

Hazardous Materials

History

Historically, fire service personnel were trained for quick response to emergency scenes and to initiate immediate offensive tactics. After experiencing considerable loss of personnel and equipment across the nation, it became apparent that traditional fire service tactics needed to be restructured for hazmat operations. However, through the 1980s many fire service organizations continued to perceive hazardous materials as a very low priority. Because of the preponderance of federal and state regulations, little thought has been given to management subsequent to the release of hazardous or toxic substances into the environment. The complexity of regulations, the multiplicity of regulating agencies, and the increasing potential of liability can become a nightmare that will tax the resources of the largest cities if greater priority is not given to proper planning and management of hazardous materials programs.

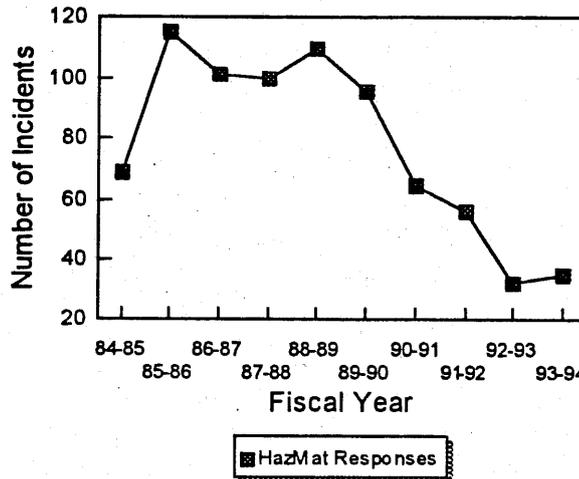
Today, many fire service organizations have developed local ordinances for hazardous materials management, including the proper planning and management of facilities using or storing hazardous materials or hazardous waste. Sunnyvale was at the forefront in model code development. Additionally when on July 5, 1983, the Hazardous Materials Team became operational it was the first of its kind in Santa Clara County.

Trends

The number of hazardous materials incidents decreased over the ten year period by 49 percent as depicted in chart 13. Initially, during the first five years, the number of incidents was elevated and stable. Beginning with fiscal year 1989-90, the number trended downward. In terms of the past five years alone, the Division experienced a 68 percent decrease. In small part this decrease can be attributed to a change in the way hazardous materials incidents were classified. Major

factors contributing to the decline came from increased public

Chart 13
HAZMAT INCIDENTS



awareness as to the hazards; regulatory programs created; safety and emergency response programs by business; and a reduction in the number and type of chemicals used in the community. Overall the total number of incidents has not increased to the level projected in 1985.

Present Services

Specially trained hazardous materials team members provide around-the-clock emergency response capability. The apparatus this team staffs is specifically designed for chemical emergencies, although it has other features making it effective for support of firefighting and rescue activities.

During the HazMat Team's first year of providing emergency response capability, fiscal year 1983-84, they responded to 69 separate hazardous materials incidents. Additionally, the Team responded to all confirmed building fires and calls for extrication. At that time, the number of reported chemical incidents was projected to increase by an estimated 10 to 15 percent each year over the next ten years.

During the first five years of operation, the projections were somewhat accurate, however, in the second five year period the Division began seeing a steady decline in hazardous materials responses.

In 1986, a civilian Hazardous Material Inspection Unit was formed. This unit currently consists of 4 civilians who are

highly trained in chemistry and chemical process operations. They are also trained as hazmat technicians allowing them to provide valuable support at hazmat incidents. These inspectors conduct routine and special inspections of all facilities permitted for hazardous materials storage and use within the city. The Unit can provide first hand knowledge of a facility, chemicals used, and what processes are employed in the event of an emergency.

To assist in emergency operations and provide strategy training for station personnel, Fire Services Division Engine companies prepare pre-fire strategy plans for most business occupancies. Additionally, HazMat Team members and civilian HazMat Inspectors develop and prepare the HazMat Incident Plan. This plan contains information on a given occupancy which could be used by first responders in the event of a HazMat incident. Annual inspection and updating of the plan assures that the most accurate data concerning the occupancy is available for emergency operations.

In addition to working with the Hazardous Materials Inspectors, Officers also work closely with Water Pollution Control Plant personnel in the City's Public Works Department. Whenever an incident occurs which might result in a discharge into the city storm drain or sewer system, WPCP personnel are notified. Depending on the circumstances, a WPCP employee may respond to the scene of the emergency to provide assistance as needed.

