL SUPPLY CENTER
 NEWARK
 NEWCASTLE FPD
 NORTH CENTRAL FPD
 NOVATO FPD
 OAKDALE FPD
 OAKHURST FD
 OAKLEY FPD
 OLIVEHURST PUD
 ORINDA FPD
 OROVILLE FD
 OSWALD-TUDOR FD
 PACIFIC FPD
 PACIFICA FD
 PALO ALTO FD
 PARADISE FD
 PENNGROVE FPD
 PETALUMA FD
 PIEDMONT FD
 PINE GROVE CSD
 PINOLE FD
 PLACER FOOT CO FPD
 PLACER HILLS FPD
 PLEASANTON FD
 PLUMAS-BROPHY FPD
 POINT MONTARA FPD
 POLLOCK PINES FD
 PORTERVILLE FD
 QUINCY FPD
 REDDING FD
 REDWOOD CITY FD
 RICHMOND FD
 RINCON VALLEY FPD
 RIO VISTA FD
 RIVERVIEW FPD
 RODEO-HERCULES FPD
 ROHNERT PARK DPS
 ROSEVILLE FD
 ROSS DPS
 ROSS VALLEY FD
 SACRAMENTO CFPD
 SACRAMENTO FD
 SALIDA FPD
 SALSIPUEDES FPD
 SAN ANTONIO FD
 SAN BENITO CO FD
 SAN BRUNO FD
 SAN FRANCISCO FD
 SAN JOSE FD
 SAN LEANDRO FD
 SAN MATEO CO FD
 SAN MATEO FD
 SAN RAFAEL FD
 SAN RAMON VALLEY FPD
 SANGER FD
 SANTA CLARA CO FD
 SANTA CLARA FD

SANTA CRUZ CSA #48
 SANTA ROSA FD
 SARATOGA FPD
 SAUSALITO FD
 SCOTTS VALLEY FD
 SELMA FD
 SKYWALKER RANCH FB
 SONORA FD
 SOUTH COUNTY FA
 SOUTH PLACER FPD
 SO SAN FRANCISCO FD
 SO SANTA CLARA CFPD
 ST HELENA FD
 STANISLAUS CFPD
 STOCKTON FD
 SUISUN CITY FD
 SUISUN FPD
 SUNNYVALE DPS FD
 SUTTER CFD
 SUTTER CREEK FPD
 SUTTER FD
 SUTTER HILLS FD
 TEHAMA CFD
 TIBURON FPD
 TRACY FD
 TRUCKEE FPD
 TULARE CFPD
 TULARE FD
 TULELAKE MULTI CO FD
 TUOLUMNE CO FD
 TWAIN HARTE FPD
 TWO ROCK USCG FD
 UC DAVIS FD
 US NAVY SEC GRP
 UNION CITY FD
 UNITED TECH CENTER
 VACAVILLE FD
 VACAVILLE FPD
 VALLEJO FD
 VISALIA FD
 WALNUT GROVE FPD
 WATERFD-HICKMAN FPD
 WATERLOO-MORADA FPD
 WATT PARK FPD
 WEAVERVILLE VFD
 WEST CO FPD
 WEST STANISLAUS FPD
 WESTSIDE FPD
 WILLIAMS VOL FD
 WILLOW OAK FPD
 WILLOWS FD
 WILTON FPD
 WINDSOR FPD
 WINTERS FD
 WOODBRIDGE FPD
 WOODLAND AVE FPD
 WOODLAND FD
 WOODSIDE FPD
 YOSEMITE LAKES FD
 YUBA CITY FD
 YUBA CO FD

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	<u>State OES, Region II</u>	
		Contra Costa County	61
<u>Police Departments - Alameda County</u>		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	<u>20</u>
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.	<u>6</u>	Out-of-County Departments	<u>334</u>
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

<u>AGENCY</u>	<u>STAFF</u>	<u>HOURS</u>
ALAMEDA COUNTY	79 (volunteers) 45 (paid)	893.75 438.25
	SUB-TOTAL	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	<u>29</u>	<u>135.75</u>
	TOTALS	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)

<u>YEAR</u>	<u>NAMES OF FIRE</u>	<u>COUNTY</u>	<u>ACRES BURNED</u>	<u>STRUCTURES DESTROYED</u>
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

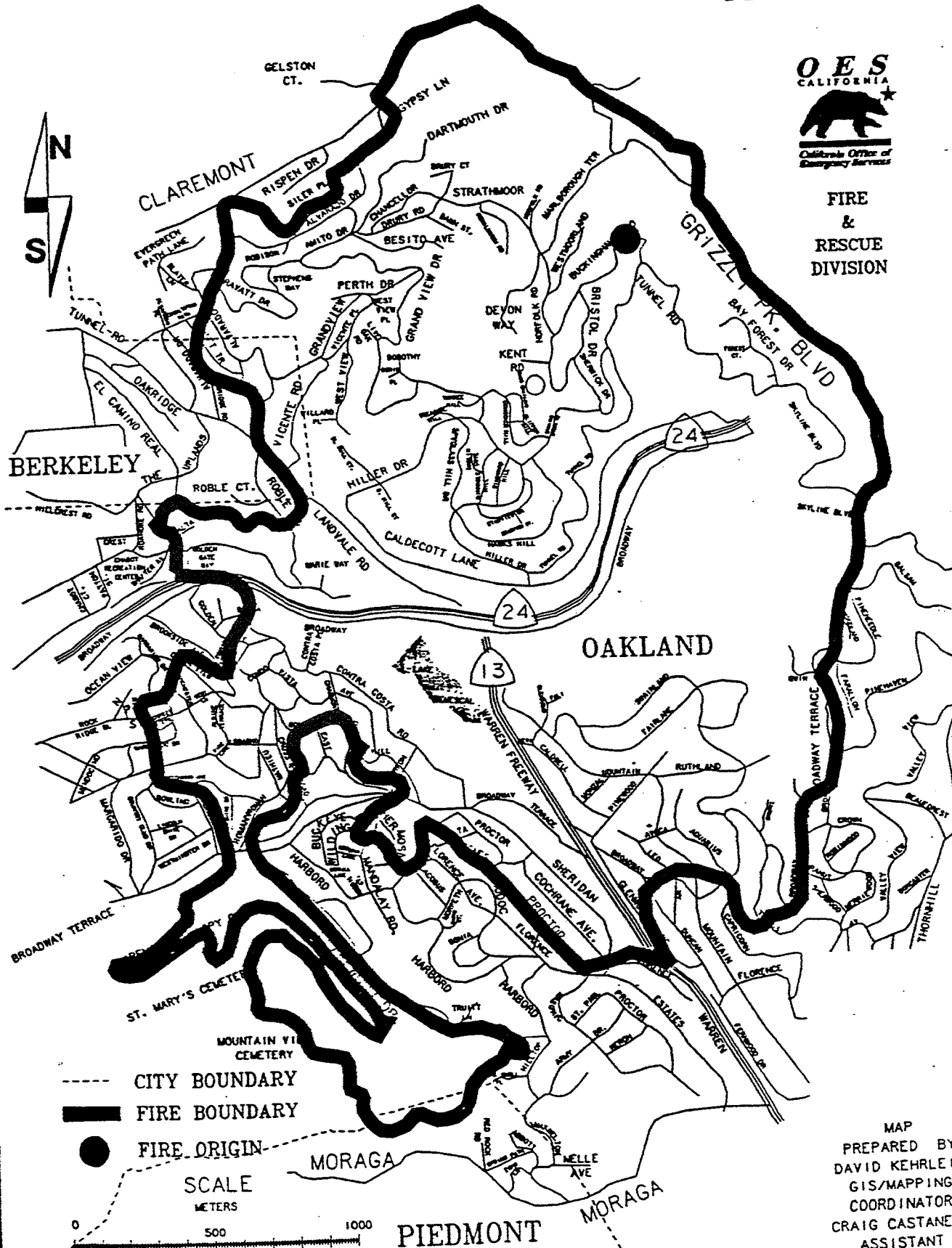
ANNEX B ESTIMATED FIRE SPREAD

O E S
CALIFORNIA



California Office of
Emergency Services

**FIRE
&
RESCUE
DIVISION**



- - - - - CITY BOUNDARY
- FIRE BOUNDARY
- FIRE ORIGIN



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

OAKLAND/BERKELEY HILLS FIRE OF OCTOBER 20, 1991

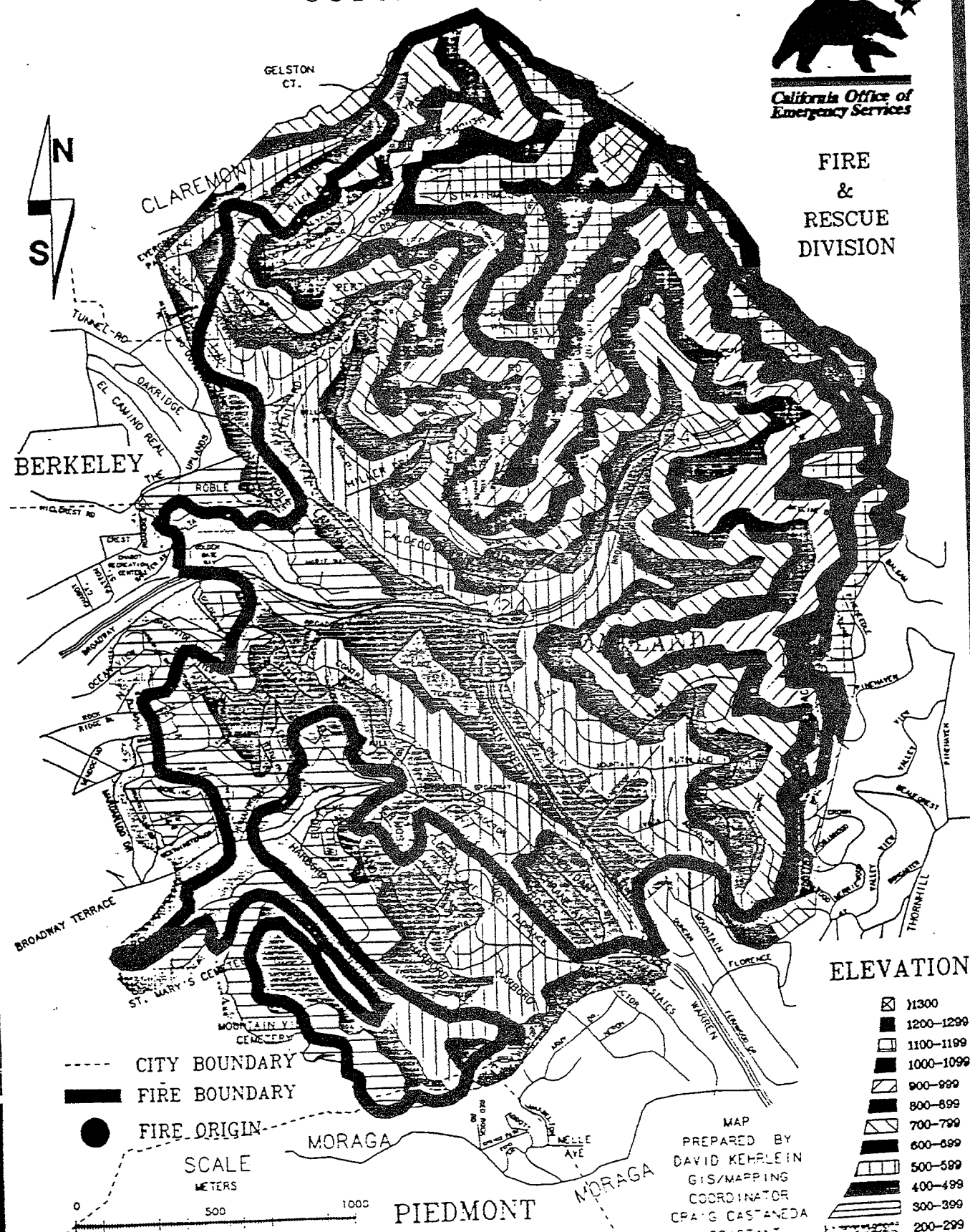
ANNEX C










O E S
CALIFORNIA



California Office of
Emergency Services

FIRE
&
RESCUE
DIVISION



-  SAT. FIRE
-  11:15
-  11:30
-  12:00
-  1:00
-  2:00
-  3:00
-  4:00
-  5:00

OAKLAND/BERKELEY HILLS

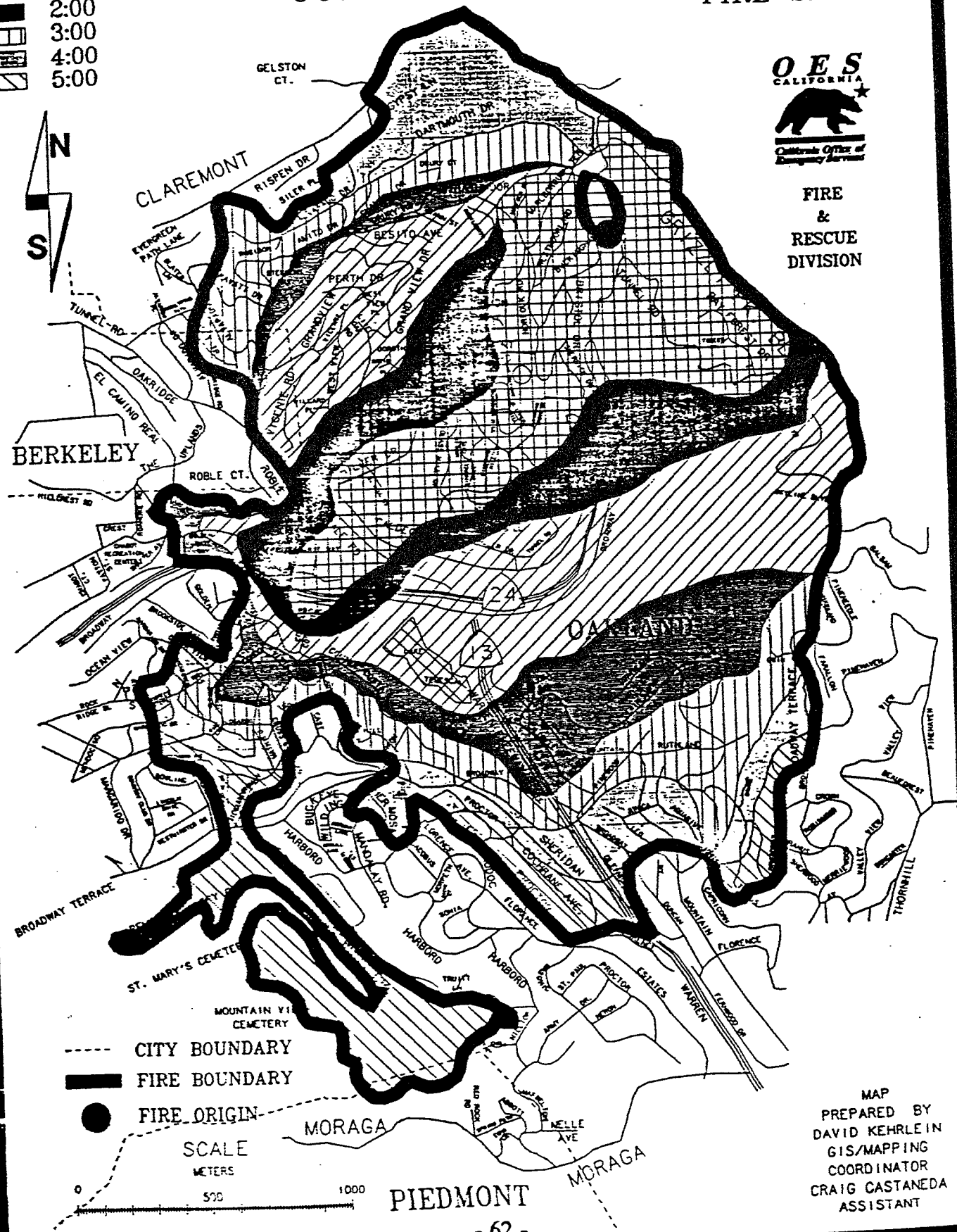
FIRE OF




OCTOBER 20, 1991

ANNEX D
ESTIMATED
FIRE SPREAD



FIRE
&
RESCUE
DIVISION



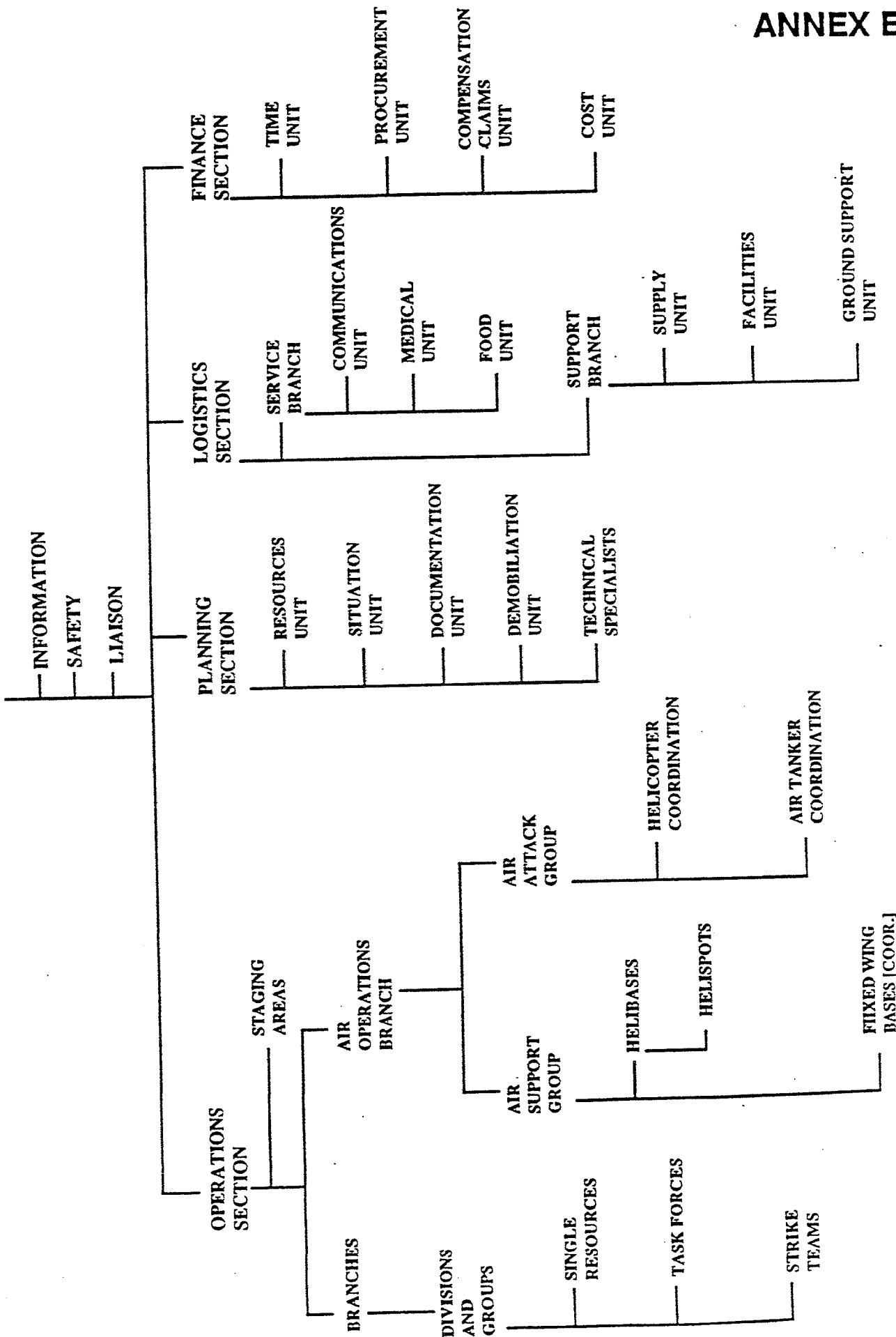
-  CITY BOUNDARY
-  FIRE BOUNDARY
-  FIRE ORIGIN

SCALE
METERS
0 500 1000

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

INCIDENT COMMAND ORGANIZATION

INCIDENT COMMANDER

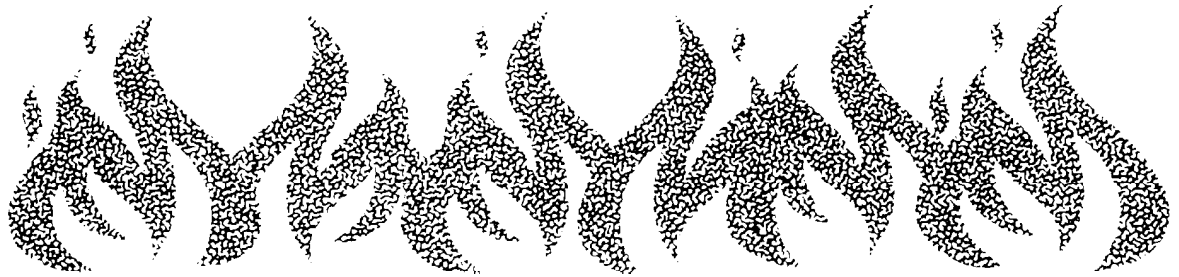


BIBLIOGRAPHY

1. "East Bay Hills Fire Review," Office of Emergency Services, Nov 6, 1991.
2. "Hazard Mitigation Report - East Bay Fire," Office of Emergency Services, Nov 26, 1991.
3. Berkeley, California Conflagration, National Board of Fire Underwriters, Sept 17, 1923.
4. *Wildland Fire Operations and Mutual Aid Procedures*, Berkeley Fire Department, Feb 5, 1991.
5. Berkeley Fire Department, Radio Logs and CFIRS, Oct 20, 1991.
6. "California, The Endangered Dream," Special Issue. TIME, Nov 18, 1991.
7. "Report - Urban Interface," 1982 Blue Ribbon Fire Prevention Committee. East Bay Regional Parks, Feb 1982.
8. *OES State Fire and Rescue Emergency Mutual Aid Plan*, Revised Sept 1988.
9. *OES Fire and Rescue Mutual Aid System*, Revised April 1988.
10. "Neighbors Bordering on Anger," *Oakland Tribune*, Nov 20, 1991.
11. Oakland Fire Department Radio Logs, Oct 20, 1991.
12. OES Situation Summary, 1300, Oct 21, 1991.
13. "Wildland Fires and Flooding in California," Recommendations of Governor's Task Force on Chaparral Fire and Flood Risk Management, California Department of Forestry, April 1981.
14. "The Fire Siege of 1987: Lightning Fires Devastate the Forests of California," California Department of Forestry, Sept 1988.
15. "Conflagrations in California, Committee Recommendations," California Disaster Office, May 1966.
16. "Fire Prevention Programs of Counties and Cities with a Wildland Fire Potential", Report to Legislature, California Department of Forestry, Feb 1980.

17. "An Evaluation of Efforts to Provide Fire Safety to Development and Occupancy Within Wildlands of California," California Department of Forestry, April 1973.
18. "Recommendations to Solve California's Wildland Fire Problem," Task Force on California Wildland Fire Problem, June, 1972.
19. "Loma Prieta Earthquake," Fire and Rescue Operations, April 8, 1991.
20. "Fires in Southern California," Hazard Mitigation Survey Team Report, June 26 - 30, 1985.
21. "California's Conflagrations, June 27 - July 20, 1985," California Department of Forestry, May 1986.
22. "California Aflame, September 22 - October 4, 1970," California Department of Forestry, Nov 1971.
23. "Law Enforcement Operations, Loma Prieta," OES Law Division, May 1990.
24. *Fireline Handbook 410-1*, National Wildfire Coordination Group.
25. *Field Operations Guide - ICS 420-1*, FIRESCOPE, Aug 1989.

United States Fire Administration



Technical Report Series

The East Bay Hills Fire Oakland-Berkeley, California



Federal Emergency Management Agency



**United States Fire Administration
National Fire Data Center**

This document was scanned from hard copy to portable document format (PDF) and edited to 99.5% accuracy. Some formatting errors not detected during the optical character recognition process may appear.

United States Fire Administration Fire Investigations Program

The United States Fire Administration develops reports on selected major fires throughout the country. The fires usually involve multiple deaths or a large loss of property. But the primary criterion for deciding to do a report is whether it will result in significant "lessons learned." In some cases these lessons bring to light new knowledge about fire - the effect of building construction or contents, human behavior in fire, etc. In other cases, the lessons are not new but are serious enough to highlight once again, with yet another fire tragedy report.

The reports are sent to fire magazines and are distributed at national and regional fire meetings. The International Association of Fire Chiefs assists USFA in disseminating the findings throughout the fire service. On a continuing basis the reports are available on request from USFA; announcements of their availability are published widely in fire journals and newsletters.

This body of work provides detailed information on the nature of the fire problem for policymakers who must decide on allocations of resources between fire and other pressing problems, and within the fire service to improve codes and code enforcement, training, public fire education, building technology, and other related areas.

The Fire Administration, which has no regulatory authority, sends an experienced fire investigator into a community after a major incident only after having conferred with the local fire authorities to insure that USFA's assistance and presence would be supportive and would in no way interfere with any review of the incident they are themselves conducting. The intent is not to arrive during the event or even immediately after, but rather after the dust settles, so that a complete and objective review of all the important aspects of the incident can be made. Local authorities review USFA's report while it is in draft. The USFA investigator or team is available to local authorities should they wish to request technical assistance for their own investigation.

This report and its recommendations were developed by USFA staff and by TriData Corporation, Arlington, Va, its staff and consultants, who are under contract to assist the Fire Administration in carrying out the Fire Reports Program.

The United States Fire Administration greatly appreciates the cooperation and information received from Fire Chief P. Lamont Ewell and many of the officers and firefighters of the Oakland Fire Department those who provided special assistance to USFA's investigation are listed on page one of this report. Appreciation also goes to Fire Chief Gary Cates, Berkeley Fire Department; Assistant Chief Bill Cullen, Contra Costa County Fire Protection District; the California Department of Forestry and Fire Protection; the California Governor's Office of Emergency Services; and Mr. Bill Patterson, Federal Emergency Management Agency (Region IX Office). Assistance with the investigation was provided by Mr. Hugh Graham.

For additional copies of this report write to the United States Fire Administration, National Fire Data Center, 16825 South Seton Avenue, Emmitsburg, Maryland 21727.

The East Bay Hills Fire Oakland-Berkeley, California (October 19-22, 1991)

Investigated by: J. Gordon Routley

This is Report 060 of the Major Fires Investigation Project conducted by TriData Corporation under contract EMW-90-C-3338 to the United States Fire Administration, Federal Emergency Management Agency.



Federal Emergency Management Agency



**United States Fire Administration
National Fire Data Center**

TABLE OF CONTENTS

OVERVIEW OF THE FIRE	2
Summary of Key Issues	4
Location	5
BACKGROUND	8
Climatic Conditions	8
Vegetation	9
Land Development on the Hills	10
Burning Characteristics	11
Ignition Sources	15
Previous Fires in the East Bay Hills	16
Other Wildland-Urban Interface Fires in California	17
Regulatory Efforts	18
Fire Protection Agencies	20
HOW THE FIRE STARTED	22
Point of Origin	22
Saturday, October 19th	22
SUNDAY, OCTOBER 20th	24
The Restart	24
Major Flare-up	26
Communications Problems	30
Critical Period	31
Totally Out of Control	33
Mutual Aid Begins to Arrive	34
Lives Saved and Lost	36
All Forces Retreating	40
Fire Jumps Freeway	40
Hiller Highlands	41
Berkeley Front	41
California Department of Forestry Operations	45
Additional Strike Teams	47
Claremont Hotel	48
New Outbreaks	49
Strategy -- Continuing Battle on Multiple Fronts	50
Evacuations	52
Tactics	53
Assessment of the Situation	54
Unified Command Structure	56
Additional Resources Ordered	58
Wind Changes	58

MONDAY THROUGH THURSDAY	61
Losses	62
ANALYSIS	65
Fire Risk	65
Fire Origin	66
Fire Characteristics	66
Wildland-Urban Interface Characteristics	68
Initial Response	69
Training and Preparation	69
Incident Management	70
Communications	75
Public Information	81
Mutual Aid	82
Volunteer Response	84
Aircraft Operations	85
Water Supply	87
Stress	88
Firefighter Safety	91
Emergency Medical Services	93
Evacuation	95
LESSONS LEARNED	96
APPENDICES	100
A. Reference Publications	
B. East Bay Hills Fire Chronology	
C. Contra Costa County Summary	
D. Strike Teams	
E. Photographs	

**The East Bay Fire
Oakland-Berkeley, California
October 19-22, 1991**

Investigated by: J. Gordon Routley

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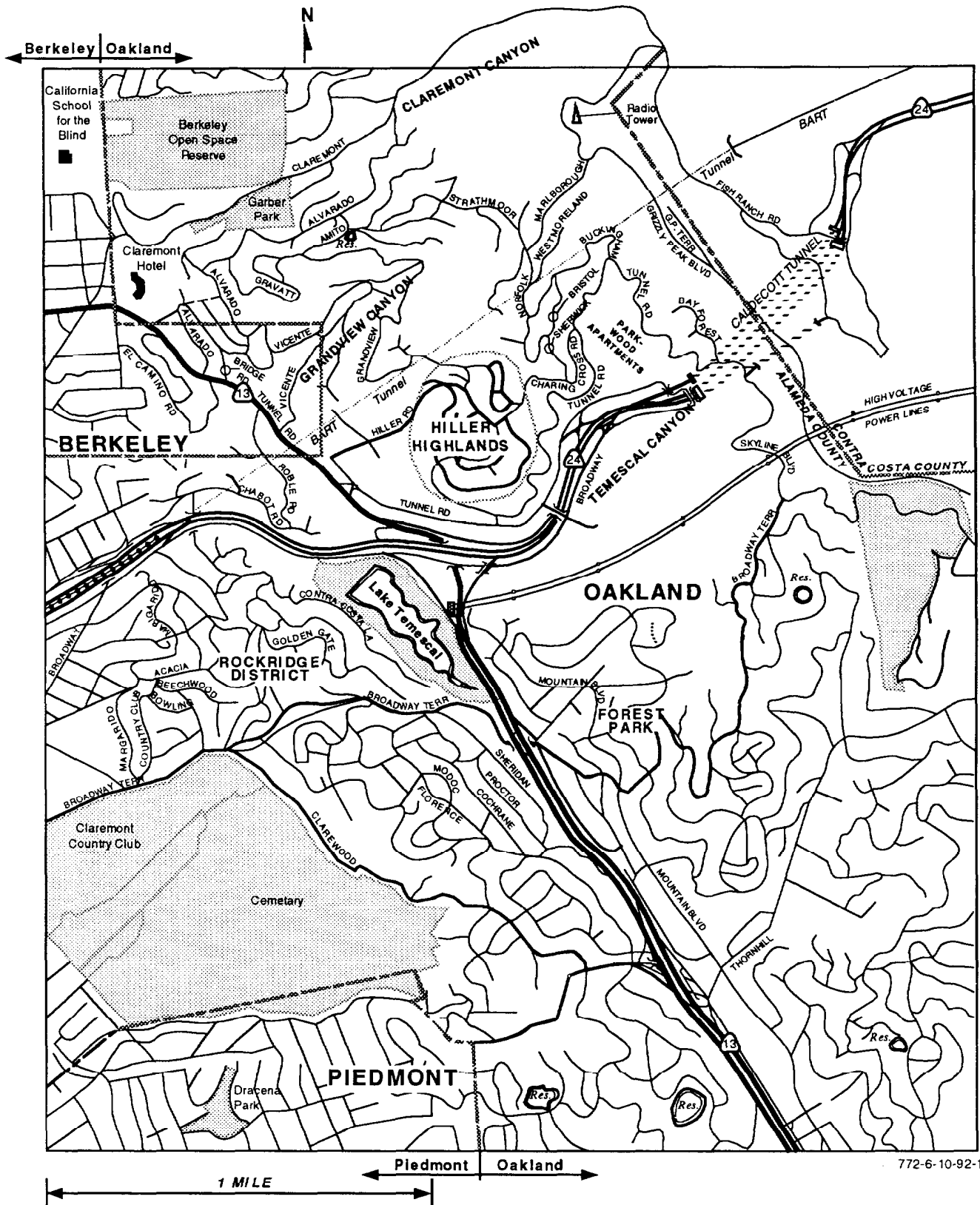
OVERVIEW OF THE FIRE

The largest dollar fire loss in United States history occurred in the East Bay Hills, within the California Cities of Oakland and Berkeley, between October 19 and 22, 1991. Twenty-five lives were lost and more than 3,000 structures were destroyed by a wildland-urban interface fire in one of the most heavily populated metropolitan areas of the North American continent. The fire completely overwhelmed the firefighting forces of the area, consuming everything in its path, and was only stopped when the Diablo wind conditions abated. The wind had threatened to drive the fire across the entire City of Oakland

The factors that set the stage for this disaster were identified long before the fire occurred, and the potential consequences had been predicted by fire officials. Nevertheless, their warnings went unheeded, and the measures that could have reduced the risks were not implemented. More than \$1 billion in damage resulted from a fire that exceeded the worst expectations of the most concerned fire professionals. It was a fire that demonstrates how natural forces may be beyond the control of human intervention and should cause a renewed look at the risk of wildland-urban interface fire disasters.

Large areas of California are known to be critically vulnerable to wildland-urban interface fires due to the development of urban areas in locations that are subject to extreme fire hazards created by climate, terrain, and natural fuels. Several major fires have occurred over the years, including one in 1970 that involved a large portion of the area burned in this incident. The coastal region was particularly vulnerable in the fall of 1991, after five years of drought, several months with no recorded precipitation, and reduced efforts to control wildland interface hazards due to state and local budget limitations. The key ingredient in this incident was the Diablo wind condition, which combined with the other critical fire risk factors to create an irresistible destructive force.

On the following page is a map of the area of Oakland where the fire occurred. This same map is repeated several times later in the report overlaid with arrows illustrating the direction and development of the fire at various stages. A regional map appears on page 6. This fire was originally labelled as the "Tunnel Fire." It is now being described as the East Bay Hills Fire in most reports.



772-6-10-92-1

SUMMARY OF KEY ISSUES	
Issues	Comments
Location	Wildland-urban interface area., Oakland-Berkeley Hills, California
Risk Factors	Extreme fire risk created by five year drought, low humidity, and Diablo winds; highly combustible natural fuels, inadequate separation between natural fuels and structures, unregulated use of wood shingles as roof and siding material; steep terrain, homes overhanging hillsides, narrow roads, limited access, limited water supply.
Mitigation Efforts	Previous fire experience identified hazards. Risk reduction measures had been studied and recommended for several years, but not implemented.
Cause	Strong winds caused rekindle of grass fire from previous day, accelerated by wind. Crews were on scene overhauling when fire erupted. Cause of original fire was undetermined.
Response	Largest response ever recorded. Massive mutual aid provided by 440 engine companies and more than 1,500 firefighters.
Damage Extent	3,354 structures destroyed, 1,500 acres, \$1.5 Billion damage.
Death & Injuries	25 lives lost, including a Battalion Chief and Police Officer; 150 people injured.
Incident Command	Shortage of command officers handicapped initial implementation of ICS. Multiple commands developed as additional agencies became involved. Unified Command implemented after several hours.
Communications	Radio channels and Communications Center overwhelmed by situation.
Strategy	Initial attack overwhelmed; crews had to retreat and evacuate residents ahead of fire. Unable to stop advance of fire until wind conditions changed.

LOCATION

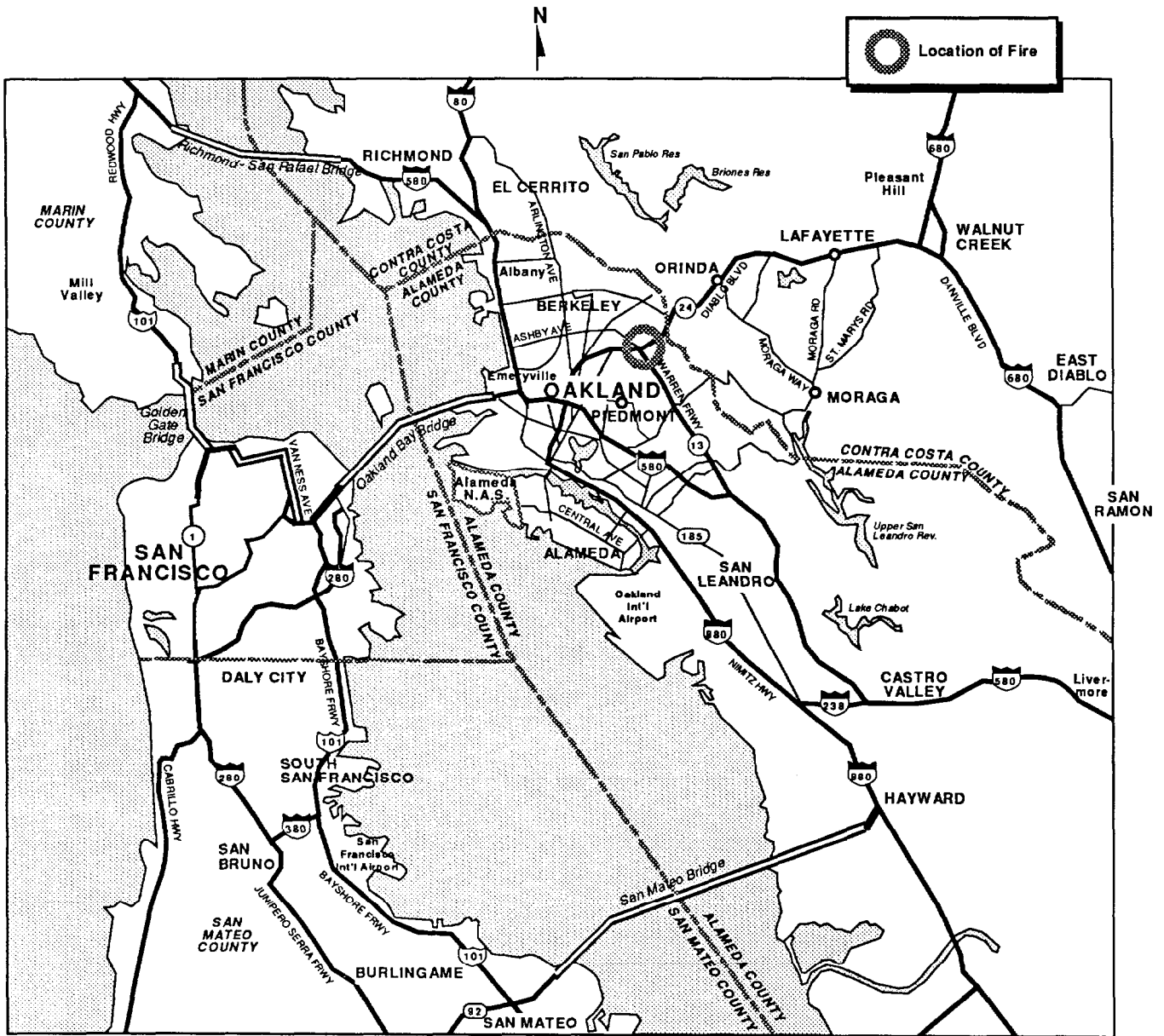
The San Francisco Bay Area is one of the most heavily occupied areas in the United States. It includes six counties, San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, and Marin, which surround San Francisco Bay, with a combined population of more than five million. The metropolitan area includes three major cities, San Francisco, San Jose, and Oakland, and dozens of smaller communities, many of which are contiguous.

The City of Oakland is situated on the eastern side of San Francisco Bay, directly opposite the City of San Francisco, as seen on the regional map on the following page. Most of Oakland's 360,000 citizens live on the coastal "flatlands" that extend inland for approximately four miles to the East Bay Hills. The flatlands are heavily developed with waterfront port installations, the central business district, industrial and warehouse zones, and several residential areas. Along the eastern edge of the flatlands, the ground begins to rise to a median elevation of approximately 400 feet and is occupied by middle- and upper-class residential neighborhoods.

The terrain then rises abruptly to form a row of hills called the East Bay Hills or the Oakland Hills, with a ridge line approximately 1,300 feet above sea level. The ridge line runs generally in a north-south direction, parallel to the shoreline of San Francisco Bay and approximately five miles inland. The hills separate the coastal flatlands from the inland valleys of Contra Costa County, and the ridge line establishes both the eastern city limits of the City of Oakland and the eastern boundary of Alameda County.

The west face of the hills is heavily developed with expensive residential properties, which are provided with spectacular views of Oakland and San Francisco.

In these hills, Temescal Canyon is one of a series of canyons that open toward the west. Grandview and Claremont Canyons are both north of Temescal Canyon. The canyons separate "fingers" of hills which project up to one mile west of the main ridge line. Temescal Canyon creates a natural path to a narrow point in the hills, providing the shortest distance for a tunnel connection between Oakland and Contra Costa County. This tunnel, the Caldecott Tunnel, links Oakland with the growing communities of Orinda, Moraga, Lafayette, Walnut Creek, Concord, and the San Ramon Valley. It is the only major highway connection in a stretch of more than 20 miles and its triple tubes carry eight lanes of commuter traffic under the hills to the major employment centers of Oakland and San Francisco. A newer tube, approximately one quarter mile north of the Caldecott Tunnel, carries the Bay Area Rapid Transit System (BART) under the hills.



772-10-16-92-1

Highway 24 follows the bottom of Temescal Canyon from the tunnel portals to the mouth of the canyon, where it meets Highway 13 in a Y-shaped interchange, then continues west toward downtown Oakland and the Bay Bridge. Highway 13 carries north-south traffic along the base of the hills, before turning west into the City of Berkeley. Within the Y of the freeway interchange are an electrical substation and a small recreational area surrounding Lake Temescal.

Grizzly Peak Boulevard follows the ridge line, approximately 600 feet above the Caldecott Tunnel, barely within the City of Oakland.

The East Bay Regional Parks District administers several recreation and preserve areas along the hilltops and on the slopes, straddling the county line. Other parts of the hill area belong to the University of California - Berkeley. The southeast corner of the City of Berkeley includes part of Grandview Canyon, just north of Highway 24 on the Oakland side. On the Contra Costa side, the communities of Orinda and Moraga lie at the base of the hills and include residential areas that have been developed on the eastern slope.

BACKGROUND

CLIMATIC CONDITIONS

The East Bay Hills have their own micro-climatic conditions, distinct from the areas to the east and west. The “flatlands” have a cool damp coastal climate, influenced by San Francisco Bay and the Pacific Ocean. The prevailing winds push moist air against the Oakland side of the hills and often create gusty winds, while the flatlands atmosphere is calm. The hills block low clouds and moist air coming through the Golden Gate opening from the ocean, keeping the moisture from reaching Contra Costa County. There is often a temperature differential of 50 to 100 between the hills and the flatlands, with the flatlands cooler sometimes and the hills cooler sometimes.

Between 1986 and 1991 most of California experienced drought conditions. This situation was recognized as creating more and more critical fire risk conditions each year. The unprecedented drought was accompanied by an unusual period of freezing weather, in December of 1990, which killed massive quantities of the lighter brush and eucalyptus. Dead fuel accumulated on the ground in many areas and combined with dropped pine needles and other natural debris to create a highly combustible blanket. Due to the fiscal cutbacks, governmental programs to thin these fuels and create fuel breaks were severely curtailed, so the fuel load was much greater than normal by the second half of 1991. In addition, no measurable rainfall was recorded during the summer and early fall of 1991.