Over the years, as new chemical response related products, materials, and procedures became available, many were incorporated into our HazMat response program. In addition to the materials carried on the HazMat apparatus, a small spills clean-up kit has been placed on all fire engines for use at minor spills. Additionally, industry also has the capability to clean-up on site spills through their own emergency response teams (ERT); several have standing contracts with clean-up companies to respond to provide the service. Furthermore, all tow trucks operating in Sunnyvale are required as part of their permit, to carry five gallons of clean-up materials for their use.

at accident scenes where small amounts of gasoline, oil, and anti-freeze has been spilled on the roadway.

Future Issues

Equipment and supplies will continue to be a high priority. With today's technological advancements, equipment is constantly being improved and enhanced. As new equipment, materials, and procedures are developed and made available for fire service use, their practical application and usefulness will be evaluated. As apparatus are replaced, technological advances will be incorporated in future apparatus design based upon current and projected community needs.

Previously, the Public Safety Concept's effectiveness in terms of changes in staffing policy or philosophy was described. As more mandated specialized hazardous materials training is imposed by regulatory bodies, alternative approaches to providing the current level of service may be warranted. As an example, it may be an acceptable risk to staff the Hazardous Materials Apparatus only during peak hours, 8:00 am and 5:00 pm, Monday through Friday, which coincidentally is where the majority of the hazmat incidents occur. This approach will also allow the Hazardous Materials Response Team to continue to conduct joint training exercises, including classroom training, with other agencies and private industry as they will be on duty while other agencies and private industry's teams will be working.

Furthermore, due to the decreased number of hazardous materials emergency responses, additional alternative approaches beyond staffing may need to be explored which will require future study. Currently there is a trend to rely more on mutual aid from other fire agencies during major hazardous materials incidents as no one community has the resources available to effectively mitigate the hazard. Additionally, there has been some discussion aimed at consolidating the various hazardous materials response teams within Santa Clara County into several larger teams who would have the capability to respond anywhere in the county.

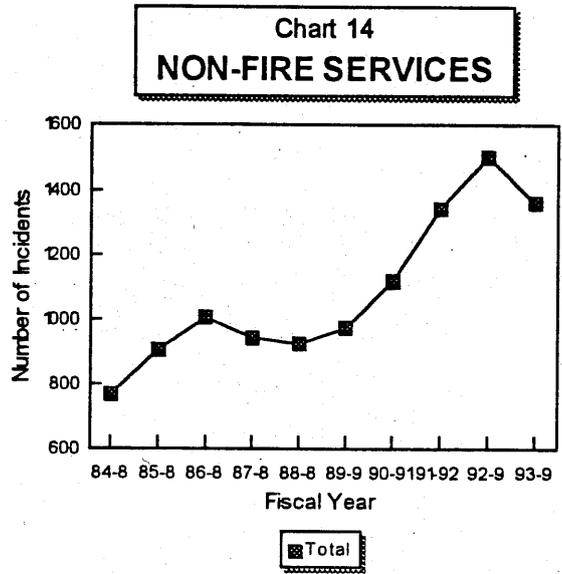
With a fully staffed hazardous materials response team housed at fire station 2, Sunnyvale's response time to such incidents is quite good. However, if a countywide consolidation were to occur, several concerns must be addressed. For instance, how much of a delay in response time can be expected and what is acceptable if the team is housed outside of Sunnyvale? What if it is housed in Sunnyvale, but spends much of its time in other jurisdictions providing service? Who will maintain control of the teams and how will each be comprised? In addition to those questions, who will perform all the other duties the team currently does, e.g., lighting, SCBA refills, heavy rescue, electrical power, hazmat pre-fire surveys, etc? Will the current hazmat team members meet the certification standards for a consolidated team? Will other hazmat team members meet Sunnyvale's standards, or will the Division have to reduce the current level of service to meet the standards of other Departments?

Non-Fire Services

Trends

In terms of activity, non-fire services is the second most active category of the five emergency fire service areas being provided.

This category includes Hazardous Conditions, Public Service Calls, Alarm-No Fire, Malicious False Alarms, and Other. Non-fire services represents 24 percent of the total alarms responded to during fiscal year 1993-94, or 1,358 of the 5,646 total calls which occurred that year. During the ten year period from fiscal year 1984-85 through 1993-94, the



upward trend was significant and represents an overall increase of 78 percent.