The coastal areas of southern California are extremely vulnerable to the infamous Santa Ana wind, officially classified as a foehn wind condition. A similar condition occurs in the Oakland area, where it is known as a Diablo (or “Devil”) wind. These winds are created when a high pressure weather system is located over the great basin of the inland western states, accompanied by an offshore low pressure system. The high pressure system imports chilled air from the far north, with extremely low moisture content. The interaction of the two pressure systems and their counter-rotational forces creates a wind flow from northeast to southwest, while the pressure differential forces the dry air from high altitudes down to ground level. The result is a strong wind of exceptionally dry air, blowing through the mountain passes and spilling over the coastal hills toward the Pacific Ocean. Increased pressure also heats the air mass (adiabatic compression), which often results in air temperatures of 90 to 100oF at sea level, with less than 10 percent relative humidity and wind velocities of 35 to 70 miles per hour.

Most of the major wildland fires in California have occurred during foehn wind conditions, which occur most frequently between mid-September and late November. The fire protection agencies in California are highly aware of the danger that is created by these wind conditions and use a Red Flag alert system to warn of extreme fire risk conditions. The National Weather Service monitors weather trends in the western states to issue an early warning of impending Red Flag conditions.¹

The drought conditions prevailed through October 1991 with warmer than normal temperatures. A Diablo wind condition was predicted for Sunday, October 20, and Red Flag warnings were issued to wildland fire agencies.

VEGETATION

Most of the native trees on the East Bay Hills were cut during the 1800s to provide wood for railroad ties and lumber for building construction, leaving the hillsides almost bare. In the early part of this century, a major effort was instituted to reforest the hills and several non-native species were imported. Eucalyptus trees from Australia were selected because of their rapid growth and their ability to cover large areas with green trees. Monterey pine trees were also imported from other parts of California.

The west face of the hills receives significantly more moisture than the east face, encouraging the growth of trees and brush on the Oakland side. The Oakland hills are covered with dense growths of trees, supplemented by grasses and thick brush. The east face is exposed to the more arid climate of the inland valleys and is predominantly covered by grasslands and brush.

These particular trees and brush are highly vulnerable to rapid fire spread and release massive amounts of thermal energy when they burn. They also create flying brands, which are easily carried by the wind to start new spot fires ahead of a fire front. The extreme fire hazard of these fuels is greatly exacerbated by the steep terrain and by adverse humidity and wind conditions.

¹ The Red Flag Alert indicates that prevailing conditions present an extremely high fire danger. The alert is posted at all park and forest service facilities and signifies that severe restrictions are in effect to prevent fires. In many areas camping privileges and other wildland activities are suspended during Red Flag alerts.

One fire chief commented, "If the Oakland Hills had been part of a national park or forest, instead of a residential neighborhood, the area would have been evacuated during the Red Flag weather conditions."

LAND DEVELOPMENT ON THE HILLS

The first residential areas in the hills were developed in the early part of this century, after the San Francisco earthquake of 1906, as country homes for the upper class families of the crowded city across the bay. Several large homes were built along the lower slopes in Grandview and Claremont Canyons. The landmark Claremont Hotel was built by a developer to attract potential buyers to the area. By the 1920s, homes for the upper-middle class were being built along the lower slopes and several very large mansions were built on the higher ground.

The major development of Temescal Canyon took place in the 1950s and early 1960s. Narrow switchback roads were built on the canyon slopes and along the ridges, and expensive homes were built to take advantage of the spectacular views.

The roads include several steep grades and hairpin turns and, in many places, are so narrow that two automobiles have difficulty passing. The access for large firefighting vehicles is very limited. The water supply is also limited, particularly when evaluated against the combined fire risk of dense vegetation and large wood-roofed homes on steep slopes. Several water storage tanks are provided at different elevations to serve domestic requirements and hydrants in the area. The water system relies on electric pumps to relay water from the lower storage tanks up to the tanks at higher levels.

The homes on the hillside range in value from \$250,000 to several million dollars. The steep slopes of the canyon walls present difficult construction challenges. Many were built on platforms overhanging the canyon walls or with multiple levels stepping down the hillside. Garages, sun decks, or swimming pools were often constructed on the top level, with two or more levels of living area below the level of access from the street. Short bridges were required in many cases to span between the street and the garage entrance. Untreated wood shake or wood shingle roofs were common, and no requirements for fire resistive roof coverings or walls were enforced.

The combination of natural fuels and man-built structures created a critical wildland-urban interface. Many of the structures were completely enveloped in the natural fuels, including the areas below overhangs. The trees were so dense in many places that they created a natural canopy over the roads and no regulations for clear areas between wildlands and structures were enforced. The steep slopes created a natural draw for a fire to spread up to, under, and around the homes.

Two major developments occurred after 1970. One brought Hiller Highland, a neighborhood of 340 densely-built, two-story condominiums and townhouses to the hills. New, wider access roads were built to serve this development, but the heavy overgrowth of trees was maintained. A single connection was provided to Charing Cross Road, one of the older hillside streets.

The second major development was the Parkwood Apartments, a complex of seven buildings, containing 456 apartments, that was built at the bottom of Temescal Canyon, just north of the Caldecott Tunnel entrance. The buildings had three and four stories of wood-frame apartments, built on top of open parking areas, and were terraced into the lower levels of the Canyon. This exclusive development had only one access point, controlled by a security gate, connecting to the Highway 24 frontage road.

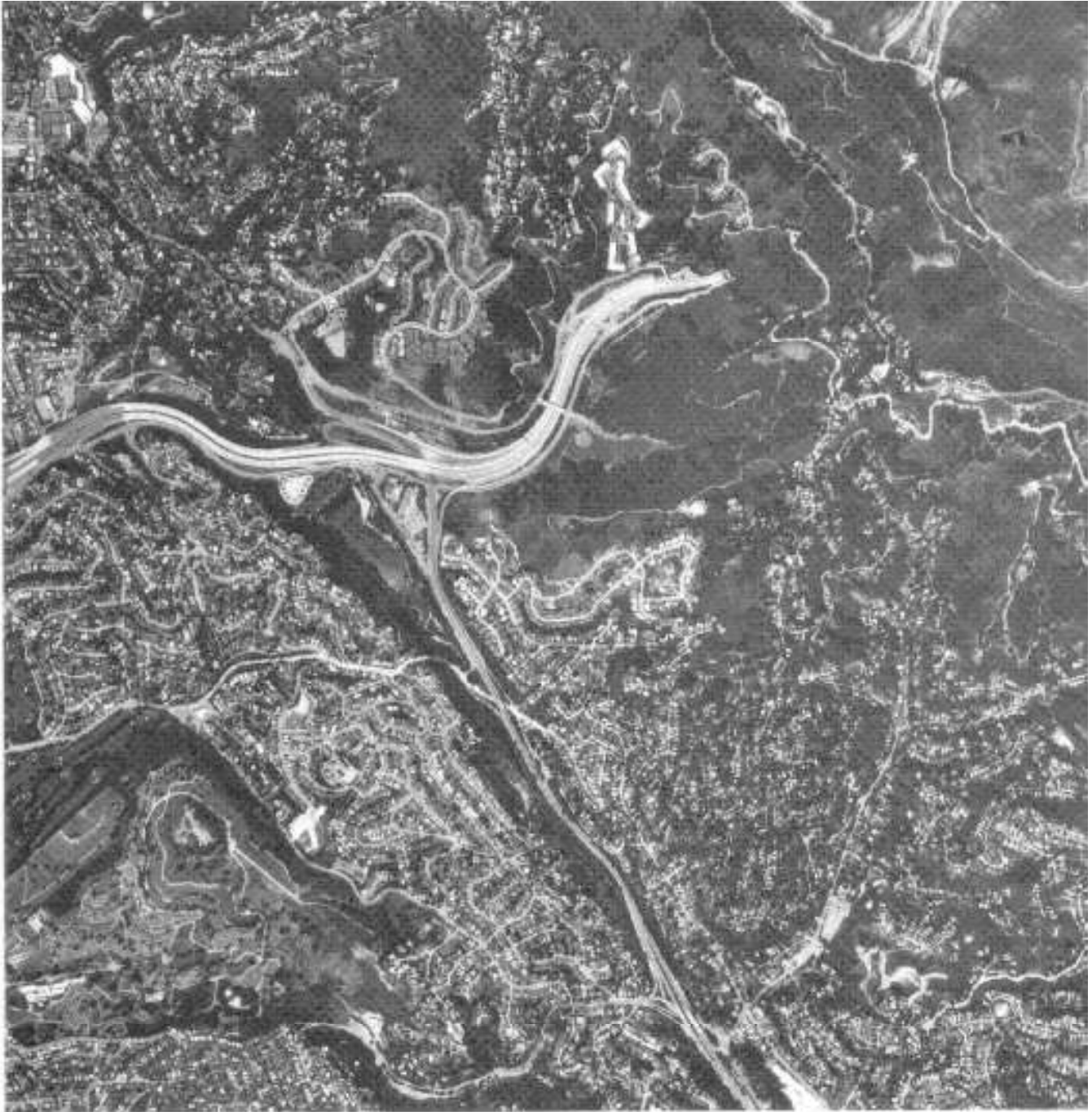
The Rockridge district, west of Temescal Canyon, features small hills and hollows that were covered with large, older homes, mainly two stories in height and closely spaced. This area was also rich in natural and ornamental trees and brush. Large pine trees were planted around many of the homes, and the mature trees enveloped many of the structures. The entire area featured lush landscaping, and many of the homes had wood shingle roofs, although Spanish tile roofs were also found in the area.

BURNING CHARACTERISTICS

Fire has been a part of the history of the Oakland-Berkeley Hills area throughout its history. As with many other marine climates, fuel moistures are such that during most periods, fires do not cause dramatic damage but rather help maintain a balance of fuel types and reduce fuel loads. The native flora and fauna had adapted correspondingly with the natural occurrence of fire in the area.

In modern times, the natural fire pattern in the area has been substantially changed. Fire suppression has reduced the natural cycle of fires which normally would have occurred in the area. Without prescribed burning or some other type of fuel reduction, the native vegetation has caused an increased fuel load through the area.

Additionally, the introduction of vegetative species which are not native to the area has dramatically impacted fuel loading. This is particularly true of the introduction of eucalyptus. Fuel accumulations in some areas under eucalyptus plantations have been estimated between 30 and 40 tons per acre. Monterey Pine was also introduced into the area and contributed significantly to the fuel loading.



This is an aerial photograph of the East Bay Hills area taken before the fire. By comparing it with the map on page 3 the reader will be able to identify the Hiller Highlands, the Parkwood Apartments, Lake Temescal, the Claremont Hotel, and major roads. A similar photograph, taken after the fire, appears on page 64.

Eucalyptus was first introduced to the East Bay Hills with extensive planting in the early 1900s. The eucalyptus has a tremendous production of both leaf and bark litter, which is not readily consumed or broken down in the normal decomposition process and leads to the presence of high volumes of fuel.

Additionally, eucalyptus is susceptible to freeze damage, as occurred in 1972, when large numbers of eucalyptus were killed due to an extended period of below freezing temperatures, and again in December of 1990. The dead trees and limbs added a significant amount of dry fuel in the area. Also, eucalyptus sprouts back from the stump and this sprouting after freezing or after logging operations has also increased fuels in some areas.

Fuel loading varied through the fire area and to some degree was dictated by the topography. The northeast portion of the fire area had more wildland fuels, while in the south and western areas, the homes were the major fuels. In effect, the more severe slopes in the north and eastern portions of the fire area required the use of native species. The more moderate slopes and deeper soils in the south and southwest areas allowed for the introduction of more ornamental type species.

Fuel Distribution -- Natural vegetative types through most of the fire area included some grassland, brushland, mixed broadleaf forest, and eucalyptus and conifer plantations. Species found in the grassland areas include various types of needle grass and perennial bunch grasses. Heaving grazing in the areas in the past resulted in the introduction of various annual grasses, such as wild and slender oats, barleys, soft chess, other bromes, and an array of associated annual and perennial herbs. Additionally, thistles, mustards, and wild oats dominate some of the area. With the discontinuation of grazing, coyote brush has become established throughout the grassland area.

The grasslands would contain the lowest fuel loading of the natural fuels through the area. However, the extended drought may have caused unusual amounts of dead fuel to accumulate before the fire.

The brushland would probably make up a large portion of the available fuel, particularly in the northeastern portion of the fire area. Drier sites would contain such things as silver lupin, California sage, and bush monkey flower. Other species which might be found would include poison oak, coffeeberry, ocean spray, and hazelnut. Hard chaparral type brushland would include alameda and brittleleaf manzanitas, bush chinquapin, and huckleberry.

Mixed broadleaf forest fuels were located in portions of the fire area., but were probably not significant in the fuel loading. Species found would have included coast live oak, California Bay, and California Buckeye. Some Monterey Pine and eucalyptus may also have been found scattered through these locations. Understory species would include poison oak, blackberries, hazelnut, and various herbaceous plants.

Eucalyptus plantations were found at various locations, through the fire area. Numerous eucalyptus, not specifically in plantations, were also scattered throughout the fire area.

Conifer species found through most of the area would have been Ponderosa Pine or the introduced Monterey Pine. There would be also some minor locations with Coastal Redwood. Monterey Pine plantations have been established through portions of the area.

In addition to the native species, various ornamental species have been added throughout the area, particularly in and around the homes. These fuels appear to be more significant toward the south/southwest of the fire area.

Fuel Loading - The heaviest fuel loading would probably have occurred in the untreated eucalyptus stands. Some estimates indicate fuel loading in these areas from 30 to 50 tons per acre. Additionally, heavy fuel accumulations would have occurred in the location of the brushlands.

Information indicates that some fuel reduction had been attempted through portions of the area. Some logging had occurred to thin eucalyptus stands and some attempts had been made to remove eucalyptus from certain areas. The East Bay Regional Parks District has used grazing to reduce fuels in some areas. The amount of fuel reduction conducted by individual homeowners varied greatly.

Various fuel reduction options need to be considered and developed in these areas. Prescribed burning and limited grazing by animals such as goats are two options that have been considered. Mechanical methods of fuel reduction could also be utilized.

Fire Spread -- Fire spread through the majority of the north and eastern portion of the fire was probably aided by the continuity of wildland cover and the rapid burning characteristics species. Most of the residences and other structures located through this area burned as the result of being exposed to the fire spreading through the continuous wildland cover. As the fire progressed into the more heavily populated area to the south and west, the structures themselves contributed to spreading the fire, assisted by the wildland and ornamental species.

Entry of fire into the structures through the fire area was closely associated with the adjacent wildland or ornamental plant species. Many of the homes in the steeper slope areas had overhanging decks with fuel accumulations underneath, allowing fire to spread to the decks and into the structures from below. It appeared from the location of trees around the homes that fuel accumulations on the roofs probably added to the spread of fire to the roof coverings and under the eaves. Additionally, fuels in close proximity to the structures proved to be significant, exposing the exteriors to extreme radiant heat loads. In many cases the radiant heat caused interior contents inside windows to ignite.

Strong winds and low fuel moistures resulted in an extremely fast spread of fire. This was increased by the topography and heavy fuel loading. The extremely rapid rate of spread, coupled with the difficulty of control made a frontal attack to stop the forward progress of the fire almost impossible. Suppression efforts in the initial stages of the fire consequently had to be defensive action in an attempt to control exposures and contain the spread on the flanks of the fire.

Spot fires occurred a quarter to a half mile in front of the fire as the wind carried embers over a large area. Spotting occurred in both wildland fuels and on top of structures. There were also spot fires occurring in the various ornamental species and in yards in the more residential areas of the fire.

IGNITION SOURCES

The combination of weather, terrain and fuel conditions have made large areas of California extremely vulnerable to wildland fires. The most frequently reported ignition sources are lightning, arcing power lines, human carelessness and incendiarism. Lightning is a high risk factor when it occurs without accompanying rain. The Diablo winds often cause power lines to arc or short out, sometimes providing multiple ignition sources as sparks rain down on the dry grass and brush.

Human carelessness includes unattended open fires and smoking materials as ignition factors. Regulatory measures are often implemented to restrict open burning and to limit or prohibit entry into high risk areas during periods of high risk weather.

Arson has been a major problem in interface areas. Individuals who seek to cause large scale destruction recognize the factors which make California's coastal areas extremely vulnerable to wildland fires. Efforts to warn the public of critical fire danger periods have been identified as an invitation to arsonists to take advantage of the opportunity.

A disproportionate number of arson fires have occurred in the most vulnerable areas, during the most critical periods.

The exact cause of the East Bay fire has not been determined. The major fire originated as a rekindle of the fire which occurred and was controlled on the previous day. Several leads were pursued relating to accidental or negligent causes for the original fire, but no definitive determination was made. A number of arson fires occurred in the hills, before and after this fire, including at least one on the same day, but no link has been made to any of those incidents.

PREVIOUS FIRES IN THE EAST BAY HILLS

The East Bay Hills have been the scene of a number of wildland-urban interface fires over the past 70 years. The circumstantial factors surrounding the major incidents have been remarkably similar. The Santa Ana wind condition, preceding periods of unusual dryness, wood shingle roofs, high burn rate natural fuels, lack of separation between the natural fuels and structures, lack of natural fuel controls, poor access, limited water supplies, and difficult terrain have all been recognized as factors in the previous fires,

History of Major Fires in the Oakland/Berkeley Area		
September 17,1923	Berkeley Fire	640 Structures
September 22,1970	Fish Canyon Fire (Oakland)	39 Structures
December 14,1980	Wildcat Canyon Fire (Berkeley)	5 Structures
October 20,1991	East Bay Hills Fire (Oakland)	3354 Structures; 25 Lives Lost

The most remarkable similarities can be seen from comparisons of the 1923 and 1970 fires with the 1991 fire. All three fires originated in the hills and spread into developed areas, pushed by Diablo winds, and each one continued to spread until the wind abated. The 1923 fire originated in Wildcat Canyon, approximately 2 1/2 miles north of Temescal Canyon, and burned from the hills down into the City of Berkeley "flatlands." This fire consumed 640 structures to the north of the University of California Berkeley Campus. Wood shingle roofs, the wind, and dry weather were cited as the major factors in this conflagration. Recommendations were made after the fire to limit the use of wood roof coverings and to control the natural fuel conditions in the hills.

The 1970 fire originated on the eastern slope of the hills near Fish Ranch Road, just over the ridge from Temescal Canyon. It spread rapidly up the slope and jumped over Grizzly Peak Boulevard on a front 300 to 400 feet wide. The fire then spread down into Temescal Canyon and subsequently crossed over into the upper parts of Grandview and Claremont Canyons. It was controlled at that point when the wind condition became less severe. The 39 homes that were consumed included virtually all of the homes that existed in the bum area in 1970. All of the homes that were rebuilt in this area were destroyed again in the 1991 fire, along with dozens of additional homes that had been constructed in the intervening years.

The 1970 fire followed virtually the same path as the early stages of the 1991 fire² and the losses were attributed to exactly the same factors; wind, weather, natural fuels, lack of separation between structures and natural fuels, unlimited use of wood shingles, terrain, access, and water supply were all identified as major factors in both fires. Investigations that followed the 1970 fire recommended regulatory restrictions to mitigate some of the risk factors, *but the am was permitted to be rebuilt and additional development was allowed to occur without action on the recommendations.*

The 1980 fire also originated in Wildcat Canyon and spread rapidly to involve five homes in the immediate area. The key factors that were identified in this fire were the lack of separation between natural fuels and structures and the unrestricted use of wood shingle roofs. While the wind was a factor in this fire, it was not as strong or persistent as in the other fires, and the fire was successfully contained. This fire underlined the risk factors that are created by the intimate mixture of structures into highly combustible natural fuels and by the use of wood shingle roofs.

OTHER WILDLAND-URBAN INTERFACE FIRES IN CALIFORNIA

The 1970 fire occurred during a period of eight days in which three major wildland-urban interface fires occurred in California. During a 60 day fire season in that year, 1,260 fires burned 600,000 acres, destroyed 885 homes, claimed 14 lives, and caused an estimated \$233,000,000 in damage along the California coast.

The Bel-Air Fire, in November of 1961, destroyed 537 structures in the Santa Monica Mountains, in the City of Los Angeles. This fire was

² The 1970 fire originated on the east slop of the hills and crossed over the ridge into Temescal Canyon. The 1991 fire originated on the west slope in the area where the 1970 fire began to spread on that side of the hills.

preceded by the Laurel Canyon Fire in July of 1959 which destroyed 38 homes. Several major investigation and analysis projects were conducted after these fires and were consistent in their warnings and recommendations. In each of the previous cases the wood roof and separation from natural fuels problems were emphasized.

In 1990, the Paint fire in Santa Barbara County involved 430 structures and caused one death. This was the largest loss of structures since the Bel-Air Fire and reminded public officials along the California coast of their extreme vulnerability to interface fires, particularly in view of the ongoing drought conditions. As the drought continued into 1991, fire officials were extremely concerned with the risk of one or more major fires that could have even more devastating results than any of the previous fires, particularly if the Santa Ana winds made their anticipated appearance during the period from September to November.

REGULATORY EFFORTS

Several regulatory efforts have been made to reduce or control the risk of wildland-urban interface fires in California. Fire officials were very much aware of the critical fire risk factors that were present in the East Bay Hills and had often encouraged measures to mitigate the risks.

Wood shingle roofs were identified as a major fire risk factor well before the Berkeley fire in 1923. Several urban conflagrations in different parts of the United States and Canada were attributed to wood roof coverings in the 1800s and early 1900s. By 1923, many states had placed regulatory restrictions on their use.

A 1959 report by the National Fire Protection Association identified the wood shingle risk factor and encouraged officials in California and Texas (which has a similar problem with wood roofing materials) to take action. This report illustrated the vulnerability of wood shingles to ignition, as well as their tendency to spread flaming brands downwind, starting new spot fires well ahead of a main fire front. This factor was identified in the 1959 fire in Laurel Canyon and the worst predictions were realized in the 1961 Bel-Air Fire. Nevertheless, legislative efforts to restrict the use of wood roofing materials were successfully resisted by the lobbying efforts of the wood products industry, which is a major component of the economy of California. The City of Berkeley passed prohibitive ordinances after the Wildcat Canyon Fire in 1980, but the City Council was persuaded to rescind the regulations soon after their adoption.

The parallel concern for maintaining an adequate clearance between natural fuels and structures has also been a subject of regulation in several areas. Following the Bel-Air Fire, most jurisdictions in southern California

began to enforce strict requirements to maintain separations between structures and natural fuels, particularly in hillside areas. The State of California adopted regulations under the Public Resources Code which require a 30 foot fire break around all structures in interface areas and require fuel modification within a 100 foot radius. These regulations apply only to State Responsibility Areas, however, and must be adopted by local jurisdictions to apply to their areas.

Minimum requirements for water supply, roadway widths, and access for fire apparatus have also been adopted for State Responsibility Areas and in many local jurisdictions. In most cases these regulations cannot be retroactively enforced on existing developments.

In 1982, a Blue Ribbon Committee studied the problems of fire risk in the wildland-urban interface areas of the East Bay Hills and recommended a major effort to institute fire breaks and fuel control measures. The fuel control measures on public lands were partially implemented for a few years, but fell victim to the economic crisis in the years preceding the 1991 fire. Most of the dead fuels resulting from the 1990 freeze were not cleared during 1991.

The Hazard Mitigation Report, prepared under the aegis of FEMA as a result of the Presidential Disaster Declaration for the East Bay Fire, identified several recommendations to reduce the risk of future fires in the area. The recommendations include requirements that would address fuel management, separations, roofing materials, roadways, and water supplies. These points are all recommended for implementation as the fire area is rebuilt and for application to other areas when feasible.

There has been considerable public pressure, both for and against the adoption of local ordinances or regulations that would change the character of the East Bay Hills. Deed restrictions in some areas prohibit the removal of trees or alteration to the natural ground cover. Proponents of safety have demanded a full review of all regulations before any permits are issued to rebuild.

Many homeowners expressed their desire to rebuild "exactly the way it was," without restrictions on construction materials or fuel separations. The vocal residents wanted to restore the character of the area without governmental restrictions. The same residents expressed fears that widened roads would bring unwanted traffic to the area and demanded compensation for any property taken to make improvements.

FIRE PROTECTION AGENCIES

The City of Oakland is protected by a 480 member career fire department and operates a total of 23 engine companies, seven truck companies, a hazardous materials unit, a fireboat, and a light duty rescue unit. Several of the engine companies are assigned small 4-wheel drive brush trucks, known as "Patrols" that are used for grass and brush fires and are staffed by the engine crew when needed. An engine company will usually take both vehicles when responding to a brush or grass fire. Most of the engine and ladder companies operate with four crew members, although three member crews are not unusual on engine companies, depending on the available personnel.

The Oakland Fire Department has been severely impacted by budget reductions during the past decade and has lost approximately 40 percent of its on-duty staffing. At least 10 companies were discontinued and the remaining companies operate with reduced staffing. The hardest hit area was the command level, which was reduced from an Assistant Chief and five Battalion Chiefs on each shift to an Assistant Chief and two Battalion Chiefs. The Assistant Chief now serves as both the Shift Commander and as Battalion 2. The Chief's Operator (Battalion Aide) positions were also cut, leaving the three on-duty command officers with no support staff.

The City of Berkeley operates seven engine companies and two truck companies, under the supervision of a Battalion Chief on each shift. Berkeley also reduced its on-duty staffing level by approximately 30 percent as a result of budget limitations. The 94 member department also provides advanced life support ambulances and a hazardous materials unit.

Both Oakland and Berkeley are located in Alameda County and participate in the Alameda County Fire Mutual Aid Plan. Oakland is the coordinating department for mutual aid within the North Zone of Alameda County, which includes 11 agencies. The Lawrence Livermore National Laboratories Fire Department is the central coordinating agency for all three zones (North, South, and East), which includes 29 different fire protection jurisdictions.

The Contra Costa County Fire Protection District is responsible for protecting a large unincorporated area in Contra Costa County as well as the incorporated communities of Lafayette, Walnut Creek, Concord, Clayton, Pleasant Hill, and Martinez. The ConFire Communications Center dispatches the 20 stations that are operated by the Consolidated Fire District, provides communications for the Orinda and Moraga Fire Departments and serves as the central mutual aid coordination point for

the entire county. The remainder of Contra Costa County is served by a mixture of 17 municipal fire departments and independent fire districts.

The California Department of Forestry and Fire Protection (CDF) has the primary responsibility for fire protection on state owned and state administered lands. It is primarily staffed and equipped as a wildland fire protection agency, although it provides structural fire protection for some counties and local jurisdictions on a contractual basis. In the San Francisco Bay area, CDF operates wildland engine companies, hand crews, bulldozers, and helitack units. (A helitack unit is a helicopter carrying a two-member hand crew and capable of making water drops on fires.) Tanker aircraft are also deployed to protect state responsibility areas. The regional headquarters is located at the Santa Clara Ranger Station in Morgan Hill, near San Jose.

The California Office of Emergency Services is a state government executive level agency that is charged with disaster preparedness and coordination. OES coordinates the statewide mutual aid system for fires and other major emergencies. The entire San Francisco Bay area is located within OES Region II, which is coordinated from the CDF office in Santa Rosa. Among the resources of OES are a fleet of OES-owned engines that are assigned to local fire departments. These engines are subject to call-up for major incidents and are then staffed by the fire departments where they are assigned. Several of the Bay Area fire departments have OES engines in their stations and are prepared to respond with them.

Most of the Bay area is protected by career fire departments, although some of the smaller jurisdictions have volunteer reserves for backup. Alameda County has a small reserve force, organized under OES, which responded to the East Bay Hills fire. In addition to the municipal fire departments, fire districts, and CDF, there are also several military installations and independent facilities, such as the Lawrence Livermore National Laboratory, the Lawrence Berkeley Laboratory, and the East Bay Regional Parks District that have their own career fire departments and participate in the mutual aid system.

HOW THE FIRE STARTED

POINT OF ORIGIN

The East Bay Hills fire originated on the steep slope at the very end of Temescal Canyon. The canyon turns north from the portals of the Caldecott Tunnel, forming a V-shape that leads directly to Grizzly Peak, the highest point in the area at almost 1,500 feet. Gwin Tank, which is part of the East Bay Municipal Utilities District water system, sits at the top of this slope, near the intersection of Marlborough Terrace and Grizzly Peak Boulevard. The hilltop is occupied by a radio tower, which is used as a transmitter site for a radio station and for some public safety radio channels. The closest Oakland Fire Department companies have an approximate response time of 10 minutes to this location due to the steep hills and narrow roads.

SATURDAY, OCTOBER 19th

On Saturday, October 19, 1991, the weather was warm, clear, and dry, with no appreciable wind. At 1212 hours a brush fire was reported on the hillside above 7151 Buckingham Boulevard, on the end slope of Temescal Canyon. This is one of the steepest parts of the canyon, with a drop of approximately 450 feet between Marlborough Terrace and Buckingham Boulevard. The vegetation on the slope was mostly grass, with some brush and a few trees. The slope directly above the fire was too steep to build on, but there were structural exposures on Westmoorland Drive and Marlborough Terrace, a few hundred feet west of the fire. Additional structures were exposed below the fire, on Buckingham Boulevard.

The actual source of the ignition has not been determined. The fire originated on the slope behind a house on Buckingham and spread rapidly up the hill. In the calm air, the fire spread was directly up the slope and was visible for miles.

The 1st Alarm assignment included three engine companies and the Assistant Chief. Another Battalion Chief was in the area and also responded on the 1st Alarm. A 2nd Alarm was requested at 1219 hours, followed by the 3rd Alarm at 1221, and a 4th Alarm three minutes later. Oakland finally struck a 5th Alarm for this fire at 1248 hours. This brought a total response of 12 engine companies and two ladder companies from Oakland and two engine companies from the City of Berkeley, as well as three engines and four patrol units from the East Bay Regional Parks District. Companies from Berkeley, Piedmont, Alameda, and San Leandro covered Oakland stations during the fire.

Oakland notified the California Department of Forestry and Fire Protection (CDF) of a fire in the “threat zone,” which indicates that the fire could spread into CDF jurisdiction. CDF responded with a 1st Alarm assignment of four engine companies, one helitack unit, one private (contract) helicopter, and a Battalion Chief. The CDF engine companies were not used, but the helicopters were used to drop water on the fire to help stop its spread and then to quench hot spots on the steep slope. The East Bay Regional Parks District’s helicopter, Eagle 5, was used for aerial reconnaissance.

The Oakland Fire Department’s Command Post Vehicle was positioned at the off-ramp from Highway 24, just west of the Caldecott Tunnel entrance. This location provided an excellent view of the burning slope and the surrounding canyon. Command Officers established Divisions on both flanks and at the top of the hill to supervise operations.

The fire was attacked from the lower side by companies on Buckingham and Westmoorland and from above by companies on Marlborough Terrace. The strategic plan was to cut off any potential spread on the flanks and then to squeeze in on the head of the fire to stop the uphill spread. The tactics were successful and the fire was declared under control at 1339 hours. The fire area was limited to two acres, with no structural involvement, and it was stopped on the uphill slope, before reaching the top of the hill.

Overhaul of the fire took several hours and was complicated by the steep slope. While the helicopters dropped buckets full of water on the visible hot spots, hand crews worked to create a secure perimeter around the entire fire area. The hand crews worked the area until darkness made it too dangerous to work on the slope, and the last company did not leave the scene until 1841 hours. Before leaving, a Battalion Chief checked the area for any visible signs of hot spots and directed the companies to leave the overhaul hoselines in place on the slope. During the night, companies returned to the scene to look for hot spots, and no signs of smoke or flames were observed.

Speaking to reporters after the fire had been controlled, Oakland Fire Officers noted the tremendous fire potential that was present in the hills after five years of drought, several months with no rain, excessive quantities of dead brush caused by the previous winter’s freeze, and the lack of clearance between hillside homes and the natural fuels. They noted that the only factor that was not present that day was the wind -- on a windy day the same fire could have become a disaster.

SUNDAY, OCTOBER 20th

THE RESTART

Sunday morning, October 20, brought the classic Diablo wind conditions to the Oakland area. The weather was still calm on the flatlands as the Oakland Fire Department changed shifts, between 0700 and 0800 hours, but the winds were already picking up in the hills. The Battalion Chief who had conducted the final check of the fire area the previous evening noticed the weather conditions as soon as he arrived at his home in the hills that morning. He called the on-duty Assistant Chief (BC2) to make him aware of the situation.

The Assistant Chief, who had also worked the previous day's fire, recognized the danger and directed two engine companies to check the bum area. Engines 19 and 24 met at the top of the hill, in the area of 7185 Marlborough Terrace, at 0850 hours. They noted a few hot spots, inside the fire line, under some pine trees on the north flank of the bum area and in the upper portion near Gwin Tank

Engine 19 asked Oakland Fire Communications to have a unit from the East Bay Regional Parks District (EBRPD) Fire Department respond to pick up their hose, which had been left on the hillside overnight. Oakland Fire Communications contacted EBRPD and was advised that there would be no one available to respond until their day shift personnel reported for duty.

The Assistant Chief decided to survey the situation and, while en route, advised Oakland Fire Communications to activate Patrol 28 with overtime personnel. This unit would be assigned to provide a quick response capability in the hill area., due to the windy conditions. Arriving at the top of the hill, at 0913, he advised Oakland Fire Communications to again call EBRPD and request their assistance in overhauling several hot spots that were flaring-up on the hillside. At 0916 he requested an additional engine company and Engine 16 was dispatched.

The wind was continuing to cause flare-ups in the bum area and the Assistant Chief was concerned with the extreme fire risk conditions. He advised Oakland Fire Communications of the risk factor at 0926 and, at 0929, assumed command of the situation from Marlborough Terrace. At that time several small flare-ups were showing within the bum area

At the same time, EBRPD was dispatching units to the scene, having received the message that their hose was in danger of burning if it was not soon picked up. The first EBRPD engine arrived at 0932 hours and advised the EBRPD Communications Center that the situation "seems

to be OK” and that the other responding units could “come in Code 2” (without lights and siren).

The flare-ups were controlled by 0945 hours. The Assistant Chief advised Oakland Fire Communications that the situation was under control and that E24 would be in command of continuing overhaul. As he was leaving the scene, the Assistant Chief contacted Battalions 3 and 4 and directed each one to assign an engine company to patrol the hills, due to the hazardous weather conditions. Engines 27 and 4, from the flatland area of the City, were assigned to this duty. At approximately the same time, the EBRPD Fire Chief, who was not aware of the flare-ups in Temescal Canyon, contacted his Communications Center and advised them to increase the staffing at the EBRPD fire stations, due to the weather conditions.

At 0959 hours the Assistant Chief questioned the assignment of an engine company to a special assignment at the Training Academy on that particular morning, noting “we have the most critical fire conditions in five years.” The assignment was canceled to keep the engine company in service.

Additional EBRPD units and personnel arrived and assisted the Oakland personnel who were overhauling hotspots on the hillside. Most of the overhaul was conducted with hand tools to root out fire that had burrowed into the thick duff and roots. The hose lines that had been left on the hill were repositioned to cover the perimeter, as a precautionary measure.

The Oakland and EBRPD units were having difficulty coordinating their efforts, since each agency’s units were on their own radio channels. Passing messages via the dispatchers, then by telephone from one communications center to the other, proved to be a problem. The units from both agencies were directed to use the “White” (Mutual Aid) channel to communicate directly.

By 1029 the situation appeared to be well in hand and E24 advised that E19 and E16 would be returning to quartets, while E24 would stay on the scene with the EBRPD personnel. The EBRPD personnel were still working a hot spot on the west flank of the fire, near the bottom of the bum area, which was emitting a significant amount of smoke. At 1035 Oakland Fire Communications advised E24 that they had received a call from a citizen at 7290 Marlborough Terrace reporting a hot spot on the hill. Engine 24 replied that the EBRPD crews were working on that spot and had advised that they could handle it. An EBRPD unit was directed to pull into the driveway at 7151 Buckingham and to extend a line up the hill to cover this flare-up. Radio traffic indicates that the personnel were

confident that they could handle the situation and that the flare-ups were all within the safe bum perimeter of the previous day's fire.

At 1040 hours, Oakland Fire Communications transmitted a 1st Alarm for a reported grass fire on Campus Drive, in the hills approximately five miles south of Temescal Canyon. The first arriving unit was Engine 27, which had been assigned to patrol the hills, and the fire was handled by one company.

At 1041 hours, E24 left the scene, leaving E19 in command of the overhaul operation. Engine 16 was already en route back to quarters. The decision to have E19 stay at the scene, instead of E24, was made between the two company officers. At this time the wind was continuing to fan minor flare-ups, but there appeared to be sufficient personnel on the scene to handle the situation with E19 and the EBRPD crews.

MAJOR FLARE-UP

Between 1040 and 1050 hours, the wind velocity increased and several additional flare-ups were observed; the crews were kept busy moving up and down the steep slope to cover them. The EBRPD officer contacted his communications center, reporting numerous rekindles, and requested another EBRPD engine company to respond "Code 3." The EBRPD helicopter, Eagle 5, was also requested to provide a better vantage point to direct operations.

Between 1050 and 1057 hours the winds continued to increase and caused more flare-ups. Engine 19 contacted Oakland Fire Communications to report that one of the flare-ups was in a new location and there was "pretty good smoke showing" from it. The Assistant Chief, who had returned to downtown Oakland, ordered E24 to return to the scene. The Lieutenant of E19 advised the Assistant Chief that the smoke was coming from a previously unburned area on the flank of the previous day's fire, but the situation was still under control.

The radio traffic indicates that there was difficulty making radio contact between the Oakland and EBRPD personnel on the hill at this time. The Lieutenant of Engine 19 was concerned that some of the EBRPD personnel could be in dangerous positions as several new flare-ups occurred in rapid succession.

Very suddenly, the fire flared up in an unburned area on the lower east flank of the bum area. Burning embers had been carried from one of the hot spots into a patch of tinder dry brush. At 1058 hours, E19 called for a "full box alarm" to respond to Gwin Tank. Oakland Fire

Communications dispatched E24, E28, and BC2 to assist E19. Engine 4, which was assigned to hill patrol, also responded.

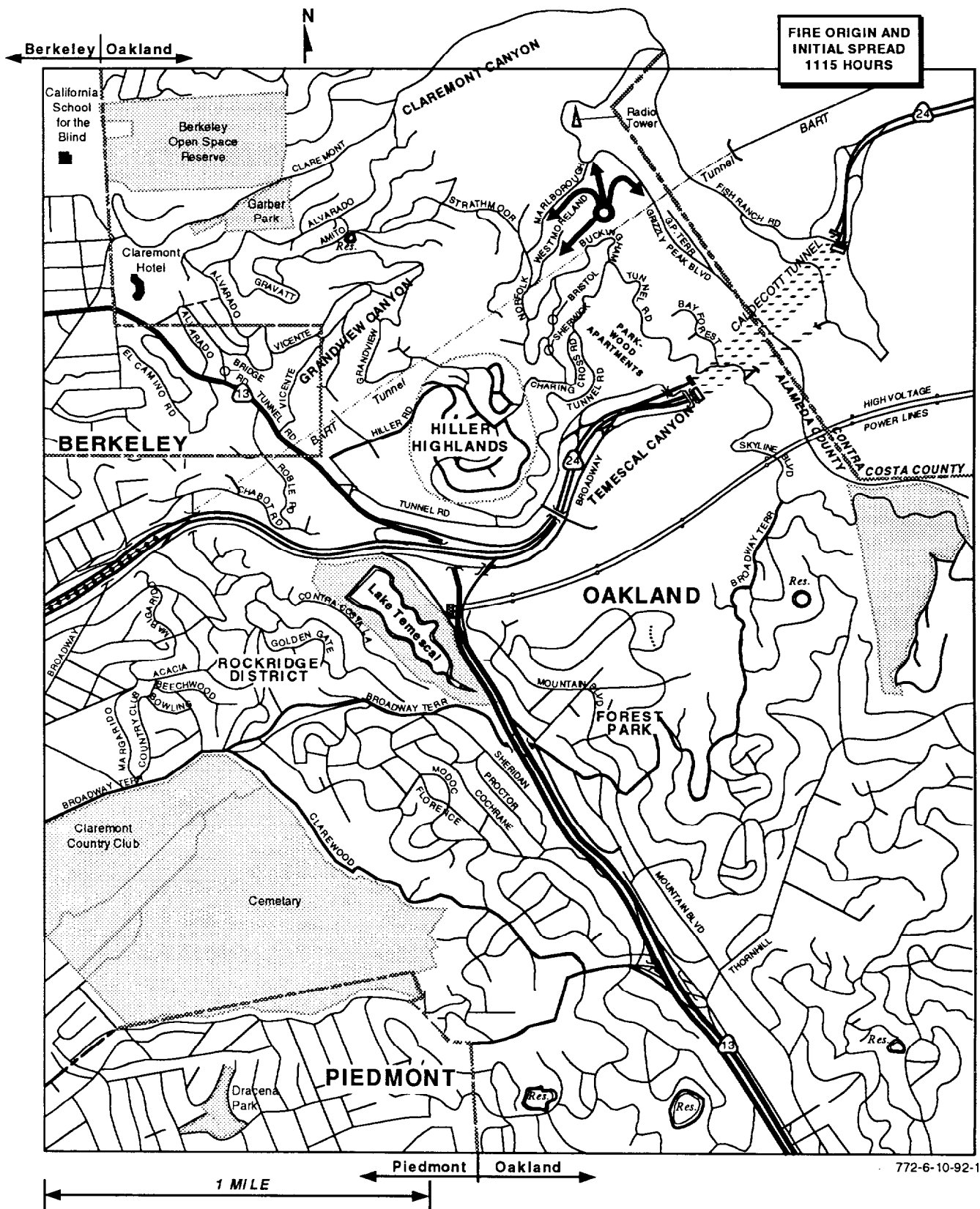
One minute later, Engine 19 requested CDF assistance and, at 1102 hours, requested a 2nd Alarm and Police assistance for traffic and crowd control. The 2nd Alarm units were directed to respond to 7140 Marlborough Terrace, at the top of the hill. At 1104 hours, the Assistant Chief, who could see the smoke from several miles away, called for a 3rd Alarm and also directed Oakland Fire Communications to request mutual aid from CDF. He specified to advise CDF that this was “another fire in the Threat Zone.” The Oakland area map presented previously is repeated on the following page showing the location of the restart and its initial spread.

The fire was spreading rapidly uphill, and the strong wind coming over the ridge was pushing the flames out to both flanks at the same time. (A television news crew, who were in the area following up on the previous fire, videotaped the rapid growth of the new fire from a minor flare-up in a growth of brush to a mass of flame, spewing flaming embers on new fuel and igniting new outbreaks at a rapid pace.) The situation changed from offensive to defensive almost instantaneously as the fire raged out of control. Within the first few minutes, E19 reported that the fire was crowning in the trees at the top of the hill, and a spot fire was reported in the area of Norfolk and Marlborough.

The Assistant Chief drove through the Caldecott Tunnel, noting the heavy smoke and flame on the hillside high above and to the left of the tunnel entrance, and turned up Fish Ranch Road to come up the back side of the hills. As he arrived at Gwin Tank, he could see that the fire was already well beyond the size of the previous day’s fire and spreading into heavier fuels. The first structure was becoming involved on Buckingham. He assumed command of the incident and assigned Battalion 4 as “Division A” to supervise operations from below on Buckingham Boulevard, while he assessed the situation from the top of the hill. He requested a 4th Alarm at 1115 hours.