Of the classifications comprising the Non-fire Services category, the Alarm-No Fire (False Alarms) generates the greatest number of emergency responses. Alarm-No Fire responses has a ten year average of 423 calls.

Public service calls (Those calls which are unrelated to fire or EMS such as lock outs, water removal, and invalid assistance.) and malicious false alarms were the two areas where the most substantial increases in number of incidents occurred. Over the ten year period public service calls increased substantially from 91 to 378 calls per year. In addition, the same general pattern occurred with the malicious false alarm classification. There was a phenomenal increase in the number of these incidents during the same period of time increasing from 10 to 350 per year.

The division responds to an average of one false alarm each day. When the expense is considered for apparatus and staffing, this represents a rather costly endeavor as well as increasing the potential for accidents or injuries which are an issue in any emergency response. Research revealed that the majority of the alarms were occurring during normal business

hours indicating that human error was the major cause of false alarms. The Fire Prevention Bureau developed a program that involved contacting the business owners and the alarm companies to provide education and training in order to prevent false alarms. The program resulted in a significant reduction in the number of false alarms received.

Mutual aid responses is the fifth category of alarms to which the Fire Services Division responds. Mutual aid responses are those responses into other, usually adjoining, jurisdictions by one or more fire apparatus and appropriate personnel, to assist in handling a local emergency.

Sunnyvale participates in the Santa Clara County Local Fire Service and Rescue

Chart 15
NON-FIRE SERVICES

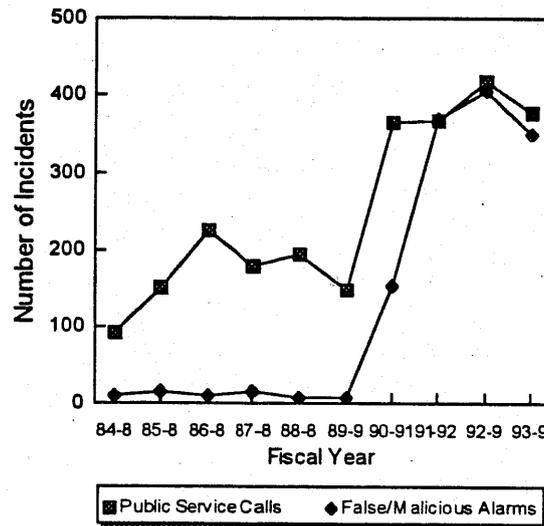
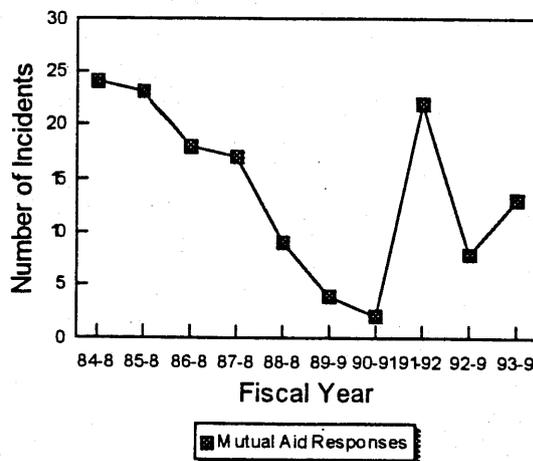


Chart 16
MUTUAL AID RESPONSES



FIRE SERVICES SUB-ELEMENT

Mutual Aid Plan. This plan is an extension of the California Fire Service and Rescue Emergency Mutual Aid Plan. If the need for assistance arises, the Mutual Aid Plan will be implemented and the necessary resources requested. During the past ten years Sunnyvale Fire Services Division has not requested mutual aid for any reason. Although, there is no Hazardous Materials Mutual Aid Plan in effect within Santa Clara County, it is believed that this service will also be reciprocated. To provide an example, during a recent 1994 hazardous materials incident on Highway 101, San Jose Fire Department's and Central Fire Protection District's Hazardous Material Teams were placed on standby as a precautionary measure, but were not needed. In recent years fire apparatus and appropriate personnel have responded as far away as Redding to participate in wildland fire suppression activities.

The number of mutual aid responses Sunnyvale provided has decreased over time to a low point in FY 90/91. Restructure of the County Mutual Aid Plan in 1991 created a system of response more conducive to providing assistance across jurisdictional boundaries. The mutual aid system has seen greater use since that time.

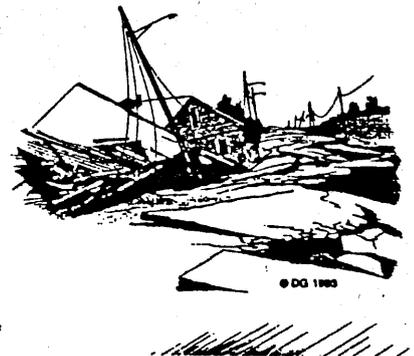
Emergency Management

Fire service emergencies can range from a minor incident requiring one person and the use of a single portable fire extinguisher to a conflagration involving all available city personnel and equipment as well as assistance from neighboring cities. Fortunately, the latter occurs rarely in most cities and has never occurred in the City of Sunnyvale, but the potential is forever present. Natural disasters, unusual weather, failures in fire protection systems, and catastrophic incidents involving chemicals or explosives are all conditions that may arise without warning in any community.

In preparation for major incidents, the Fire Services Division participates in a variety of regional exercises to test specific components of the State and Local mutual aid system. These collective drills routinely are held on a county-wide basis to prepare firefighters and emergency medical responders for multiple or mass casualty incidents such as multi-vehicle collisions, bus accidents or train wrecks. In addition, drills are held in preparation for large fires in highrise buildings or in wildland situations. Multiple jurisdiction response to major hazardous materials incidents is also practiced.

In California, the threat of an earthquake is ever present. Fire in the aftermath of an earthquake has the potential of causing greater loss of life and property than the earthquake itself. Likewise, spills and discharges of toxic and hazardous chemicals as the result of an earthquake can have long term impacts on community health and the environment. While the building and life safety codes as well as hazardous materials and toxic gas regulations incorporate seismic safety considerations, no community is immune to the devastation of a higher magnitude earthquake.

The response to major incidents typically involves only the emergency response disciplines (fire, hazardous materials, emergency medical, and law enforcement), but a disaster requires the complete realignment of all local government resources to meet the emergency needs of the community. The



California Government Code requires that Cities develop an Emergency Plan that provides for preparation and planning to protect life and property in the event of a disaster and the effective mobilization of all resources of the City to meet any emergency/disaster. The current Emergency Plan was adopted by Council in July 1993.

The Emergency Plan establishes the Emergency Management Organization (EMO) to manage an emergency or disaster. The City Manager or his/her designee is the Director of Emergency Services. When an event, or combination of events, begin to reach the point that a potential exists for exceeding the ability to handle the event in a routine manner, the Director of Emergency Services may direct a partial or complete mobilization of the EMO. Fire Services Division personnel play an integral role in the EMO with responsibility for staffing a number of key positions within the twenty-eight functional designations in the Emergency Operations Center. Training in EMO operations are conducted periodically. (See the Seismic Safety and Safety Sub-Element.)

The key to successfully mitigating any emergency regardless of size, is the element of effectively managing and directing available resources and equipment to the best advantage. Sunnyvale's Fire Services Division currently operates under the Incident Command System, hereafter referred to as "ICS." This concept affords both the means and flexibility for the effective management of emergency incidents.

The fire service recognized the need for a standardized approach to allow fire resources from a variety of departments to integrate into a single response organization in response to a major fire. The Incident Command System was developed by the California fire services to streamline response and improve resources use by standardizing procedures and terminology. This concept of standardized procedures has spread throughout fire services across the nation. Over a period of twenty years, ICS has incorporated many effective management concepts such as limited span of control, standard terminology, and action planning. Gradually, these concepts are being adopted within other disciplines, such as law enforcement, emergency medical services, and others.

As a direct result of the 1991 East Bay Hills Fire, Senate Bill 1841 (chaptered as Government Code Section 8607, effective January 1, 1993) was introduced, directing the Governor's Office of Emergency Services (OES) and other agencies to develop, by regulation, the *Standardized Emergency Management System (SEMS)*. It is to be used by all disciplines and all levels of government. As defined in the statute, the framework of SEMS is the Incident Command System, the Multi-Agency Coordination System, the Master Mutual Aid Agreement and related mutual aid systems, and the operational area concept.