Engine 24 had come in on the lower side of the fire and reported that they thought they had the fire cut off to the west from 7140 Buckingham. Engine 19, with a vantage point above the fire, could see that left flank of the fire had jumped, possibly from a flaming brand, and started a new run uphill and to the west, above the houses on Buckingham. This created an immediate threat to houses at the end of Westmoorland Drive and at the top of the hill on Marlborough Terrace.

Engine 19 advised the Incident Commander that there were two distinct fire fronts, moving laterally in both directions from the area of



origin. The wind coming over the ridge was meeting the fire spreading up the slope and splitting it into two flame fronts.

An off-duty Assistant Chief, who was in the area, had responded and was at the bottom of the hill. Communicating with the on-duty Assistant Chief, they decided to set up the Command Post Vehicle at the Highway 24 off-ramp, in the same location as the previous day. The off-duty chief became the Incident Commander, while the on-duty chief became the Operations Officer.

Ladder 1, a tractor-trailer unit, was responding to Marlborough Terrace on the 2nd Alarm, when the Assistant Chief saw the vehicle coming up the hill via Hiller Road. He redirected L1 to meet the Command Vehicle on Highway 24. The large truck took several minutes to descend via Charing Cross Road to Tunnel Road, with their steep slopes narrow switchbacks. By the time they reached the bottom of the hill, the fire was spreading to the area they had just come through.

Situation Status at 1120 Hours

Fire:	Rapid uphill and lateral spread on both flanks in steep terrain. Moving through fast burning fuels toward residential areas
Resources:	Oakland 4th Alarm assigned, assisted by EBRPD, and mutual aid requested from CDF.
Strategy:	Companies attempting to set-up ahead of fire to protect exposures and hold flanks.

An assessment of the situation at this point indicates that the rapid ***fire spread, combined with very limited access, was beyond the capability of conventional firefighting forces.*** To reach the fire, companies had only a few very steep and narrow roads, while the fire had the advantages of weather conditions, terrain, and natural fuels. The wind coming over the end of the canyon and down the slope was splitting the fire to both sides, pushing it directly toward inhabited areas on both flanks. The force of the wind was so strong that master streams were unable to reach the flames. It was clear to the Operations Officer that rapid intervention with firefighting aircraft was needed to have any hope of stopping the spread of this fire.

At 1119 hours, CDF Morgan Hill was dispatching its closest available helitack unit, Copter 106, to Oakland. The CDF dispatcher had received the initial mutual aid request from Oakland, but when he called back to obtain additional details, the call was placed on hold for several

minutes. Copter 106 normally has a 15 to 20 minutes flying time to the fire scene; on this day the strong headwind almost doubled the flying time.

COMMUNICATIONS PROBLEMS

Radio communications was a major problem from the outset. The Oakland Fire Department's primary radio channel (Ch2) was overwhelmed with traffic as companies tried to report their approach and request instructions from command officers, report worsening fire conditions, request assistance, and describe their actions. The Command Officers tried to contact units and make assignments, but the radio traffic was so overwhelming that most messages went without acknowledgements and many were never heard. The only alternate frequency that was available for the Command officers to communicate with each other was Oakland Channel 1, and all other Oakland incidents were being handled on that channel, including a structure fire.

Companies were deployed above and below the fire and on both flanks. Without effective radio communications, it was impossible to direct or keep track of them or to maintain any awareness of fire conditions in different areas.

In the Oakland Fire Communications Center, the situation was also out of control. The incoming telephone lines rang continuously, with one caller after another reporting the fire, requesting the fire department to come to a particular address, asking if residents should evacuate, and telling the dispatchers to send more fire trucks to different locations. The news media were calling for information. The radio was so jammed with traffic that it was difficult to hear and respond to the messages that were directed to the Communications Center. When Command officers asked the Communications Center to do something, the dispatchers were so overwhelmed that several minutes would elapse before it could be done. With so many telephone calls coming in, it was almost impossible to make a call out from the Communications Center.

Under these conditions, there were several miscommunications and delays in processing information and requests. Automatic notifications had to be made on the multiple alarms, and a recall of off-duty personnel had to be initiated. Mutual aid requests had to be processed. Calls to other agencies were delayed, and callbacks from agencies requesting additional information went unanswered or were put on hold. Additional experienced personnel arrived within the first 15 to 20 minutes to assist in the Communications Center, but the overload condition persisted for several hours.

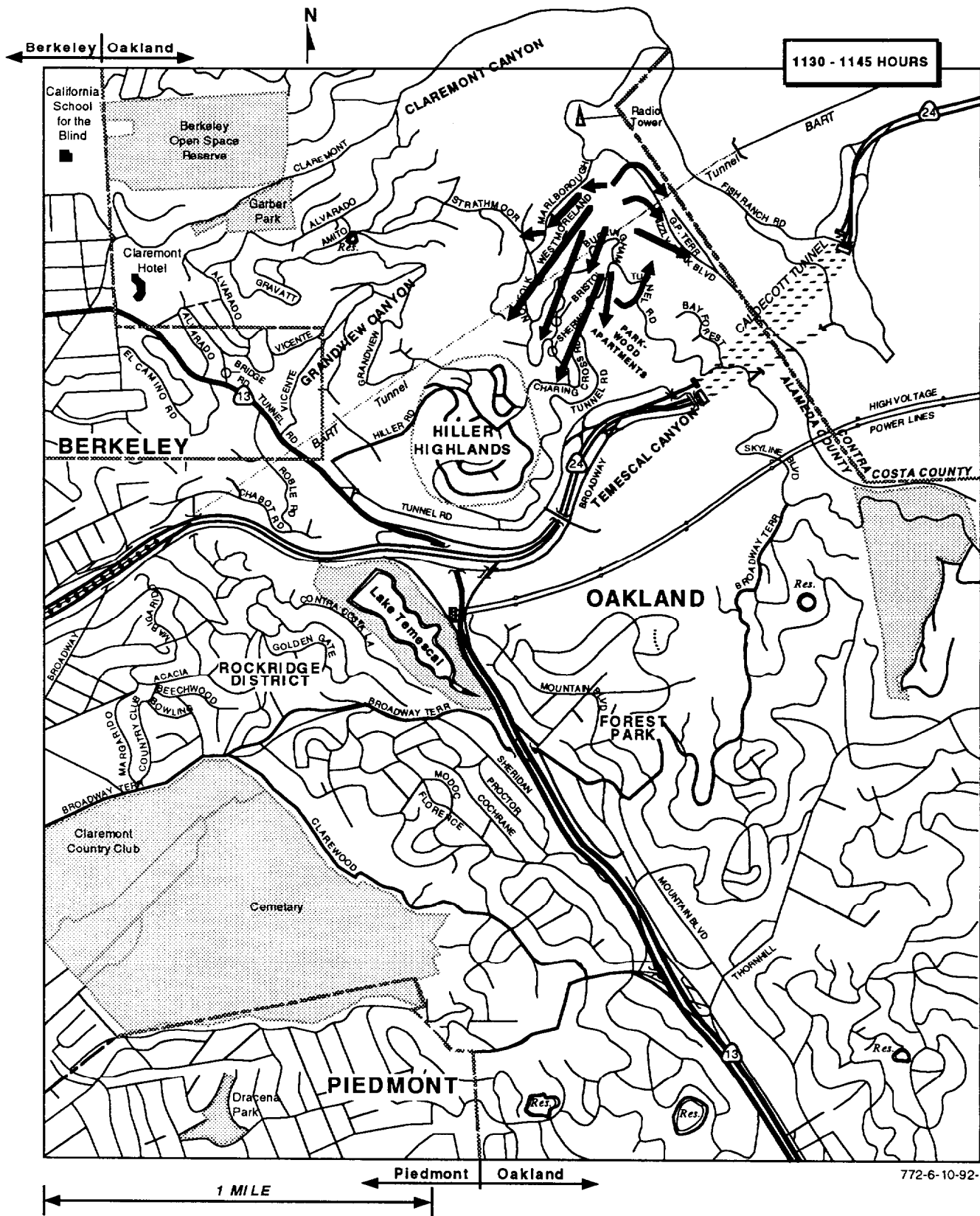
CRITICAL PERIOD

Between 1119 and 1125 hours the situation became even worse:

- Division A (BC4) reported that the fire was spreading rapidly uphill on the west (left) flank and that he would be moving up to Marlborough Terrace to try to protect homes at the top of the hill.
- The Incident Commander reported that the smoke was so heavy coming down the canyon that he could not see where the fire was or which way it was moving from the Command Post at the bottom of the hill.
- The fire was spreading south and east on the right flank toward a cluster of homes on Grizzly Peak Terrace. Engine 6 and Truck 15 were assigned to try to protect that exposure.
- The Operations Officer reported the need for an additional Command Officer at the top of the hill to cover the right flank. None was available.
- Engine 19 reported that the fire spread on the left flank was lateral, toward the homes on Norfolk Drive.
- Division A reported that he had at least one structure involved, and the fire was “going to jump Buckingham any minute.”

The Incident Commander called for the 5th and 6th Alarms at 1120 hours. The Operations Officer requested the 6th Alarm companies to respond to Bay Forest Drive and Tunnel Road, directly above the entrance to the Caldecott Tunnel, where a group of homes were directly in the path of the flames advancing on the right flank. He added a request for five mutual aid engine companies to respond up the back side of the hills to stage at Fish Ranch Road and Grizzly Peak Blvd.

By 1130 hours the fire was moving so fast on the left flank that companies were abandoning their offensive positions and retreating in search of safe areas to protect structures or to make a stand. Several houses were burning on Buckingham and Westmoorland, and the homes on Marlborough Terrace were in imminent danger as the fire continued to spread west along the face of the canyon and up the slope. The spread of the fire by 1130 is illustrated on the following page.



772-6-10-92-1

to protect exposed houses and to stop the fire from topping the hills along Marlborough Terrace and Grizzly Peak Boulevard.

Two minutes after requesting the 2nd Alarm, BC45 advised ConFire that Oakland was requesting all available units. Learning that Oakland had established a Command Post at the bottom of the hill, BC45 assigned a Captain as "Division A," to direct the Contra Costa units, while he drove to the Command Post location.

ConFire had already been contacted by the Alameda County Mutual Aid Coordinator, asking for one strike team and, when the ConFire dispatcher telephoned Oakland Fire Communications for routing instructions, the request was increased to two strike teams. Contra Costa County was also working a multiple alarm brush fire in Franklin Canyon, six miles northeast of this fire. ConFire began to call-up additional strike teams from the remaining resources within Contra Costa County to respond to Oakland.

"It's hard to get organized and run for your life at the same time!"
(An Oakland Command officer)

As the fire ignited structures and began to jump the street along Marlborough Terrace, firefighters had to abandon their defensive strategy and evacuate. Companies had already been forced out of Buckingham and Westmoorland, back to Norfolk Road. The firefighting forces were in complete disarray. Streets were blocked by flames and live power lines were falling from burning poles.

Situation Status at 1145 Hours

Fire: Completely out of control, moving west along the north side of Temescal Canyon (left flank) and involving numerous structures. Also involving structures on the upper (Grizzly Peak Terrace) and lower (Bay Forest) right flanks. Spreading rapidly through Parkwood Apartments. Hiller Highlands is in direct path of the fire.

Resources: Most Oakland units evacuating or seeking refuge. Contra Costa County 2nd Alarm assignment arriving at Fish Ranch Road. Five strike teams requested from Alameda County. Only one helitack available from CDF; all air tankers committed to other fires.

Strategy: Companies evacuating residents and abandoning positions. Life safety is only concern until additional resources arrive and can be assembled ahead of fire fronts.

At 1133 hours, Division A radioed "probably can't hold -- it's coming over -- we are abandoning task!" The Operations Officer replied with a warning to be extremely careful: "Don't get anybody killed!" Two minutes later Division A radioed "We're evacuating Buckingham. The fire went over both sides of us!"

Situation Status at 1130 Hours

Fire: Left flank involving structures on Buckingham and Westmoorland, threatening Marlborough Terrace above. Right Flank rapidly approaching homes on Grizzly Peak Terrace, Bay Forest Road, and Tunnel Road. Fire threatening to top hill and spread into Contra Costa County.

Resources: All available Oakland resources committed or en route. CDF units en route. Mutual aid being requested from Contra Costa County and North Zone of Alameda County.

strategy: Companies on left flank retreating, attempting to evacuate immediately threatened areas. Probably cannot stop fire until resources can be assembled to make a stand ahead of the fire. Companies on right flank trying to assemble adequate resources before the fire reaches structures.

TOTALLY OUT OF CONTROL

At 1133 hours on Sunday, the Incident Commander instructed Oakland Fire Communications to request five Strike Teams from Alameda County to stage at Hiller and Tunnel Roads, a half mile ahead of the fire on the left flank. He reported that the fire was totally out of control and moving on several fronts, involving more than 100 acres of trees, brush, and houses. He also requested the response of Pacific Gas and Electric because of numerous power lines that were falling as their poles burned.

This request was intended to provide the resources to make a stand to hold the fire inside Temescal Canyon, trying to prevent its spread into the Hiller Highlands development or over the top to Grandview Canyon. Hiller Road is the only wide access road to the hillside, and Hiller Highlands provided the best opportunity to make a stand ahead of the fire that was moving quickly along the north face of the Canyon.

The fire not only burned up the slope and outward on both flanks, but the wind coming over the ridge pushed flames, smoke, and burning brands back down into the canyon. At 1134 hours it became evident that a fire front was moving down the canyon toward the Command Post. At the

bottom of the slope, more than 200 feet below Buckingham Blvd., the Parkwood Apartments suddenly became an exposure. Highway Patrol Officers had already closed the Caldecott Tunnel and were trying to clear the backed-up traffic from Highway 24 by sending cars back toward Highway 13. Oakland Police Officers were sent to warn the apartment residents to evacuate and found some residents already driving out through the narrow security gate. As more residents heard the warnings, the single exit road from the complex became clogged with cars and pedestrians.

The Incident Commander's next request, at 1135, was for the Oakland Police to send as many officers as possible to help with evacuations, beginning with the 7100 block of Marlborough Terrace.

The Incident Commander sent the only available companies to try to evacuate and protect the exposed apartment complex. At 1137 hours Engine 1, Truck 1, and Truck 3 tried to enter and work their way toward the rear of the complex, but they encountered backed-up traffic with more than 1,000 residents trying to escape on the private roadways. The plume of superheated gasses and the shower of burning brands was beginning to ignite exposed wood surfaces on the upper levels of the buildings at the rear of the complex. Trees among the buildings also ignited, adding to the exposure problem.

Engine 1 worked its way back to a position to operate its elevating master stream, laying a five-inch supply line, but exposures were igniting rapidly and the position in front of the fire became untenable. The crews committed themselves to interior search and rescue, going in after residents who were reported to still be inside the three- and four-story buildings. The Incident Commander located another available company, Engine 16, and sent them to assist in the apartment complex at 1141 hours. While this was happening, Engine 6 was reporting that the fire was spreading south from Grizzly Peak Terrace, 600 feet directly above Parkwood.

MUTUAL AID BEGINS TO ARRIVE

The first outside assistance to arrive came up Fish Ranch Road on the back side of the hills. A 1st Alarm assignment, consisting of Orinda, Moraga, and Contra Costa County units, had been dispatched by Contra Costa County Communications (ConFire) at 1135 hours, on a report from a citizen of fire on the hilltop above the Caldecott Tunnel. The Orinda Battalion Chief (BC45) requested a 2nd Alarm at 1143 hours, when he reached the top of the hill and saw the magnitude of the fire on the Oakland side. It was impossible for BC45 to make contact with the Oakland IC by radio due to the extremely heavy radio traffic, so the Contra Costa companies went to work with the Oakland companies, trying

LIVES SAVED AND LOST

Most of the fatalities occurred between 1130 and 1200 hours as the fire spread across the north face of Temescal Canyon, involving all of the structures on Buckingham, Westmoorland, Marlborough, Norfolk, Sherwick, Bristol, Charing Cross, and Tunnel Roads. The spread of the fire by 1200 is shown on the following page. Police officers and firefighters tried to evacuate the area as wind-blown brands and embers ignited more and more spot fires ahead of the rapidly moving fire front. Police cars cruised the streets with sirens wailing, and officers used their PA speakers to warn residents to evacuate.

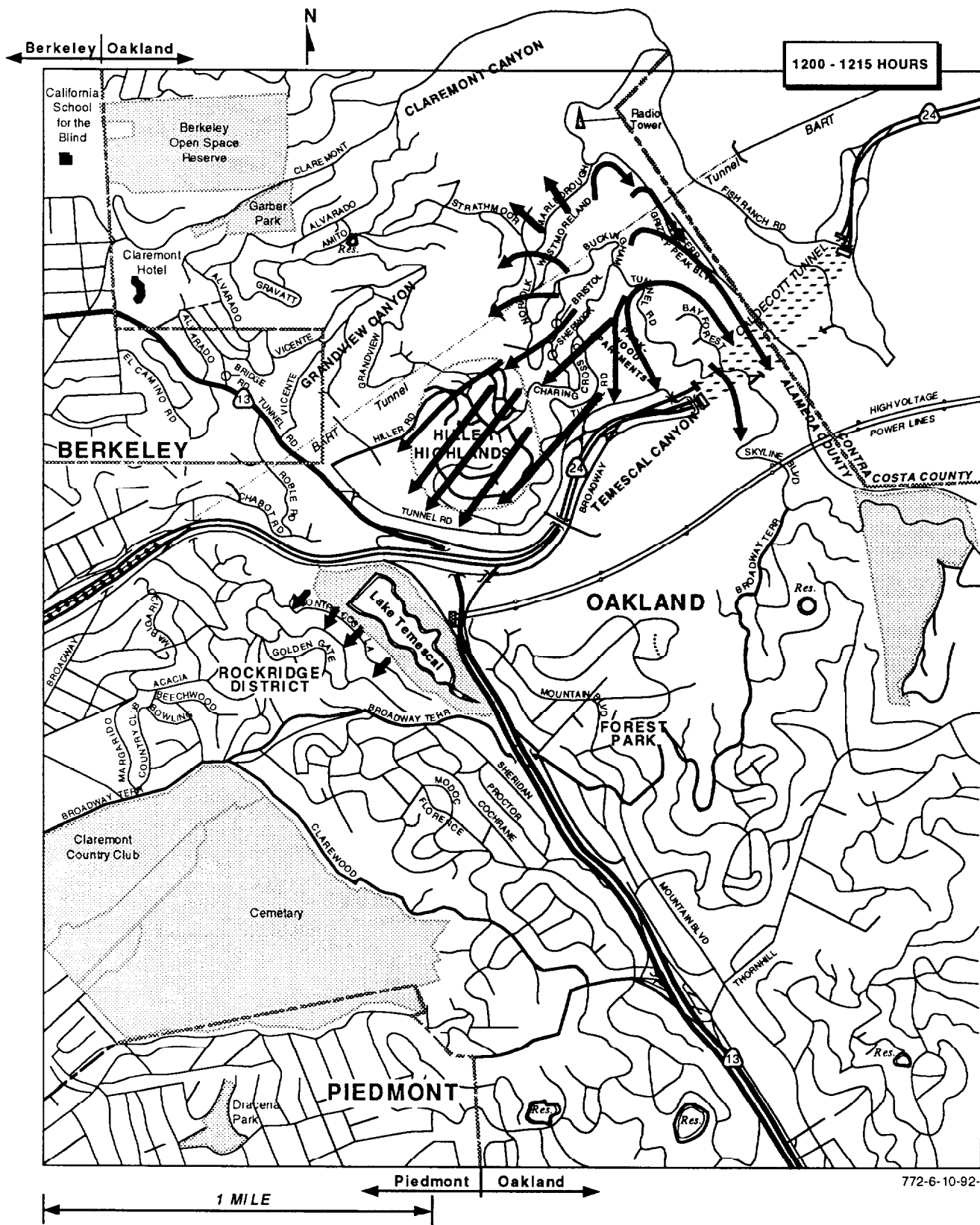
Residents who had been standing in front of their homes moments before, watching a fire that was two blocks away, were suddenly piling belongings, children, and pets into their cars. The steep narrow streets, now obscured by swirling smoke, were suddenly clogged with cars as falling power lines and flaming brands ignited spot fires, adding to the confusion. Some of the narrow roads were blocked by collisions as panicstricken residents searched for safe escape routes.

The body of Oakland Police Officer John Grubensky was found, along with five civilian fatalities, at a narrow point on Charing Cross Road. It appeared that the cars were jammed at this point by a collision in the narrowest part of the road, and the occupants were unable to escape the advancing flames.

The fatalities included individuals who were unable to evacuate, because of age or disabilities, and several who were overrun by the flames as they tried to escape. Firefighters reported hearing shouts for help from one home and not being able to reach it before it became heavily involved in flames. As their positions were overwhelmed, firefighting crews were split up, and for hours some members did not know the fate of the other members of their companies.

As they pulled out, they tried to evacuate everyone in the path of the fire, and some ended up taking refuge where they could find it. The Lieutenant from Engine 19 reported that he was taking refuge with a group at the base of Gwin Tank, using a hoseline to protect themselves as the fire surrounded their position.

A Lieutenant and a Firefighter had to abandon their Patrol vehicle and took refuge in the swimming pool of a hillside home, along with the homeowner, and spent more than an hour under the pool cover, sticking their heads out just often enough to splash water on the cover to prevent its ignition. The house burned, leaving only the pool, and when the fire



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subsided they found that every house on the block had burned to the ground.

Oakland's Division A, BC4, called the IC at 1144 hours with the message "fire at both ends - we're going to have to wait it out." The Battalion Chief had been with a Patrol unit that was forced to pull out of Buckingham Boulevard and made its way to Norfolk Road. He left them near the intersection to retrieve his car, directing the Patrol on down Norfolk toward Strathmoor Drive to evacuate residents on the opposite side of the hill. The burned bodies of Battalion Chief James Riley and a civilian resident of the area were found hours later, near the location where he was last seen by the Patrol unit. It is believed that the Chief was trying to assist the woman, who had left her home by car, and both were electrocuted by a falling power line. The message from Division A at 1144 is the last recorded communication from Chief Riley.

Crews on the right flank were also in serious trouble. Engine 8 had been assigned to assist E24, protecting structures in the area of 7140 Buckingham, below the point of origin of the fire, but was blocked in the 7200 block by live power lines and abandoned cars. Engine 8's Captain directed his crew and a ride-along volunteer to lay a supply line from a hydrant and set up to protect three large houses that were in the path of the fire. They met up with the crew from Engine 24, one crew member from Engine 16, two from Engine 19, and a volunteer who had been helping to fight the fire on the hillside. They were soon joined by five EBRPD firefighters who drove two of their vehicles out of the smoke and flames.

As they set up to protect the structures, the fire that had blocked their path to the west, sweeping down toward the Parkwood Apartments, came back from below their position and cut them off to the east. Seven civilians were trapped along with them. A power line burned through and dropped around the hydrant, burning a hole in the hose and dropping their water pressure. Engine 8 contacted the IC to obtain emergency assistance, but there was nothing available to send until the mutual aid strike teams arrived. The Captain had his crew members force entry into a large three story house and put all of the civilians inside the concrete block garage. The house was newly constructed and was equipped with an automatic sprinkler system, although he recognized that the sprinklers could never protect the structure from the approaching fire.

The firefighters operated master streams and hoselines on the exterior of the house to keep the wood siding from igniting, flowing an estimated 2,500 gpm, as the fire swept over and around them. Fog nozzles had to be used to protect the members operating the larger handlines that were directed to wet the structure. For an estimated five to eight minutes

the fire storm raged around them, burning one of the adjacent houses to the ground, but the exposure protection tactic worked and 20 people survived.

When the storm had passed, they realized that there was still enough fuel left after the fire's pass that it could come back if the wind shifted. They went behind the houses and set a backfire to clear enough area behind to protect them from a rear assault. By this time their hydrant had gone completely dry and they were left with only tank water to maintain their protection.

When conditions finally appeared to stabilize, they met up with the two firefighters and the woman who had survived the fire under the pool cover. Looking down the hill they could see the smoking ruins of the Parkwood Apartments below them; the entire complex had burned to the ground. Then, as they worked their way out of the area, they found the burned bodies of two civilians in the street, only a block from where they had taken refuge. They went on to fight fire for several more hours.

Situation Status at 1200 Hours

Fire: Entire north side of Temescal Canyon involved, up to Charing Cross Road, spreading into Hiller Highlands. Several lives and dozens of structures already lost. East end of Temescal Canyon involved, with fire moving rapidly toward upper Broadway Terrace. Parkwood Apartments fully involved. Fire threatening to top hill near Norfolk Road and spread into Grandview Canyon and to go over Grizzly Peak Drive into Contra Costa County. Flames also threatening to cross Strathmoor Ridge to enter Claremont Canyon.

Resources: All companies on left flank in retreat or taking refuge. Too few companies on right flank to make a successful stand. Contra Costa County resources assisting at top of hill, but situation is beyond control. CDF Helitack 106 on scene, making preliminary assessment. Communications systems overwhelmed. Water system failing due to loss of electricity to supply pumps. Additional strike teams and CDF units en route (ETA 15 to 45 minutes).

Strategy: Firefighters and police officers attempting to evacuate residents and spectators ahead of fire; no resources available to commit to any offensive or defensive action until companies can regroup or mutual aid arrives.

ALL FORCES RETREATING

When the Orinda Battalion Chief (BC45) arrived at the Command Post, he made face to face contact with the Incident Commander and reported that the Contra Costa County units were working on the upper east side of the fire. The IC assigned BC45 to direct the defense of the Parkwood Apartments, but the rear half of the complex was fully involved and companies were still trying to evacuate the last residents from the front buildings. There were no more companies available to assign and nothing could have stopped the fire as it swept through the complex, pushed by the wind coming down the canyon.

The Command Post had to be relocated as the fire swept toward its position on Highway 24. As the Command Post was moved to the freeway interchange, a wall of flames was sweeping into the Hiller Highlands development, unchallenged by fire forces. Police officers and firefighters alerted occupants to evacuate moments before a wall of flames enveloped the entire complex.

FIRE JUMPS FREEWAY

At 1202 hours, Oakland Engine 2, which was responding to the main fire, reported to the IC that it had discovered a vegetation fire in the Temescal Recreation Area, west of the interchange of Highways 13 and 24. This area is 2,000 feet beyond the face of the burning hills and 400 feet lower in elevation. Flying brands were dropping into this area and within minutes were beginning to ignite a line of trees that border the west side of Lake Temescal. This area was in the direct path of the fire's convective thermal column, which dried and preheated the ignitable fuels.

An off-duty Oakland Battalion Chief, who had picked up a spare car and was assigned as BC44 to cover the City, saw the fire west of Highway 13 and drove around to the residential area west of the lake. At 1212 hours, BC44 reported to the IC that he had multiple structures involved along Contra Costa Lane, a long dead end street that borders the lake. He reported that he was establishing a Command Post at the intersection of Contra Costa and Buena Vista and initiating operations with Engine 2. Engines 3 and 13 were assigned to stage at Broadway and Golden Gate to assist BC44.'

A size-up of the situation west of Lake Temescal was bleak. The fire had jumped the only major physical barrier between the hills and the rest of the City and was now moving into a heavily wooded residential "flatland" area. Flying brands were raining down on the trees and rooftops. The resources of the Oakland Fire Department were fully committed and

only a few mutual aid companies had arrived on the west side of the fire. More structures were becoming involved every minute.

Battalion 44 sized-up the situation and suggested calling San Francisco for additional assistance to make a stand. At 1218 the IC asked Oakland Communications to request two Strike Teams from San Francisco. Two minutes later a structure fire was reported on Country Club Drive, several blocks further west, in an area of large homes with a very limited water supply.

The request for two strike teams was made directly from Oakland Fire Communications to San Francisco Fire Communications at 1229 hours. Two strike teams were dispatched and en route to Oakland by 1240.

HILLER HIGHLANDS

At approximately the same time that the fire was jumping across the freeway interchange, it was also sweeping through the 340 unit Hiller Highlands development. There were no fire suppression forces there to make a stand, because all of the companies that had been committed to the left flank of the fire had been overrun or were retreating from the overwhelming fire front. The fire arrived well ahead of the mutual aid strike teams that had been ordered to protect the area. The fire swept over the crest of the hill from Charing Cross Road into the tightly packed two-story townhomes, as residents rushed to escape the flames by driving down Hiller Road to Tunnel Road. Several residents of this development were unable to escape ahead of the flames and died in their homes or on the roadways.

BERKELEY FRONT

On the northwest flank of the fire, flames were spreading quickly toward the City of Berkeley. A portion of the City of Berkeley projects into the lower part of Grandview Canyon, although the major part of the city lies north of Highway 24 and west of the foothills. The City of Berkeley is heavily developed and the part that projects into Grandview Canyon contained closely built two-story dwellings, primarily along Vicente Road and Alvarado Road.

The Berkeley Police and Fire Communications Center received several calls from residents between 1100 and 1130 hours and advised the callers that the fire was in the City of Oakland. (Many of the area residents used Berkeley as a mailing address, although they were actually located within the City of Oakland.) Although no mutual aid request had

been received, the Berkeley Fire Department had monitored part of the Oakland radio traffic and was aware of the fire.

Around 1130 hours, the Berkeley duty Battalion Chief drove to the Vicente Road area and made an assessment of the potential threat to Berkeley. At that time there was no indication of fire moving in that direction.

At 1207 hours, Berkeley received a call from a citizen on Vicente Road, reporting that fire was coming over the hilltop above that address; Berkeley Engine 3 was dispatched to check on that report. Engine 3 drove up Vicente Drive to the intersection of Grandview and Westview before the fire was spotted, coming over the ridge from the area of Norfolk Drive.

Berkeley Engine 3 called for a full 1st Alarm assignment at 1213 hours. Twelve minutes later the companies on Vicente Road were trying to protect structures as flying brands began raining down on them. Dozens of spot fires ignited ahead of the main fire front as it swept down into Grandview Canyon.

Situation Status at 1230 Hours

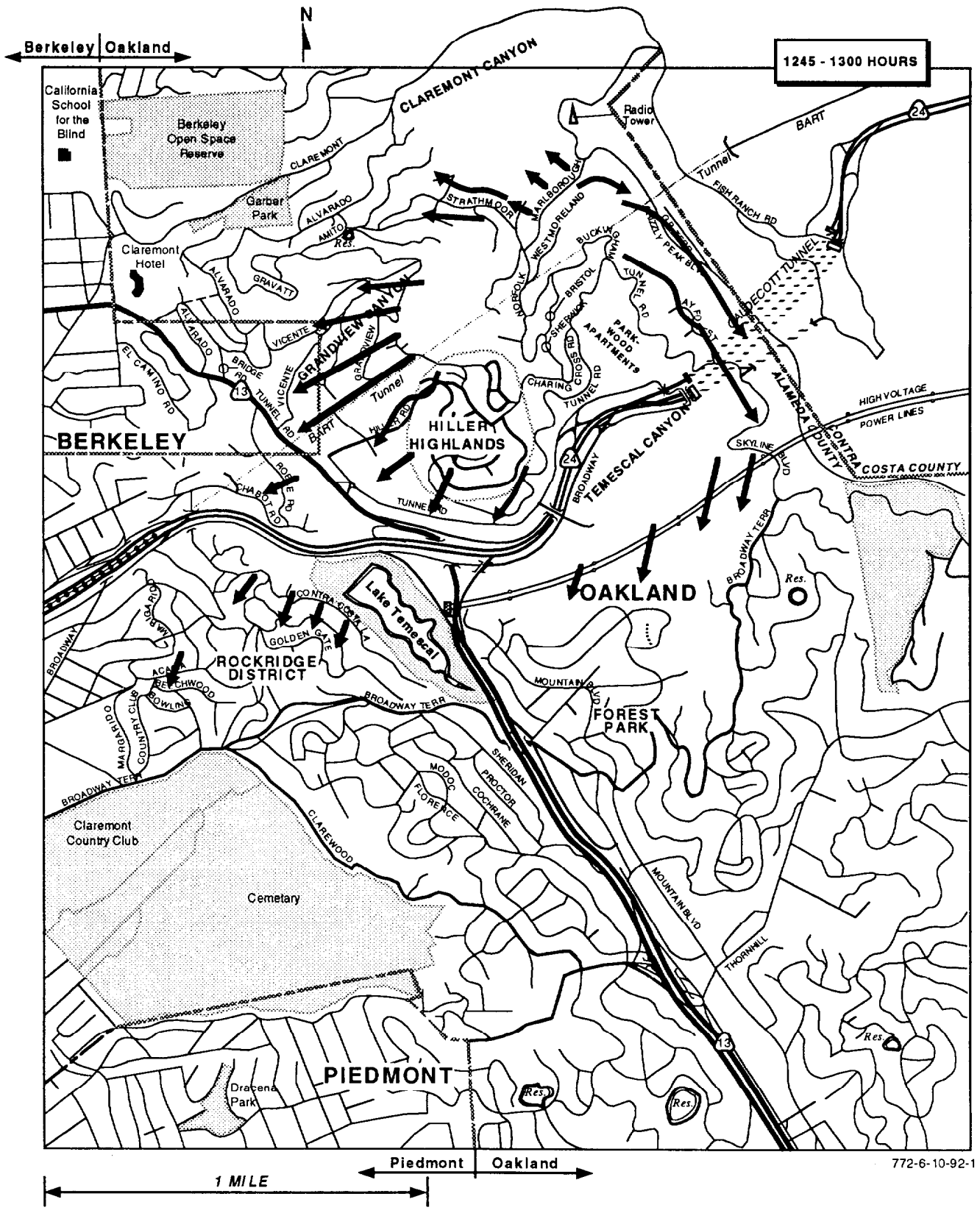
Fire: Now out of control on four major fronts. (1) The entire north side of Temescal Canyon, including Hiller Highlands, was already lost, and the fire was spreading into the top of Grandview Canyon and toward the City of Berkeley. (2) Fire was spreading over the ridge into the east fork of Claremont Canyon. (3) The fire on the right flank was still moving to the south, toward the upper reaches of Broadway Terrace and Skyline Drive. (4) West of Lake Temescal, the fire was spreading in the Rockridge district.

Resources: Oakland still waiting for mutual aid strike teams to arrive on the west side of the fire. (The first strike team from Contra Costa County was just arriving on the east side and trying to contact the IC for instructions.) Two Strike teams en route from San Francisco (ETA 20 to 30 minutes). Berkeley Fire Department quickly committing its resources and mutual aid to Grandview Canyon. CDF ground units committing to stop spread into Claremont Canyon from east side. Helicopter 106 working with BC44 in Rockridge district. Two CDF air tankers and spotter aircraft diverted from fire in Contra Costa County (ETA 30 minutes).

Strategy: Continuing to evacuate ahead of fire. Trying to identify natural positions to make stands ahead of fire when additional resources arrive.

A Berkeley 2nd Alarm was called at 1231, followed by a 3rd Alarm at 1238. With all of Berkeley's resources now responding, one engine company had to be diverted to handle a working structure fire in Berkeley. Mutual aid was requested from Albany, Emeryville, and Lawrence Berkeley Laboratory, and off-duty personnel were recalled to place Berkeley's reserve apparatus in service.

The following map shows the spread of the fire at 1245. The Berkeley units had been driven out of Vicente Road and were setting up to make a stand with master streams in the area of Tunnel Road, Bridge Road, and Alvarado Road. Berkeley established a Command Post on Tunnel Road and designated the defensive line as Division A. Berkeley companies were also deployed to the Chabot Road area, a quarter mile beyond Tunnel Road where brands had already started an additional flare-up that was spreading from trees to structures. This area was designated as Division B by Berkeley Command.



1245 - 1300 HOURS

1 MILE
Piedmont Oakland

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CALIFORNIA DEPARTMENT OF FORESTRY OPERATIONS

At 1153 hours, Copter 106 was the first CDF unit to reach the scene but could not establish radio contact with the Oakland IC. Copter 106 made an aerial size-up of the situation and then dropped its hand crew members to begin manual firefighting on the upper hillside near Grizzly Peak, trying to keep the fire from crossing into Claremont Canyon. The helicopter then began to operate as a water bomber. Shortly after the fire was discovered west of Lake Temescal, Copter 106 redeployed itself to this area, trying to stop the spread on this new front. Lake Temescal was used to refill the helicopter's water bucket.

The first CDF ground units arrived shortly after noon at the Grizzly Peak side of the fire, where they made direct contact with Oakland companies that were engaged along Marlborough Terrace and Grizzly Peak Drive. The CDF Battalion Chief (BC1616) was unable to establish radio contact with the Oakland Command Post or with Oakland Fire Communications. Shortly after their arrival, the situation on Marlborough Terrace became untenable and the CDF units backed out to make an assessment of the situation.

Their location put them in the best position to recognize the threat to Claremont Canyon, if the fire continued to spread over the hill and to the north. Unable to make contact with Oakland, the BC1616 decided to commit the CDF units to independent action on the north side of the fire. They worked their way down Claremont Avenue to Alvarado Road and then up to the Amato Road area, where they encountered structures already on fire.

CDF operated independently to cover the Claremont Canyon exposure and established its base at the intersection of Grizzly Peak Boulevard and Fish Ranch Road. Most of the CDF ground resources were committed on this flank of the fire for the remainder of the afternoon. BC1616 coordinated CDF actions with Morgan Hill until a Unified Command structure was established, around 1600 hours.

CDF was extremely short of resources due to the demands of several simultaneous incidents, including the Franklin Canyon fire that was drawing resources from both CDF and Contra Costa County fire departments. The only two available CDF air tankers and a spotter aircraft had been dispatched to Franklin Canyon at 1156 hours. All other CDF air tankers in the area had been dispatched to other wildland fires in Sonoma County.

The two air tankers that had been dispatched to the Franklin Canyon fire had an ETA of 45 to 50 minutes from their bases at Fresno

and Salinas. They were diverted to Oakland when it was determined that the East Bay Hills situation was much more critical than the Franklin fire. The spotter aircraft was in the area at 1250 hours and contacted Air Traffic Control to clear the air space around the fire for tanker operations.

The two tankers made their first slurry drop at approximately 1300 hours. The tankers tried to drop their slurry on the flanks of the fire, trying to limit the lateral spread, but their operations were restricted by the terrain and the wind, as well as the thermal updrafts caused by the fire. After dropping their loads the tankers had to fly to Santa Rosa, 45 miles northwest of Oakland, to refill their tanks and refuel before returning to the fire.

The need for additional helicopters and air tankers was recognized, and CDF Morgan Hill initiated requests for aircraft from other parts of California. One additional air tanker was dispatched at 1239 hours, and six more were assigned during the afternoon.

Situation Status at 1300 Hours

Fire: Spreading on five major fronts. (1) Rockridge district, west of Lake Temescal; (2) Grandview Canyon, threatening to jump Tunnel Road; (3) Chabot Road; (4) Claremont Canyon; (5) along the south side of Temescal Canyon, threatening upper Broadway Terrace. Claremont Hotel recognized as a major exposure with possibility of additional spread to flatlands of Oakland and Berkeley.

Resources: Alameda County Task Forces and San Francisco Strike Teams arriving and in process of deployment; Berkeley Fire Department fully committed to holding action. Oakland and Contra Costa units regrouping on upper hillsides east of fire; CDF ground units deploying along ridge line to protect Claremont Canyon; two CDF air tankers approaching for first air drop.

Strategy: Three separate command structures established. Oakland priority on stopping spread in areas (1) and (5); Berkeley in areas (2) and (3); CDF in area (4). All working on establishing defendable lines and evacuating residents ahead of the fire, while hitting spot fires ahead of the main front to prevent leapfrogging.

ADDITIONAL STRIKE TEAMS

By 1300 hours it was evident that additional resources would be needed to stop the progress of the fire in the flatland areas and on the multiple hillside fronts. With the wind coming down from the hills, the fire was being pushed toward the southwest and there were no natural barriers that appeared to be capable of stopping it. Both Oakland and Berkeley recognized the need for more resources at the same time and both requested additional strike teams through Alameda County.

Oakland requested three additional strike teams to respond to Grizzly Peak and one to the intersection of Golden Gate and Acacia in the Rockridge district. Berkeley requested two strike teams to respond to a staging area at Berkeley High School, approximately two miles from the fire. Both requests were logged at the Alameda County Mutual Aid Coordination Center (Lawrence Livermore National Laboratory) at 1309 hours. Two additional Alameda County task forces were mobilized, one each from the South and East zones, and the remainder of the request was relayed to OES Region II. Oakland also requested additional command officers to assist in managing the incident, and this request was fulfilled from fire departments in Alameda County.

The strike teams that had been requested earlier were beginning to arrive by 1300 hours. Most had difficulty reaching their assigned destinations and establishing contact with the command structure.

The strike teams that had been directed to stage at Hiller and Tunnel Roads had difficulty with traffic congestion, particularly northbound on Highway 13. By the time they arrived, the fire had destroyed the area they were en route to protect and had jumped over the top of the staging location. The mutual aid radio channel was hopelessly jammed with communications, and they were unable to make contact with the Command Post. The Command Post had been moved to the Highways 24/13 interchange, and some of the strike teams made direct contact at this location.

When the first of the strike teams made their way up Hiller Road, between 1315 and 1330 hours, they found blocks of burning rubble. Every structure in the development was destroyed before any fire suppression crews arrived. The intense fire had already moved on into Grandview Canyon, and the strike teams were able to drive through most of the Hiller Highlands development to Charing Cross Road, where they discovered the bodies of Police Officer Grubensky and several civilians. One badly burned survivor was also located and was transported out to a medical helicopter for transfer to a burn unit.

The companies arriving at the east side of the fire were also unable to establish radio contact with the Command Post. As they reached the area of Fish Ranch Road and Grizzly Peak Boulevard they found a mixture of Oakland, Contra Costa, and CDF units, attempting to regroup and initiate defensive actions. Most of the resources that arrived in this area deployed to the upper reaches of Broadway Terrace, where they linked up with Oakland companies to protect structures on the right flank of the fire, or with the CDF forces that were trying to stop the fire and protect structures in Claremont Canyon. These battles continued throughout the afternoon as single companies and grouped resources fought a house to house battle with the flames on both fronts.

The City of Piedmont had already committed one engine company to Oakland and had recalled all off-duty personnel to the station. The Piedmont Fire Chief, while en route to the station, saw fires burning in the Rockridge district, with no fire apparatus or personnel in sight. Recognizing that Piedmont was directly in the path of the advancing fire, he decided to commit the two remaining engines to Rockridge, in hopes of stopping the fire before it reached Piedmont. The Piedmont companies operated in the Florence and Modoc area for the remainder of the day. San Francisco Strike Team 1 was deployed north of the Piedmont units.

One of the San Francisco strike team leaders described the situation on his arrival at the command post, which at that point had relocated to the middle of Highway 24 near the Broadway overpass. "It was eerie -- very smoky in the area --- almost like night" Structures were burning within a few hundred feet on both sides of the elevated roadway and shrubs in the median were ablaze from a burning brand. As soon as they arrived, the strike team was split to attack the fires on both sides of the roadway, with two engines going to the north side and the strike team leader taking three engines to attack the fire on the south side.

CLAREMONT HOTEL

As the fire continued to spread to the northwest, the huge wood frame structure of the Claremont Hotel became a major concern. The five story hotel, which is believed to be the second largest wood-frame building in the United States, sits on a hillside overlooking the City of Berkeley, at the mouth of Claremont Canyon. The concern was that, if the hotel became involved, it would be a "conflagration breeder," generating a massive additional source of heat and flying brands that could ignite hundreds of new spot fires in the flatland area. Between 1230 and 1300 hours, the fire had swept through Grandview Canyon and was threatening to jump Tunnel Road, a few blocks south of the hotel. Flames were also visible in the upper reaches of Claremont Canyon. A slight shift in the wind would place the hotel directly in the path of the fire.

An Oakland ladder company and a Piedmont engine were the first units assigned to protect the hotel, under the supervision of an Oakland Captain designated as Division C. San Francisco Strike Team 2 was assigned to this Division shortly after 1300 hours, and a defensive perimeter was established along the rear of the hotel, utilizing a ladder pipe and several master streams. The lines were supplied from the hotel's private water supply system. The brush and trees along the rear of the hotel were wet down, and the lines were positioned for immediate operation if the fire came down the hill. A second strike team was assigned to Division C to ensure that this perimeter would be held.

With the lines in place to protect the hotel, the crews began to extend handlines up the hill to Alvarado Road to try to stop the fire on the streets above the hotel.

NEW OUTBREAKS

A set of high voltage electrical lines, supported on steel towers, crosses over the East Bay Hills and drops down to the Pacific Gas and Electric substation that is located in the Y of the freeway interchange, next to Lake Temescal. At 1315 hours, personnel staffing Oakland's Command Post Vehicle, which was parked near the substation, were shocked to see the electrical lines suddenly light-up and shower the hillside in front of them with sparks. As circuit breakers popped in the substation, a hasty decision was made to retreat the Command Post a half mile west on Highway 24 to the Broadway BART Station. This facility, which is located in the median area of the freeway, became the Command Post for the remainder of the incident.

The arcing of the power lines is believed to have been caused by ionization of the air where the high voltage lines passed through the thermal column created by the fire. The arcing caused the lines to "light-up" all the way over the hills. The shower of sparks ignited several new grass fires on the south side of Temescal Canyon, which soon merged with the main body of fire.

The arcing followed the electrical lines all the way to a PG & E substation in Moraga, and two significant new outbreaks were immediately observed by the CDF spotter aircraft on the east side of the hills. The new fires were within two miles of the main fire and created the risk of two additional fire fronts coming over the hills into Oakland. Four helicopters that had been working on the main fire were immediately diverted to the new outbreaks, with the hope that they could be controlled before they could climb the hills and carry over the ridge to the Oakland side.

ConFire also received numerous reports on the new outbreaks and began dispatching ground resources to the reported locations. One of these fires, known as the Dolores fire, eventually required 49 ground units and was not controlled until the evening hours, after burning 160 acres. Some of the units that were sent to the Dolores Fire responded directly from the Franklin Canyon fire as it was brought under control. The other fire, titled the Sunset fire, burned 50 acres and one barn, but was controlled within four hours by nine units.

The new outbreaks delayed the arrival of assistance at the East Bay Hills fire, because Contra Costa resources that were still en route had to be diverted and additional resources had to be requested from the statewide mutual aid system to cover Contra Costa County. Some of the units worked on two or more of the major incidents in succession.

Situation Status at 1400 Hours

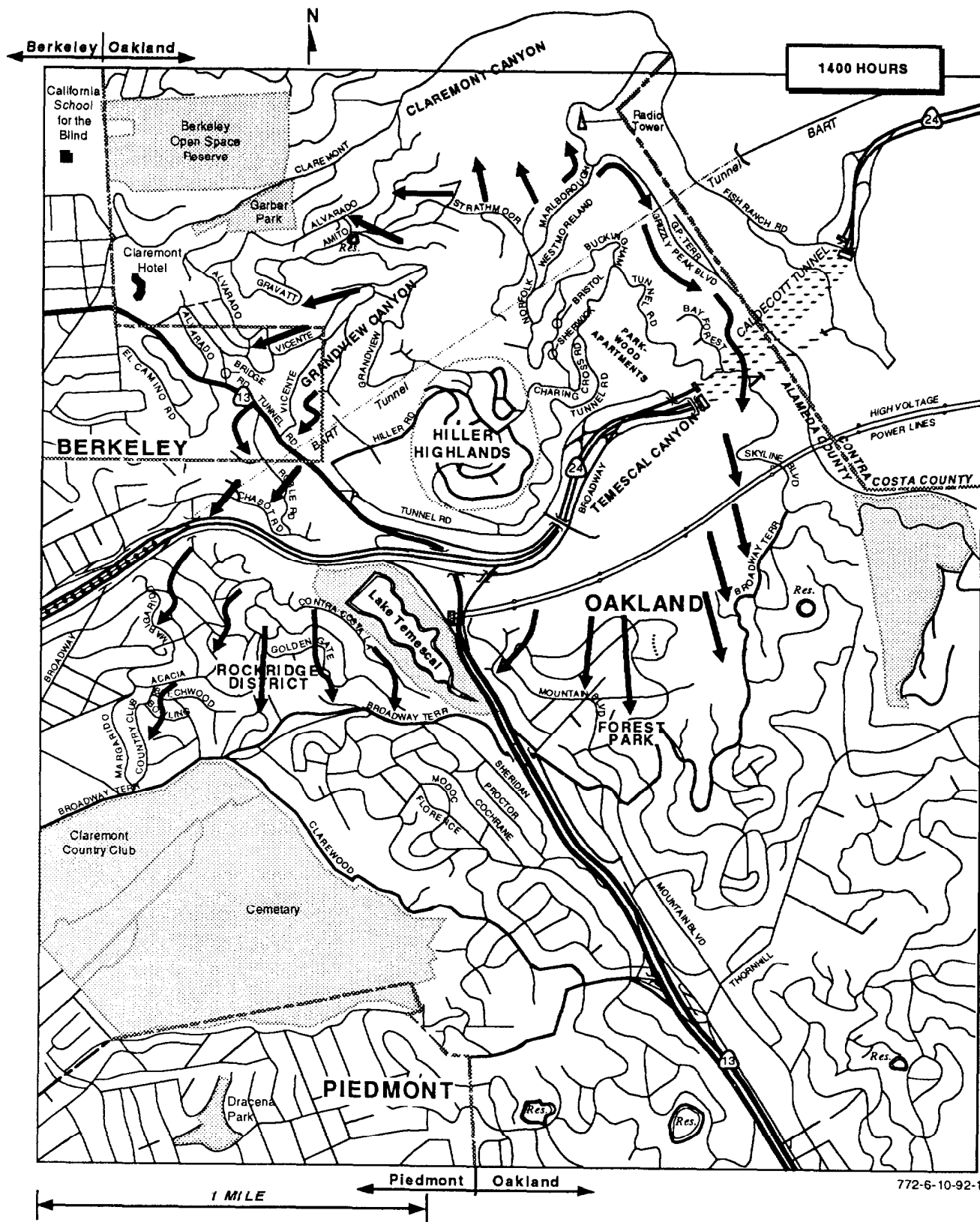
Fire: Advancing through the Rockridge district and into the Forest Park area. See map on the following page. Heavy action taking place in upper reaches of Broadway Terrace, along Tunnel Road and Chabot Road, and in upper Claremont Canyon. Claremont Hotel still threatened. Risk of fire working out of Claremont Canyon toward UC Berkeley Campus. Two new fires burning on east slope in Contra Costa County.

Resources: All available resources in the area already committed. Additional resources hours away.

Strategy: Large scale evacuations ahead of fire. Attempting to protect key exposures and hold flanks, looking for natural barriers to make stands.

STRATEGY - CONTINUING BATTLE ON MULTIPLE FRONTS

The battle against the main fire reached a phase that continued for several hours. While aircraft and ground resources were having some success at holding the perimeters of the fire along the north and east sides of the fire area, the flames continued to spread, from house to house and block to block in a southwesterly direction, pushed by the incessant wind. Continuing attempts were made to stop the progress of the fire on three major fronts. In these main directions of fire spread, individual companies and strike teams placed themselves ahead of the fire or on the flanks, trying to stop the flames from advancing to the next house or the next block.



772-6-10-92-1

Two of the major actions took place along both sides of Highway 13, in the Rockridge and Forest Park districts. In the Rockridge district, the fire worked its way parallel to the open space provided by the Claremont Country Club and Mountain View Cemetery, heading toward the City of Piedmont. The battle took place south of Broadway Terrace, along Sheridan, Cochrane, Proctor, Florence, and Modoc. A secondary head carried the fire into a hollow where stands were made along Beechwood, Bowling, Margarido, and Country Club Drive, north of Broadway Terrace.

East of Highway 13, the fire worked its way south into a neighborhood at the base of the foothills along Mountain Boulevard. Resources had to be directed south to Thornhill to cross Highway 13, then worked their way back north to make a stand against the advancing flames.

The master stream stand continued along Tunnel, Bridge, and Alvarado Roads, south of the Claremont Hotel, trying to keep the fire from taking the streets at the foot of the hills and to stop it from making an uncontrollable advance into the City of Berkeley and the northeastern corner of Oakland.

Between Tunnel Road and Highway 24, an isolated battle was waged to control the flames that had reached Chabot Road, Roble Road, and El Camino Real. The flames also continued to attack homes on Amito and Gravatt Drives on the upper slopes of Claremont Canyon, above and east of the hotel.

Continuing actions took place on the upper reaches of Broadway Terrace, where the fire was working its way up the steep slopes to attack homes along the southeast perimeter of the fire. In the deeper recesses of Claremont Canyon, the fire was crossing over the ridge through a wooded area, threatening to gain an additional foothold.

EVACUATIONS

Large areas were evacuated ahead of the fire. Fire officers identified the areas, while the evacuations were conducted primarily by Oakland and Berkeley police officers. The areas that were identified for evacuation were large, because there was no assurance that the fire could be stopped or that the wind would continue to push it in the same direction.

Some of the residents refused to leave and prepared garden hoses and buckets to protect their own homes; others placed garden sprinklers on their rooftops before leaving. A command officer, who had been assigned to a helicopter, described the reactions of residents who were advised to evacuate over the helicopter's public address speakers. While some

hurried to leave the area, others displayed their determination to stay and their contempt that the fire forces were not doing enough to protect their properties. Police officers had to use their authority to evacuate some residents and to keep others from returning to endangered areas.

The evacuation included more than 5,000 people from significant portions of Oakland, Berkeley, and Piedmont, as well as part of the UC-Berkeley campus. The cities' emergency planning and support agencies were activated to open shelters and provide food and other services. The basic logistics of evacuating a large urban area are complicated and required a large commitment of personnel, primarily from law enforcement agencies.

TACTICS

Two basic tactical approaches were used. The structurally-oriented strike teams used 1 1/2-, 1 3/4- and 2 1/2-inch handlines, as well as master stream appliances where sufficient water was available from hydrants. The wildland-oriented strike teams used 1-inch attack lines, supplied by tank water, and were much more mobile. While the mobility was important in controlling the numerous spot fires that were ignited by brands and embers ahead of the main fire front, the heavy streams were needed to have any effect where the main body of the fire was creating the exposure. Both tactical approaches were effective in different situations, but neither one could stop the progress of the fire in the downwind direction.

A few homes were saved by homeowners who made determined efforts to protect their properties. On Margarido Drive, a retired Battalion Chief enlisted his off-duty firefighter son-in-law to keep the flames from igniting his home. In another area, three homeowners banded together to protect their homes as they were exposed in succession. Most of the structures that survived were the products of determined efforts by firefighters who identified locations they could defend and stayed until the threat had passed, before moving on to another location. The few homes that were left standing demonstrated the value of noncombustible roofing materials and brush clearance around the structures.

Company officers reported that their efforts were most successful when they could group several companies together and make a coordinated effort to save a group of homes. They also reported the frustration of fighting to save a home for an hour or more, only to see it burn when they ran out of water or were simply defeated by the fire's unyielding energy.

Firefighters on the front lines endured hours of frustration and punishment. The 90° weather and the hot dry wind were enough to cause heat exhaustion at a routine fire; this battle continued for hours without

relief, in the face of a fire that drove heavy smoke, flaming brands, and embers into the faces of the fire suppression forces. Handlines had to be moved repeatedly to hit new outbreaks on rooftops and in vegetation. Interior attacks were attempted to hit wood shingle roof fires from below. Houses burst into flames and fire swept across streets all around them. Time after time, the firefighters fought until they won or had to retreat, then moved on to the next block and did it all over again.

One of the Alameda County Task Force Commanders reported that his convoy was en route to an assigned staging location at Golden Gate and Acacia in the Rockridge district, but had to take an indirect route due to blocked roads and traffic congestion. At Proctor and Broadway Terrace they were flagged down by a resident urgently requesting assistance to evacuate a disabled relative from a nearby home. Before the rescue could be completed, they found themselves fighting flaming brands and embers that rained down on the trees and rooftops around them, igniting dozens of fires within the block. Unable to contact the Command Post, they fought to keep the flames from involving one house after another until they had to pull back and retreat to the next block. The rescue was completed, but the block was lost.

As the battle continued, they developed tactics that were successful in protecting individual homes, where they could deploy ahead of the fire, but the majority of the homes burned to the ground around them. Time after time they pulled back to make another stand, first on Proctor, then on Agnes, Florence, and Modoc. They saved one or two homes where they could, but they were never able to stop the fire's advance. It was hours later before they discovered that their successive positions had been directly on the head of the advancing fire.

ASSESSMENT OF THE SITUATION

The critical shortage of resources was the major problem for several hours. As soon as any single or grouped resources would arrive, there were assignments waiting for them. Command Post personnel were trying to obtain good information on the fire's perimeter, trying to predict the direction the fire would take in order to identify evacuation areas, and prioritizing requests for assistance that came from several different areas in rapid succession.

It was difficult to determine resource deployment because so many units were engaged in actions that were unknown to the Command Post. They were engaged in different areas, had no radio contact with the command structure, and were operating on their own initiative.

Efforts were being made to develop an incident command structure and to build a logistics system to support expanding operations. Division assignments were being made to supervise operations in particular areas that could be identified, but there was no information on where many companies were working, what conditions they were encountering, and what success they were achieving. One Oakland Captain reported that when he finally reached the Command Post, after the situation calmed down in his area, he found out that he had been assigned, hours earlier, as a Division Supervisor over several other units.

The Battalion Chief who had been assigned to make an aerial assessment from the police helicopter had to return to the Command Post to deliver his report. This information led to the conclusion that massive additional mutual aid resources would be needed to contain or control the fire. Alameda County resources had already been severely depleted and Contra Costa County was requesting assistance from other areas to respond to the fires that had broken out on the opposite side of the hills. San Francisco was requested to send additional strike teams, but there was a concern that flying brands would begin to ignite fires in that city on the opposite side of the bay; the smoke was already banking down and causing problems in San Francisco. After sending 25 percent of its on-duty forces to Oakland, San Francisco was calling back off-duty personnel to increase staffing on its remaining companies. San Francisco was able to send several special units and additional personnel to Oakland.

With local resources already depleted, the assistance would have to come from distant locations with extended travel times. The overall incident strategy was changed to a "campaign approach," based on assembling the resources that would be needed to deal with a worst case scenario.

At 1359 hours, Oakland requested 13 additional strike teams, 6 air tankers, and 6 helitack units. The ground units were directed to a Staging Area at Raimondi Park, three miles from the fire, near the Oakland end of the Bay Bridge. This location provided the space for a full base camp operation to support the incident and a large open area to service helicopters. Thirty minutes later Berkeley requested two more strike teams to respond to the Berkeley High School staging area. This large scale assistance would take from one to four hours to arrive at the staging areas.

The fire was headed straight for the City of Piedmont, which had already committed all of its apparatus and personnel to Oakland. All that was left in Piedmont was a Streets Department street flusher, manned by one firefighter. Piedmont requested the assignment of strike teams to protect the city, but none could be allocated until the distant mutual aid forces could arrive and the most urgent requests could be accommodated.

(A strike team was briefly assigned to cover Piedmont, later in the afternoon, but it too was soon committed to fighting fires in the Rockridge district. The Piedmont companies returned to their city around 0100 hours and stood-by at the perimeter for the remainder of the night.)

UNIFIED COMMAND STRUCTURE

Around 1600 hours, implementation of the Incident Command System on a large scale began to bring the incident into focus at the Command Post. The map on the following page shows the extent of the fire by this time. Prior to this point, Oakland and Berkeley had each operated independently, with their own Command Posts. A Berkeley officer had been assigned as a liaison at the Oakland Command Post. The CDF units were working under their own command structure, primarily on the north and east sides of the fire, with limited contact between CDF and the Oakland or Berkeley Incident Commanders. San Francisco had established a secondary command post at the Claremont Hotel to manage its resources, which were operating entirely on their own radio channels, with a liaison officer assigned to maintain contact at the Oakland Command Post.

A Unified Command structure was implemented, involving Oakland, Berkeley, and CDF command officers, and the overall incident was restructured to divide geographic and functional responsibilities into manageable components. It took several hours to make a complete assessment of the situation and to develop an organization structure to deal with the complex incident. To simply cover the perimeter of the fire, three branches and 15 divisions were established.

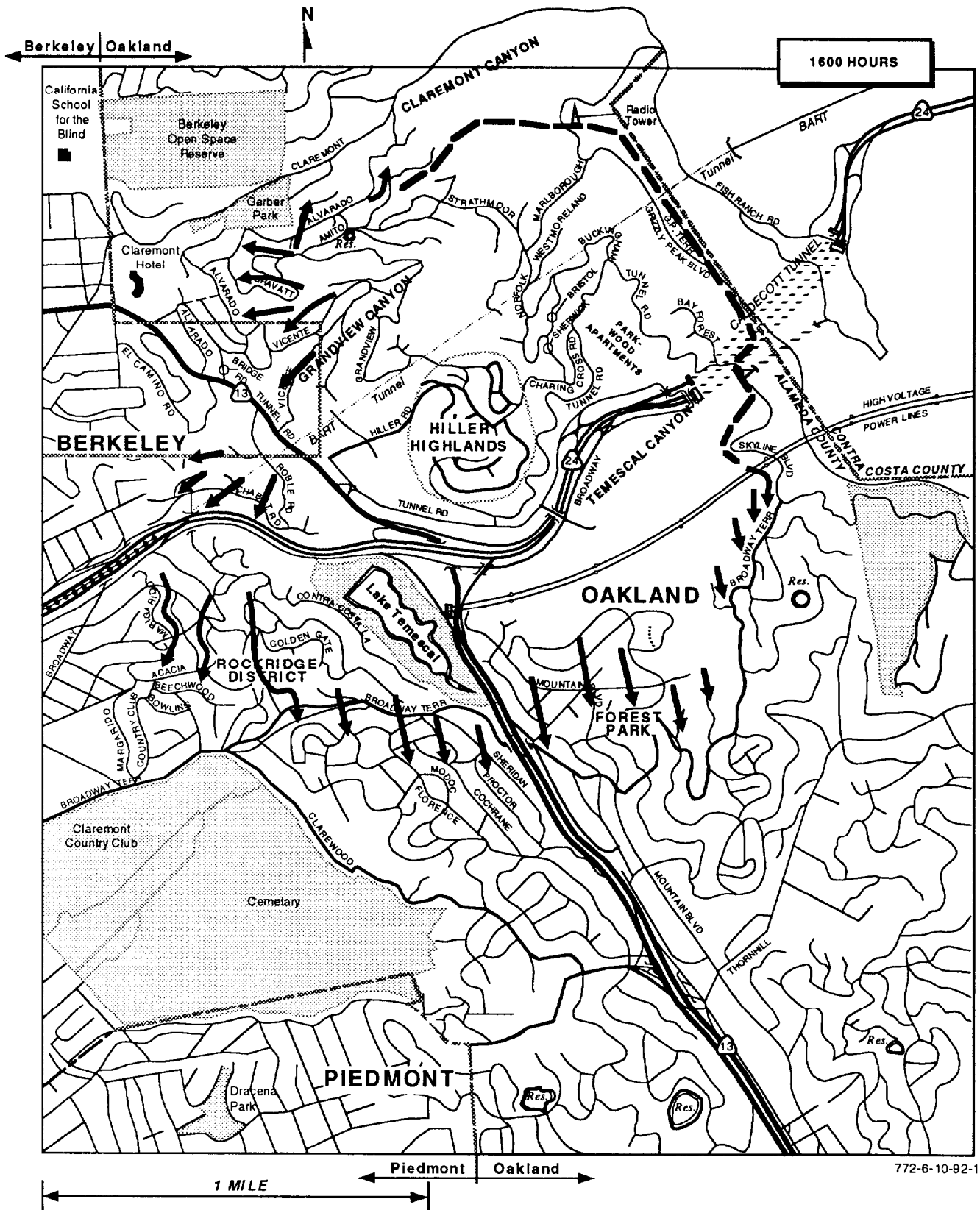
Branch 1 incorporated the area from the Claremont Hotel to the top of Grizzly Peak.

Branch 2 covered the area along the south side of the fire, from Grizzly Peak to Highway 13.

Branch 3 covered the Rockridge District, from Highway 13 around to the Berkeley front on Tunnel Road.

To assist in establishing an effective incident management structure, two caches of 40 portable radios each were requested from the Alameda County Mutual Aid system. These radios provided additional channels to organize the communications network for a large scale incident.

An "Overhead Team" was also requested from the state Office of Emergency Services (OES) to bring in personnel experienced in managing large scale incidents, including specialists in logistics, communications,



772-6-10-92-1

and finance, along with supporting equipment. The Overhead Team would take several hours to arrive.

ADDITIONAL RESOURCES ORDERED

After a further assessment of the situation, 11 additional strike teams were requested at 1746 hours, also directed to report to the Raimondi Park staging area. To obtain this level of resources, fire departments from up to 300 miles away mobilized units to respond to Oakland. These forces would be needed to relieve exhausted firefighters, some of whom had been engaged on the front lines for almost seven hours. The extent of the fire at approximately 1800 is shown on the following page.

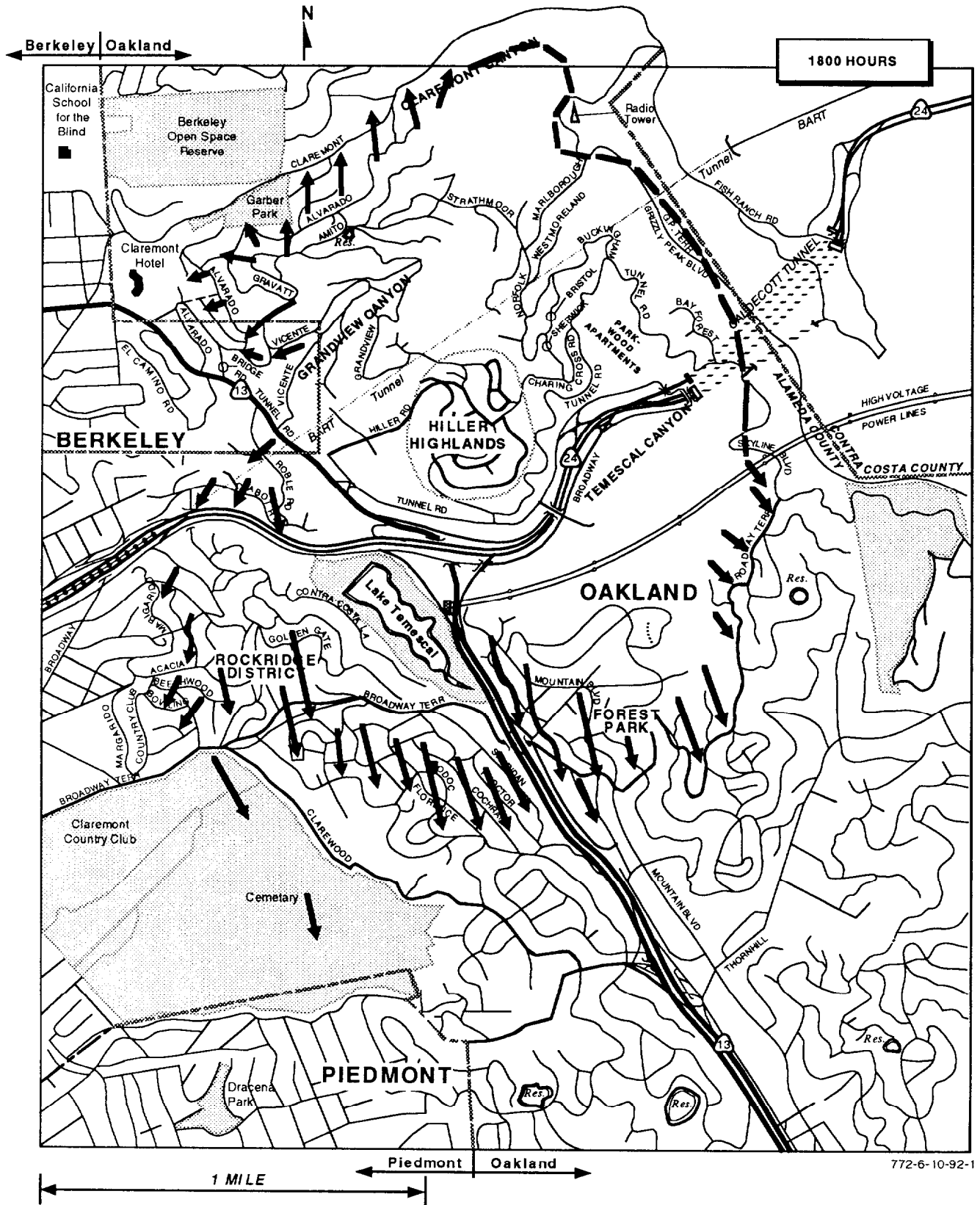
The San Francisco strike teams were able to maintain contact with their own Communications Center and requested additional support from their own Department. Two Hose Tenders were activated by reassigning ladder company crews and responded to the staging area at the Claremont Hotel. These units are loaded with 5-inch hose and are equipped to establish emergency above-ground water supply systems in the event of an earthquake. Three water tenders and a communications vehicle from the Department of Public Works were also dispatched to Oakland. In response to further requests for assistance, San Francisco called in 85 additional off-duty personnel and sent them to Oakland by bus to reinforce the companies at the Claremont Hotel and in the Rockridge district.

On the hill above the Claremont Hotel, the fire was advancing through a mixture of modern homes and stately mansions, working its way down the hillside. With the hotel protected by master streams, poised for action, the crews climbed the hill to engage the fire on the upper streets, but found that the hydrants on the upper streets were dry. They returned to the bottom and started up again, hand-stretching a 5-inch hoseline to support an offensive attack on the fire. The fire was successfully held at Alvarado Road.

In the Rockridge district, the 5-inch hose and portable hydrant system was used to bring a strong water supply into the area where San Francisco units were operating. Several companies were able to obtain water from the portable hydrants.

WIND CHANGES

The main battle continued until approximately 1930 hours, when the wind finally abated. The smoke and heat changed from pushing ahead of the fire to rising vertically as the wind eased off. Within a few minutes, a cool damp ocean breeze began to push the products of



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combustion back into the bum area. This stopped the uncontrollable advance of the fire, but left a huge perimeter of blazing homes that continued to expose adjacent structures.

The battle against these fires continued well into the night around the entire five-mile perimeter of the fire. From time to time the wind would pick up, and the burning intensity would increase for a few minutes, showering the area with new sparks. Crews worked to build a safe perimeter around as much of the fire as possible, including attacking structure fires and shutting off burning gas lines.

CDF hand crews were used in some of the wooded areas, particularly in Claremont Canyon and along the Piedmont border, where fire had spread to a wooded hollow next to the cemetery. Bulldozers were used to clear a fire break in Claremont Canyon.

The major concern was that the wind would return in the morning, so plans were made to bring in even more resources, to overhaul as much of the perimeter as possible and to be prepared for a new outbreak. A priority was placed on relieving units that had been in operation for as long as 10 hours. The strike teams that were arriving from the earlier requests were assigned to relieve tired crews. A request for 30 additional strike teams was made at 2030 hours, plus 10 more helitack units at 2200 hours. Berkeley requested two additional strike teams to report to its staging area. These resources were ordered with the anticipation that they would travel during the night and be available for assignment in the early morning hours.

The OES Overhead Team arrived at the Command Post during the evening to assist with the development of a structure for extended management of the incident, mobilizing state government resources to support Oakland. The Staging Area was moved to the Alameda Naval Air Station around 2200 hours, where facilities were available to support a base camp for several hundred firefighters and an inactive runway area could be used to stage apparatus.

MONDAY THROUGH THURSDAY

During Sunday night, a helicopter with infrared monitoring equipment was used to survey the fire area, and the data was transferred to a geographic data base map. This information was used to plan the deployment of resources for Monday morning and to identify the most vulnerable areas if the strong winds returned. There were still dozens of structure fires burning in different parts of the fire area and flames were evident in some wooded areas. Thousands of smoking ruins marked the locations of obliterated homes. As long as these fires persisted, the fire continued to be a threat. The first objective was to contain the fires within a safe perimeter, then to extinguish all the remaining flames.

Daylight offered the first opportunity to survey the fire area from the air under reasonably calm conditions, although the atmosphere was still heavily laden with smoke. Fortunately, the wind did not return on Monday morning, and weather conditions were favorable for developing a secure perimeter and eliminating potential sources for rekindles. Water supply was restored to some areas when East Bay Municipal Utilities District personnel brought in emergency generators and transportable pumps. Public works and utility crews had to clear the streets with heavy equipment to provide access to several areas.

The fresh strike teams were deployed and most of the units that responded during the first six hours were released. This restored normal protection to most of the communities in Alameda and Contra Costa Counties. Units from all over California took part in the continuing operations at East Bay Hills.

Attempts were made to locate bodies and account for missing persons in the burned area, and damage assessment and preliminary investigative efforts were initiated. More than 100 people were initially reported as missing, mostly by friends and relatives who were unable to make contact with people who lived in the fire area. Many families were separated during the evacuation and were unsure if everyone had reached safety. Lists were compiled and search efforts were directed to the areas where missing persons were last seen.

LOSSES

The fire was declared as contained on Tuesday morning, with overhaul continuing throughout the day. The final, full extent of the fire is shown on the following page followed by an aerial photograph taken after the fire.

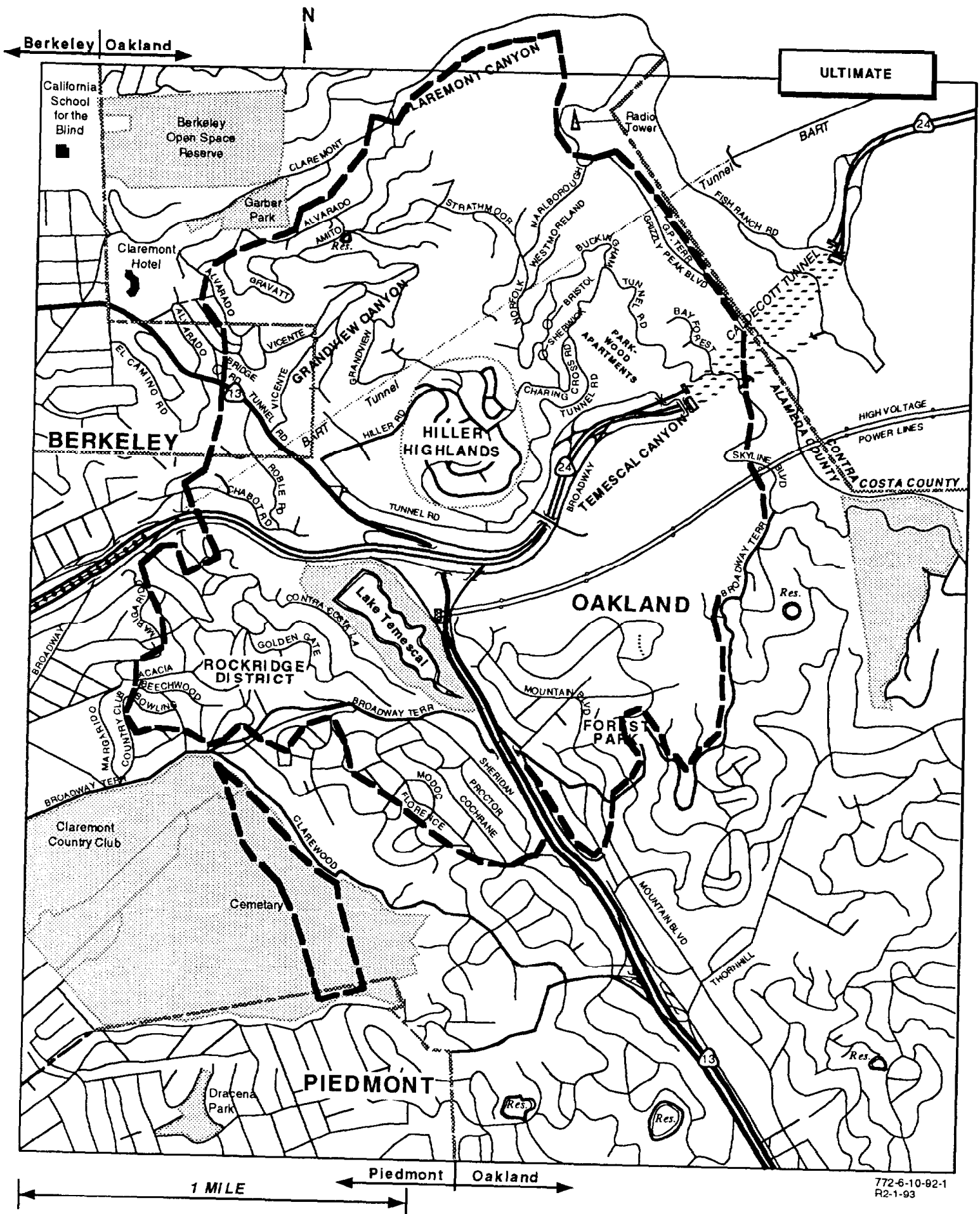
Reports of missing persons were processed, attempting to identify bodies that had been located and gradually searching areas as overhaul continued in the burned areas. Most of the bodies that were recovered from the rubble were so badly burned that they were difficult to identify as human remains.

Within an area of more than two square miles, only a few structures remained standing. Even people familiar with the area had difficulty navigating, as all landmarks were gone and the appearance of the entire area was radically changed. Crews worked their way in from the perimeters, completing a thorough overhaul of the rubble. Where personal belongings could be salvaged from the rubble, they were turned over to the owners, but most of the homes were so completely destroyed that few items could be salvaged.

As the extent of the destruction became evident, the area was declared a Federal Disaster Area. The Presidential declaration made federal relief funds available to reimburse agencies for their costs and to help in rebuilding.

Most of the strike teams from distant areas were released, primarily on Wednesday and Thursday. Ten additional OES engines were brought in for continuing overhaul, along with two urban search and rescue teams with dogs to continue the search for bodies in the rubble. The final death toll was set as 25, with approximately 150 injuries to civilians and firefighters.

After the full area was surveyed for damage assessment, the number of people left homeless was estimated at close to 10,000 and damage estimates exceeded \$1.5 billion. The actual number of structures destroyed was eventually determined to be 3,354 single family dwellings and 456 apartment units. Approximately 2,000 burned vehicles were also located in the area.





Aerial photograph taken after the fire. Area shown is the same as on page 12.
In total 3,354 structures were destroyed.

ANALYSIS

FIRE RISK

The most significant factor that should be recognized from this incident is that the fire was beyond the capability of fire suppression forces to control. The stage was set by a number of contributing factors that created the opportunity for disaster. When the Santa Ana wind condition was added to those risk factors, the combination was more than any fire department could handle. It was remarked by one fire official that if the same fire risk factors had been present in a national park or forest, the area would have been closed to all activities. As long as the wind was present, the fire was going to continue to spread, no matter what strategy and tactics were used and no matter how much equipment and how many firefighters were there to try to stop it. The fire was contained only when the wind changed.

The spread of the fire during the first hour is virtually unprecedented for an urban conflagration, including wildland-urban interface fires. Just 64 minutes after the fire broke out, it was burning in the Rockridge district, more than a mile downwind from the point of origin. This rate of fire spread and the difficult access to the fire area meant that firefighters arriving to combat the fire could not be effective against it, and they were in extreme danger from it.

The factors that created the extreme fire risk situation in the East Bay Hills are not unique. There are similar situations in many parts of the United States and particularly in the coastal areas of California, which have seen some of the most destructive wildland-urban interface fires over the last 70 years. This incident may be viewed as “the ultimate” interface fire, but there are many reasons to believe that it could easily be repeated or surpassed, unless a major hazard mitigation effort is instituted.

The risks can be significantly reduced in several ways, all of which have been identified and advocated for decades by the fire protection community. There are political and economic reasons why these recommendations have not been implemented. After the fire there were two opposing forces at work in Oakland; those who wanted the hill area rebuilt and restored to its former condition without delay and those who wanted to wait until the risk factors could be mitigated before allowing any rebuilding. There was also a deluge of litigation relating to lost lives and property, claiming that various public and private entities were negligent in their responsibility to prevent or control the destruction.

Without risk mitigation efforts, the same area could easily become vulnerable to another disastrous fire. The adjacent areas, which were spared in this event, are equally vulnerable, as are dozens of areas in California and other parts of the country with similar characteristics.

The lesson from this fire should not be that public fire protection forces were unable to control it. The more important lesson is that the risks were recognized and the consequences were accurately predicted long before the fire, but nothing was done to mitigate the risks before the fire occurred.

FIRE ORIGIN

The Saturday afternoon fire was controlled by aggressive fire suppression efforts, involving a major commitment from the Oakland Fire Department, assisted by EBRPD, CDF, and Berkeley units. It was a “good stop” in a very difficult location. Crews continued to overhaul the bum area until darkness made it too dangerous to operate on the steep hills and the scene was checked during the night for signs of hot spots or rekindles, which would have been readily apparent in the dark. Even knowing the tendency of fires to bum down into duff and root systems, there is little more that could have been done before the following morning to continue the overhaul process.

On Sunday morning, the wind made the hotspots evident. Units were sent to complete the overhaul and experienced officers were confident that the situation was under control. The sudden eruption occurred when a firefighter was digging out a hotspot, near the perimeter, and sparks were carried into an area of dry brush, which virtually exploded into flames. The sudden development of the new fire was witnessed by several individuals, including experienced firefighters, who were able to describe the phenomenal rate of fire growth and spread.

FIRE CHARACTERISTICS

In this case it is evident that the wind played a major part in every aspect of the fire’s growth and spread, when the wind died down, the fire’s progress was stopped.

The East Bay Hills fire has been described as a conflagration and as a fire storm in media accounts. The synergistic effects of the wind and the thermal energy released by the fire created unusual fire phenomena that exhibited some of the characteristics of a fire storm on a localized basis, but the term conflagration is more appropriate for the overall situation.

A fire storm is defined as a situation in which the fire's thermal energy creates its own weather phenomena, overpowering natural meteorological forces. There were many observations of flaming whirlwinds, crowning fire in the treetops, and rolling clouds of fire moving through the air or along the ground. Firefighters described balls of fire floating through the air around them. These descriptions are evidence of localized fire storm characteristics. One witness described the fire in Hiller Highlands as a single swirling mass of flame, involving buildings, trees, and vehicles, consuming everything as if it was in a gas oven. This area was totally consumed by the fire, which spread so rapidly that residents died in the streets trying to outrun it.

Natural convective forces cause a fire's plume of smoke and superheated gases to rise. A fire of this magnitude releases tremendous quantities of thermal energy into the plume every second. It is estimated that a wind between 15 and 30 miles per hour is sufficient to bend the thermal column and cause it to travel parallel to the ground, projecting out ahead of the fire. The superheated gases preheat exposed fuels, hundreds or possibly thousands of feet ahead of the fire, causing them to burst into flames with almost explosive force when they are ignited. The ignition may come from a flying brand or a glowing ember, or the preheating may continue until materials reach their autoignition temperatures. The ignition process is similar to the effect of a thermal layer of superheated gases within a room that radiates heat down onto the exposed contents prior to flashover.

One phenomenon that was observed at this fire was the ignition of the tops of wooden power poles ahead of the fire. The tops of the poles were high enough to project into the thermal layer and were ignited by convective heat transfer over the heads of firefighters working below. This suggests that the firefighters were working in an area that was being preheated by radiant heat transfer from the superheated gases above, as well as from the approaching flame front.

The actual spread of the fire, in most cases, was observed to be flaming brands and embers, carried by the wind and dropping onto ignitable fuels ahead of the fire front. The ignitable fuels included trees, brush, grass, and other natural fuels, as well as wood roofs, debris in rain gutters, and other combustibles around structures. The preheating process dried any remaining moisture from the fuels and may have elevated their temperatures close to their autoignition point before the brands or embers landed. When an open flame came in contact with these preconditioned fuels, they would become involved in a fraction of the normal time.

In many cases the embers, blown by the strong winds, were seen to work their way in under the eaves of houses, readily igniting even tile-roofed structures. Where the walls and roofs resisted ignition, the exposure caused by burning trees and brush was often sufficient to cause interior ignitions by radiant exposure through windows. The worst cases were the hillside homes, where natural fuels carried the flames directly under overhanging structures.

Very few structures in the area escaped total destruction. Most of the houses burned to the ground, as the fire totally consumed all available fuels. The combustion process was very rapid, as it took place in a superheated environment with a constant supply of fresh air, so houses became fully involved very rapidly and were totally consumed in less than an hour. The same observation was made of the more than 2,000 vehicles that were burned in the fire area; in most cases only a hulk of corroded steel and melted glass was left behind.

The most rapid fire spread occurred during the first hour of the fire. Temescal Canyon provided a natural draw for the fire with the wind blowing in over the ridge and down into the canyon, then sweeping out toward the open end. This action split the fire into two fronts and then carried the fire along the north slope, spreading more than a mile in the first hour. This initial spread carried the fire all the way to Hiller Highlands, before it jumped 2,000 feet of freeway interchange and open space to begin its run on the other side of Lake Temescal. In comparison the head of the fire advanced only three quarters of a mile in the next seven hours in the densely built-up Rockridge and Forest Park neighborhoods.

WILDLAND-URBAN INTERFACE CHARACTERISTICS

The East Bay Hills could be described as an extreme example of a wildland-urban interface zone, where the fuel supply was an intimate mixture of natural trees, brush, and grass surrounding man-made structures and vehicles. The complete intermingling of the natural and man-made fuels, combined with the steep terrain, created a combination that was more hazardous than either urban or wildland fuels alone. Hundreds of homes were completely enveloped in an extremely flammable environment. The natural fuels provided a continuous fuel blanket to carry the fire across the hillsides.

The fire differs from many previous interface fires in that it originated within a developed area. Most of the major interface fires have originated in more remote wildland areas and grown to major proportions

before attacking urbanized areas. This fire originated within a few hundred feet of occupied homes and involved structures in the first 10 to 15 minutes, in spite of the fact that firefighters were present when it broke out.

There was no time or space to attack the fire before it involved the urbanized area and no time to establish a defensive barrier ahead of the fire. The combination of wind and thermal forces turned water streams away when they were directed on the fire, forcing the firefighters to abandon any early attack strategies and concentrate on evacuating residents and themselves from the path of the flames. The fire moved so quickly and grew so fast that firefighters were in imminent danger trying to evacuate the residents ahead of the flames.