Government Code Section 8607 requires all disciplines and all levels of government to use SEMS by December 1, 1996 to coordinate multiple jurisdiction or multiple agency emergencies in order to be eligible for any funding of response-related personnel costs under disaster assistance programs. Furthermore, the Government Code requires OES, in coordination with the State Fire Marshal's Office, the Department of the California Highway Patrol, the Commission on Peace Officer Standards and Training, the Emergency Medical Service Authority, and all other interested state agencies with designated response roles in the state emergency plan, to develop an approved course of instruction for SEMS by December 1, 1994.

Under Government Code Section 8607, Sunnyvale's participation in SEMS is voluntary, however, it is mandatory in order to receive reimbursement of response personnel costs under disaster assistance programs involving multiple agency responses.

Alarm Response Times and Conditions

The most crucial element in providing high quality emergency services is response time. Response time is defined as *"the total time from the moment a report of an emergency is received until emergency fire personnel and equipment arrives at the scene and begins emergency activities."* The adage which states "minutes count" is never so true as when applied to actions required to minimize the effects of a fire on the lives and property of citizens, or when providing emergency medical services. Response time is one key area the department measures to determine the level of emergency services that is being provided to the citizens.

How response time is measured has been refined considerably since adoption of the 1985 Fire Services Sub-Element. Prior to the 1985 Sub-Element, the Fire Services' program performance objective was concerned only with the time elapsed from receipt of the call at the fire station until the arrival of the first public safety unit at the emergency scene. This unit could be either a fire apparatus or a patrol officer. The performance measure was changed in FY 85/86 in an attempt to include call processing time by dispatch. This was accomplished by adding **0.9 minutes** to projected response time. The added time was strictly an estimate as it was recognized the existing CAD system was incapable of providing accurate information about this critical time element in the response process. The need for improvement of the City's EDP capabilities was cited as a future issue in the 1985 Sub-Element. In FY 85/86 the new performance standard was an **average response time of 4.2 minutes with 85% of all responses under 5 minutes**. The reported emergency response performance in that fiscal year was an average of 4.6 minutes with 83.4% of all emergency responses under 5 minutes. (In FY 91/92, the last full year this method of calculation was used, the reported emergency response performance was 4.8 minutes with 55.2% of all emergency responses under 5 minutes.)

In preparation of the 1990 Public Safety Information Systems Master Plan it became apparent that a significant time frame within the response process was still not being captured. Earlier assumptions did not adequately account for the time required by the dispatcher to solicit information from the caller prior to data entry into the system. Reports generated by the CAD system "time-stamped" on initiation of data entry, not on receipt of the call via the 911 phone system. Despite continued efforts at representative sampling, conflicting data indicated that short of manual timing of all dispatches, determination of actual total response time was not possible. In the specifications for the new Public Safety Computer Aided Dispatch (CAD) and Records Management System (RMS) that was purchased in 1992, the significant reporting deficiencies identified in the Master Plan were corrected. The new CAD system came "on-line" in April 1993 with most of the reporting capabilities immediately accessible.

In anticipation of the availability of more accurate data, the program performance objectives were restructured for FY 93/94 to provide better tools for examining response performance. Two performance indicators were developed for **total response time** (elapsed time from receipt of call in dispatch to arrival of fire apparatus on scene) and two performance indicators for the **fire services program response time** (elapsed time from receipt of call at the fire station to arrival of fire apparatus on scene).

Although patrol officers are frequently on scene prior to arrival of fire companies, all four measures were restricted to tracking response time for fire apparatus. Early arriving patrol officers can provide valuable assessments of conditions to responding fire personnel which enhance rapid deployment and initial fire operations. However, beyond the use of "first aid appliances" such as fire extinguishers and garden hoses, firefighting capability is severely limited until the arrival of fire apparatus.

Total Response Time Performance Indicators

1. Average response time to emergency calls for service from receipt of call. **Standard: 5.6 minutes.**

2. Total number of emergency calls for service and percent in which on scene services were provided in 6 minutes or less from receipt of call. **Standard: 90.0%**

Program Response Time Performance Indicators

1. Average response time to emergency calls for service from time of dispatch. **Standard: 4.6 minutes.**
2. Total number of emergency calls for service and percent in which on scene services were provided in 5 minutes or less from time of dispatch. **Standard: 90.0%**

Fiscal year 1993/94 marked the first full year of service of the new CAD system and the first opportunity for accurate response data. The total response time performance reported was an average response time of 4.7 minutes with 88% of all responses under 6 minutes. Program response performance was an average of 4.5 minutes with 66% of all responses under 5 minutes.