INITIAL RESPONSE

Initial response time to this fire was not a factor, because firefighters were actually present and working on hot spots from the previous day's fire when this fire broke out. Response time to this area of the hills is normally a concern, because fire apparatus must climb the steep hills on narrow switchback roads. The access problems caused a delay for companies responding to reinforce the units that were already on the scene, but there is no evidence to suggest that this was a significant factor in the outcome of the fire.

Analysis of the fire strongly suggests that it was uncontrollable by conventional firefighting methods within the first few minutes. The fire broke out and increased in size so rapidly that the firefighters who were already present with charged hoselines could not stop it and had to retreat for their own safety. With the Santa Ana wind blowing into a canyon that was so ripe for fire propagation, the fire would have overwhelmed any conventional fire suppression capability. This had been recognized and predicted years earlier and was commented upon by the officers who had directed the previous day's incident, when the wind had been the only missing factor.

TRAINING AND PREPARATION

The Oakland Fire Department is and has always been a structure-oriented fire department. Before budget reductions of the 1970s and '80s, it was recognized as one of the strongest fire suppression departments in the western United States. The budget limitations reduced the number of companies in service and the staffing on each company. Several stations were closed during this period.

Wildland fire suppression was not considered to be a major area of emphasis for the department, although many of its officers have developed knowledge and expertise in this type of firefighting. The department has not been directly involved in some of the programs that have been developed for wildland fire suppression forces, and this caused some problems with the integration of operations at the fire.

Oakland, as the largest city in the area west of San Francisco Bay, is seldom in the position of requesting mutual aid. There were problems with the processing of mutual aid requests, partly due to problems with terminology and procedures in the Communication Center. The shortcomings of the communications system were also a major obstacle to effective incident management. The radio system proved to be inadequate for the scale of operations that was necessary, even for the initial stages of the incident. These factors made effective coordination or control of the mutual aid resources that arrived during the first five hours impossible.

INCIDENT MANAGEMENT

The management of an incident of this size and complexity is a tremendous challenge. From the beginning of the incident, the situation expanded and changed more rapidly than the suppression forces could communicate, obtain reinforcements, and get organized. Almost 800 structures were ignited within the first hour and more than 300 per hour for the next seven hours. These factors created a situation that exceeds all previous experience with ICS or any other incident management system.

After the Loma Prieta earthquake in 1989, the Oakland Fire Department placed an emphasis on the full implementation of the ICS system for managing incidents and coordinating mutual aid. The ICS system was used for this fire, but the shortage of command officers and the extremely fast escalation of the incident made it very difficult to develop the organization in proportion to the situation. With the radio system overwhelmed and companies in retreat or taking refuge, the early attempts to organize the operation were unsuccessful. There were not enough command officers to assign manageable areas, size up the situation, develop strategy, direct tactics, or to even account for the location and actions of the resources that were deployed.

The officer in charge of Engine 19 was in a command and had a good view of the situation when the fire erupted. He initiated calls for multiple alarms and mutual aid, provided a good size-up report for the responding Assistant Chief, and directed the first responding units to critical locations.

The Assistant Chief was extremely familiar with the locations and the risk factors and was on the scene within the first 12 to 14 minutes, but the fire was already so big and spreading so fast that there was no opportunity to make an accurate assessment of its size, direction of travel, or rate of spread. The position that was the initial choice for a command post location turned out to be in the direct path the fire took and was too dangerous to use. The fire was obviously moving quickly toward occupied dwellings and growing at an almost unbelievable rate. The severity of the problem and the extreme danger were recognized immediately, but with the fire spreading in three directions at the same time, there were insufficient resources available to cover the critical exposures. There was not even a safe vantage point to size up the situation.

The first arriving Battalion Chief was assigned to supervise the area that appeared to be the most critical exposure, while the Assistant Chief tried to make a size-up by moving around to different vantage points. The situation required several more command officers in those first few minutes to establish Divisions in the most critical areas in order to make an assessment of conditions and supervise the actions of units. Based on their information, the Incident Commander could have determined the best strategy to employ and prioritize the assignment of resources. The shortage of command officers made it impossible to perform these standard command functions. The lack of aides to work with the command officers compounded the problem, because there was no one to assist with recording information, managing radio traffic, or utilizing alternate radio channels and communications systems.

The shortage of command officers also compounded the communications bottleneck. The Incident Commander had to deal with information coming from too many different sources and had to direct too many individual units. The capacity of the primary assigned tactical radio channel and the mutual aid channel were soon overwhelmed and the communications process broke down.

When an off-duty Assistant Chief arrived, he was in a better position to assume overall command of the incident and establish a command post at the bottom of the hill, while the on-duty Assistant Chief attempted to direct the Operations section from the top of the hill. Smoke conditions made it impossible for the Incident Commander to see where the fire was going from the command post location.

All efforts to make an initial attack on the fire were abandoned within the first 30 minutes, as the Oakland companies were forced to abandon their positions to take refuge. It was during this critical period

that one of the Battalion Chiefs was killed, along with a Police Officer and most of the civilians who died. The retreating units were unable to communicate effectively with the Command Post and had to retreat to safe areas before they could regroup and commit themselves to further action. The units that were unable to communicate attempted to establish defensive positions on their own initiative. Where it was infeasible to engage the fire, they made their best attempts to evacuate residents ahead of the flames.

As successive agencies became involved in the incident, multiple commands developed. Command posts utilized during the course of the fire and other features of incident command are illustrated on the following page. The Contra Costa County units established a secondary command structure on the east side of the fire and communicated many of their needs back to ConFire on their own radio channels. ConFire mobilized all of the resources that could be obtained from their county, in spite of the simultaneous major fire in Franklin Canyon. The Contra Costa County Assistant Chief, who was at the ConFire Center, was instrumental in obtaining the air tankers from CDF for the Oakland incident.

When the CDF units arrived, they were also unable to make contact with Oakland and established another secondary command structure, taking responsibility for the northeast flank of the fire. These forces used CDF radio channels and communicated back to Morgan Hill to obtain additional resources.

When the fire spread into the City of Berkeley, yet another independent command structure was established, with the Berkeley Fire Department units utilizing their own radio system. This meant that there were two “primary” incident commands and two “secondary” commands, working with four separate communications centers and unable to effectively communicate with each other.

The San Francisco Fire Department later established an additional “secondary” command post at the Claremont Hotel and coordinated its resource requirements back to the SFFD Communications Center using their own radio system.

All of the agencies involved used the ICS system in parallel, with inadvertent overlapping boundaries and designations. The first assignment in the Oakland system was to designate Battalion 4 as “Division A.” After this area was abandoned (and the assigned officer was killed), Battalion 44 was designated as “Division A” on the Rockridge front. Battalion 45, directing units arriving from the Contra Costa side of the hills, designated

the Captain of an Orinda engine company as “Division A” on the upper east side of the fire. The Berkeley Incident Commander established the Tunnel/Bridge Road front as “Division A” and the Roble Road area as “Division B,” which was approximately the same area designated as “Division B” by the Oakland Incident Commander. The two Berkeley divisions were geographically located between Oakland’s “Division B” and “Division C” (Claremont Hotel) areas.

The multiple use of division designators was not a severe problem, however, since each was communicating with a different command post on different radio systems, but it illustrates the type of problems that can arise without unified command and effective communication.

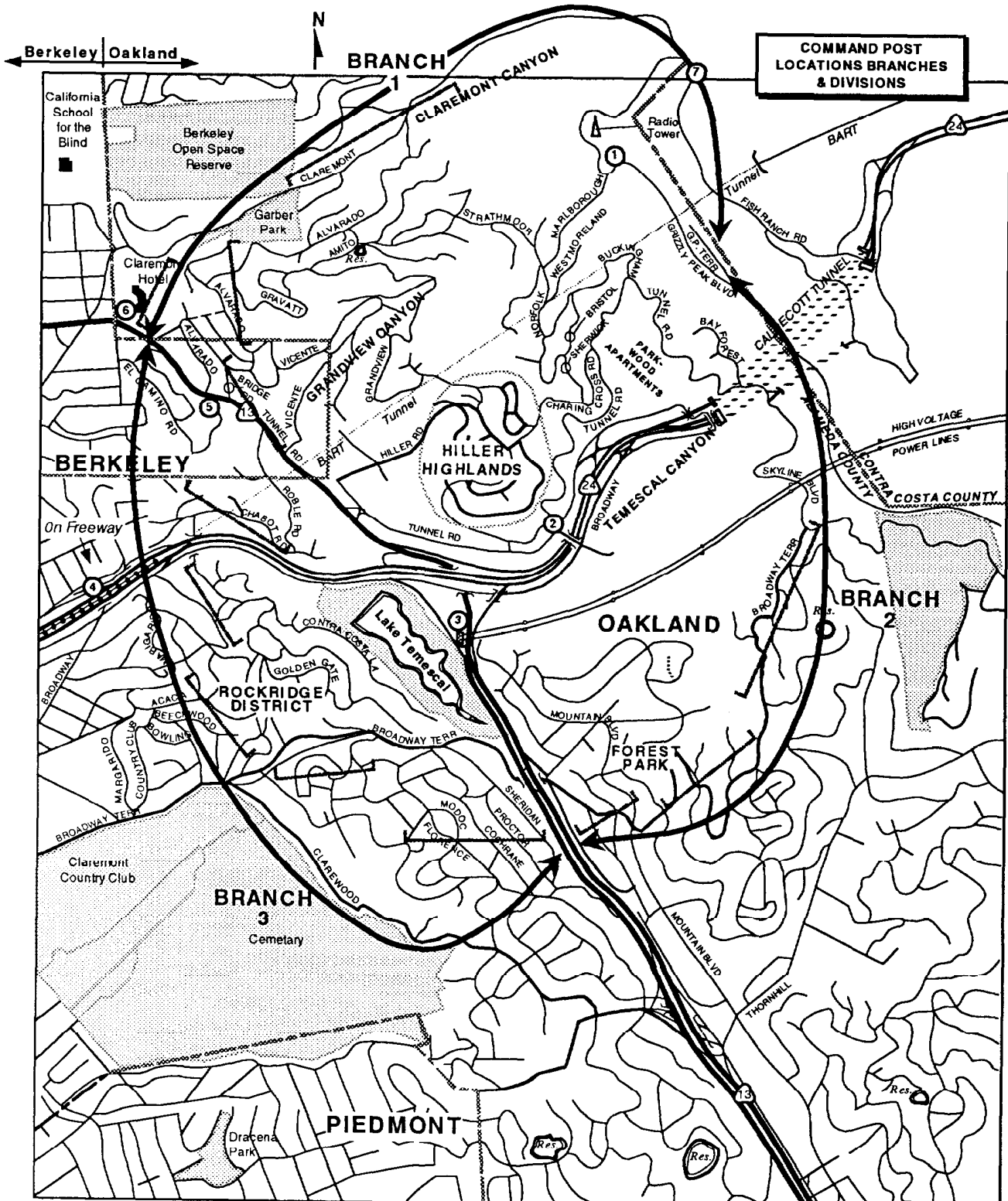
At the Oakland command post there were not enough command personnel to fill standard ICS positions, so important Planning functions, including resource status and situation status, had to be absorbed by the command officers who were trying to direct suppression operations. Logistics coordination was assigned to members of a ladder company. The coordination began to improve as the other agencies established liaisons at the Oakland command post.

Between 1500 and 1530 hours, a unified command structure was developed among Oakland, Berkeley, and CDF, and, by approximately 1630 hours, the fire perimeter had been divided into three branches (as illustrated on the following page) and 15 divisions, as previously noted. The unified command was centered at Oakland’s Command Post, although Berkeley continued to operate a command post to direct operations in its area and the CDF and San Francisco secondary command posts continued to function.

The command system was further refined as the OES overhead team arrived and assisted in the implementation of a large scale command logistics system for the incident. This moved the incident into a longer-term, large-scale mode of operations that continued for the next four days.

At the onset of the fire, the Incident Command structure was unable to catch up with the expanding incident for several hours. Some of the major challenges included:

- The fire moved so fast and became so large that it could not be accurately defined or predicted.
- The units that were initially deployed in close proximity to the fire had to abandon their positions and evacuate the



COMMAND POST LOCATIONS BRANCHES & DIVISIONS

- COMMAND POST LOCATIONS**
- ① Oakland - original location of units (also Contra Costa County Command Location)
 - ② Oakland FD - First Command Post
 - ③ Oakland FD - Second Command Post
 - ④ Oakland FD - Third Command Post
 - ⑤ Berkeley FD Command Post
 - ⑥ San Francisco FD Command Post
 - ⑦ CDF Command Post
- Tactical (Division) Areas

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area; it was impossible to account for their welfare or direct their regrouping into effective tactical units.

- Units that were unable to communicate took actions on their own initiative and were not under the control of the command system.
- Changing conditions required frequent changes in plans.
- Communications systems could not support the necessary exchanges of information and direction of tactical resources.
- Officers assigned to survey the fire from helicopters could not communicate with the command post and had to land to deliver their information.
- Mutual aid units could not arrive fast enough to keep up with the rapidly escalating need for them.
- Incoming mutual aid units did not have maps of the fire area.
- There were insufficient command personnel to staff essential positions.
- The command post location became untenable and had to be relocated two more times.
- The final command post location was so overwhelmed with smoke and embers that it was difficult to work and impossible to make a visual assessment of the situation.

COMMUNICATIONS

Effective communications systems are an essential component of emergency operations. In the analysis of this incident there are several components of the established communications systems that proved to be inadequate. These points are valuable lessons in planning for future large scale situations.

Radio -- The Oakland Fire Department conducts its emergency incidents on a single VHF radio channel, with one additional channel available for back up. The normal mode of operations is to dispatch and manage incidents on the main channel (F2) and to keep working incidents and multiple alarms on this channel. All other traffic is switched to the

back up channel (F1), when requested by the IC, to reserve F2 for the major incident in progress. The digital tones for status encoders in the department's vehicles also transmit on F2, and there is an ongoing problem with the tones overriding voice transmissions. There are also locations in the hill areas where radio reception is difficult because of signal blockage caused by the terrain.

The Oakland Fire Department's mobile and portable radios also carry White 1, the primary statewide mutual aid channel, which is used for interagency communications and as a back up for the other channels. Command officers have White 2 in their portable radios and use it as a command channel during major incidents. The third statewide channel, White 3, is not installed in Oakland's radios.

On the day of the Hills fire, all six alarms of Oakland units were on F2, placing an extremely heavy message load on the channel, in addition to numerous status tone transmissions as each unit reported it was responding and then on the scene. When numerous units are attempting to transmit status information simultaneously, they begin to block each other, causing the devices to retransmit the message until an acknowledgement is received from the central processing unit. Each transmission occupies the channel for only a fraction of a second, but each interruption makes voice communications more difficult.

With the arriving units requesting instructions and units on the scene reporting rapidly changing fire conditions, the contention for air time was severe. It became very difficult to transmit a message to an intended receiver and to obtain an acknowledgement without being interrupted. Units with urgent messages had to wait for opportunities to talk.

When the command officers tried to go to White 2 or F1 to communicate with each other, they removed themselves from the critical traffic on F2 and were out of touch with the Communications Center. They had to switch back and forth to try to communicate with each other and with their companies. Traffic relating to other incidents was also occupying F1.

By the time the units on the upper slopes had to abandon their positions, unit to unit communications had become extremely fragmented. The Incident Commander had no means to keep track of the location, status, or welfare of units and could not be sure which units were safe or in trouble. Companies were urgently requesting assistance, but there were no units to send and no means to direct units to where the help was needed. Without effective communications, it became an undirected and

uncoordinated situation, with companies doing whatever they could to provide for their own safety and evacuate residents in the path of the fire.

It was during this period that the Battalion Chief was lost. His last radio transmissions indicated that the fire had overrun the positions on Westmoorland Drive, and he was pulling the units out of the area. Moments earlier, the Operations Assistant Chief had expressed his concern for the danger to firefighting personnel, advising him "Don't get anyone killed up there." Sometime after that message was transmitted, Battalion Chief Riley was killed, but in the confusion he was not missed until his car and then his body were found by units reentering the area, more than two hours later. (The radio tape indicates that he may have tried unsuccessfully to communicate as late as 1222 hours, approximately 30 minutes after his last successful communication.)

The Oakland Command Post Vehicle was initially dispatched to the top of the hill at Grizzly Peak and missed the first instruction to set up at the tunnel entrance; it had to be redirected to the bottom on Highway 24. Until it arrived, the IC had only a portable radio. Soon after the vehicle arrived and was set up, it had to be relocated, with the fire on the verge of overrunning its position. This created a significant delay in setting up the Command Post with effective communications and support systems.

When they were unable to communicate by radio, company officers resorted to other means. Some messages were transmitted by police officers to their communications center, then relayed to the Fire Department. Others called-in on private telephones from houses or on cellular telephones borrowed from spectators. Messages for the IC had to be relayed back to the Command Post from the Communications Center. Cellular telephones provided reliable auxiliary communications for several functions.

White 1 was in use by the EBRPD and Oakland units that were originally on the scene of the fire and was the designated channel for units arriving on mutual aid to report-in. The first arriving Contra Costa County units were unable to make contact on White 1, so they continued to communicate with each other on Contra Costa channels, while the Battalion Chief went to report in person at the Command Post. Contra Costa County's White 1 base station was disabled when fire reached the telephone lines to the transmitter site.

As additional mutual aid resources approached the scene, they were also unable to make contact with the Command Post for directions and assignments. These units either found the Command Post and reported in

person or went into action where they encountered the fire. Lacking detailed maps of Oakland city streets, they also had difficulty navigating to assigned destinations, and several found themselves in the middle of suppression operations, but in the wrong locations. Meanwhile, Division supervisors who had requested reinforcements received none.

White 1 was also designated for helicopters to communicate with the Command Post. Eagle 5, the EBRPD helicopter, was over the scene, but could not get through to the Command Post to provide information on fire growth and spread. The Battalion Chief, who was assigned to size-up conditions from a Police helicopter, had to land to give his report. Copter 106 had similar problems and had to make its own determinations of where to land and discharge its crew members and where to attack the fire with water drops. A Captain at the Oakland Fire Department Communications Center used White 1 to coordinate the aircraft operations for part of the incident but experienced difficulty coordinating needs with the Command Post.

Berkeley, San Francisco, and CDF resources all used their own radio channels, supplemented by cellular telephones, to communicate with their own units and with their respective communications centers. The ability of the other major agencies to utilize their own radio channels actually relieved some of the pressure on the main Command Post and radio channels. As long as effective liaisons could be maintained, this was the most efficient means to reduce the communications overload at Oakland's Command Post.

The Command Post was overwhelmed by communications coming from too many directions, with too few people to manage. The pace was fast and furious and the overload on radio channels prevented effective communications from taking place. To utilize a radio channel effectively, there should be one person at the Command Post assigned exclusively to communicate on that channel. That individual must be able to input significant information to the decision making process and obtain direction.

The radio problems began to improve when two radio caches were delivered to the scene from the Alameda County Coordination Center. Each cache included 40 multi-channel portable radios and a mobile repeater unit. This additional radio capability, along with sufficient personnel to staff an expanded Command Post, provided relief for the critical radio communications problems by approximately 1600 hours.

Oakland has ordered and is awaiting delivery and installation of an 800MHz trunked radio system for the Fire Department. This system will

provide a needed improvement in the availability of radio paths and will counteract some of the overload problems on the existing channels. However, this will not solve the problem of too much information coming too quickly into the Command Post, with too few personnel to perform necessary command functions and effectively communicate with units at different locations. There is an opportunity to establish a multi-jurisdictional trunked radio network among several of the jurisdictions in the North Zone of Alameda County. This could result in a major operational improvement for the mutual aid system.

Communications Centers -- The Oakland Fire Communications Center was at minimum staffing on the morning of the fire, with two operators and one supervisor on duty. The center, located in Fire Station One, has seven consoles, each capable of performing all radio and telephone functions. A new, second generation Computer Aided Dispatch system had recently been installed in the center.

The operational policy is for individual operators to answer incoming telephone calls, dispatch incidents, and handle the radio traffic associated with their incidents. This means that each operator may have to deal with both telephone and radio traffic at the same time. The Oakland Police Communications Center initially answers all 9-1-1 calls and transfers fire-related calls to the OFD Communications Center.

As soon as the fire broke out, the Fire Communications Center was flooded with incoming calls from citizens reporting the fire and providing information, and news media requesting details. As the fire grew rapidly, the calls changed to requests for information on whether or not residents should evacuate and distressed residents reporting that the fire appeared to be heading toward them. Some residents asked for instructions on which way to go to get away from the fire. These calls kept all of the incoming telephones ringing incessantly, keeping the operators on the telephones and making it difficult for them to monitor radio traffic. The supervisor was occupied with making notifications to designated individuals and agencies on the multiple alarms and requesting mutual aid from adjoining jurisdictions.

With telephone traffic occupying the communications operators, it became difficult for the IC or any units at the incident scene to communicate effectively with the Communications Center by radio. Messages going in both directions had to be repeated and miscommunications became a major problem. Cellular telephones were used as an alternate means to call in to the Communications Center, but they too faced the problem of too many

busy telephone lines and not enough personnel to answer them.

The overload on the operators resulted in delays in processing the requests for multiple alarms, mutual aid, and other requirements. Outbound calls had to wait because there were no lines available to call out of the Communications Center. Messages and requests were backed up and confusion increased.

Part of the delay in sending air tankers was attributed to a lack of familiarity with standard terminology by the person who made the call to CDF. When CDF called back to clarify the request for assistance, the call was put on hold because so many telephones were ringing and every message appeared to be critical. It was impossible to sort out who was on which line and what was most important at any moment. It was approximately 15 minutes from the time the IC requested assistance from CDF until Copter 106 was dispatched and 25 minutes before CDF ground units were en route.

Within the first 15 to 20 minutes, additional personnel arrived at the Communications Center to assist the on-duty shift. Several trained operators, officers and firefighters arrived and activated the additional consoles, but they were not able to relieve the overload condition and the Communications Center became severely congested. It was impossible for the operators to comprehend the situation that was going on at the scene, so they could not provide evacuation instructions to the residents seeking direction.

The Communications Center handled hundreds of requests from the Command Post throughout the day, and the operators struggled for hours to support the operation. The Command Post was calling with all kinds of different urgent requests, and other agencies were calling to ask if they could help or to advise that they had special equipment available. It was a massive overload situation for the personnel and the systems that were available to them.

Berkeley operates a much smaller Public Safety Communications Center which had one 9-1-1 call taker and one fire dispatcher on duty on the day of the fire. During the first hour they received dozens of calls from concerned citizens about the fire and reassured them that Oakland was taking care of it. When the fire unexpectedly attacked Berkeley, the Communications Center was suddenly placed in a similar situation to the Oakland Communications Center. One of the problems that was reported in Berkeley was that the person answering the telephone continued to

reassure callers, well after the Berkeley IC had ordered a massive evacuation of the area ahead of the fire front.

The Contra Coast County Communications Center (ConFire) was in the difficult position of trying to handle multiple major incidents at the same time. The Franklin Canyon fire was demanding multiple alarms at the same time as the East Bay Hills fire; one in the county and one on the border threatening to come into the county. ConFire was able to send multiple alarm assignments to both fires, called up additional strike teams from other parts of the county, and then called for mutual aid from Region II to cover the massive void of coverage in Contra Costa County. It then had to deal with two more major fires in Contra Costa County, when the power lines shorted out.

ConFire continued to manage resources among all of these incidents throughout the day and continued to find more resources to send to Oakland as the other fires were brought under control. ConFire provided communications support for the resources it sent to Oakland, since they could not establish effective communications with the Oakland Command Post, and also served an important role in obtaining the air support for Oakland when the need was critical. (A description of activities within Contra Costa County is included in Appendix C.)

PUBLIC INFORMATION

Notification of the public becomes a very significant concern in any disaster situation, when there is a need for evacuations or other actions by the general population. The established system in Oakland calls for the City's public information staff to establish a central emergency operations/information center to disseminate information, primarily through the news media. Since the emergency occurred on a Sunday, the public information staff had to be called in from home and took a considerable amount of time to gather the information and to be prepared to perform their functions.

While this delay was occurring, most of the news media had representatives on the scene, covering the story and giving out whatever information they could obtain from any sources that were available. In several cases it was suggested that the media obtained better information from unofficial sources than from the "official sources." This causes confusion and may cause improper actions to be taken by the public.

There was an additional problem with law enforcement agencies excluding the news media from operational areas. This caused conflict

with media representatives on the scene who were aware of their rights to enter to gather legitimate news information.

It should be emphasized that public information is a critical component in a disaster, particularly if the public must be warned to take protective or preventive actions or to evacuate an area that is in imminent danger. There should be procedures to provide for rapid activation of the public information system and close coordination with the Incident Commander.

MUTUAL AID

The established mutual aid systems among cities, within counties, and on the regional and statewide levels provided an unprecedented amount of assistance to Oakland and Berkeley for this incident. The total mutual aid commitment involved 440 engine companies and 1,539 personnel from 250 agencies. Eighty-eight strike teams were mobilized, some from more than 350 miles away, and some were on the scene for four to five days.

The effectiveness of this mutual aid system in being able to mobilize and support this level of response is unparalleled in the United States. The analysis of the events indicates some areas where procedures could be improved to speed response and improve coordination, but these suggestions are based on a situation that exceeded all previous experience.

The State of California Mutual Aid Plan was based primarily on experience gained from wildland fires, some of which became wildland-urban interface fires. The procedural steps that are involved in this plan do not facilitate rapid response. In designing the system, extremely rapid response was considered to be less essential than establishing and maintaining strong organizational characteristics. Specific requests are processed from the requesting jurisdiction, to the County Coordinator, to the Region, and, if necessary, from one Region to another. The strike teams are then activated in a very structured manner, with mobilization orders passed down through the system to each individual fire department that will be contributing a unit to a strike team. The departments are notified to have their units form up in convoys at designated meeting points.

These very deliberate procedures reinforce the system, but they take time. The procedures for notification may take 15 to 30 minutes, particularly if the request is for several strike teams. It is not unusual for a strike team to take an hour or more to assemble and be ready to depart

for its destination, which may involve several hours' travel time. The delay is not a problem in cases where resources are being assembled in preparation for strategic actions, but it is a significant concern when a conflagration is moving through an urban area and lives are being lost.

The Bay Area Inter-County Mutual Aid Plan is designed for rapid response within the highly urbanized six county area. It took six minutes for the request from the Incident Commander to be transmitted from the Oakland Communications Center to the San Francisco Fire Department Communications Center, then it took only 90 seconds for the dispatch message to be transmitted to the units that would form the first strike team. The second strike team had assembled and was en route to Oakland within 11 minutes of the call. The response from Contra Costa County was also immediate, dispatching a first and second alarm in rapid succession, then calling up additional strike teams without waiting for requests to work their way through the formal system.

The Alameda County Fire Mutual Aid Plan is also designed for rapid response but encountered problems on the day of the fire. The interconnect line among the departments in the North Zone was not operational and calls had to be made from Oakland to each individual neighboring department to request assistance. In the confusion of the situation at the Communications Center, Oakland did not pass the zone coordination responsibility to Alameda Naval Air Station (NAS) and neglected to notify or request assistance from Berkeley.

At the Alameda County coordination level, the processing of the initial request took several minutes, because of the procedural requirements and conflicting radio and telephone traffic. Recognizing the problem, steps were immediately implemented to speed up the process for the requests that followed. It appears that there are improvements that could be made to process intra-zone and inter-zone requests more promptly by predesignating responses and developing an immediate notification and dispatch system. The situation was more complex, because some mutual aid requests were handled directly, by calling to other jurisdictions, while others went through the County Coordinator.

The procedures for requesting CDF response also appear to be a problem, particularly when aircraft are needed. A major priority is directed toward determining if the fire is in a "state responsibility area" or a "threat zone" where CDF would assume the cost of suppression, or if the local jurisdiction will be responsible for the cost. If it is a local jurisdiction fire, a specific request for air tankers is required.

There were difficulties in communication between the Oakland Communications Center and CDF on the initial request for assistance, which brought the first helitack unit. There seemed to be a problem convincing CDF of the urgent need for additional aircraft at the East Bay Hills fire, even with Contra Costa County recommending diversion of the air tankers from the Franklin Canyon fire to Oakland. The personnel in the Oakland Communications Center believed that air tankers and more helicopters were on the way at least 30 minutes before CDF rerouted the first two air tankers and dispatched a third.

The procedures for requesting CDF response, authorizing aircraft response, and coordinating air operations need to be reexamined and streamlined for urgent situations. Time is much more critical in a wildland-urban interface fire than in a normal wildland situation.

VOLUNTEER RESPONSE

While the large scale mobilization of fire department resources was taking place, off-duty firefighters from Oakland and surrounding communities were converging on the scene to offer their assistance. Appeals were broadcast for all available experienced firefighters to respond to Oakland to assist in stopping the conflagration, and scores responded.

Many individual firefighters, both career and volunteer, simply showed up, attached themselves to operating units, and went to work. They were joined by dozens of citizens who pitched in to help the firefighters in any way they could. The untrained citizens carried equipment, dragged hoses, helped to direct nozzles, and performed anything that was asked of them. There were also groups of military personnel, particularly from the Alameda Naval Air Station, who showed up and volunteered their services. While trained firefighters wearing protective clothing worked in the most hazardous locations, they were often supported by citizens in shorts and tee shirts who were anxious to help and enthusiastically followed directions.

While untrained citizens were being enlisted at the fire scene, trained firefighters from other jurisdictions who called to offer their services were directed first to Oakland Fire Headquarters and later to the staging area at Raimondi Park. Dozens responded and signed in to offer their services, but there was no mechanism to organize them and utilize their capabilities. Some complained about being kept waiting around the staging areas for hours, watching reports on television and looking at the

fire in the distance. Some became frustrated and drove to the fire scene on their own, joining in the action wherever they saw the need.

There is a dilemma in the concern for accountability and safety of “spontaneous volunteers,” versus the desirability of using them to assist in situations that are beyond the control of the regular force. Clearly, untrained citizens provided valuable assistance in several areas. Oakland had a very similar experience with citizens assisting in the initial rescue efforts at the Cypress Freeway collapse in the Loma Prieta earthquake. In disaster planning, there is a need to develop mechanisms to effectively utilize this “spontaneous volunteer” assistance.

There must also be concern for the safety of such participants. Prevailing standards hold the Incident Commander and supervisory officers responsible for the safety of all personnel under their direction. This should be a consideration when the use of untrained personnel is contemplated, but in a true disaster the decisions are usually made at the point where the need exists, not at a central command post.

Prevailing standards and procedures severely limit the ability of trained firefighters to “freelance” at incidents, by requiring them to be part of a recognized organization structure. It is ironic when untrained citizens can be used, but trained and capable firefighters cannot, because there is no structure to bring them into the system. While the need for such mechanisms may be infrequent, there should be a system to effectively organize both trained and untrained individuals when the need arises. This should be addressed in planning for future disasters.

AIRCRAFT OPERATIONS

The need for aircraft to attack the fire was expressed from the first stages of the incident. The Captain of Engine 19 requested mutual aid from CDF at 1059 hours, and this was echoed by the Assistant Chief who was still en route at 1104 hours. Both of these officers expected that CDF would be responding with air tankers to drop slurry on the flanks of the fire, as well as helicopters to make direct water drops. The Assistant Chief used the key phrase “threat zone” to indicate that the fire was in an area where it could spread to wildland areas within CDF jurisdiction.

When the request was passed from Oakland Fire Communications to CDF at Morgan Hill, there was confusion over the terminology that was used. The normal mutual aid response, which includes a single Helitack unit was dispatched. The confusion was based on the terminology of the request for “air operations,” since this refers to a particular individual in

the ICS structure. It took several minutes to clarify that the request was for air support and the only available air tankers had been dispatched to other incidents.

When the officers at the scene made repeated urgent requests for aircraft and were reassured that they were coming, only the one Helitack unit was actually en route. It was not until 1236 hours that the two tankers responding to the Franklin Canyon fire were rerouted to Oakland, and it was 1300 hours before they were overhead. A third air tanker was dispatched from Ukiah at 1239, with an ETA of 1316 hours.

The diversion of the first two tankers and the dispatch of the third were based on the intervention of the Contra Costa County Assistant Chief, who convinced CDF of the urgent need for aircraft and accepted responsibility for the cost. Several more air tankers were deployed to Oakland during the afternoon, as quickly as they could be released from other wildland fires in California. Contra Costa County also activated a privately owned (contract) water drop helicopter to assist Oakland.

Initially, a Captain at the Oakland Communications Center tried to coordinate the aircraft operations over the radio. Later in the afternoon, a CDF Battalion Chief, located at the Command Post, took over the task of communicating with the spotter aircraft and communicated the priorities for air attack operations. The primary objectives were to stop the fire's advance to the southwest, along both sides of Highway 13. The area where the Berkeley Fire Department was trying to make a stand, north of Highway 24, was a third priority for the aircraft.

It was extremely difficult for the spotter aircraft to see through the smoke and for the tanker pilots to find a clear run to their target areas. To make bombing runs into the wind would have required the aircraft to fly directly toward the smoke-obscured hills. Flying with the wind required the aircraft to maintain higher than normal altitudes, and the combination of altitude, wind, and thermal updrafts significantly reduced the effectiveness of their drops. After each run, the aircraft had to return to Santa Rosa Airport to refill their slurry tanks; a round trip which takes approximately one hour.

Water drops from helicopters were more effective in reaching their targets, but their water capacity is limited and the pilots had great difficulty with the wind and smoke conditions. Lake Temescal provided an ideal source for refilling the helicopter water buckets, within 60 seconds flying time of the drop zones, and Lake Merritt was available as an alternate. The helicopter drops are most effective in quenching a particular hot spot,

as opposed to the fixed wing tankers' specialty of dropping slurry along a line. The fire's thermal column was extremely hazardous to low flying helicopters, forcing the pilots to work carefully along the flanks, avoiding the head of the fire where the superheated air would have been disastrous.

WATER SUPPLY

Water supply was a major problem during most of the incident. Part of the problem related to the fact that many of the units that responded from distant areas were unable to hook up to Oakland hydrants. When California adopted a standard 2 1/2 inch threaded connection for all hydrants, the cities of Oakland and San Francisco opted to maintain their 3-inch connections and to keep a supply of adapters on hand for mutual aid units. Fire departments in the area normally carry adapters on their apparatus, but the plan called for adapters to be obtained from the warehouse to meet incoming mutual aid strike teams at staging areas. Since this fire occurred on a Sunday, there was a delay in obtaining the adapters until off-duty personnel could open the warehouse and send them to the scene on supply trucks.

Many of the incoming units were committed and discovered the adapter problem only when they needed water to supply hoselines or refill their tanks. This limited the ability of several units to work effectively until they could locate a unit with an adapter, or one of the supply trucks located them. Since some of these companies were in critical combat areas, it was difficult for the logistics system to find them and deliver the adapters.

The water supply on the hills was known to be a problem from previous incidents and from risk analysis projects, including earthquake vulnerability studies. The water system on the hills was arranged as layered pressure zones, each supplied by a tank at a higher level. The storage tanks served areas where the difference in elevation would maintain static pressure in a desirable range at the delivery levels.

The tanks were kept filled by a series of electrically powered pumps, which relayed the water from tank to tank, and the pumps were not provided with emergency generators. If a pump at a particular level failed, it isolated the tanks at higher levels from any capability for replenishment. The power began to fail early in the fire, as wooden poles burned, lines dropped, and transformers exploded. As pumps failed, the higher level tanks would begin to run out of water. When the high voltage lines shorted out, at 1315 hours, all of the power to the remaining pumps failed, and the whole system on the hills began to run dry.

The demand on the system was also very high, as companies tried to establish large handlines and master streams to establish defensive lines. In addition, many of the homeowners were using their garden hoses to wet down their roofs and shrubbery to guard against flying brands and embers; some even left garden sprinklers running on their rooftops as they evacuated. As homes burned to the ground, their water connections were left spurting water into the rubble. All of these factors created an unprecedented demand on the system, quickly using all of the stored water.

Companies on the hills reported hydrants going dry as early as Sunday noon, and the supply was not restored until that night, when portable generators were brought in to power some of the critical pumps. It does not appear that the water supply was a deciding factor in the outcome of the fire on the hills, since the crews were unable to make any progress against the flames before the hydrants went dry. The strength of the wind and the thermal forces made water almost totally ineffective to stop the downwind progress of the fire. The available water was useful in protecting certain positions, including some locations where firefighters took refuge, and in covering exposures on the flanks.

In the Rockridge district there were also sections where the water supply was known from past experiences to be weak. Many of the mains in the area were old and inadequate, and at least 50 homes were burning by 1300 hours. San Francisco Strike Team One was assigned to this area and around 1420 hours the Strike Team Leader was able to call back to his department and have two of the city's large diameter hose tenders activated and dispatched to Oakland. The hose tenders were able to bring in large supply lines from streets on the edge of the district to supplement the supply.

One of the strong water supply areas was the private system installed at the Claremont Hotel. This system provided an adequate supply for the defensive streams that were established on the exposed side of the hotel. While these streams were maintained in a stand-by defensive posture, the crews were able to extend handlines up the hill to engage the fire on Alvarado Road and some of the smaller streets overlooking the hotel. This kept the fire from advancing further down the hill and causing a direct exposure to the hotel.

STRESS

Both physiological and psychological stress had significant effects on the firefighters who were involved in this incident. The physiological stress aspects are easy to comprehend, since many firefighters were involved in

continuous and intense fire suppression activities for hours on end. Most of the on-duty Oakland crews and the mutual aid forces that responded in the first two hours were actively engaged in fire suppression for 12 hours or more, without more than a few minutes of rest at any time.

The reductions in the Oakland and Berkeley Fire Department budgets had reduced their staffing levels and number of companies and made their challenges even more difficult in this incident. While it may be assumed that reduced company staffing subjects the crew members to additional stress and exertion, it is clear that every firefighter on the front lines was subjected to a maximum amount of stress and exertion at this fire.

The heat of the fire and the exertion of extended heavy labor drained strength and challenged the stamina of firefighters well beyond normal limits. Even when they could take a brief rest, the 900 ambient temperatures and the strong hot wind provided no respite. Officers had to be extremely concerned with the dangers of heat exhaustion, dehydration, and simple fatigue from overexertion. There were few opportunities to rehabilitate or rotate crews for most of the day and providing drinking water and fluid replacement drinks for the front line combatants was a major problem. After several hours, volunteer groups, including the Red Cross and Salvation Army, began to deliver food and drinks to the suppression forces wherever they could be reached.

It would be reasonable to conclude that many of the participants pushed themselves far beyond their normal limits of stamina and endurance, based on the magnitude and potential consequences of the situation. As long as the fire did not quit, they were determined to keep up the battle. But there was a definite psychological impact of being unable to stop the enemy as it overran fire department defensive lines time and time again. In the past they had always been able to attack and defeat the fire or at least define and hold a perimeter around it; this fire could not be defeated and it could not even be contained.

There were a few reports of conflict between units regarding the tactics employed and the level of effort that was being directed toward operations. These seemed primarily to involve units that were extremely fatigued and had reached the point where their physical stamina and aggressive spirit had both been depleted, encountering units that were fresh or supervised by unrelenting officers. These situations were unusual, but they were widely reported, suggesting that conflict existed between different agencies or between structure-oriented units and wildland-oriented units.

The more frequent observation was that everyone worked together very effectively, in spite of the many adversities created by the fire itself.

Another psychological factor was the fear of being overwhelmed by the fire. Few of the firefighters had ever imagined an urban conflagration of this magnitude, and no one had ever seen one. Many experienced firefighters expressed their feelings of fear as the fire jumped from building to building, swept over and around them, and overwhelmed their efforts to control it. They described their feelings as the smoke reduced their visibility to zero, and they wondered if the fire was going to close in on them or cut off their escape.

Many of the companies that had been involved in the initial actions on the hills had been driven out by the fire, abandoning their positions and, in some cases, losing track of crew members. One company officer did not know the fate of his crew for several hours; he drove the engine down from the hills alone. There was no effective organization structure in place, and the communications system was so overwhelmed that it was impossible to account for companies or individuals. The Battalion Chief who died was not missed in the confusion until his body was found, and there were several reports about finding burned bodies in the streets or not being able to rescue persons who were known to be trapped in burned homes. This information spread among the firefighters on the scene and helped to create an extreme stress level.

Many of the individuals who were involved in fighting this fire were also involved in the Loma Prieta Earthquake that struck the Bay area in 1989. The Cypress Freeway collapse in Oakland had been a devastating incident, in terms of its magnitude and consequences, and most of the crews that were involved in the first few hours of that incident were also on duty on the day of the fire. They described the fire as being more stressful, because of the continuing fear that the fire kept getting bigger and nothing they could do seemed to stop it. While the earthquake was an extremely stressful incident, they did not feel a personal commitment to stop a freeway from falling down. They did feel a personal commitment to control fires, but they were facing a fire that was a major threat to their own safety.

The Oakland Fire Department instituted its Critical Incident Stress Debriefing system in the days immediately after the fire. The long term consequences of the stress are not known, but it was evident that a very high level of stress surrounded the incident, particularly the loss of so many lives and such a large part of the community. The mental health agencies and professionals in Oakland and Berkeley also provided counselling for

residents of the devastated area. The sight of more than two square miles of devastation, with the total destruction of more than 3,000 dwellings, is convincing evidence of the need for these services.

Some of the most difficult feelings were faced by command officers who were responsible for managing and directing the fire suppression efforts. There were experienced officers who were extremely familiar with the risk factors and the history of previous fires in the hills and had some expectation of what could happen, but the actual fire was worse than their worst predictions. Some of these individuals had tried unsuccessfully for years to make residents and political leaders aware of the risks and to convince them to take measures to mitigate the hazards. They had a high level of personal commitment to prevent this fire from happening and to be prepared to manage the situation if it did happen, but they were defeated in both respects by forces beyond their control.

It was particularly devastating when reports were published after the fire accusing the Fire Department of negligence or inadequate response to the fire. Some of those accusations came from fire service professionals who had not been involved in the incident and were not aware of the situation. These accusations caused additional stress to several experienced and conscientious officers, who were already suffering from physical and psychological stress.

FIREFIGHTER SAFETY

Approximately 150 firefighter injuries were reported in this incident, plus the one fatality. Most of the injuries were in the categories normally experienced in major fires, including exhaustion, dehydration, strains, sprains, contusions, dislocations, and minor burns. Several cases relating to smoke inhalation and eye irritations were also treated, and there were numerous reports of post-incident exhaustion, as indicated by weakness and aching muscles. At least one firefighter with chest pains was handled by the medical units at the scene. Another was blown off a roof by the force of the wind.

Many of the firefighters were treated for respiratory distress, eye irritation, and other symptoms of prolonged exposure to products of combustion, exacerbated by dehydration, heat exhaustion, and stress. Treatment was provided at first aid stations, in rehab areas, and by ambulance crews that were assigned to the incident. Several firefighters were treated at hospitals, and some were held overnight for observation and additional treatment.

There was a problem in trying to decide if this incident should be handled as a wildland or structural fire. It primarily involved exterior operations but also included most of the hazards of structural operations, including search and rescue and interior attack on several structures. Many units alternated between the two types of activities, working mainly on the exterior but engaging in structural actions whenever it was the most effective way to deal with a situation.

The accepted protective equipment for a wildland intervention includes a lightweight fire protective jacket and pants, with a helmet, goggles, leather boots, and gloves. Structural protective equipment includes insulated coat and pants, helmet with ear protection or hood, gloves, rubber or leather boots, and self-contained breathing apparatus. Some of the responding units had only one type of protection or the other, while some brought both.

The use of structural firefighting protective clothing for hours on end, on a hot day and in a fire's thermal environment, creates an obvious problem with fatigue and heat exhaustion. The addition of breathing apparatus provides protection for the respiratory system and eyes, but adds more weight and requires regular changes or refilling of the air cylinder, which would be infeasible on the scale of this incident. The wildland protective clothing is more practical for operations that extend over lengthy periods, but does not provide the same level of safety, particularly respiratory protection.

There is no easy middle ground between structural and wildland protective clothing. The individuals involved in the incident used whichever they had with them, although most expressed a preference for wildland clothing under similar conditions.

The lack of respiratory protection was a major concern, in both interior and exterior operations, and there were numerous reports of respiratory irritation. Fortunately, there were no major injuries related to the lack of proper protective clothing or respiratory equipment. This is a subject that needs further research, to determine the best protective ensembles and tactical approaches for an interface fire.

A few of the crews were wearing experimental respirators (smoke masks) that have been developed by Lawrence Livermore National Laboratory for use by wildland firefighters and are currently being evaluated in California. The masks incorporate a full facepiece with a large capacity HEPA (high efficiency particulate) filter intended to remove soot, ash, cinders, tar, and other airborne contaminants from the inhaled

air. The filters do not remove carbon monoxide or other gaseous contaminants.

After several hours of use, the team members all registered very high on carboxyhemoglobin (the amount of carbon monoxide in the bloodstream), indicating that they had been exposed to significant concentrations of CO. The members who wore the masks reported that they were able to rest and recover from the CO saturation in a relatively short time, while those who worked without the masks had much more respiratory action and at least two required hospitalization.

This experience provided valuable information on two points of interest. One finding confirmed that members working “in the open” may still be exposed to high levels of carbon monoxide from wildland fires. The second is that the other combustion products and contaminants play a major role in causing severe respiratory reactions and may even increase the toxicity of carbon monoxide. This synergistic effect suggests that a filter-type mask may prove to be valuable and effective in wildland fire suppression.

The experimental masks currently incorporate a monitoring device that indicates high CO levels in the environment, as a warning to discontinue work in that area. Future developments of the mask may incorporate chemical filter packs to remove CO from the air, similar to the filter canister masks that were once popular for structural fire suppression but proved to be unsafe in oxygen deficient atmospheres.

The Safety Officer position was not staffed until late on Sunday afternoon because of the multitude of problems at the command level. This incident involved extreme risks to firefighters, and to adequately address the responsibilities of the safety officer position would have required numerous qualified individuals maintaining communications with a senior Safety Officer at the Command Post.

EMERGENCY MEDICAL SERVICES

The primary agency for emergency medical incidents in Oakland is the Alameda County Emergency Medical Service, which operates advanced life support ambulances in Oakland and some other parts of the county. The Oakland Fire Department provides first responder service to certain categories of emergency medical incidents. In some jurisdictions within the county, fire departments provide advanced life support and ambulance transportation.

When the 3rd alarm was transmitted, Oakland Fire Communications advised the EMS Communications Center that the Fire Department was suspending its response to medical incidents, according to established policy. During the fire Alameda County EMS took responsibility for all medical responses at 1107 hours. As the magnitude of the incident became known, additional ambulances were activated and units from surrounding jurisdictions and from ambulance companies were placed on standby.

At approximately 1330 hours the first reports of fatalities and serious injuries were received, and the system moved to a higher state of preparedness, with several ambulances staged around the fire area. Hospitals and hospital-based helicopters were also alerted. A number of civilians with serious burn injuries were transported in the early part of the afternoon.

Alameda County Emergency Medical Service provides advanced life support ambulance service in the City of Oakland, and managed the treatment and transportation of injured firefighters and civilians during the fire. Alameda County EMS requested assistance from surrounding areas, including the City of Alameda Fire Department and the Berkeley Fire Department, which operate ALS ambulances, and from private ambulance companies. All available units were placed in service and staged in several locations around the fire perimeter. They were directed to the locations where assistance was needed by a liaison at the main Command Post. Hospital-based medical helicopters were also used to transport critical patients.

The ambulance crews provided medical evaluation and treatment at rehab areas and responded to locations where injuries were reported. The total numbers of injured firefighters who were treated or transported is believed to be in the vicinity of one hundred. Several additional patients were transported to areas by other means, some injured by the fire or smoke and many suffering from anxiety from the loss of their homes and family members.

The Oakland Fire Department normally provides first responder level treatment on selected EMS calls, usually arriving several minutes ahead of an ambulance. When multiple alarm incidents reduce the Department's resources, the Department suspends its response to EMS incidents and returns full responsibility to the County EMS agency. This results in longer response times, but there is no documentation of any positive or negative consequences resulting from this.

For the next 10 to 12 hours the ambulances responded to treat numerous firefighters suffering from minor burns, cinders in eyes, respiratory irritation, heat exhaustion, and a variety of other injuries. Most of the firefighters were treated on the scene and returned to duty on the fire lines. Several civilians were also injured assisting in fighting the fire or evacuating from it and several cases of stress were reported, involving evacuees and spectators. The major problem for ambulance personnel was finding the areas where firefighters were working and making access to reach them.

EVACUATION

The fire burned along the north face of Temescal Canyon faster than any kind of organized evacuation could be implemented. The fire swept through areas, particularly the Hiller Highlands complex, and residents had to flee as the fire ignited around them; several died in the process. Firefighters attempted to direct residents out of the fire's path, in some cases as they themselves were retreating from the advancing flames. Police officers were also dispatched to the area to assist in warning and evacuating residents in the path of the fire. The police officer and the fire department Battalion Chief who died in the fire were both attempting to rescue residents and were overrun by the fire in the narrow streets of the hillsides.

As more resources were assembled and the rate of spread of the fire decreased, there was more time to plan and organize evacuations from areas in its path. Several of the flatland areas were planned for evacuation, and emergency shelters were opened to accommodate the displaced occupants.

The population of the areas evacuated on the day of the fire is estimated in the range of 20,000 to 30,000. Many of these residents were unable to return to their homes for several days due to the continuing fire threat, as well as interruptions in electrical, gas, and water service and blocked streets. There were some reports of looting in the evacuated areas, in spite of a heavy commitment of law enforcement personnel to secure the perimeter.

With over 3,000 dwelling units destroyed or heavily damaged, finding shelter and providing emergency assistance for the homeless was a major concern. These functions were assigned to the local emergency preparedness agencies, assisted by the California Office of Emergency Services and Federal Emergency Management Agency personnel.

LESSONS LEARNED

There are hundreds of lessons to be learned from this incident, many of which are contained in the body of this report and in several other reports that have been prepared on the incident. The lessons revolve around specific themes:

Mitigation -- The risk of disastrous wildland-urban interface fires has been recognized and emphasized by the fire service and other organizations for many years. This incident is the ultimate experience, to date, of those dire predictions coming true.

The factors that created the critical fire risk situation in the East Bay Hills on October 20, 1991, exist in hundreds of other locations and, when the same circumstances repeat themselves, there is every reason to expect that another very similar fire will result.

In particular, in California, when the Santa Ana (or Diablo) wind is blowing, and a fire occurs in a susceptible area, there is very little that any current fire suppression forces or technologies can do to resist the spread of the fire. The results will depend mainly on the fuel that is downwind from the fire and the length of time that the wind continues to push the fire in that direction.

An observation was made that most fire codes would have required an area with these fire risk characteristics to be evacuated. It was compared to a neighborhood with spilled gasoline flowing in the gutters. This type of regulatory control has never been applied in an interface area in the same way it is routinely applied to structures. The outcome of this incident appears to demonstrate the validity of the concept.

Several of the risk factors that make an area susceptible to an interface fire can be mitigated, to reduce the level of risk:

- Use of drought-tolerant and fire-resistant landscaping.
- Fuel control measures including controlled burns, clearing of dead wood, cutting tall grass and brush, grazing to thin vegetation in particular areas and similar measures.
- Brush clearance areas around structures and fuel breaks in strategic locations.

- Use of fire resistant roof and exterior wall materials.
- Adequate access roadways for emergency vehicles and exit roadways for residents.
- Water storage and distribution systems adequate for fire protection purposes.
- Development of exposure protection systems, incorporating technologies such as Class A foam.⁴

Disaster Response -- This incident was clearly beyond the capabilities of normal fire suppression forces, and a realistic approach to similar situations must be based on hazard mitigation and risk reduction. It is not feasible to provide a fire suppression organization to master the situation that occurred in Oakland. The fire departments in Oakland, Berkeley, and all of the surrounding areas provided a valuable lesson to the fire service, in demonstrating their courage, skills, and dedication. But they also demonstrated the need for risk assessment and planning for disasters that completely overwhelm regular emergency response systems. There are many things that can be said and done to react to these lessons:

- There are recognizable fire risk situations (not necessarily limited to wildland-urban interface environments) that are clearly beyond the capabilities of fire suppression forces. Hazard reduction strategies should be the primary approach taken when these situations are recognized.
- An urban conflagration resulting from a wildland interface fire is a situation that has not received sufficient planning attention.
- It is unrealistic to expect normal emergency response systems, that are based on routine demands to smoothly manage a disaster situation; the test is how quickly and effectively a disaster response system can be implemented.
- It is impossible to manage a large scale disaster with insufficient command personnel and inadequate command and control systems. Fire departments should always

⁴Residential automatic sprinkler systems alone would not provide protection against this type of fire exposure. Compressed air foam systems (CAFS) may prove to be the most effective exposure protection system for this type of severe exposure.

anticipate “worst case” scenarios and develop plans and procedures to address those situations.

- Communications systems that are adequate for normal times and situations may be easily overwhelmed in a disaster situation.
- In the aftermath of a disaster, every detail of response operations is subject to review in minute detail. The inadequacies are grossly magnified.
- It is extremely difficult to evacuate a heavily populated interface zone, particularly when the homes are enveloped in rapid burning and easily ignitable fuels. When wind, terrain, narrow roads, steep grades, and other factors combine to accelerate fire spread and restrict passage, the risk to residents can be extreme. Once a fire starts spreading through the area, it may be too late to evacuate.
- Firefighters will subject themselves to extreme levels of risk and personal exertion in the face of a disastrous fire. It may be necessary to order companies to evacuate for their own safety, or to rest when the situation is still out of control.
- When normal response resources are forced to retreat, it is extremely difficult to regroup, reorganize, and return to effective action. Command officers must recognize when conditions are failing and decommit early enough from futile operations in order to have time to regroup and reorganize effectively.
- Existing expectations for “jump potential” may need to be reevaluated. The distance that the this fire jumped, from Hiller Highlands over the freeway interchange and Lake Temescal, was much farther than had been anticipated in planning for a fire in the hills. The conditions for a long “jump” were perfect and the fire spread rapidly into an entirely new area.
- It is not clear that even an early series of aerial attacks could have controlled this fire; however, the need for rapid notification and response of aircraft can be seen in the analysis. The arrival of helicopters and fixed wing aircraft to

attack this fire was delayed by circumstances, communication problems, and confusion.

- It may have been feasible to protect some of the structures with exterior sprinkler systems, if adequate water flows and pressures had been available and the more severe exposures to wildland fuels had been reduced. The intensity of the exterior fire exposure was so severe that interior automatic sprinkler systems had no value in protecting the structures from ignition.
- Compressed-air foam systems (CAFS) appear to be very useful in applying a thick foamy covering to protect severely exposed structures. There have been experiments with Class A Foam agents, applied through automatic sprinklers or deluge systems, or by handlines, as exposure protection systems. Research is being conducted on mobile (truck mounted) systems and fixed or portable CAFS systems for homeowners.

Appendices

- A. Reference Publications
- B. East Bay Hills Fire Chronology
- C. Contra Costa County Summary
- D. Strike Teams
- E. Photographs

Appendix A

Reference Publications

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

***Hazard Mitigation Report for the East Bay Fire
in the Oakland Berkeley Hills***

(In response to the October 22, 1991
Federal Disaster Declaration Covering
Alameda County, California)
FEMA-919-DR-CA

***Response of the San Francisco Fire Department to the
Oakland Conflagration of October 20 and 21, 1991***

Edited by David Fowler
San Francisco Fire Department

***Preliminary Study of the 1991 Oakland Hills Fire
and Its Relevance to Wood-Frame, Multi-Family
Building Construction (NISTIR 4724)***

Kenneth D. Steckler, David D. Evans, and
Jack E. Snell
National Institute of Standards and Technology
US Department of Commerce

***The Great Oakland, Los Angeles, and
San Diego Fires September 22 to 29, 1970***

Naval Ordnance Laboratory, White Oak,
Silver Spring MD
NOLTR 71-229

***The Oakland-Berkeley Hills Fire -
October 20, 1991; and
Wood Shingles - 1959 and The Devil Wind and Wood Shingles:***

The Los Angeles Conflagration of 1961
(Bel Air Fire)
by Rexford Wilson
National Fire Protection Association
Quincy, MA

The California Department of Forestry and Fire Protection is conducting a detailed study of fire spread characteristics at the East Bay Hills Fire. This study included gathering detailed information on every structure that was destroyed, damaged or exposed and is intended to yield a body of knowledge on the mechanisms that determine susceptibility to ignition in an interface.

Appendix B

East Bay Hills Fire Chronology

East Bay Hills Fire Chronology on October 20th

Selected messages from the enormous amount of radio and telephone traffic that occurred on the first day of the fire are presented in this Chronology to illustrate not only the sequence of events, but also the extreme complexity of this fire from the point of view of incident management.

- 0820 Off duty Battalion Chief advises BC2 of strong wind condition developing in Oakland Hills area.
- 0830 BC2 sends E24 and E19 to check scene of previous day's fire.
- 0850 E19 & E24 on scene at 7185 Marlborough Terrace locate spots inside fire line from previous day's fire. Hot spots noted in duff under pine trees on north flank and near Gwin Tank. East Bay Regional Parks District (EBRPD) requested to respond to pick up their hose. EBRPD contacted by Oakland Fire Communications (OAK); unable to respond until day personnel report for duty.
- 0908 BC2 orders Patrol 28 to be activated to increase fast response capability in Hills area.
- 0913 BC2 at scene at top of hill, at Marlborough Terrace near Grizzly Peak. Requests EBRPD to respond to assist with flare-ups inside burned area.
- 0916 BC2 requests additional engine company. E16 dispatched.
- 0925 EBRPD advised by OAK to respond and pick up hose or risk losing it to rekindled fire.
- 0926 BC2 advises OAK of extreme fire hazard conditions in Hills area due to wind and fuel conditions.
- 0929 BC2 assumes command.

EBRPD Unit 5675 dispatched, requests additional units to respond.
- 0932 EBRPD 5675 on scene, reports that situation "seems to be OK." Advises additional units to respond Code 2 (non-emergency). EBRPD personnel assigned to work hot spots on lower north flank from Buckingham Blvd.
- 0945 BC2 reports situation under control. Delegates command to E24.

EBRPD Chief advises to increase staffing at EBRPD fire stations due to unusual weather conditions.

- 0947 BC2 orders BC3 and BC4 to each assign one engine company to patrol Hills due to severe weather danger. E4 and E27 assigned.
- 0953 EPRPD Unit 5632 at scene, at Marlborough and Grizzly Peak.
- 0959 BC2 notes, "We have the most critical fire conditions in five years."
- 1004 EBRPD Unit 5676 at scene, along with two additional EBRPD firefighters.
- 1005 Companies at scene continuing to work hot spots. Hose lines set up at perimeter as precaution.
- 1015 E24 radios OAK to advise EBRPD to have their units work hot spot on east flank. (EBRPD relays information to Unit 5675.) OAK advises E24 to contact EBRPD units on scene on "White" (mutual aid channel).
- 1026 EBRPD advises Unit 5675 to contact Oakland units on "White" channel.
- 1029 E24 advises that E19 and E16 will be released, E24 and EBRPD will stay at scene with precautionary lines in place.
- 1030 EBRPD personnel working spot fire with hand tools on west flank at bottom of bum area.
- 1035 OAK advises E24 of telephone call from a resident at 7290 Marlborough Terrace reporting a hot spot on the hill. E24 reports this is the area they are working and EBRPD has advised that they can handle the situation.
- EBRPD 5675 advises 5632 to cover flare-up (open flame) on left flank. Engine 5632 positioned in driveway at 7151 Buckingham, extending line uphill to attack.
- 1037 EBRPD 5675 asks units if they can handle the flare-ups. Unit advises "10-4."
- 1040 Grass fire reported at 13685 Campus Drive, in Hills area approximately five miles south of this incident. E21, E25, and E27 dispatched. (Small grass tire was located and handled by E27.)

1041 E24 reports E19 will be command, E24 will be leaving scene.

1050 EBRPD 5675 requests another EBRPD engine to respond Code 3. Reports "we're getting a lot of rekindles up here." The EBRPD helicopter, Eagle 5, also requested.

1050-

1057* E19 reports new flare-up with "pretty good smoke showing." BC2 directs E24 to return to assist E19.

E19 reports smoke is coming from previously unburned area.

Numerous spot fires and flare-ups on the slope with personnel moving quickly to keep them suppressed. E19 advises BC2 of the situation and reports it is still "under control."

Radio traffic indicates a concern for the safety of personnel working in the area of flare-ups and difficulty maintaining radio communications between Oakland and EBRPD personnel.

1058 E19 requests full box alarm (1st Alarm) to respond to Gwin Tank. Reports "fire showing on the lower east flank." E24, E28, and BC2 dispatched. E4 advises he is in the area and also responding.

1059 E19 requests CDF response (acknowledged by OAK).

1102* E19 requests 2nd Alarm. Units to respond to 7140 Marlborough Terrace. Also requests Oakland Police Department for traffic and crowd control.

1104 BC2 en route, requests 3rd Alarm.

Also requests CDF on Mutual Aid; advises OAK to inform CDF this is another fire in the "Threat Zone."

1105 2nd Alarm: E6, E10, T1, T15, BC4 dispatched.

1105-

1114 OAK suspends responses to medical incidents. Initial call made from OAK to CDF. E19 reports fire crowning in trees below Marlborough. BC2 directs Command Van to set up at Tunnel entry. BC4 reports spot fire at Norfolk & Marlborough.

* Indicates an unverified time.

First structure becomes involved on Buckingham.

1115 BC2 requests 4th Alarm. Assigns BC4 as Division A (DIV A) to supervise operations from Buckingham Blvd.

1115-

1117* E24 reports they think they have the fire cut off from spreading to the west from 7140 Buckingham.

E19 reports fire spreading along the north side of the canyon, behind houses on Buckingham.

E19 reports fire spreading on two fronts.

Off-duty Assistant Chief on scene, advised to meet ComVan and establish Command Post at Tunnel Entrance.

1118 4th Alarm dispatched.

1119 CDF dispatches Helitack Copter 106 to Oakland.

BC2 requests confirmation that CDF is responding (no reply).

Contra Costa County (ConFire) calls OAK to ask if they have a fire; reply, "Same as yesterday."

1119-

1125* DIV A (BC4) reports fire is spreading rapidly toward Marlborough Terrace. DIV A will be moving up to Marlborough from Buckingham.

Incident Commander (IC) reports he cannot see fire spread from bottom of hill - just smoke.

BC2 assigns E6 and T15 to protect homes on Grizzly Peak Terrace.

BC2 advises need for additional command officer on top. E19 reports fire spread is lateral, not uphill. Fire spreading rapidly toward Norfolk Drive.

DIV A reports structure fire and fire "going to jump Buckingham any minute."

At 1120, off-duty Assistant Chief assumes command of incident and requests 5th and 6th Alarms.

BC2 requests 6th Alarm companies to respond to Bay Forest Drive and Tunnel Road. Also requests five engines on Mutual Aid to respond to Grizzly Peak Blvd. and Fish Ranch Road. "Ask Orinda if they can send us mutual aid to Grizzly Peak."

Command officers attempted to use Oakland Channel 1 but encountered EI7 and T8 on McArthur Blvd., who were using Oakland 1 for a working structure fire.

- 1123 ConFire dispatches 1st Alarm to grass fire in Franklin Canyon (Martinez, approximately 20 miles northeast of Oakland fire).
- 1126 CDF Copter 106 en route to Oakland.
- 1129 CDF dispatches 2 Engines' Dozer, and Battalion Chief on Mutual Aid to Oakland, Grizzly Peak area.
- 1130 ConFire requests response from CDF for Franklin Canyon fire.
- 1132 Berkeley monitoring Oakland FD radio traffic. Chief 6 (duty chief) responds to check Berkeley area. No immediate risk noted.
- 1133 DIV A reports "Probably can't hold - it's coming over - we are abandoning task."

BC2 advises DIV A to be extremely careful. "Don't get anybody killed!"

IC requests five Strike Teams from Alameda County to stage at Hiller and Tunnel Roads. Reports fire totally out of control and moving on several fronts' involving more than 100 acres of trees, brush, and houses.

Pacific Gas and Electric requested to respond for live power lines down.

Helicopter Eagle 5 (EBRPD) attempting to contact OAK on White 1.

California Highway Patrol transfers call to ConFire reporting fire on Orinda side, above Caldecott Tunnel. CHP also advises ConFire to anticipate mutual aid request from Oakland.

- 1134 Command Van redirected from top of hill to off-ramp at Tunnel entrance ("same place as yesterday").

Oakland Police requested to begin evacuating Parkwood Apartments. Fire is coming toward the complex

BC2 advises OAK to request Contra Costa County to respond, "fire is spreading to their area."

DIV A reports "We're evacuating Buckingham - fire went over both sides of us."

E25 reports they are at 7160 Marlborough, protecting two houses.

IC requests major response from Oakland Police Department. Need to evacuate 7100 block of Marlborough.

ConFire activates Plan 1.

ConFire dispatches 1st Alarm Brush assignment to Fish Ranch Rd above Caldecott Tunnel entrance and advises OAK they are responding.

CDF dispatches 3 Engine Companies and a Battalion Chief to Franklin Canyon on request from ConFire.

1136 ConFire dispatches 2nd Alarm to Franklin Canyon fire.

Alameda County advises ConFire of request from OAK for one Strike Team.

1137 E1, T1 and T3 assigned to try to protect Parkwood Apartments. E6 reports fire is moving south from Grizzly Peak Terrace.

1138 ConFire advises OAK they are responding.

1140 Eagle 5 attempting to contact IC on White 1.

1141 IC attempting to find additional engine companies to assign to Parkwood. Companies attempting to evacuate complex. E16 assigned to assist.

1143 Orinda Battalion Chief (BC45) requests 2nd Alarm from ConFire to Fish Ranch Road above tunnel portals. ConFire dispatches.

ConFire contacts OAK for instructions. OAK requests 2 Strike Teams to respond to east tunnel entrance, then contact Tunnel Command on White 1. (Changed to west exit 1 minute later.)

Radio interference for several minutes on White 1 due to burning telephone line to Caldecott transmitter tower.

- 1144 Oakland's DIV A reports' "Fire at both ends - we're going to have to wait it out." (Last recorded communication from Chief Riley.)

Orinda BC45 advises ConFire that Oakland is requesting all available units.

ConFire calls San Ramon Valley dispatch and requests a Strike Team (ST2031A) to Caldecott Tunnel.

- 1145 El9 reports personnel trapped behind Gwin Tank. "need help to get out, but not in imminent danger."

Alameda County logs first request for 5 Strike Teams from OAK. Dispatches 4 Task Forces from Alameda County and requests one from Contra Costa County (ConFire). ConFire advises they have strike teams already en route.

- 1148 CDF Battalion Chief 1616 responding to Oakland advises Morgan Hill he can see both fires (Oakland and Franklin Canyon) and both are major.

- 1149 Orinda units trying to make a stand at top of hill above fire with Oakland companies; BC45 en route to Oakland Command Post - assigns Captain as Division A.

- 1150 Training 2 advises of 2 structures involved at 7120 Norfolk. OAK advises IC that 7 Strike Teams are en route to the Command Van.

Hill Area Disaster Plan activated by IC. Agencies to prepare for mass evacuations.

1150-

- 1158 IC requests ETA for air support -- need is critical. OAK advises it has been ordered.

Patrol 20 advises they are at 7120 Marlborough with 2 houses involved, fire has jumped street. They are protecting selves.

El reports rear buildings are becoming involved at Parkwood, Committing to interior rescue efforts.

DIV A makes several attempts to contact IC by radio -- unsuccessful.

E8 reporting emergency conditions on Norfolk; needs assistance.

1153 CDF Copter 106 on scene, switching to White 1.

1155 Oakland requests mutual aid from Alameda City FD.

1156 CDF dispatches Air Tankers 92 and 94 and spotter aircraft AA460 to Franklin Canyon fire. Planes respond from Salinas (90 mi) and Fresno (150 mi).

1157 ConFire dispatches 3rd Alarm to Franklin Canyon Fire.

1159 IC requests ETA for air strikes; "fire is across tunnel."

CDF Battalion Chief 1616 requests aircraft status. Advised Copter 106 is only air unit on scene. Two Air Tankers en route to Franklin Canyon fire; all others committed to Sonoma County fire.

Telephone call to ConFire from Orinda Fire Station 45, relaying message from Battalion Chief 45, to advise he needs air strike "Right now - homes are going like crazy!"

1200 ConFire contacts CDF with air strike request. Advised no aircraft available. BC45 advised at 1204.

ConFire contacts Alameda County for situation update. Advises that ConFire will request an OES Strike Team.

1200* Fire reported rapidly spreading through Parkwood complex, rear buildings fully involved. Companies attempting holding action while evacuation continues.

Command Post relocated to Hwy 24 & 13 interchange.

1201 E8 asking for "anyone to pump their line." Report Buckingham blocked by parked cars and downed power lines - need help!"

IC advises "waiting for Strike Teams to arrive -- everyone is committed."

1201 ConFire calls OES Region 2. Phone is forwarded to CDF Santa Rosa. Santa Rosa will advise OE2 to pick up calls.

1202 E2 reports fire in trees at Temescal Recreation Area; no structures involved at this time.

E8 reports "EMERGENCY -- power lines down on hydrant!" Needs Pacific Gas and Electric.

ConFire calls Crane Helicopter (private contractor for water drops) to request their response.

- 1203 East Bay Municipal Utilities District (EBMUD) calls ConFire for information on fire situation.

CDF Battalion Chief 1616 on scene, Fish Ranch Road.

- 1204 ConFire contacts OES Region 2. Advises OES of situation with 2 major fires, requests 2 Strike Teams to stage at Orinda and Concord fire stations.

- 1206 Crockett Fire District 1st Alarm response assisting at Franklin Canyon fire.

- 1207 Berkeley E3 dispatched to 32 Vicente Drive on citizen report of fire coming over the hill above that address.

BC45 contacts ConFire to see if they are in contact with Copter 106. Reply is negative, also ConFire is unable to contact OAK.

- 1209 CDF Engine 1661 on scene at Tunnel Fire (1st CDF engine to arrive).

- 1210 OAK advises IC, "Tankers and helicopters en route." IC reports "Fire moving fast on multiple fronts -- losing structures."

Moraga Task Force at scene, assigned to assist units on Grizzly Peak Terrace.

- 1210 ConFire contacts Richmond Fire Department for mutual aid, two engines to cover Orinda.

- 1211 Telephone discussion between ConFire Assistant Chief and CDF Division Chief at Morgan Hill, updating situation. ConFire suggests diverting aircraft from Franklin Canyon to Oakland due to structures and report from BC45; Franklin Canyon is the lesser threat.

CDF advises Contra Costa that OAK has only requested mutual aid response (2 Engines, 1 Dozer and 1 Battalion Chief). Call continues until 1222.

1212 BC44 (off-duty Battalion Chief) reports houses involved on Contra Costa Lane west of Lake Temescal. Establishing Command Post at Contra Costa and Buena Vista with E2.

Strike Team 2031A en route from San Ramon to Tunnel.

1213 Berkeley E3 checks area on Vicente Drive, continues to Grandview and Westview before seeing fire on the ridge at approximately Norfolk/Buckingham area.

E3 requests Berkeley 1st Alarm. E2, E5, T5, Chief 6, and Paramedic 113 dispatched.

1215 Engine 8 reports no water coming from hydrant on Buckingham. CDF Helicopter 106 working with BC44.

E3 and E13, assigned to assist BC44, stage at Broadway and Golden Gate.

CDF Engines 1661 and 1674 on scene at Grizzly Peak and Marlborough Terrace; assessing situation and trying to determine if fire is spreading to State responsibility area.

1217 CDF asks E1676 at Franklin Canyon fire if Air Tankers can be diverted.

1218 BC44 suggests requesting mutual aid from San Francisco. IC orders OAK to request 10 engine companies from SFFD.

1220 Structure fire reported on Country Club Drive.

1220-

1230 CDF E1616, E1661, and E1674 working with Oakland companies trying to save structures on Marlborough Terrace. Main body of fire had already gone past this area, headed southwest, pushed by 10-30 mph wind. CDF and Oakland units unable to establish radio contact with Oakland Command Post.

1222 DIV A attempting radio contact with BC44 -- unsuccessful.

1223 OAK advises IC, 6 tankers and 6 helicopters en route. Report of invalid trapped in home at 1516 Northhill.

1223 CDF Morgan Hill asks Franklin IC if Air Tankers can be diverted.

1225 Berkeley E2 assumes command at Vicente Road. Fire coming over the hill above with flying brands starting several fires ahead of the flame front. Companies committed to prevent involvement of structures.

Franklin IC approves diverting Air Tankers to Oakland.

1226 ST3031A calls ConFire on cellular phone and reports unable to contact Tunnel IC by radio. Advised to go up Fish Ranch Road to find them.

CDF Battalion Chief advises Morgan Hill that he is trying to organize CDF resources on north side of fire; unknown number of acres and structures involved, but fire is moving rapidly in all parts with 15 mph winds. Having difficulty organizing situation.

1229 San Francisco Fire Department (SFFD) receives first request for assistance from Oakland.

SFFD Strike Team 1 (E1, E3, E8, E29, E36, and BC3) assembles at west end of Bay Bridge.

1230 CDF units still unable to contact IC. Determine that CDF units will take independent action to limit fire spread to north toward Claremont Avenue.

1231 Berkeley IC requests 2nd Alarm. E1, E6, T2 dispatched.

CDF attempts to contact aircraft en route to Franklin fire.

1233 Berkeley units begin evacuating Vicente Road.

1236 CDF contacts Air Tankers 92 and 94 and Air Attack 460 and diverts them to Oakland.

1237 Radio traffic between Orinda E44 and Division A, "about to be surrounded."

1239 Additional telephone contact between ConFire Assistant Chief and CDF Division Chief regarding locations and authorizations for air strikes. OAK has requested only one helicopter. CDF will dispatch a 3rd Air Tanker. Air Tanker 77 dispatched from Ukiah (ETA 1316 hrs).

1240 SFFD Strike Team 2 (E6, E7, E13, E17, E25, and BC9) assembles at west end of Bay Bridge.

- 1240* Berkeley E5 and TS assigned to Chabot Road area to check for fire extension. Fires discovered starting in trees and spreading to structures.
- 1242 Spotter Aircraft A4460 overhead requesting CDF BC1616 to assign Air-to-Ground frequency.
- 1244 E44 advises ConFire of no water pressure at Grizzly Peak and Fish Ranch Road ConFire to advise EBMUD.
- 1245 ConFire officer at Franklin Canyon requests additional Strike Team. Fire has jumped fire break. Relayed to CDF.
- 1245* Berkeley companies driven out of Vicente Road. Master streams set up to make stand along Tunnel Road, Bridge Road, and Alvarado Road ahead of fire. Area designated as Berkeley Division A. Chabot Road is designated as Division B.
- 1249 Orinda E44 attempting to contact DIV A or DIV B.
- 1250 AA460 advises position and altitude for air operations over Tunnel fire. Requests air space clearance from Oakland Airport Control Tower.
- 1253 ConFire advises E44 that EBMUD is aware of no water situation; they are having power problems. EBMUD wants to know if roads are clear to access pumping station.
- E42 reports to ConFire, "Oakland chiefs say they are going to pull out of area."
- 1259 Air Tankers 92 and 94 begin first slurry drops. (At 1303 en route to Santa Rosa Airport to reload.)
- 1300 CDF units proceed to Claremont Canyon and take Alvarado Road from east end. Encounter structure fires starting up around Amito Road.
- SFFD ST2 assigned to protect Claremont Hotel. Deployed in defensive positions under Oakland DIV C (Captain Parker).
- 1308 2nd Contra Costa Strike Team (ST2036A) en route from Walnut Creek.

1309 Alameda County Mutual Aid -

Oakland requests:

3 Strike Teams to Grizzly Peak (two Type 1, one Type 3) 1 Strike Team to Golden Gate and Acacia (Type 3)

3 Command Officers requested to Command Post.

Berkeley requests:

2 Strike Teams (type 1) to stage at Berkeley High School.

1313 BC45 advises ConFire that Oakland Command Post is now at Lake Temescal.

1315 CDF Copter 96 en route to Tunnel fire.

ConFire receiving multiple reports of major power lines exploding and starting fires on Contra Costa side of hills, one in Lost Valley, Moraga and one near Brookwood Apartments, Orinda. Both are threatening structures.

1318 ConFire dispatches Orinda E45 and 4 Richmond units to Lost Valley for grass fire (Dolores fire).

1319 AA460 advises CDF of two new fires started by power lines shorting. One fire is 1 mile south, second is 2 miles south of main fire (Dolores and Sunrise fires).

1320 Citizen calls ConFire to advise of Lost Valley fire; reports 2 helicopters are approaching.

CDF 1616 calls Morgan Hill on cellular phone to report on situation.

1321 ConFire diverts ST2036A to Orinda.

1327 ST2031A leader advises ConFire - unable to contact any Oakland units; ST is protecting structures, need to know if Oakland units are pulling out.

1329 Air Tankers 94 and 92 land at Santa Rosa to reload.

1330 CDF 1616 reports multiple structures involved and brands starting new fires in Alvarado Road area. Some residents fleeing; others on rooftops with hoses.

- 1330* Alameda County Task Force 13 en route to Golden Gate and Acacia, stopped at Broadway Terrace and Proctor to rescue resident from endangered residence. Fire crossing Broadway Terrace at this location.
- 1330* Piedmont E1 and E2 respond to area of Florence and Modoc to engage fire heading toward city limits on direction of Piedmont Chief. Units committed in this area until approximately 0100 hours.
- 1334 CDF dispatches 5 Engines, 1 Dozer, and BC1611 to brush fire in Bollinger Canyon.
- 1337 ConFire dispatches Moraga E42 to grass fire on Brookwood Road; under control at 1347.
- 1342 Alameda FD ambulance requested to EMS staging area.
- 1346 ConFire dispatches 3 OES engines (part of ST2803A) from Orinda to Dolores fire.
- Franklin fire IC advises “shaky containment.”
- 1350* TF13 unable to reach assigned location. Self-assigned to attempt to stop progress along Proctor, Florence, Agnes, and Modoc. Battle continues in this area for 6 hours.
- 1351 ConFire dispatches E42 to Sunrise fire. (Fire eventually requires 9 units to control.)
- 1352 CDF diverts units responding to Bollinger Canyon to stage as Strike Team (ST916OC) at Sunol.
- 1355 CDF directs BC1612 from Franklin fire to Tunnel fire; en route at 1410.
- 1359 Oakland requests:
7 Type 1 Strike Teams, and
6 Type 3 Strike Teams to stage at Raimondi Park
6 Additional Air Tankers
6 Additional Helitack Units.
- 1400 SFFD Fire Department Command Staff alerted. Smoke and burning embers reported reaching San Francisco.
- 1400* Berkeley Assistant Chief assigned as liaison at Oakland Command Post.

- 1410 SFFD OES E217 placed in service to respond to staging area in Contra Costa County. (Later responds to Oakland.)
- 1414 Alameda E3 requested to cover Oakland Station 17. Later dispatched to Hills fire from FS17.
- 1415 CDF BC1616 directed by Morgan Hill to report to Oakland Command Post at Hiller & Tunnel Roads.
- 1416 ConFire calls Pinole, Crockett, Richmond to assemble additional Strike Team to stage at Station 15, Lafayette.
- 1430 Berkeley requests 2 additional Strike Teams (Type 1) to stage at Berkeley High School.

CDF reassigns 4 additional Air tankers from Geysers fire north of Santa Rosa to Oakland.
- 1449 ConFire advised Franklin IC will begin releasing Contra Costa units.
- 1452 BC1612 on scene at CDF Staging Area - Fish Ranch and Grizzly Peak. Directs ST916OC to his location at 1457.
- 1500 CDF BC1616 locates Oakland Command Post on Highway 24. Establishment of Unified Command begins.
- 1506 CDF advises AA440 of aircraft assigned to incident: 7 Air Tankers and 4 Copters.
- 1513 ST2037A assembled at Contra Costa Station 15, Lafayette (dispatched to Oakland at 2028).
- 1520 ConFire assembles ST204OA and dispatches to Dolores fire.
- 1522 SFFD activates HT8 and HT15 with crews of T8 and T15. Units respond to Oakland with high volume relay/supply hose.
- 1527 AA440 assigns AA140 to control air operations over Dolores and Sunrise fires.
- 1532 ConFire dispatches 3 additional Engines to Tunnel fire.
- 1540 Oakland requests 2 caches of 20 portable radios each from Alameda County.

- 1545 CDF BC1612 at Command Post, developing overall plan for incident management with Oakland command staff.
- 1546 CDF BC1614 and 1602 en route to establish communications at Raimondi Park Staging Area.
- 1548 ConFire dispatches ST (PW5,6, 19, 51, and PT38) to Dolores fire.
- 1549 SFFD dispatches 3 water tenders and a command van from the Department of Public Works to Oakland.
- 1552 CDF assigns additional (8th) Air Tanker.
- 1555 CDF air units having difficulty making contact with IC on ground at Dolores fire.
- 1556 Contra Costa units working in area of Claremont and Aivarado, shuttling water, trying to protect structures.
- 1558 ConFire dispatches ST (51A, 54A, 73, and 78) to Dolores fire.
- 1600 IC and CDF BC1616 determine air attack priorities as both sides of Hwy 13 south of Hwy 24. BC1616 radios instructions to aircraft.
- 1604 CDF assigns additional (9th) Air Tanker.
- 1614 ConFire dispatches ST2041C to Dolores fire.
- 1615 ST916OC (CDF) deployed along Claremont Ave.
- 1617 Franklin fire IC begins releasing CDF units.
- 1700 CDF BC1616 surveying Branch 2; Broadway Terrace from Skyline to Hwy 13. Determines Broadway Terrace is viable cut-off point. Locate Oakland and EBRPD crews working in this area.

Branch 1 is Tunnel Road to Grizzly Peak along Claremont.

Branch 2 is south & east perimeter of fire to Hwy 13.

Branch 3 is Rockridge District to Claremont Hotel.
- 1715 SFFD dispatches 60 additional personnel by bus to assist at the Claremont Hotel.
- 1727 Sunrise fire contained at 200 acres, 1 structure.

- 1746 Oakland requests 11 additional strike teams; 5 Type 3 and 6 Type 1.
- 1815 SFFD requested to provide 10 additional strike teams. Unable to meet request; however 25 additional personnel sent to Oakland by bus.
- 1930 OES Region 2 requests ST2043A from ConFire to Oakland.
- 2002 ConFire releases San Mateo Strike Team to Oakland.
- 2028 OES Region 2 requests ST2037A from ConFire to Oakland.
- 2030 ConFire ST2031A released from Oakland.
- 2045 ConFire ST2041C released from Dolores fire.
- 2050 Oakland requests 30 additional Strike Teams: 20 Type 1 and 10 Type 2.
- 2100 ConFire ST2038A and 2040A (PW69, 15, E15A, 36A) released from Dolores fire.
- 2136 ConFire 1st and 2nd Alarm companies released from Oakland.
- 2145 ConFire ST2036A released from Oakland.
- 2200* OES Overhead Team arrives at Command Post.
- 2220 Oakland requests 10 additional Helitack units, planned need for dawn.
- 2241 OES Region 2 requests ST2804A from ConFire to Oakland.
- 2245 OES Region 2 requests ST2042A from ConFire to Oakland.
- 2300* Staging Area relocated to Alameda Naval Air Station.
- 0304 Berkeley requests 2 additional Strike Teams for 0800 hours.

Appendix C

Contra Costa County Summary

Appendix C

Contra Costa County Summary

This appendix is provided as a supplement to demonstrate the complicated situations that were experienced throughout the area on the day of the fire.

Contra Costa County Fire Protection District (ConFire) became aware of the East Bay Hills fire from callers reporting smoke coming over the hills. ConFire called the Oakland Fire Department Communications Center at 1119 hours. Oakland confirmed that they had a major fire in the same location as the previous day.

A major brush fire was reported in the Franklin Canyon area of Contra Costa County, approximately six miles northeast of the Oakland fire, at 1123 hours. ConFire immediately dispatched a 1st Alarm and requested a full response from CDF at 1130 for the Franklin Canyon fire. CDF dispatched three engine companies and a Battalion Chief at 1135 hours. One minute later a 2nd Alarm was requested from ConFire for the Franklin Canyon fire.

ConFire dispatched a 1st Alarm assignment to Fish Ranch Road at 1135, when a citizen calling from a cellular telephone reported a fire on the hillside above the east portal of the Caldecott Tunnel. Units from the Orinda and Moraga Fire Departments were included in this assignment, along with Contra Costa County Fire Department companies from the Lafayette station, under Orinda Battalion Chief BC45.

At 1136, Alameda County called ConFire to advise that Oakland was requesting a strike team from Contra Costa County. ConFire immediately called Oakland to inform them that a full 1st Alarm response was already en route. A second alarm was requested by BC45 at 1143 and additional companies were dispatched from Orinda, Lafayette, and Walnut Creek.

The ConFire had some difficulty reaching the Oakland Communications Center to clarify the request for a strike team. Contact was made at 1144, and Oakland requested 2 strike teams, one wildland and one structural, to respond to the Caldecott Tunnel and contact Oakland on White Channel. At the same time, BC45 was reporting to ConFire that Oakland was requesting "all available units." ConFire immediately called up Strike Team 2031A consisting of San Ramon Valley and Dougherty companies. This strike team was en route at 1212 and in the fire area at 1226 hours.

Unable to reach the Incident Commander by radio, the Orinda Battalion Chief assigned a Captain as "Division A" and directed the incoming units respond to Fish Ranch and Grizzly Peak, while he went to make direct contact at the Oakland Command Post.

At 1156 air support for the Franklin Canyon fire was dispatched by CDF, consisting of a spotter aircraft and two slurry bombers. A third alarm was requested at 1157, and additional Contra Costa County units were dispatched. At 1206 the Crockett Fire Department called to advise ConFire that they had a 1st Alarm assignment staged near the Franklin fire. These units were also requested to assist and were designated as Division B on the Franklin fire.

At 1159 ConFire received a telephone call from Orinda Fire Station 45, relaying a message from BC45, that air strikes were urgently needed on the Oakland fire; "Right now homes are going up like crazy." ConFire called CDF to relay the request and was told that no aircraft were available. This information was given to BC45 at 1204 hours. At 1202 hours, ConFire called Crane Helicopter, a private water drop contractor, and activated them for the Oakland fire.