In May 1995, the CAD system will be upgraded to capture the entire response process from the time the 9-1-1 phone call is answered until the arrival of the first fire apparatus on scene. The program response time is not anticipated to change in the near term. Reported total response time will appear to increase in FY 95/96 as the total call processing time in dispatch will be captured. In reality the actual level of service will be unchanged, just better measured.

While it is recognized correctable flaws in response procedure (dispatch and fire operations) may still exist, Division managers now have better tools for analyzing response information and can begin to develop informed alternatives for response time improvements.

There are a number of forces at work that affect the time of arrival of emergency personnel at the scene of an incident once it has occurred, all have varying degrees of influence on

the successful resolution of the incident. Factors impacting response time are delayed alarms, dispatching time, turn-out time, and travel time. Improvements can result from one or a combination of factors: awareness, procedures, technology, or resources.

Emergency communications or dispatching technology dramatically impacts the response time. To better understand the effects of a timely response, it is necessary to be familiar with the process involved. The Department of Public Safety's emergency communications center is the location where emergency responses are initiated. The dispatcher must be responsive, efficient, and knowledgeable using up-to-date, state of the art information systems in order to initiate an appropriate emergency response.

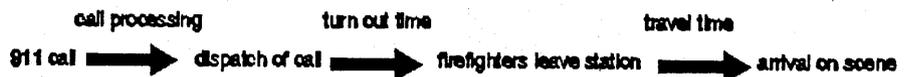
Currently with the O. C. S. Computer Aided Dispatch (CAD) system, response times are calculated based on the time the dispatch case is created until the time emergency personnel arrive on scene. As discussed above, the time the call is actually answered until the case is created, "call processing," is not captured data, but is important in terms of determining the "real" response time. System upgrades will correct this deficiency.

Another factor affecting response time is "delayed alarms." There are many different reasons for delays in reporting alarms. A fire may go undetected for a long period of time before discovery because of its location or time of ignition. Automatic detection equipment may malfunction or the alarm company's own "call processing" procedures may be complex and time consuming. Persons may attempt to control a fire before sounding an alarm, or there may not be an immediate means of reporting an emergency because of its remoteness or a lack of a telephone or other alarm device. Sometimes there is hesitancy to report a situation because the reporting party is unsure. Many of these barriers can be positively influenced through public education.

A third factor, "turn-out time," also affects response time. Turn-out time is the time between when an alarm is received until

emergency personnel and equipment are enroute to the scene. When the alarm sounds, fire personnel retrieves information as to type and location of the emergency, which is sent via telephone lines to a printer in the station. They acknowledge the call, select previously prepared information regarding the best route of travel, and in some cases, a pre-fire survey of the building to which they are responding. The officers must also put on protective clothing, enter and start the fire apparatus, and proceed to the emergency scene. This time segment is influenced by time of day, station design, apparatus and equipment design, and the nature of personnel activity just prior to the alarm. With the new communications alarm alerting system, fire companies are often enroute to an alarm in about one and one half minutes.

The fourth factor affecting overall response time is "travel time." Travel time is measured from the time emergency personnel go enroute until they arrive at scene and begin emergency operations. The most significant factor affecting travel time is the distance fire companies are away from the incident and the time it takes to travel that distance. A prime consideration in the location of fire stations is the selection of sites that are central to the area (districts) being covered. Regardless of the distance involved, if response routes are congested with traffic, the travel time will increase. Traffic signal preemption capability for an increasing number of intersections helps eliminate traffic bottlenecks and shorten travel time. It should be noted that many emergency responses are made while fire companies are out of quarters. Daily activities such as conducting fire prevention inspections, pre-fire planning of commercial and residential property, and training often requires fire companies to be anywhere in their district. Travel time may either increase or decrease when this occurs, depending upon their activity, their particular location in the district, and the location of the call to which they are dispatched.



Throughout this section it is clear the emergency communications center has a direct impact on alarm response times especially if the time begins when the 9-1-1 telephone rings. In reality, that is when the public expects that it starts.

Future Issues

To further influence response times in a positive manner a greater use of available technology is needed. Currently available for use is the automatic vehicle locator tracking systems (AVL) which utilize the global positioning satellite (GPS) technology. Rather than relying on recommendations programmed into CAD to assign fire apparatus to a call, the system would select the "closest" unit to the scene. When fire companies are out of quarters performing a myriad of activities, the closest unit is assigned, allowing for a shorter distance and quicker travel time to initiate emergency operations.

O. C. S.'s next generation of CAD proposes to combine AVL and GPS into the CAD functionality. O. C. S. will be providing this capability as an upgrade to the current system which could be fully implemented by 1997. Although software upgrades are part of present multi-year maintenance agreements, there would be costs associated with hardware upgrades and improvements in the radio/communications infrastructure. The new system will begin tracking emergency calls from the moment the 9-1-1 telephone rings (included will be how long it takes to answer the telephone) and will end once all fire apparatus have returned to quarters or are dispatched to another call for service. As mentioned earlier, the closest fire apparatus to the scene will be dispatched, reducing the response time, thereby providing a higher level of service to the community.

The new system could provide a phone management report that can be compared to CAD reports to get a clearer picture on how communications dispatching impacts the overall response time. This upgrade could effectively cut the call

processing time by about two-thirds; to approximately 45 seconds.

In addition to the telephone system upgrade, the Department, over the next three years beginning January 1995 will be installing other equipment designed to reduce the overall response time. The first upgrade will be to install a new operating system for the HP computer which will allow synchronization of the internal clocks. Once synchronized, response time can be accurately measured.

Under consideration is a two phase fire dispatching system which could be implemented with a "pre-alerting" feature. This "pre-alerting" feature allows a dispatcher to "pre-alert" a specific fire station that an emergency has occurred in their district and will soon be dispatched to the call. This feature should reduce "turn-out time" by approximately 15 to 30 seconds and call processing time by an additional 10 to 35 seconds depending on the complexity of the emergency call.

Mobile digital computers (MDC's) are also available and would facilitate a quicker turn out time. Fire personnel would not need to spend precious seconds retrieving information they could receive while enroute to the scene. By installing MDC's in fire stations and fire apparatus, dispatch could transmit run cards and pre-fire surveys directly to the responding apparatus. MDC's support AVL technology, bar code scanning, fax transmissions, cellular transmissions, magnetic card, and touch screen technologies. Additionally, it will support mug shot and fingerprint transmissions for law enforcement use.

Improvement in response time can be achieved through improvements in technology and procedure which the Fire Services and Support Services Divisions are actively pursuing. The greatest areas of leverage appear to be in streamlining call processing in the Communications Center and the continuation of efforts in traffic engineering design of the transportation system. Concurrently, reduction in needless responses (such as false alarms) help ensure greater availability for assignment of the first due fire apparatus to

actual emergencies within their own district. It is only after these efforts are exhausted should the addition of resources be considered.

DELIVERY OF NON-EMERGENCY SERVICES

The internal components of a fire department represent many functions. In addition to its traditional function of fire suppression and emergency response, the department is responsible for fire prevention, hazardous materials control, fire and life safety education, and other community services.

Fire Prevention

A basic concept concerning public fire protection is that it is best for fires not to occur at all. Reducing the number of incidents of fire involves concerted efforts in a number of areas. Historically, more effort and resources have been directed toward firefighting activities than toward fire prevention and fire education. This is true perhaps because the need and the results are more immediately evident in firefighting. Significant resources are required for the around-the-clock capability for effective fire suppression. Yet fire prevention programs are growing nationwide as more and more communities realize their value. The National Fire Protection Association (NFPA), insurance organizations, and state and federal governments support and encourage their development and awareness.

Fire prevention is less sensational than suppression. It is also less expensive and is universally accepted as the most effective means of accomplishing the mission of the fire service. Fire prevention is the responsibility of every member of the Public Safety organization, especially those assigned to the Fire Services Division. Fire prevention efforts are coordinated through the Fire Prevention Bureau under the authority of the Fire Marshal. The Fire Prevention Bureau is responsible for building plans and permit review, building inspection, code enforcement, and fire cause and arson investigation. Several of these key elements are accomplished in concert with the Community Development Department.

The Fire Prevention Bureau participates in the streamlined building permit process operated through the Community

companies on reinspections, and eliminate additional intrusions by inspectors during business operations.