At 1204 hours, ConFire called OES Region II requesting two strike teams to cover Contra Costa County. One was requested to respond to Station 45 in Orinda and one to Station 10 in Concord. At 1210, ConFire asked the Richmond Fire Department to send two engine companies, Code 3, to cover Station 45.

At 1215 a telephone conversation was initiated between the Contra Costa Assistant Chief and the CDF Division Chief at Morgan Hill. They discussed the situation at both fires and the urgent need for air support at the Oakland fire. Contra Costa gave an order to CDF requesting air support for the Hills fire and suggested diverting the aircraft from Franklin Canyon to Oakland, based on the threat to structures. (At the time this conversation was taking place, the first two CDF engines had just arrived at the Franklin fire and two CDF engines had been on the scene in Oakland for approximately five minutes.) The aircraft were diverted at 1236, after Morgan Hill verified the situation with the CDF-IC at Franklin Canyon.

At 1222, ConFire called up Strike Team 2036A, consisting of units from River-view, Byron, East Diablo, and Oakley, to assemble in River-view and respond to Concord Station 10. This Strike Team was assembled and en route to Oakland at 1255.

At 1233, OES Region II called ConFire to authorize activation of two OES engines from El Cerrito and San Ramon for Strike Team 2803A, to respond to Orinda. Additional OES engines from Hollister and Benicia

were to meet them at Station 45. A San Mateo County strike team was also being sent by Region II to cover Contra Costa County.

At 1248 CDF determined that the Franklin Canyon fire was in a State responsibility area and assumed command of that incident. At that point CDF had three engines on the scene, with four additional engines, two hand crews, two dozers, and a Battalion Chief en route. Contra Costa County had a 3-alarm assignment on the scene, assisted by a 1-alarm assignment from Crockett.

ADDITIONAL FIRES

At approximately 1315 hours, the high voltage power lines shot-ted-out in the area of the Oakland fire, igniting two additional fires on the Contra Costa side of the hills, approximately one mile and two miles southeast of the Oakland fire. ConFire began receiving multiple calls on these fires, giving locations in Orinda and Moraga.

ConFire originally dispatched Orinda and Richmond units to a fire in the area of the Pacific Gas and Electric substation in Moraga, which was named as the Dolores fire. ConFire also diverted ST2036A from responding to Oakland to stand-by at Station 45. Four helicopters that were working the Oakland fire spotted the new outbreaks and responded to them.

At 1334 hours, CDF dispatched a full wildland response to Bollinger Canyon in Contra Costa County. This was probably a duplicate report on the Moraga fire. These companies were rerouted at 1352 to assemble at Sunol and then responded to the Oakland fire as ST916OC at 1452.

Several additional units from Contra Costa County were dispatched to the Dolores fire in Moraga, including three of the OES engine companies from ST2803A and companies from ST2036A. Region II assigned additional OES engine companies to reassemble ST2803A, which then responded to Oakland.

The second new fire was identified as the Sunrise fire in Orinda. At 1351 hours, companies from Orinda and Moraga responded to this incident. They were assisted by some of the Contra Costa County and Richmond companies that were standing by in Orinda. A total of nine companies were used on this fire which was reported to be contained at 1727 hours.

At 1346, the Franklin fire was reported to be contained and at 1449 hours the Contra Costa County units were ready to turn the scene over to CDF for overhaul. Several of the Contra Costa County units were

reassembled into ST204OA and responded to the Dolores fire at 1548 hours. At 1415, ConFire had called-up a strike team (ST2038A) consisting of units from East Diablo, Pinole, Crockett, and Rodeo to assemble at Station 15 in Lafayette. This strike team was assigned to the Dolores fire at 1558 hours. An additional strike team, consisting primarily of Contra Costa County Fire Department companies (ST2041C) was activated and sent to the Dolores fire at 1614 hours. A total of approximately 49 ground units and four helicopters were used to control the Dolores fire by 2047 hours.

Strike Team 2037A, consisting of units from River-view, Oakley, Bethel Island, and Richmond was called up at 1513 and was staged at Station 15. As units were released from the other fires, this strike team was dispatched to Oakland at 2028 hours. The San Mateo County strike team was released to respond to the Oakland fire at 2002 hours.

Contra Costa County supplied three additional strike teams to Oakland, on requests from OES Region II. Strike Team 2043A was called up at 2045 hours and consisted of units from East Diablo, Rodeo, Pinole, Oakley, and Crockett. A strike team of OES engines from San Ramon, River-view, Orinda, and El Cerrito (ST2804A) was sent to Oakland at 2241 hours, followed by ST2042A, consisting of El Cerrito, Riverview, Crockett, Richmond, and Contra Costa County units. Several of the units included in these strike teams had seen action in the earlier incidents.

The first Contra Costa units were released from the Oakland fire before midnight on October 20, as fresh resources were brought in to relieve the most fatigued units. Some of the later responding strike teams were held in Oakland for several days.

Appendix D

Strike Teams

Strike Teams

To illustrate the complexity of the situation, with multiple, simultaneous, major incidents in both Alameda and Contra Costa Counties, the following is a partial summary of resource deployments involving Contra Costa County for part of October 20, 1991. (This information was compiled from a number of different sources and may not be completely accurate. It is as accurate a log as could be obtained from the multiple information sources that were consulted.)

Contra Costa County

1135	1st ALARM	BC45	Orinda
		E43	Orinda
		PW16	Contra Costa (Lafayette)
		PW42	Moraga
		Ta15	Contra Costa (Lafayette)
Released at 2136			

1143	2nd ALARM	PW45	Orinda
		E44	Orinda
		PW17	Lafayette ConFire
		E4	Walnut Creek ConFire
		Ta1	Walnut Creek ConFire
Released at 2136			

1212	ST2031A	BC31	San Ramon
		E38	San Ramon
		E31	San Ramon
		E34	San Ramon
		E35	San Ramon
		E142	Dougherty
Called up by ConFire at 1144			
En route to Oakland at 1212			
Arrived area at 1226			
Released at 2145			

1255	ST2036A	BC81	River-view
		E81	River-view
		E97	Byron
		E51	East Diablo
		E52	East Diablo
		E94W	Oakley

Ordered up by ConFire at 1222, Assemble at Station 10
 Dispatch noted CAD at 1255
 En route to Oakland at 1308
 Held at Orinda at 1321
 Released from Oakland at 2145

2028	ST2037A	BC81A	River-view
		E82	River-view
		E97	Byron
		E93	Oakley
		E93A	Oakley
		E95A	Bethel Island
		E62	Richmond

Assembled at Lafayette FS15 at 1513
 Dispatched to Oakland at 2028
 En route at 2034

1440	ST2038A	AC5101	East Diablo
		E51A	East Diablo
		E73	Pinole
		E78	Crockett
		E54A	East Diablo
		E72	El Cerrito
		E76	Rodeo

Called up by ConFire to Lafayette FS15 at 1440
 To Dolores Fire at 1558
 On scene at 1619
 Released at 2100

1520	ST2040A	1170	Contra Costa
		E11	(reassigned to ST2041C)
		PW5	Contra Costa
		PW6	Contra Costa
		PW19	Contra Costa
		PT38	Contra Costa
		PW51	East Diablo (sub for Ell)

Sent to Dolores fire at 1548
Released at 2100

1614	ST2041C	1113	Contra Costa
		E11	Contra Costa
		PW1	Contra Costa
		PW10	Contra Costa
		Ta12	Contra Costa
		PW44	Contra Costa

To Dolores fire at 1614

2236	ST2042A	BC71	El Cerrito
		E81A	River-view
		E78	Crockett
		E10C	Concord ConFire
		E10A	Concord ConFire
		E61	Richmond

E78 to FS15 at 1418
En route to Oakland at 2236
Released from Oakland at 1300 October 24th

2045	ST2043A	AC5101	East Diablo
		E75A	Rodeo
		E73	Pinole
		E94WT	Oakley
		E79	Crockett
		E51	East Diablo

E73 to FS15 at 1416
Dispatched to Oakland at 1930
En route at 2045
Released at 1541 on October 23rd

1222	ST2803A	OES199	El Cerrito
		OES233	San Ramon
		OES	Hollister
		OES	Benicia

Called up by OES at 1233 per ConFire request
 Dispatched to fill-in at FS45 Orinda
 Split-up between Dolores and Sunrise fires
Reconstituted with OES engines from

- San Francisco*
- San Mateo*
- Pacifica*
- Kenfield*
- Ross Valley*

2241	ST2804A	BC3113	San Ramon
		OES159	Lawrence Livermore
			National Labor-tory
		OES140R	River-view
		OES235	San Ramon
		OES237	Orinda
		OES199	El Cerrito

Also responded to Oakland from Contra Costa County:

E71, PW71, BC7120	El Cerrito
E93	Oakley
E45 ComVan 45	Orinda
E64	Richmond
E32	San Ramon Valley

Appendix E

Photographs

The photographs that follow were taken one week after the fire by J. Gordon Routley except where otherwise noted.



View looking toward the area of fire origin - on the grassy slope in the background. The left flank of the fire spread laterally behind the homes on Buckingham Boulevard and up toward the area in the foreground.



(Photo by Hugh Graham)

View of the area of fire origin as seen from the Parkwood Apartments. The Saturday fire burned up the grassy slope on the hills toward Marlborough Terrace and the radio tower on Grizzly Peak. The fire on Sunday broke out in the lower part of the original burn area.



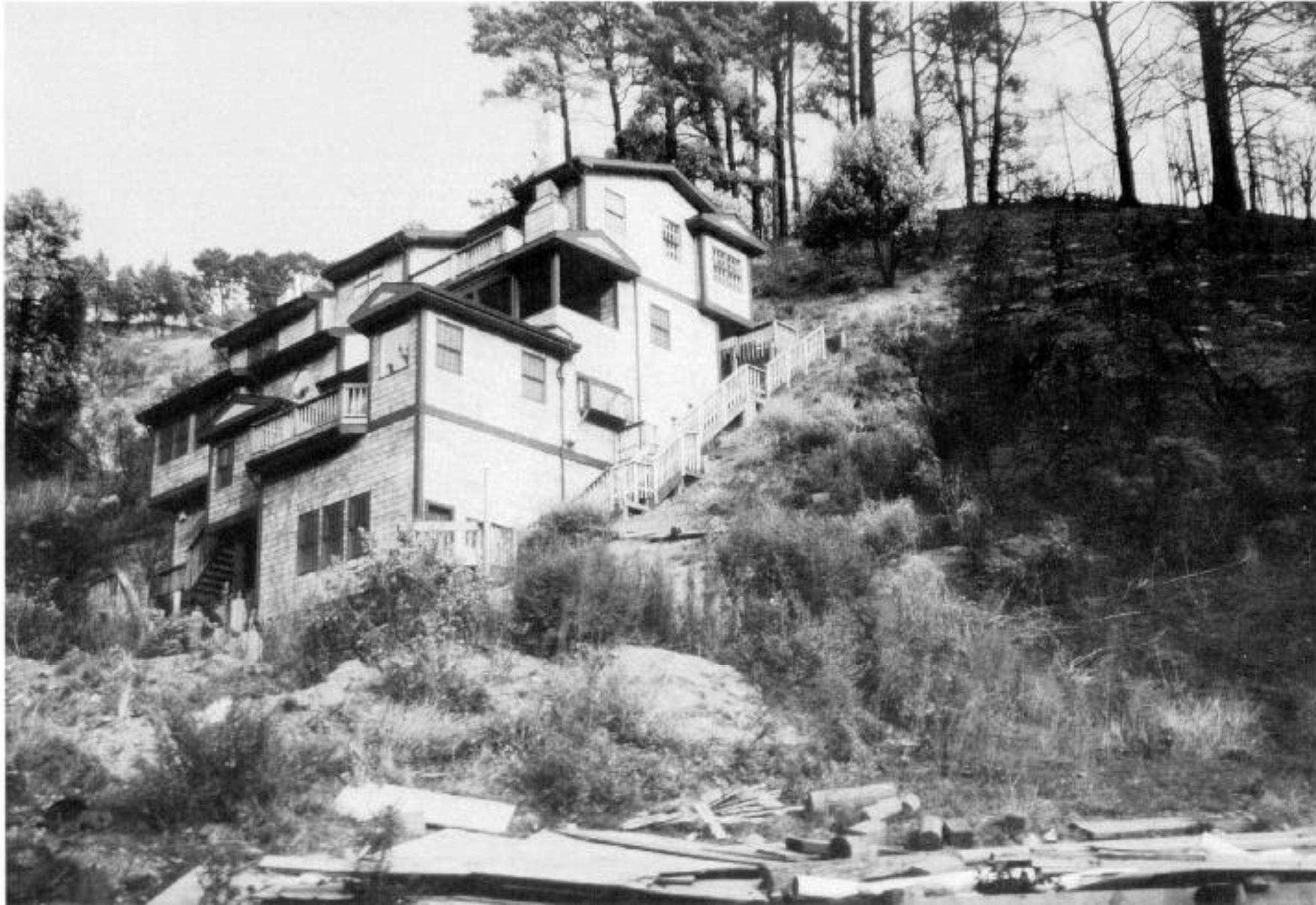
One of the few homes on Marlborough Terrace that was not destroyed by the fire. Houses on both sides burned to the ground.



All that remains of one hillside home is the steel supporting structure for the main floor.



Buckled steel beams mark the location of a destroyed home on Buckingham Boulevard.



(Photo by Hugh Graham)

One of the few surviving structures on Buckingham Boulevard, near the area of fire origin. This is the house where firefighters and residents took refuge, using all available water flow to protect the surface as the fire front passed over,



Looking down on the ruins of the Parkwood Apartments from Buckingham Boulevard. Tunnel Road is visible in the lower left corner.



Ruins of the Parkwood Apartments; previously 4-story buildings.



Ruins of the Parkwood Apartments; previously 4-story buildings.



Total destruction of Hiller Highlands complex.



Total destruction of Hiller Highlands complex.



Total destruction of Hiller Highlands complex.



View from Hiller Highlands, looking down on interchange of Highway 24 and Highway 13. Entrance to Caldecott Tunnel is to the left. Lake Temescal and Rockridge District in the background. Fire jumped from Hiller Highlands to the trees beyond Lake Temescal, a distance of approximately 2,000 feet.



Ruins of large 2-story home in Rockridge district.



Huge pine trees in the Rockridge district ignited and accelerated the fire spread in this area.



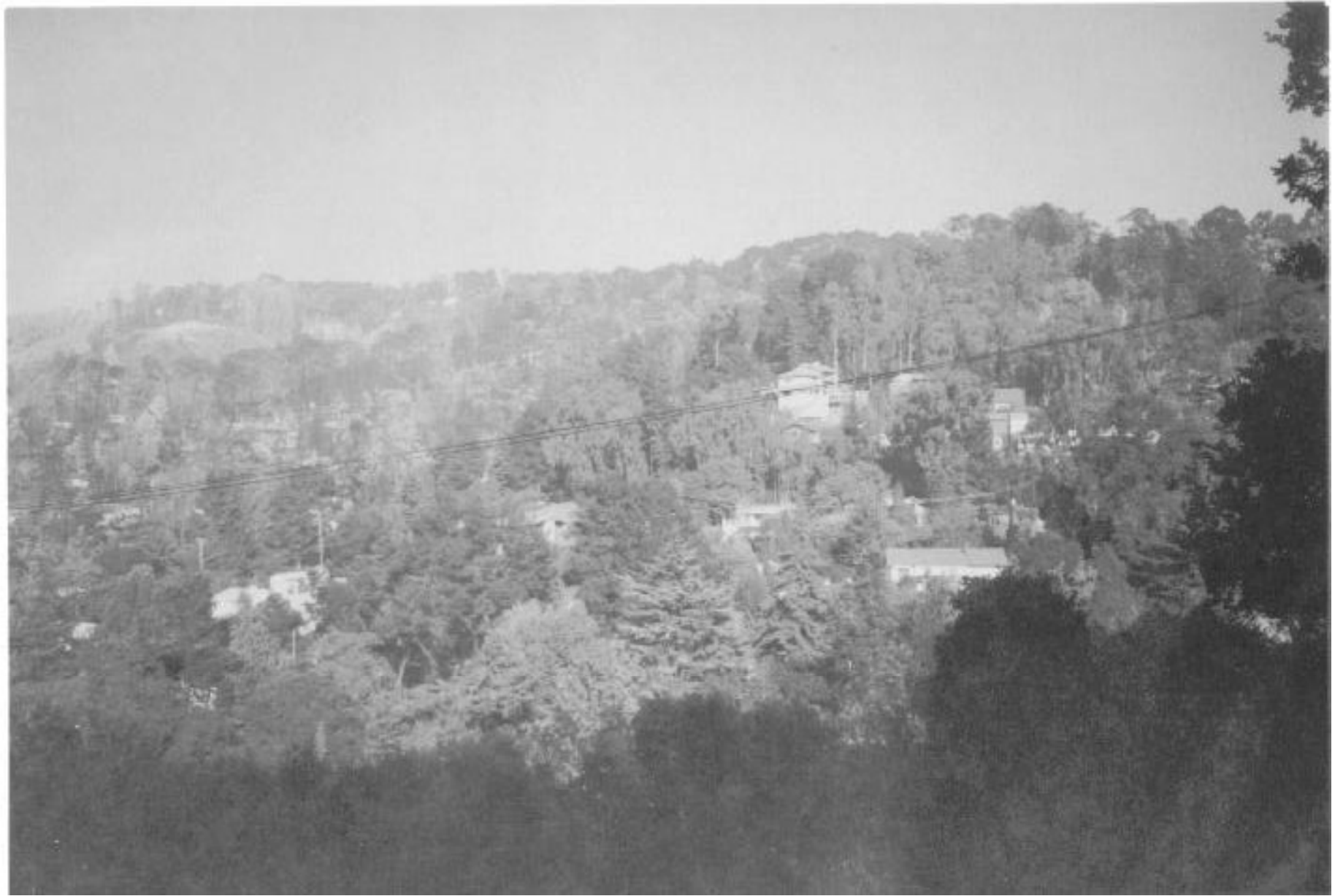
Examples of development in the fire area - wood shingle roofs.



Typical homes in Alvarado Road area.



Home enveloped in natural vegetation.



Homes enveloped in natural vegetation - fire area in background.



Typical homes on western edge of fire area.



Homes saved within fire area - note non-combustible roofs.



Home with wood shingle roof destroyed. Neighboring home with tile roof saved.



Home with wood roof burned off.



Large home saved by firefighters after vegetation became involved.



Large home saved by clear area around structure.



West limits of fire area - groups of homes saved, others lost.



The Claremont Hotel - 5 - story wood frame structure in the path of the fire, considered a “conflagration breeder.”



One of approximately 2,000 burned automobiles in the fire area.



9/29/21

City of Berkeley
2180 Milvia Street
Berkeley CA 94704

RE: Municipal Lease # 25159

Enclosed for your review, please find the **Municipal Lease** documentation in connection with the solution to be leased from Motorola. The interest rate and payment streams outlined in Equipment Lease-Purchase Agreement #25159 are valid for contracts that are executed and returned to Motorola on or before **October 1, 2021**. After **10/1/21**, the Lessor reserves the option to re-quote and re-price the transaction based on current market interest rates.

Please have the documents executed where indicated and forward the documents to the following address:

Motorola Solutions Credit Company LLC
Attn: Bill Stancik / 44th Floor
500 W. Monroe
Chicago IL 60661

Should you have any questions, please contact me at 847-538-4531.

Thank You,

MOTOROLA SOLUTIONS CREDIT COMPANY LLC
Bill Stancik

LESSEE FACT SHEET

Please help Motorola provide excellent billing service by providing the following information:

1. Complete Billing Address City of Berkeley

E-mail Address: _____

Attention: _____

Phone: _____

2. Lessee County Location: _____

3. Federal Tax I.D. Number _____

4. Purchase Order Number to be referenced on invoice (if necessary) or other “descriptions” that may assist in determining the applicable cost center or department: _____

5. Equipment description that you would like to appear on your invoicing: _____

Appropriate Contact for Documentation / System Acceptance Follow-up:

6. Appropriate Contact & Mailing Address

Phone: _____

Fax: _____

7. Payment remit to address: **Motorola Solutions Credit Company LLC**
P.O. Box 71132
Chicago IL 60694-1132

Thank you

EQUIPMENT LEASE-PURCHASE AGREEMENT

LESSEE:

City of Berkeley
2180 Milvia Street
Berkeley CA 94704

Lease Number: 25159

LESSOR:

Motorola Solutions, Inc.
500 W. Monroe
Chicago IL 60661

Lessor agrees to lease to Lessee and Lessee agrees to lease from Lessor, the equipment and/or software described in Schedule A attached hereto ("Equipment") in accordance with the following terms and conditions of this Equipment Lease-Purchase Agreement ("Lease").

1. TERM. This Lease will become effective upon the execution hereof by Lessor. The Term of this Lease will commence on date specified in Schedule A attached hereto and unless terminated according to terms hereof or the purchase option, provided in Section 18, is exercised, in which case this Lease will continue until the Expiration Date set forth in Schedule B attached hereto ("Lease Term").

2. RENT. Lessee agrees to pay to Lessor or its assignee the Lease Payments (herein so called), including the interest portion, in the amounts specified in Schedule B. The Lease Payments will be payable without notice or demand at the office of the Lessor (or such other place as Lessor or its assignee may from time to time designate in writing), and will commence on the first Lease Payment Date as set forth in Schedule B and thereafter on each of the Lease Payment Dates set forth in Schedule B. Any payments received later than forty-five (45) days from the due date will bear interest at the lesser of three percent (3%) per annum or the highest lawful rate from the due date. Except as specifically provided in Section 5 hereof, the Lease Payments will be absolute and unconditional in all events and will not be subject to any set-off, defense, counterclaim, or recoupment for any reason whatsoever. Lessee reasonably believes that funds can be obtained sufficient to make all Lease Payments during the Lease Term and hereby covenants that a request for appropriation for funds from which the Lease Payments may be made will be requested each fiscal period, including making provisions for such payment to the extent necessary in each budget submitted for the purpose of obtaining funding. It is Lessee's intent to make Lease Payment for the full Lease Term if funds are legally available therefor and in that regard Lessee represents that the Equipment will be used for one or more authorized governmental or proprietary functions essential to its proper, efficient and economic operation.

3. DELIVERY AND ACCEPTANCE. Lessor will cause the Equipment to be delivered to Lessee at the location specified in Schedule A ("Equipment Location"). Lessee will accept the Equipment as soon as it has been delivered and is operational. Lessee will evidence its acceptance of the Equipment either (a) by executing and delivering to Lessor a Delivery and Acceptance Certificate in the form provided by Lessor; or (b) by executing and delivering the form of acceptance provided for in the Contract (defined below).

Even if Lessee has not executed and delivered to Lessor a Delivery and Acceptance Certificate or other form of acceptance acceptable to Lessor, if Lessor believes the Equipment has been delivered and is operational, Lessor may require Lessee to notify Lessor in writing (within thirty (30) days of Lessee's receipt of Lessor's request) whether or not Lessee deems the Equipment (i) to have been delivered and (ii) to be operational, and hence be accepted by Lessee. If Lessee fails to so respond in such thirty (30) day period, Lessee will be deemed to have accepted the Equipment and be deemed to have acknowledged that the Equipment was delivered and is operational as if Lessee had in fact executed and delivered to Lessor a Delivery and Acceptance Certificate or other form acceptable to Lessor.

4. REPRESENTATIONS AND WARRANTIES. Lessor acknowledges that the Equipment leased hereunder is being manufactured and installed by Lessor pursuant to contract (the "Contract") covering the Equipment. Lessee acknowledges that on or prior to the date of acceptance of the Equipment, Lessor intends to sell and assign Lessor's right, title and interest in and to this Agreement and the Equipment to an assignee ("Assignee"). LESSEE FURTHER ACKNOWLEDGES THAT EXCEPT AS EXPRESSLY SET FORTH IN THE CONTRACT, LESSOR MAKES NO EXPRESS OR IMPLIED WARRANTIES OF ANY NATURE OR KIND WHATSOEVER, AND AS BETWEEN LESSEE AND THE ASSIGNEE, THE PROPERTY SHALL BE ACCEPTED BY LESSEE

"AS IS" AND "WITH ALL FAULTS". LESSEE AGREES TO SETTLE ALL CLAIMS DIRECTLY WITH LESSOR AND WILL NOT ASSERT OR SEEK TO ENFORCE ANY SUCH CLAIMS AGAINST THE ASSIGNEE. NEITHER LESSOR NOR THE ASSIGNEE SHALL BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY CHARACTER AS A RESULT OF THE LEASE OF THE EQUIPMENT, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, PROPERTY DAMAGE OR LOST PRODUCTION WHETHER SUFFERED BY LESSEE OR ANY THIRD PARTY. NOTHING CONTAINED HEREIN SHALL PRECLUDE THE LESSEE FROM ENFORCING ANY WARRANTIES AFFORDED UNDER THE CONTRACT, AGAINST MOTOROLA SOLUTIONS, INC. AS THE EQUIPMENT VENDOR.

Lessor is not responsible for, and shall not be liable to Lessee for damages relating to loss of value of the Equipment for any cause or situation (including, without limitation, governmental actions or regulations or actions of other third parties).

5. NON-APPROPRIATION OF FUNDS. Notwithstanding anything contained in this Lease to the contrary, Lessee has the right to not appropriate funds to make Lease Payments required hereunder in any fiscal period and in the event no funds are appropriated or in the event funds appropriated by Lessee's governing body or otherwise available by any lawful means whatsoever in any fiscal period of Lessee for Lease Payments or other amounts due under this Lease are insufficient therefor, this Lease shall terminate on the last day of the fiscal period for which appropriations were received without penalty or expense to Lessee of any kind whatsoever, except as to the portions of Lease Payments or other amounts herein agreed upon for which funds shall have been appropriated and budgeted or are otherwise available. The Lessee will immediately notify the Lessor or its Assignee of such occurrence. In the event of such termination, Lessee agrees to peaceably surrender possession of the Equipment to Lessor or its Assignee on the date of such termination, packed for shipment in accordance with manufacturer specifications and freight prepaid and insured to any location in the continental United States designated by Lessor. Lessor will have all legal and equitable rights and remedies to take possession of the Equipment. Non-appropriation of funds shall not constitute a default hereunder for purposes of Section 16.

6. LESSEE CERTIFICATION. Lessee represents, covenants and warrants that: (i) Lessee is a state or a duly constituted political subdivision or agency of the state of the Equipment Location; (ii) the interest portion of the Lease Payments shall be excludable from Lessor's gross income pursuant to Section 103 of the Internal Revenue Code of 1986, as it may be amended from time to time (the "Code"); (iii) the execution, delivery and performance by the Lessee of this Lease have been duly authorized by all necessary action on the part of the Lessee; (iv) this Lease constitutes a legal, valid and binding obligation of the Lessee enforceable in accordance with its terms; (v) Lessee will comply with the information reporting requirements of Section 149(e) of the Internal Revenue Code of 1986 (the "Code"), and such compliance shall include but not be limited to the execution of information statements requested by Lessor; (vi) Lessee will not do or cause to be done any act which will cause, or by omission of any act allow, the Lease to be an arbitrage bond within the meaning of Section 148(a) of the Code; (vii) Lessee will not do or cause to be done any act which will cause, or by omission of any act allow, this Lease to be a private activity bond within the meaning of Section 141(a) of the Code; (viii) Lessee will not do or cause to be done any act which will cause, or by omission of any act allow, the interest portion of the Lease Payment to be or become includible in gross income for Federal income taxation purposes under the Code; and (ix) Lessee will be the only entity to own, use and operate the Equipment during the Lease Term.

Lessee represents, covenants and warrants that: (i) it will do or cause to be done all things necessary to preserve and keep the Lease in full force and effect, (ii) it has complied with all laws relative to public bidding where necessary, and (iii) it has sufficient appropriations or other funds available to pay all amounts due hereunder for the current fiscal period.

If Lessee breaches the covenant contained in this Section, the interest component of Lease Payments may become includible in gross income of the owner or owners thereof for federal income tax purposes. In such event, notwithstanding anything to the contrary contained in Section 11 of this Agreement, Lessee agrees to pay promptly after any such determination of taxability and on each Lease Payment date thereafter to Lessor an additional amount determined by Lessor to compensate such owner or owners for the loss of such excludibility (including, without limitation, compensation relating to interest expense, penalties or additions to tax), which determination shall be

conclusive (absent manifest error). Notwithstanding anything herein to the contrary, any additional amount payable by Lessee pursuant to this Section 6 shall be payable solely from Legally Available Funds.

It is Lessor's and Lessee's intention that this Agreement not constitute a "true" lease for federal income tax purposes and, therefore, it is Lessor's and Lessee's intention that Lessee be considered the owner of the Equipment for federal income tax purposes.

7. TITLE TO EQUIPMENT; SECURITY INTEREST. Upon shipment of the Equipment to Lessee hereunder, title to the Equipment will vest in Lessee subject to any applicable license; provided, however, that (i) in the event of termination of this Lease by Lessee pursuant to Section 5 hereof; (ii) upon the occurrence of an Event of Default hereunder, and as long as such Event of Default is continuing; or (iii) in the event that the purchase option has not been exercised prior to the Expiration Date, title will immediately vest in Lessor or its Assignee, and Lessee shall immediately discontinue use of the Equipment, remove the Equipment from Lessee's computers and other electronic devices and deliver the Equipment to Lessor or its Assignee. In order to secure all of its obligations hereunder, Lessee hereby (i) grants to Lessor a first and prior security interest in any and all right, title and interest of Lessee in the Equipment and in all additions, attachments, accessions, and substitutions thereto, and on any proceeds therefrom; (ii) agrees that this Lease may be filed as a financing statement evidencing such security interest; and (iii) agrees to execute and deliver all financing statements, certificates of title and other instruments necessary or appropriate to evidence such security interest.

8. USE; REPAIRS. Lessee will use the Equipment in a careful manner for the use contemplated by the manufacturer of the Equipment and shall comply with all laws, ordinances, insurance policies, the Contract, any licensing or other agreement, and regulations relating to, and will pay all costs, claims, damages, fees and charges arising out of the possession, use or maintenance of the Equipment. Lessee, at its expense will keep the Equipment in good repair and furnish and/or install all parts, mechanisms, updates, upgrades and devices required therefor. If applicable, Lessee's purchased extended warranty may cover such repairs.

9. ALTERATIONS. Lessee will not make any alterations, additions or improvements to the Equipment without Lessor's prior written consent unless such alterations, additions or improvements may be readily removed without damage to the Equipment.

10. LOCATION; INSPECTION. The Equipment will not be removed from, [or if the Equipment consists of rolling stock, its permanent base will not be changed from] the Equipment Location without Lessor's prior written consent which will not be unreasonably withheld. Lessor will be entitled to enter upon the Equipment Location or elsewhere during reasonable business hours to inspect the Equipment or observe its use and operation.

11. LIENS AND TAXES. Lessee shall keep the Equipment free and clear of all levies, liens and encumbrances except those created under this Lease. Lessee shall pay, when due, all charges and taxes (local, state and federal) which may now or hereafter be imposed upon the ownership, licensing, leasing, rental, sale, purchase, possession or use of the Equipment, excluding however, all taxes on or measured by Lessor's income. If Lessee fails to pay said charges and taxes when due, Lessor shall have the right, but shall not be obligated, to pay said charges and taxes. If Lessor pays any charges or taxes, Lessee shall reimburse Lessor therefor within ten days of written demand.

12. RISK OF LOSS: DAMAGE; DESTRUCTION. Lessee assumes all risk of loss or damage to the Equipment from any cause whatsoever, and no such loss of or damage to the Equipment nor defect therein nor unfitness or obsolescence thereof shall relieve Lessee of the obligation to make Lease Payments or to perform any other obligation under this Lease. In the event of damage to any item of Equipment, Lessee will immediately place the same in good repair with the proceeds of any insurance recovery applied to the cost of such repair. If applicable, Lessee's purchased extended warranty may cover such repairs.

If Lessor determines that any item of Equipment is lost, stolen, destroyed or damaged beyond repair (an "Event of Loss"), Lessee at the option of Lessor will: either (a) replace the same with like equipment in good repair; or (b) on the next Lease Payment date, pay Lessor the sum of : (i) all amounts then owed by Lessee to Lessor under this Lease, including the Lease payment due on such date; and (ii) an amount equal to all remaining Lease Payments to be paid during the Lease Term as set forth in Schedule B.

In the event that Lessee is obligated to make such payment with respect to less than all of the Equipment, Lessor will provide Lessee with the pro rata amount of the Lease Payment and the Balance Payment (as set forth in Schedule B) to be made by Lessee with respect to that part of the Equipment which has suffered the Event of Loss.

13. INSURANCE. Lessee will, at its expense, maintain at all times during the Lease Term, fire and extended coverage, public liability and property damage insurance with respect to the Equipment in such amounts, covering such risks, and with such insurers as shall be satisfactory to Lessor, or, with Lessor's prior written consent, Lessee may self-insure against any or all such risks. All insurance covering loss of or damage to the Equipment shall be carried in an amount no less than the amount of the then applicable Balance Payment with respect to such Equipment. The initial amount of insurance required is set forth in Schedule B. Each insurance policy will name Lessee as an insured and Lessor or its Assigns as an additional insured, and will contain a clause requiring the insurer to give Lessor at least thirty (30) days prior written notice of any alteration in the terms of such policy or the cancellation thereof. The proceeds of any such policies will be payable to Lessee and Lessor or its Assigns as their interests may appear. Upon acceptance of the Equipment and upon each insurance renewal date, Lessee will deliver to Lessor a certificate evidencing such insurance. In the event that Lessee has been permitted to self-insure, Lessee will furnish Lessor with a letter or certificate to such effect. In the event of any loss, damage, injury or accident involving the Equipment, Lessee will promptly provide Lessor with written notice thereof and make available to Lessor all information and documentation relating thereto.

14. INDEMNIFICATION. Lessee shall, to the extent permitted by law, indemnify Lessor against, and hold Lessor harmless from, any and all claims, actions, proceedings, expenses, damages or liabilities, including attorneys' fees and court costs, arising in connection with the Equipment, including, but not limited to, its selection, purchase, delivery, licensing, possession, use, operation, rejection, or return and the recovery of claims under insurance policies thereon.

15. ASSIGNMENT. Without Lessor's prior written consent, Lessee will not either (i) assign, transfer, pledge, hypothecate, grant any security interest in or otherwise dispose of this Lease or the Equipment or any interest in this Lease or the Equipment or; (ii) sublet or lend the Equipment or permit it to be used by anyone other than Lessee or Lessee's employees. Lessor may assign its rights, title and interest in and to this Lease, the Equipment and any documents executed with respect to this Lease and/or grant or assign a security interest in this Lease and the Equipment, in whole or in part. Any such assignees shall have all of the rights of Lessor under this Lease. Subject to the foregoing, this Lease inures to the benefit of and is binding upon the heirs, executors, administrators, successors and assigns of the parties hereto.

Lessee covenants and agrees not to assert against the Assignee any claims or defenses by way of abatement, setoff, counterclaim, recoupment or the like which Lessee may have against Lessor. No assignment or reassignment of any Lessor's right, title or interest in this Lease or the Equipment shall be effective unless and until Lessee shall have received a notice of assignment, disclosing the name and address of each such assignee; provided, however, that if such assignment is made to a bank or trust company as paying or escrow agent for holders of certificates of participation in the Lease, it shall thereafter be sufficient that a copy of the agency agreement shall have been deposited with Lessee until Lessee shall have been advised that such agency agreement is no longer in effect. During the Lease Term Lessee shall keep a complete and accurate record of all such assignments in form necessary to comply with Section 149(a) of the Code, and the regulations, proposed or existing, from time to time promulgated thereunder. No further action will be required by Lessor or by Lessee to evidence the assignment, but Lessee will acknowledge such assignments in writing if so requested.

After notice of such assignment, Lessee shall name the Assignee as additional insured and loss payee in any insurance policies obtained or in force. Any Assignee of Lessor may reassign this Lease and its interest in the Equipment and the Lease Payments to any other person who, thereupon, shall be deemed to be Lessor's Assignee hereunder.

16. EVENT OF DEFAULT. The term "Event of Default", as used herein, means the occurrence of any one or more of the following events: (i) Lessee fails to make any Lease Payment (or any other payment) as it becomes due in accordance with the terms of the Lease when funds have been appropriated sufficient for such purpose, and any such failure continues for forty five(45) days after the due date thereof; (ii) Lessee fails to perform or observe any other covenant, condition, or agreement to be performed or observed by it hereunder and such failure is not cured within forty five (45) days after written notice thereof by Lessor; (iii) the discovery by Lessor that any statement, representation, or warranty made by Lessee in this Lease or in writing delivered by Lessee pursuant hereto or in connection herewith is false, misleading or erroneous in any material respect; (iv) proceedings under

any bankruptcy, insolvency, reorganization or similar legislation shall be instituted against or by Lessee, or a receiver or similar officer shall be appointed for Lessee or any of its property, and such proceedings or appointments shall not be vacated, or fully stayed, within twenty (20) days after the institution or occurrence thereof; or (v) an attachment, levy or execution is threatened or levied upon or against the Equipment.

17. REMEDIES. Upon the occurrence of an Event of Default, and as long as such Event of Default is continuing, Lessor may, at its option, exercise any one or more of the following remedies: (i) by written notice to Lessee, declare all amounts then due under the Lease, and all remaining Lease Payments due during the fiscal period, "calculated as the fiscal year upon which the payments are due" in effect when the default occurs to be immediately due and payable, whereupon the same shall become immediately due and payable; (ii) by written notice to Lessee, request Lessee to (and Lessee agrees that it will), at Lessee's expense, promptly discontinue use of the Equipment, remove the Equipment from all of Lessee's computers and electronic devices, return the Equipment to Lessor in the manner set forth in Section 5 hereof, or Lessor, at its option, may enter upon the premises where the Equipment is located and take immediate possession of and remove the same; (iii) sell or lease the Equipment or sublease it for the account of Lessee, holding Lessee liable for all Lease Payments and other amounts due prior to the effective date of such selling, leasing or subleasing and for the difference between the purchase price, rental and other amounts paid by the purchaser, Lessee or sublessee pursuant to such sale, lease or sublease and the amounts payable by Lessee hereunder; (iv) promptly return the Equipment to Lessor in the manner set forth in Section 5 hereof; and (v) exercise any other right, remedy or privilege which may be available to it under applicable laws of the state of the Equipment Location or any other applicable law or proceed by appropriate court action to enforce the terms of the Lease or to recover damages for the breach of this Lease or to rescind this Lease as to any or all of the Equipment. In addition, Lessee will remain liable for all covenants and indemnities under this Lease and for all legal fees and other costs and expenses, including court costs, incurred by Lessor with respect to the enforcement of any of the remedies listed above or any other remedy available to Lessor.

18. PURCHASE OPTION. Upon forty five (45) days prior written notice from Lessee to Lessor, and provided that no Event of Default has occurred and is continuing, or no event, which with notice or lapse of time, or both could become an Event of Default, then exists, Lessee will have the right to purchase the Equipment on the Lease Payment dates set forth in Schedule B by paying to Lessor, on such date, the Lease Payment then due together with the Balance Payment amount set forth opposite such date. Upon satisfaction by Lessee of such purchase conditions, Lessor will transfer any and all of its right, title and interest in the Equipment to Lessee as is, without warranty, express or implied, except that the Equipment is free and clear of any liens created by Lessor.

19. NOTICES. All notices to be given under this Lease shall be made in writing and mailed by certified mail, return receipt requested, to the other party at its address set forth herein or at such address as the party may provide in writing from time to time. Any such notice shall be deemed to have been received five days subsequent to such mailing.

20. SECTION HEADINGS. All section headings contained herein are for the convenience of reference only and are not intended to define or limit the scope of any provision of this Lease.

21. GOVERNING LAW. This Lease shall be construed in accordance with, and governed by the laws of, the state of the Equipment Location.

22. DELIVERY OF RELATED DOCUMENTS. Lessee will execute or provide, as requested by Lessor, such other documents and information as are reasonably necessary with respect to the transaction contemplated by this Lease.

23. ENTIRE AGREEMENT; WAIVER. This Lease, together with Schedule A Equipment Lease-Purchase Agreement, Schedule B, Evidence of Insurance, Statement of Essential Use/Source of Funds, Certificate of Incumbency, Certified Lessee Resolution (if any), Information Return for Tax-Exempt Governmental Obligations and the Delivery and Acceptance Certificate and other attachments hereto, and other documents or instruments executed by Lessee and Lessor in connection herewith, constitutes the entire agreement between the parties with respect to the Lease of the Equipment, and this Lease shall not be modified, amended, altered, or changed except with the written consent of Lessee and Lessor. Any provision of the Lease found to be prohibited by law shall be ineffective to the extent of such prohibition without invalidating the remainder of the Lease.

The waiver by Lessor of any breach by Lessee of any term, covenant or condition hereof shall not operate as a waiver of any subsequent breach thereof.

24. EXECUTION IN COUNTERPARTS.This Lease may be executed in several counterparts, either electronically or manually, all of which shall constitute but one and the same instrument. Lessor reserves the right to request receipt of a manually-executed counterpart from Lessee. Lessor and Lessee agree that the only original counterpart for purposes of perfection by possession shall be the original counterpart manually executed by Lessor and identified as "Original", regardless of whether Lessee's execution or delivery of said counterpart is done manually or electronically.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the ____ day of September, 2021.

LESSEE:
City of Berkeley

LESSOR:
MOTOROLA SOLUTIONS, INC.

By: _____

By: _____

Printed Name: _____
Title: _____

Uygar Gazioglu
Title Treasurer

CERTIFICATE OF INCUMBENCY

I, _____ do hereby certify that I am the duly elected or
(Printed Name of Secretary/Clerk)

appointed and acting Secretary or Clerk of the City of Berkeley, an entity duly organized and existing under the laws of the **State of California** that I have custody of the records of such entity, and that, as of the date hereof, the individual(s) executing this agreement is/are the duly elected or appointed officer(s) of such entity holding the office(s) below his/her/their respective name(s). I further certify that (i) the signature(s) set forth above his/her/their respective name(s) and title(s) is/are his/her/their true and authentic signature(s) and (ii) such officer(s) have the authority on behalf of such entity to enter into that certain Equipment Lease Purchase Agreement number **25159**, between City of Berkeley and Motorola Solutions, Inc. If the initial insurance requirement on Schedule B exceeds \$1,000,000, attached as part of the Equipment Lease Purchase Agreement is a Certified Lessee Resolution adopted by the governing body of the entity.

IN WITNESS WHEREOF, I have executed this certificate and affixed the seal of City of Berkeley, hereto this ____ day of September, 2021.

By: _____
(Signature of Secretary/Clerk)

SEAL

OPINION OF COUNSEL

With respect to that certain Equipment Lease-Purchase Agreement 25159 by and between Motorola Solutions, Inc. and the Lessee, I am of the opinion that: (i) the Lessee is, within the meaning of Section 103 of the Internal Revenue Code of 1986, a state or a fully constituted political subdivision or agency of the State of the Equipment Location described in Schedule A hereto; (ii) the execution, delivery and performance by the Lessee of the Lease have been duly authorized by all necessary action on the part of the Lessee, (III) the Lease constitutes a legal, valid and binding obligation of the Lessee enforceable in accordance with its terms; and (iv) Lessee has sufficient monies available to make all payments required to be paid under the Lease during the current fiscal year of the Lease, and such monies have been properly budgeted and appropriated for this purpose in accordance with State law. This opinion may be relied upon by the Lessor and any assignee of the Lessor's rights under the Lease.

Attorney for City of Berkeley

**SCHEDULE A
EQUIPMENT LEASE-PURCHASE AGREEMENT**

**Schedule A 25159
Lease Number:**

This Equipment Schedule is hereby attached to and made a part of that certain Equipment Lease-Purchase Agreement Number **25159** ("Lease"), between Lessor and Lessee.

Lessor hereby leases to Lessee under and pursuant to the Lease, and Lessee hereby accepts and leases from Lessor under and pursuant to the Lease, subject to and upon the terms and conditions set forth in the Lease and upon the terms set forth below, the following items of Equipment

QUANTITY	DESCRIPTION (Manufacturer, Model, and Serial Nos.)
	Refer to attached Equipment List.
Equipment Location:	

Initial Term: 84 Months

Commencement Date: 10/1/2021

First Payment Due Date: 10/1/2022

7 annual payments as outlined in the attached Schedule B, plus Sales/Use Tax of \$0.00, payable on the Lease Payment Dates set forth in Schedule B.

City of Berkeley (Schedule B)						
Compound Period:		Annual				
Nominal Annual Rate:		2.538%				
CASH FLOW DATA						
Event	Date	Amount	Number	Period	End Date	
1 Lease	10/1/2021	\$ 5,818,116.00	1			
2 Lease Payment	10/1/2022	\$ 917,646.08	7	Annual	10/1/2028	
AMORTIZATION SCHEDULE - Normal Amortization, 360 Day Year						
	Date	Lease Payment	Interest	Principal	Balance	
Lease	10/1/2021				\$ 5,818,116.00	
1	10/1/2022	\$ 917,646.08	\$ 147,653.17	\$ 769,992.91	\$ 5,048,123.09	
2	10/1/2023	\$ 917,646.08	\$ 128,112.15	\$ 789,533.93	\$ 4,258,589.16	
3	10/1/2024	\$ 917,646.08	\$ 108,075.22	\$ 809,570.86	\$ 3,449,018.30	
4	10/1/2025	\$ 917,646.08	\$ 87,529.79	\$ 830,116.29	\$ 2,618,902.01	
5	10/1/2026	\$ 917,646.08	\$ 66,462.95	\$ 851,183.13	\$ 1,767,718.88	
6	10/1/2027	\$ 917,646.08	\$ 44,861.48	\$ 872,784.60	\$ 894,934.28	
7	10/1/2028	\$ 917,646.08	\$ 22,711.80	\$ 894,934.28	\$ -	
Grand Totals		\$ 6,423,522.56	\$ 605,406.56	\$ 5,818,116.00		

INITIAL INSURANCE REQUIREMENT: \$5,818,116.00

Except as specifically provided in Section five of the Lease hereof, Lessee agrees to pay to Lessor or its assignee the Lease Payments, including the interest portion, in the amounts and dates specified in the above payment schedule.

EVIDENCE OF INSURANCE

Fire, extended coverage, public liability and property damage insurance for all of the Equipment listed on Schedule A number 25159 to that Equipment Lease Purchase Agreement number 25159 will be maintained by the City of Berkeley as stated in the Equipment Lease Purchase Agreement.

This insurance is provided by:

Name of insurance provider

Address of insurance provider

City, State and Zip Code

Phone number of local insurance provider

E-mail address

In accordance with the Equipment Lease Purchase Agreement Number 25159 , City of Berkeley , hereby certifies that following coverage are or will be in full force and effect:

Type	Amount	Effective Date	Expiration Date	Policy Number
Fire and Extended Coverage	_____	_____	_____	_____
Property Damage	_____	_____	_____	_____
Public Liability	_____	_____	_____	_____

Certificate shall include the following:

Description: All Equipment listed on Schedule A number 25159 to that Equipment Lease Purchase Agreement number 25159. Please include equipment cost equal to the Initial Insurance Requirement on Schedule B to Equipment Lease Purchase Agreement number 25159 and list any deductibles.

Certificate Holder:

MOTOROLA SOLUTIONS, INC. and or its assignee as additional insured and loss payee
1303 E. Algonquin Road
Schaumburg, IL 60196

If self insured, contact Motorola representative for template of self insurance letter.

STATEMENT OF ESSENTIAL USE/SOURCE OF FUNDS

To further understand the essential governmental use intended for the equipment together with an understanding of the sources from which payments will be made, please address the following questions by completing this form or by sending a separate letter:

1. What is the specific use of the equipment?

2. Why is the equipment essential to the operation of **City of Berkeley**?

3. Does the equipment replace existing equipment?

If so, why is the replacement being made?

4. Is there a specific cost justification for the new equipment?

If yes, please attach outline of justification.

5. What is the expected source of funds for the payments due under the Lease for the current fiscal year and future fiscal years?

EQUIPMENT LEASE PURCHASE AGREEMENT DELIVERY AND ACCEPTANCE CERTIFICATE

The undersigned Lessee hereby acknowledges receipt of the Equipment described below (“Equipment”) and Lessee hereby accepts the Equipment after full inspection thereof as satisfactory for all purposes of lease Schedule A to the Equipment Lease Purchase Agreement executed by Lessee and Lessor.

Equipment Lease Purchase Agreement No.: 25159

Lease Schedule A No. : 25159

EQUIPMENT INFORMATION

QUANTITY	MODEL NUMBER	EQUIPMENT DESCRIPTION
		Equipment referenced in lease Schedule A# 25159. See Schedule A for a detailed Equipment List.

LESSEE:

City of Berkeley

By: _____

Date: _____

CERTIFIED LESSEE RESOLUTION

At a duly called meeting of the Governing Body of the Lessee (as defined in the Lease) held on September _____, 2021, the following resolution was introduced and adopted. BE IT RESOLVED by the Governing Board of Lessee as follows:

1. Determination of Need. The Governing Body of Lessee has determined that a true and very real need exists for the acquisition of the Equipment or other personal property described in the Lease between City of Berkeley(Lessee) and Motorola Solutions, Inc. (Lessor).
2. Approval and Authorization. The Governing body of Lessee has determined that the Lease, substantially in the form presented to this meeting, is in the best interests of the Lessee for the acquisition of such Equipment or other personal property, and the Governing Board hereby approves the entering into of the Lease by the Lessee and hereby designates and authorizes the following person(s) referenced in the Lease to execute and deliver the Lease on Lessee's behalf with such changes thereto as such person deems appropriate, and any related documents, including any escrow agreement, necessary to the consummation of the transactions contemplated by the Lease.
3. Adoption of Resolution. The signatures in the Lease from the designated individuals for the Governing Body of the Lessee evidence the adoption by the Governing Body of this Resolution.

Billing Address:
 BERKELEY, CITY OF
 1326 ALLSTON WAY
 BERKELEY CA, 94702

Shipping Address:
 POLICE COMMUNICATION CE
 2100 MLK JR WAY
 BERKELEY CA, 94704

Customer:
 BERKELEY, CITY OF

Contract:
 17724 - HGAC (TX)

Line #	Item Number	Description	Quantity	Unit List Price
	APX™ 8000 Series			
1	H91TGD9PW7AN	APX 8000 ALL BAND PORTABLE MODEL 3.5	265	\$6,795.00
1a	Q806CB	ADD: ASTRO DIGITAL CAI OPERATION	265	\$515.00
1b	Q361AN	ADD: P25 9600 BAUD TRUNKING	265	\$300.00
1c	Q58AL	ADD: 3Y ESSENTIAL SERVICE	265	\$115.00
1d	QA00580AA	ADD: TDMA OPERATION	265	\$450.00
1e	QA09007AA	ADD: OUT OF THE BOX WIFI PROVISIONING	265	\$0.00
1f	QA09001AB	ADD: WIFI CAPABILITY	265	\$300.00
1g	Q498AU	ENH: ASTRO 25 OTAR W/ MULTIKEY	265	\$740.00
1h	H38BS	ADD: SMARTZONE OPERATION	265	\$1,500.00
1i	QA07682AA	ADD: SMARTCONNECT	265	\$0.00
1j	G996AP	ADD: PROGRAMMING OVER P25 (OTAP)	265	\$100.00
1k	Q629AH	ENH: AES ENCRYPTION AND ADP	265	\$633.00
	APX™ 8500			
2	M37TSS9PW1AN	APX8500 ALL BAND MP MOBILE	68	\$5,152.00
2a	G90AC	ADD: NO MICROPHONE NEEDED APX	68	\$0.00
2b	GA09007AA	ADD: OUT OF THE BOX WIFI PROVISIONING	68	\$0.00
2c	G996AS	ENH: OVER THE AIR PROVISIONING	68	\$100.00
2d	GA00250AA	ADD: WIFI/GNSS STUBBY ANTENNA LMR240	68	\$100.00

2e	GA00580AA	ADD: TDMA OPERATION	68	\$450.00
2f	GA01513AB	ADD: ALL BAND MOBILE ANTENNA (7/8/V/U)	68	\$95.00
2g	G51AT	ENH:SMARTZONE	68	\$1,500.00
2h	G142AD	ADD: NO SPEAKER APX	68	\$0.00
2i	G78AT	ENH: 3 YEAR ESSENTIAL SVC	68	\$176.40
2j	G298AS	ENH: ASTRO 25 OTAR W/ MULTIKEY	68	\$740.00
2k	GA09001AA	ADD: WI-FI CAPABILITY	68	\$300.00
2l	G843AH	ADD: AES ENCRYPTION AND ADP	68	\$633.00
2m	G444AH	ADD: APX CONTROL HEAD SOFTWARE	68	\$0.00
2n	G67EH	ADD: REMOTE MOUNT E5 MP	68	\$297.00
2o	GA01517AA	DEL: NO J600 ADAPTER CABLE NEEDED	68	\$0.00
2p	G806BL	ENH: ASTRO DIGITAL CAI OP APX	68	\$515.00
2q	GA01670AA	ADD: APX E5 CONTROL HEAD	68	\$652.00
2r	GA01630AA	ADD: SMARTCONNECT	68	\$0.00
2s	G361AH	ENH: P25 TRUNKING SOFTWARE APX	68	\$300.00
2t	GA05509AA	DEL: DELETE UHF BAND.	68	-\$800.00
	APX™ 8500			
3	M37TSS9PW1AN	APX8500 ALL BAND MP MOBILE	40	\$5,152.00
3a	G90AC	ADD: NO MICROPHONE NEEDED APX	40	\$0.00
3b	GA09007AA	ADD: OUT OF THE BOX WIFI PROVISIONING	40	\$0.00
3c	G996AS	ENH: OVER THE AIR PROVISIONING	40	\$100.00
3d	GA00250AA	ADD: WIFI/GNSS STUBBY ANTENNA LMR240	40	\$100.00
3e	GA00580AA	ADD: TDMA OPERATION	40	\$450.00
3f	GA01513AB	ADD: ALL BAND MOBILE ANTENNA (7/8/V/U)	40	\$95.00
3g	G66BN	ADD: DASH MOUNT E5	40	\$125.00
3h	G51AT	ENH:SMARTZONE	40	\$1,500.00
3i	G142AD	ADD: NO SPEAKER APX	40	\$0.00
3j	G78AT	ENH: 3 YEAR ESSENTIAL SVC	40	\$176.40
3k	G298AS	ENH: ASTRO 25 OTAR W/ MULTIKEY	40	\$740.00
3l	GA09001AA	ADD: WI-FI CAPABILITY	40	\$300.00
3m	G843AH	ADD: AES ENCRYPTION AND ADP	40	\$633.00
3n	G444AH	ADD: APX CONTROL HEAD SOFTWARE	40	\$0.00
3o	GA01517AA	DEL: NO J600 ADAPTER CABLE NEEDED	40	\$0.00
3p	G806BL	ENH: ASTRO DIGITAL CAI OP APX	40	\$515.00
3q	GA01670AA	ADD: APX E5 CONTROL HEAD	40	\$652.00
3r	GA01630AA	ADD: SMARTCONNECT	40	\$0.00
3s	G361AH	ENH: P25 TRUNKING SOFTWARE APX	40	\$300.00
3t	GA05509AA	DEL: DELETE UHF BAND.	40	-\$800.00
	APX™ 8500			
4	M37TSS9PW1AN	APX8500 ALL BAND MP MOBILE	20	\$4,770.00

4a	G90AC	ADD: NO MICROPHONE NEEDED APX	20	\$0.00
4b	G72AD	ADD: APX O3 HANDHELD CH	20	\$946.00
4c	G996AS	ENH: OVER THE AIR PROVISIONING	20	\$100.00
4d	GA00250AA	ADD: WIFI/GNSS STUBBY ANTENNA LMR240	20	\$100.00
4e	G67DE	ADD: REMOTE MOUNT O3 MP	20	\$297.00
4f	GA00580AA	ADD: TDMA OPERATION	20	\$450.00
4g	GA01513AB	ADD: ALL BAND MOBILE ANTENNA (7/8/V/U)	20	\$95.00
4h	G51AT	ENH:SMARTZONE	20	\$1,500.00
4i	G142AD	ADD: NO SPEAKER APX	20	\$0.00
4j	G78AT	ENH: 3 YEAR ESSENTIAL SVC	20	\$176.40
4k	G298AS	ENH: ASTRO 25 OTAR W/ MULTIKEY	20	\$740.00
4l	GA09001AA	ADD: WI-FI CAPABILITY	20	\$300.00
4m	G843AH	ADD: AES ENCRYPTION AND ADP	20	\$633.00
4n	G444AH	ADD: APX CONTROL HEAD SOFTWARE	20	\$0.00
4o	GA01517AA	DEL: NO J600 ADAPTER CABLE NEEDED	20	\$0.00
4p	G806BL	ENH: ASTRO DIGITAL CAI OP APX	20	\$515.00
4q	GA01630AA	ADD: SMARTCONNECT	20	\$0.00
4r	G361AH	ENH: P25 TRUNKING SOFTWARE APX	20	\$300.00
4s	GA05509AA	DEL: DELETE UHF BAND.	20	-\$800.00
5	APX™ 8500			
5a	M37TSS9PW1AN	APX8500 ALL BAND MP MOBILE	13	\$5,152.00
5b	GA00250AB	ADD: MOTORCYCLE WIFI/GNSS	13	\$100.00
5c	G90AC	ADD: NO MICROPHONE NEEDED APX	13	\$0.00
5d	GA09007AA	ADD: OUT OF THE BOX WIFI PROVISIONING	13	\$0.00
5e	G996AS	ENH: OVER THE AIR PROVISIONING	13	\$100.00
5f	GA00580AA	ADD: TDMA OPERATION	13	\$450.00
5g	G51AT	ENH:SMARTZONE	13	\$1,500.00
5h	G142AD	ADD: NO SPEAKER APX	13	\$0.00
5i	G78AT	ENH: 3 YEAR ESSENTIAL SVC	13	\$176.40
5j	G298AS	ENH: ASTRO 25 OTAR W/ MULTIKEY	13	\$740.00
5k	GA09001AA	ADD: WI-FI CAPABILITY	13	\$300.00
5l	GA00512AB	ADD: ANT MTCL 1/4 WAVE WHIP 150.8-162	13	\$50.00
5m	G843AH	ADD: AES ENCRYPTION AND ADP	13	\$633.00
5n	G138AC	ADD: APX7500 MOTORCYCLE CH SFWR O5	13	\$0.00
5o	W620AE	ADD:NO MTRCYCLE ENCL NEEDED APX	13	\$0.00
5p	G444AH	ADD: APX CONTROL HEAD SOFTWARE	13	\$0.00
5q	G67EJ	ADD: E5 REMOTE MOUNT MOTORCYCLE	13	\$400.00
5r	GA01517AA	DEL: NO J600 ADAPTER CABLE NEEDED	13	\$0.00
5s	G806BL	ENH: ASTRO DIGITAL CAI OP APX	13	\$515.00

5t	GA01670AA	ADD: APX E5 CONTROL HEAD	13	\$652.00
5u	GA01630AA	ADD: SMARTCONNECT	13	\$0.00
5v	G174AG	ADD: ANT 3DB LOWPRO MCYC 762-870	13	\$43.00
5w	G361AH	ENH: P25 TRUNKING SOFTWARE APX	13	\$300.00
5x	GA05509AA	DEL: DELETE UHF BAND.	13	-\$800.00
6	T7936A	APX UCM UPGRADE CD.	1	\$57.50
6a	CA00182AR	ADD: AES ENCRYPTION SOFTWARE.	8	\$633.00
7	FLASHport Series			
7a	T7562A	DIGITAL SMARTZONE.	1	\$0.00
7b	G298AU	ENH: ASTRO 25 OTAR W/ MULTIKEY.	8	\$851.00
7c	T7936A	APX UCM UPGRADE CD.	1	\$57.50
7d	CA00182AR	ADD: AES ENCRYPTION SOFTWARE.	8	\$633.00
	FLASHport Series			
8	T7562A	DIGITAL SMARTZONE.	1	\$0.00
8a	G298AU	ENH: ASTRO 25 OTAR W/ MULTIKEY.	8	\$851.00
9	APX™ Consolette			
9a	L37TSS9PW1AN	ALL BAND CONSOLETTTE.	3	\$8,683.00
9b	L998AB	ADD: LIMITED FRONT PANEL W/CLOCK/VU.	3	\$480.00
9c	G996AS	ENH: OVER THE AIR PROVISIONING.	3	\$100.00
9d	GA00580AA	ADD: TDMA OPERATION.	3	\$450.00
9e	CA01598AB	ADD: AC LINE CORD US.	3	\$0.00
9f	G51AT	ENH:SMARTZONE.	3	\$1,500.00
9g	G78AR	ADD: 3Y ESSENTIAL SERVICE.	3	\$176.00
9h	GA05509AA	DEL: DELETE UHF BAND.	3	-\$800.00
9i	G298AS	ENH: ASTRO 25 OTAR W/ MULTIKEY.	3	\$740.00
9j	G843AH	ADD: AES ENCRYPTION AND ADP.	3	\$475.00
9k	G806BL	ENH: ASTRO DIGITAL CAI OP APX.	3	\$515.00
9l	G361AH	ENH: P25 TRUNKING SOFTWARE APX.	3	\$300.00
9m	GA05508AA	DEL: DELETE VHF BAND.	3	-\$800.00
9n	HKN6233C	APX CONSOLETTTE RACK MOUNT KIT.	3	\$200.00
Line #	Item Number	Description	Quantity	Unit List Price
10	APX™ 8000 Series			
10a	H91TGD9PW6AN	APX 8000 ALL BAND PORTABLE MODEL 2.5	210	\$6,462.00
10b	H64BK	ALT: APX8000/XE HOUSING YELLOW	210	\$25.00
10c	Q806CB	ADD: ASTRO DIGITAL CAI OPERATION	210	\$515.00
10d	Q361AN	ADD: P25 9600 BAUD TRUNKING	210	\$300.00
10e	QA02006AC	ENH: APX8000XE RUGGED RADIO	210	\$800.00
10f	Q58AL	ADD: 3Y ESSENTIAL SERVICE	210	\$115.00
10g	QA00580AA	ADD: TDMA OPERATION	210	\$450.00
10h	QA09007AA	ADD: OUT OF THE BOX WIFI PROVISIONING	210	\$0.00
10i	QA09001AB	ADD: WIFI CAPABILITY	210	\$300.00

10j	Q498AU	ENH: ASTRO 25 OTAR W/ MULTIKEY	210	\$740.00
10k	H38BS	ADD: SMARTZONE OPERATION	210	\$1,500.00
10l	QA07682AA	ADD: SMARTCONNECT	210	\$0.00
10m	G996AP	ADD: PROGRAMMING OVER P25 (OTAP)	210	\$100.00
10n	Q629AH	ENH: AES ENCRYPTION AND ADP	210	\$633.00
11	APX™ 8000 Series			
11a	H91TGD9PW6AN	APX 8000 ALL BAND PORTABLE MODEL 2.5	5	\$6,462.00
11b	Q806CB	ADD: ASTRO DIGITAL CAI OPERATION	5	\$515.00
11c	Q361AN	ADD: P25 9600 BAUD TRUNKING	5	\$300.00
11d	QA02006AC	ENH: APX8000XE RUGGED RADIO	5	\$800.00
11e	Q58AL	ADD: 3Y ESSENTIAL SERVICE	5	\$115.00
11f	QA00580AA	ADD: TDMA OPERATION	5	\$450.00
11g	QA09007AA	ADD: OUT OF THE BOX WIFI PROVISIONING	5	\$0.00
11h	QA09001AB	ADD: WIFI CAPABILITY	5	\$300.00
11i	Q498AU	ENH: ASTRO 25 OTAR W/ MULTIKEY	5	\$740.00
11j	H38BS	ADD: SMARTZONE OPERATION	5	\$1,500.00
11k	QA07682AA	ADD: SMARTCONNECT	5	\$0.00
11l	G996AP	ADD: PROGRAMMING OVER P25 (OTAP)	5	\$100.00
11m	Q629AH	ENH: AES ENCRYPTION AND ADP	5	\$633.00
12	APX8000 Series			
12a	H91TGD9PW7AN	APX 8000 ALL BAND PORTABLE MODEL 3.5	4	\$6,795.00
12b	Q806CB	ADD: ASTRO DIGITAL CAI OPERATION	4	\$515.00
12c	Q361AN	ADD: P25 9600 BAUD TRUNKING	4	\$300.00
12d	QA02006AC	ENH: APX8000XE RUGGED RADIO	4	\$800.00
12e	Q58AL	ADD: 3Y ESSENTIAL SERVICE	4	\$115.00
12f	QA00580AA	ADD: TDMA OPERATION	4	\$450.00
12g	QA09007AA	ADD: OUT OF THE BOX WIFI PROVISIONING	4	\$0.00
12h	QA09001AB	ADD: WIFI CAPABILITY	4	\$300.00
12i	Q498AU	ENH: ASTRO 25 OTAR W/ MULTIKEY	4	\$740.00
12j	H38BS	ADD: SMARTZONE OPERATION	4	\$1,500.00
12k	QA07682AA	ADD: SMARTCONNECT	4	\$0.00
12l	G996AP	ADD: PROGRAMMING OVER P25 (OTAP)	4	\$100.00
12m	Q15	ENH: AES/DES,DES-XL,DES-OFB AND ADP	4	\$799.00
		ADD: FRONT PANEL PROGRAMMING & CLONING		
12n	Q53		4	\$150.00
13	APX™ 8500			

13a	M37TSS9PW1AN	APX8500 ALL BAND MP MOBILE	99	\$5,152.00
13b	G88	ADD: NO CONTROL HEAD	99	\$0.00
13c	G90AC	ADD: NO MICROPHONE NEEDED APX	99	\$0.00
13d	GA09007AA	ADD: OUT OF THE BOX WIFI PROVISIONING	99	\$0.00
13e	G996AS	ENH: OVER THE AIR PROVISIONING	99	\$100.00
13f	GA00250AA	ADD: WIFI/GNSS STUBBY ANTENNA LMR240	99	\$100.00
13g	GA00580AA	ADD: TDMA OPERATION	99	\$450.00
13h	GA01513AB	ADD: ALL BAND MOBILE ANTENNA (7/8/V/U)	99	\$95.00
13i	G51AT	ENH:SMARTZONE	99	\$1,500.00
13j	G142AD	ADD: NO SPEAKER APX	99	\$0.00
13k	G78AT	ENH: 3 YEAR ESSENTIAL SVC	99	\$176.40
13l	GA00179AB	ADD: NO REMOTE CABLE NEEDED APX	99	\$0.00
13m	G298AS	ENH: ASTRO 25 OTAR W/ MULTIKEY	99	\$740.00
13n	GA09001AA	ADD: WI-FI CAPABILITY	99	\$300.00
13o	G843AH	ADD: AES ENCRYPTION AND ADP	99	\$633.00
13p	G444AH	ADD: APX CONTROL HEAD SOFTWARE	99	\$0.00
13q	G67EH	ADD: REMOTE MOUNT E5 MP	99	\$297.00
13r	GA01517AA	DEL: NO J600 ADAPTER CABLE NEEDED	99	\$0.00
13s	G806BL	ENH: ASTRO DIGITAL CAI OP APX	99	\$515.00
13t	GA01630AA	ADD: SMARTCONNECT	99	\$0.00
13u	G361AH	ENH: P25 TRUNKING SOFTWARE APX	99	\$300.00
14	APX™ 8500			
14a	M37TSS9PW1AN	APX8500 ALL BAND MP MOBILE	2	\$4,770.00
14b	GA09007AA	ADD: OUT OF THE BOX WIFI PROVISIONING.	2	\$0.00
14c	GA00250AA	ADD: WIFI/GNSS STUBBY ANTENNA LMR240.	2	\$100.00
14d	G72AD	ADD: APX O3 HANDHELD CH.	2	\$946.00
14e	GA00580AA	ADD: TDMA OPERATION.	2	\$450.00
14f	GA01513AB	ADD: ALL BAND MOBILE ANTENNA (7/8/V/U).	2	\$95.00
14g	G51AT	ENH:SMARTZONE.	2	\$1,500.00
14h	G78AT	ENH: 3 YEAR ESSENTIAL SVC.	2	\$176.00
14i	G298AS	ENH: ASTRO 25 OTAR W/ MULTIKEY.	2	\$740.00
14j	GA09001AA	ADD: WI-FI CAPABILITY.	2	\$300.00
14k	B18CR	ADD: AUXILIARY SPKR 7.5 WATT APX.	2	\$60.00
14l	G843AH	ADD: AES ENCRYPTION AND ADP.	2	\$633.00
14m	G67DE	ADD: REMOTE MOUNT O3 MP.	2	\$297.00
14n	G444AH	ADD: APX CONTROL HEAD SOFTWARE.	2	\$0.00
14o	GA01517AA	DEL: NO J600 ADAPTER CABLE NEEDED.	2	\$0.00
14p	G806BL	ENH: ASTRO DIGITAL CAI OP APX.	2	\$515.00

14q	W22BA	ADD: STD PALM MICROPHONE APX.	2	\$72.00
14r	G361AH	ENH: P25 TRUNKING SOFTWARE APX.	2	\$300.00

FIRE ACCESSORIES

15	PMMN4106CBLK	XE500 REMOTE SPKR MIC WITH CHANNEL KNOB, HIGH IMPACT BLACK.	270	\$616.00
16	HN008000P13	U_HOUSING-HOUSING,FRONT,PTT SIDE, BLUE, APX8000.	20	\$33.00
17	PMLN7466A	OVER THE HEAD H/DUTY HEADSET, GCAI.	4	\$330.00
18	HN008000P07	HOUSING-HOUSING,FRONT,PTT SIDE, RED, APX8000.	5	\$35.48
19	HN008000G13	U_HOUSING-HOUSING,FRONT,GCAI SIDE, BLUE, APX8000.	20	\$33.00
20	HN008000G14	U_HOUSING-HOUSING,FRONT,GCAI SIDE, RED, APX8000.	5	\$33.00
21	PMLN7902A	CARRY ACCESSORY-HOLSTER,UNIVERSAL HOLDER FOR XE MODELS.	250	\$29.00

22 KVL and Programming Accessories

22a	T8476B	KVL 5000.	1	\$6,000.00
22b	CA00182AW	ADD: AES ENCRYPTION SOFTWARE.	1	\$0.00
22c	CA03467AA	ADD: NORTH AMERICA MICRO USB CHARGER 100/240V.	1	\$0.00
22d	CA03358AA	ADD: ASTRO 25 MODE.	1	\$0.00
22e	X423AG	ADD: DES/DES-XL/DES-OFB ENCRYPTION.	1	\$750.00
	Standalone Items			
23	PMPN4381A	CHGR DESKTOP MULTI UNIT EXT PS NA/LA/CA.	1	\$675.00
24	HKN6182B	CABLE KEYLOADING ADAPTER CGAI.	2	\$163.33
25	HKN6184C	CBL ASSY:CABLE CH, PROGRAMMING, USB.	2	\$57.20
26	PMKN4013C	PROGRAMMING, TEST & ALIGNMENT CABLE.	2	\$103.40
27	WPLN6905B	KEYLOAD RS-232 CABLE.	2	\$199.00
28	PMNN4549A	BATT IMPRES 2 LIION 2925T.	2	\$80.00
29	AN000131A01	ANTENNA, WHIP,ALL BAND-V/U/7800, MOBILE, 17 FT, QMA.	19	\$240.00

30	DMS SERVICES			
30a	ADV DMS SUB	RADIO MANAGEMENT HOSTED	726	\$245.00
30b	ADV DMS HOST	RADIOMAMGEMENT HOSTING FEE	726	\$310.00
30c	ADV DMS ONSITE	ONSITE RM SETUP VIRTUAL SERVER	1	\$29,655.00
30d	ESS DMS W ACCD	Essential DMS with Accidental Damage	726	\$453.00

31 INCENTIVE

31a	PER RADIO	CREDIT OF \$300 PER NEW RADIO	726	-\$300.00
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32 TRADE-IN

32a	PER RADIO	250 TRADE-IN Police & Fire	549	-\$250.00
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BERKELEY, CITY OF

ENTER

Quote Date: 2020-12-19
 Expiration Date: 2021-9-30
 Quote Created By:
 Dick Fasi
 dfasi@redcloudinc.com

Ext. List Price	Discount %	Discount \$	Unit Sale Price	Ext. Sale Price
\$1,800,675.00	40.52%	\$2,753.02	\$4,041.98	\$1,071,124.70
\$136,475.00	35.76%	\$184.16	\$330.84	\$87,672.60
\$79,500.00	35.76%	\$107.28	\$192.72	\$51,070.80
\$30,475.00	0.00%	\$0.00	\$115.00	\$30,475.00
\$119,250.00	35.76%	\$160.92	\$289.08	\$76,606.20
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$79,500.00	35.76%	\$107.28	\$192.72	\$51,070.80
\$196,100.00	50.00%	\$370.00	\$98,050.00	\$98,050.00
\$397,500.00	35.76%	\$536.40	\$963.60	\$255,354.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$26,500.00	35.76%	\$35.76	\$64.24	\$17,023.60
\$167,745.00	100.00%	\$633.00	\$167,745.00	\$0.00
\$350,336.00	40.52%	\$2,087.75	\$3,064.25	\$208,369.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$6,800.00	35.76%	\$35.76	\$64.24	\$4,368.32
\$6,800.00	35.76%	\$35.76	\$64.24	\$4,368.32

\$30,600.00	35.76%	\$160.92	\$289.08	\$19,657.44
\$6,460.00	35.76%	\$33.97	\$61.03	\$4,150.04
\$102,000.00	35.76%	\$536.40	\$963.60	\$65,524.80
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$11,995.20	0.00%	\$0.00	\$176.40	\$11,995.20
\$50,320.00	50.00%	\$370.00	\$25,160.00	\$25,160.00
\$20,400.00	35.76%	\$107.28	\$192.72	\$13,104.96
\$43,044.00	100.00%	\$633.00	\$43,044.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$20,196.00	35.76%	\$106.21	\$190.79	\$12,973.72
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$35,020.00	35.76%	\$184.16	\$330.84	\$22,497.12
\$44,336.00	43.64%	\$284.55	\$367.45	\$24,986.60
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$20,400.00	35.76%	\$107.28	\$192.72	\$13,104.96
-\$54,400.00	27.00%	-\$216.00	-\$584.00	-\$39,712.00
\$206,080.00	40.52%	\$2,087.75	\$3,064.25	\$122,570.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$4,000.00	35.76%	\$35.76	\$64.24	\$2,569.60
\$4,000.00	35.76%	\$35.76	\$64.24	\$2,569.60
\$18,000.00	35.76%	\$160.92	\$289.08	\$11,563.20
\$3,800.00	35.76%	\$33.97	\$61.03	\$2,441.20
\$5,000.00	35.76%	\$44.70	\$80.30	\$3,212.00
\$60,000.00	35.76%	\$536.40	\$963.60	\$38,544.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$7,056.00	0.00%	\$0.00	\$176.40	\$7,056.00
\$29,600.00	50.00%	\$370.00	\$14,800.00	\$14,800.00
\$12,000.00	35.76%	\$107.28	\$192.72	\$7,708.80
\$25,320.00	100.00%	\$633.00	\$25,320.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$20,600.00	35.76%	\$184.16	\$330.84	\$13,233.60
\$26,080.00	43.64%	\$284.55	\$367.45	\$14,698.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$12,000.00	35.76%	\$107.28	\$192.72	\$7,708.80
-\$32,000.00	27.00%	-\$216.00	-\$584.00	-\$23,360.00
\$95,400.00	35.76%	\$1,705.75	\$3,064.25	\$61,285.00

\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$18,920.00	35.76%	\$338.29	\$607.71	\$12,154.20
\$2,000.00	35.76%	\$35.76	\$64.24	\$1,284.80
\$2,000.00	35.76%	\$35.76	\$64.24	\$1,284.80
\$5,940.00	35.76%	\$106.21	\$190.79	\$3,815.80
\$9,000.00	35.76%	\$160.92	\$289.08	\$5,781.60
\$1,900.00	35.76%	\$33.97	\$61.03	\$1,220.60
\$30,000.00	35.76%	\$536.40	\$963.60	\$19,272.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$3,528.00	0.00%	\$0.00	\$176.40	\$3,528.00
\$14,800.00	50.00%	\$370.00	\$7,400.00	\$7,400.00
\$6,000.00	35.76%	\$107.28	\$192.72	\$3,854.40
\$12,660.00	100.00%	\$633.00	\$12,660.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$10,300.00	35.76%	\$184.16	\$330.84	\$6,616.80
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$6,000.00	35.76%	\$107.28	\$192.72	\$3,854.40
-\$16,000.00	27.00%	-\$216.00	-\$584.00	-\$11,680.00
\$66,976.00	40.52%	\$2,087.75	\$3,064.25	\$39,835.25
\$1,300.00	35.76%	\$35.76	\$64.24	\$835.12
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$1,300.00	35.76%	\$35.76	\$64.24	\$835.12
\$5,850.00	35.76%	\$160.92	\$289.08	\$3,758.04
\$19,500.00	35.76%	\$536.40	\$963.60	\$12,526.80
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$2,293.20	0.00%	\$0.00	\$176.40	\$2,293.20
\$9,620.00	50.00%	\$370.00	\$4,810.00	\$4,810.00
\$3,900.00	35.76%	\$107.28	\$192.72	\$2,505.36
\$650.00	35.76%	\$17.88	\$32.12	\$417.56
\$8,229.00	100.00%	\$633.00	\$8,229.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$5,200.00	35.76%	\$143.04	\$256.96	\$3,340.48
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$6,695.00	35.76%	\$184.16	\$330.84	\$4,300.92

\$8,476.00	43.64%	\$284.55	\$367.45	\$4,776.85
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$559.00	35.77%	\$15.38	\$27.62	\$359.06
\$3,900.00	35.76%	\$107.28	\$192.72	\$2,505.36
-\$10,400.00	27.00%	-\$216.00	-\$584.00	-\$7,592.00
\$57.50	0.00%	\$0.00	\$57.50	\$57.50
\$5,064.00	50.00%	\$316.50	\$316.50	\$2,532.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$6,808.00	50.00%	\$425.50	\$425.50	\$3,404.00
\$57.50	0.00%	\$0.00	\$57.50	\$57.50
\$5,064.00	50.00%	\$316.50	\$316.50	\$2,532.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$6,808.00	50.00%	\$425.50	\$425.50	\$3,404.00
\$26,049.00	27.00%	\$2,344.41	\$6,338.59	\$19,015.77
\$1,440.00	27.00%	\$129.60	\$350.40	\$1,051.20
\$300.00	27.00%	\$27.00	\$73.00	\$219.00
\$1,350.00	27.00%	\$121.50	\$328.50	\$985.50
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$4,500.00	27.00%	\$405.00	\$1,095.00	\$3,285.00
\$528.00	0.00%	\$0.00	\$176.00	\$528.00
-\$2,400.00	27.00%	-\$216.00	-\$584.00	-\$1,752.00
\$2,220.00	27.00%	\$199.80	\$540.20	\$1,620.60
\$1,425.00	27.00%	\$128.25	\$346.75	\$1,040.25
\$1,545.00	27.00%	\$139.05	\$375.95	\$1,127.85
\$900.00	27.00%	\$81.00	\$219.00	\$657.00
-\$2,400.00	27.00%	-\$216.00	-\$584.00	-\$1,752.00
\$600.00	27.00%	\$54.00	\$146.00	\$438.00
Ext. List Price	Discount %	Discount \$	Unit Sale Price	Ext. Sale Price
\$1,357,020.00	37.45%	\$2,420.02	\$4,041.98	\$848,815.80
\$5,250.00	35.76%	\$8.94	\$16.06	\$3,372.60
\$108,150.00	35.76%	\$184.16	\$330.84	\$69,476.40
\$63,000.00	35.76%	\$107.28	\$192.72	\$40,471.20
\$168,000.00	35.76%	\$286.08	\$513.92	\$107,923.20
\$24,150.00	0.00%	\$0.00	\$115.00	\$24,150.00
\$94,500.00	35.76%	\$160.92	\$289.08	\$60,706.80
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$63,000.00	35.76%	\$107.28	\$192.72	\$40,471.20

\$155,400.00	50.00%	\$370.00	\$77,700.00	\$77,700.00
\$315,000.00	35.76%	\$536.40	\$963.60	\$202,356.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$21,000.00	35.76%	\$35.76	\$64.24	\$13,490.40
\$132,930.00	100.00%	\$633.00	\$132,930.00	\$0.00
\$32,310.00	37.45%	\$2,420.02	\$4,041.98	\$20,209.90
\$2,575.00	35.76%	\$184.16	\$330.84	\$1,654.20
\$1,500.00	35.76%	\$107.28	\$192.72	\$963.60
\$4,000.00	35.76%	\$286.08	\$513.92	\$2,569.60
\$575.00	0.00%	\$0.00	\$115.00	\$575.00
\$2,250.00	35.76%	\$160.92	\$289.08	\$1,445.40
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$1,500.00	35.76%	\$107.28	\$192.72	\$963.60
\$3,700.00	50.00%	\$370.00	\$1,850.00	\$1,850.00
\$7,500.00	35.76%	\$536.40	\$963.60	\$4,818.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$500.00	35.76%	\$35.76	\$64.24	\$321.20
\$3,165.00	100.00%	\$633.00	\$3,165.00	\$0.00
\$27,180.00	40.52%	\$2,753.02	\$4,041.98	\$16,167.92
\$2,060.00	35.76%	\$184.16	\$330.84	\$1,323.36
\$1,200.00	35.76%	\$107.28	\$192.72	\$770.88
\$3,200.00	35.76%	\$286.08	\$513.92	\$2,055.68
\$460.00	0.00%	\$0.00	\$115.00	\$460.00
\$1,800.00	35.76%	\$160.92	\$289.08	\$1,156.32
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$1,200.00	35.76%	\$107.28	\$192.72	\$770.88
\$2,960.00	50.00%	\$370.00	\$1,480.00	\$1,480.00
\$6,000.00	35.76%	\$536.40	\$963.60	\$3,854.40
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$400.00	35.76%	\$35.76	\$64.24	\$256.96
\$3,196.00	50.00%	\$399.50	\$1,598.00	\$1,598.00
\$600.00	35.76%	\$53.64	\$96.36	\$385.44

\$510,048.00	40.52%	\$2,087.75	\$3,064.25	\$303,360.75
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$9,900.00	35.76%	\$35.76	\$64.24	\$6,359.76
\$9,900.00	35.76%	\$35.76	\$64.24	\$6,359.76
\$44,550.00	35.76%	\$160.92	\$289.08	\$28,618.92
\$9,405.00	35.76%	\$33.97	\$61.03	\$6,041.97
\$148,500.00	35.76%	\$536.40	\$963.60	\$95,396.40
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$17,463.60	0.00%	\$0.00	\$176.40	\$17,463.60
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$73,260.00	50.00%	\$370.00	\$36,630.00	\$36,630.00
\$29,700.00	35.76%	\$107.28	\$192.72	\$19,079.28
\$62,667.00	100.00%	\$633.00	\$62,667.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$29,403.00	35.76%	\$106.21	\$190.79	\$18,888.21
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$50,985.00	35.76%	\$184.16	\$330.84	\$32,753.16
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$29,700.00	35.76%	\$107.28	\$192.72	\$19,079.28
\$9,540.00	35.76%	\$1,705.75	\$3,064.25	\$6,128.50
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$200.00	35.67%	\$35.67	\$71.34	\$128.66
\$1,892.00	27.00%	\$255.42	\$690.58	\$1,381.16
\$900.00	35.67%	\$0.00	\$0.00	\$900.00
\$190.00	35.67%	\$33.89	\$67.77	\$122.23
\$3,000.00	35.67%	\$535.05	\$1,070.10	\$1,929.90
\$352.00	35.67%	\$62.78	\$125.56	\$226.44
\$1,480.00	50.00%	\$370.00	\$740.00	\$740.00
\$600.00	35.67%	\$107.01	\$214.02	\$385.98
\$120.00	35.67%	\$21.40	\$42.80	\$77.20
\$1,266.00	100.00%	\$633.00	\$1,266.00	\$0.00
\$594.00	35.67%	\$105.94	\$211.88	\$382.12
\$0.00		\$0.00	\$0.00	\$0.00
\$0.00		\$0.00	\$0.00	\$0.00
\$1,030.00	35.67%	\$183.70	\$367.40	\$662.60

\$144.00	35.67%	\$25.68	\$51.36	\$92.64
\$600.00	35.67%	\$107.01	\$214.02	\$385.98

\$166,320.00	35.67%	\$219.73	\$59,326.34	\$106,993.66
\$660.00	35.67%	\$11.77	\$235.42	\$424.58
\$1,320.00	35.67%	\$117.71	\$470.84	\$849.16
\$177.40	35.67%	\$12.66	\$63.28	\$114.12
\$660.00	35.67%	\$11.77	\$235.42	\$424.58
\$165.00	35.67%	\$11.77	\$58.86	\$106.14
\$7,250.00	35.67%	\$10.34	\$2,586.08	\$4,663.93

\$6,000.00	10.00%	\$600.00	\$5,400.00	\$5,400.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$0.00	0.00%	\$0.00	\$0.00	\$0.00
\$750.00	10.00%	\$75.00	\$675.00	\$675.00
\$675.00	35.67%	\$240.77	\$240.77	\$434.23
\$326.66	20.01%	\$32.68	\$130.65	\$261.30
\$114.40	20.00%	\$11.44	\$45.76	\$91.52
\$206.80	20.00%	\$20.68	\$82.72	\$165.44
\$398.00	20.01%	\$39.82	\$159.18	\$318.36
\$160.00	25.00%	\$20.00	\$60.00	\$120.00
\$4,560.00	20.01%	\$48.02	\$191.98	\$3,647.62

\$177,870.00	0.00%	\$0.00	\$245.00	\$177,870.00
\$225,060.00	0.00%	\$0.00	\$310.00	\$225,060.00
\$29,655.00	0.00%	\$0.00	\$29,655.00	\$29,655.00
\$328,878.00	0.00%	\$0.00	\$453.00	\$328,878.00

-\$217,800.00	0.00%	\$0.00	-\$300.00	-\$217,800.00
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-\$137,250.00	0.00%	\$0.00	-\$250.00	-\$137,250.00
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NET TOTAL	\$5,277,202.73
SALES TAX 10.25%	\$540,913.28
GRAND TOTAL	\$5,818,116.00



[REDACTED]

[REDACTED]

[REDACTED]