Although preliminary findings are favorable, the Self-Certification Program is still in its initial stages and has not yet achieved its full effectiveness. One measurement of how effective this program will be is by measuring the percentage of violations being corrected; that is, did the property owner in fact correct the violation as indicated to the department. Once the program is accepted and the statistical data indicates widespread compliance, future uses can be expanded to include various other types of business and industries, as well as the residential community.

Frequency of Inspections

At the writing of the 1985 Sub-Element, it was axiomatic that frequent inspections were necessary in a proactive fire prevention program. It is still a widely held belief for some in the Fire Service today. The Sub-Element states that there was no expectation of change in the frequency (twice a year) of inspections unless other fire services priorities necessitated a reduction. Since adoption of the 1985 Sub-Element the interval between inspections has increased from 6 months to one year. (18 months in the case of about one-third of all hazardous materials inspections.) The reason was not a change in priorities, but rather challenging the accepted idea that somehow more frequent inspections were better. Systematic reduction in frequency over the past decade has demonstrated that not to be the case as measured by all performance indicators of fire incident rate and fire loss experience.

The new Fire Management Information System (FMIS) will allow further investigation into the relationship between inspection frequency and fire cause. FMIS is due to be fully operational in July 1996. The on-going effort to determine what the appropriate frequency of inspection should be, to maximize utilization of staff and minimize government intrusion, while at the same time providing a fire-safe environment will

beneficial to both the City and developers alike. The first civilian Fire Prevention/Plan Checkers were hired in 1986 and were assigned to the Fire Prevention Bureau. However, at the conception of the One Stop Permit Center in the Community Development Department, it was determined that the Fire Prevention/Plan Checkers would best suit the needs of this function and were reassigned. The Fire Prevention/Plan Checkers have the ability and authority to review plans and issue permits "over the counter" if the project is relatively non-technical, otherwise, the plans will be reviewed within thirty days and recommendations made.

The city offers the Planning Review Committee (PRC) to assist developers. This committee is comprised of a representative from each city division responsible for reviewing plans for code compliance of prospective developments. The Fire Prevention Supervisor (a Public Safety Lieutenant) participates as a member of the committee. At a pre-scheduled meeting with the developer, the committee collectively, verbally and in writing, explains and clarifies what is needed to comply with code requirements. This procedure helps resolve unnecessary conflicts prior to actual construction. The Fire Prevention Supervisor reviews plans for fire strategy, hydrant location and fire lane access. The Lieutenant's PRC comments are recorded and passed onto the Fire Prevention/Plan Checkers for follow up and for the developer as the project moves forward for permits.

From the time of application for development and building permits, through the final phase of construction, Fire Prevention/Plan Checkers are involved in the review of site development plans and architectural building plans. They work closely with the inspectors from the Building Safety Division of the Community Development Department. Fire Prevention/Plan Checkers also conduct the necessary field inspections of all fire and life safety portions of building projects.

During fiscal year 1992-93, Fire Prevention/Plan Checkers conducted approximately 1,452 plan checks and 1,867 field inspections. In fiscal year 1993-94, these numbers increased

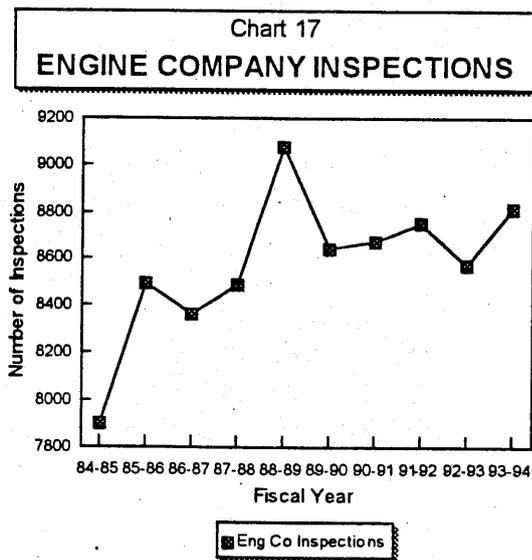


to approximately 1,688 plan checks and 2,386 field inspections. This has resulted in a significant reduction of construction inspections for the Fire Prevention Staff, allowing the opportunity to focus on fire and life safety issues in existing facilities. In the past, Public Safety Officers conducted the plan review process. With the addition of the Fire Prevention/Plan Checkers, a higher level of expertise, proficiency and service for the City's clientele and citizens has been achieved.

Inspections

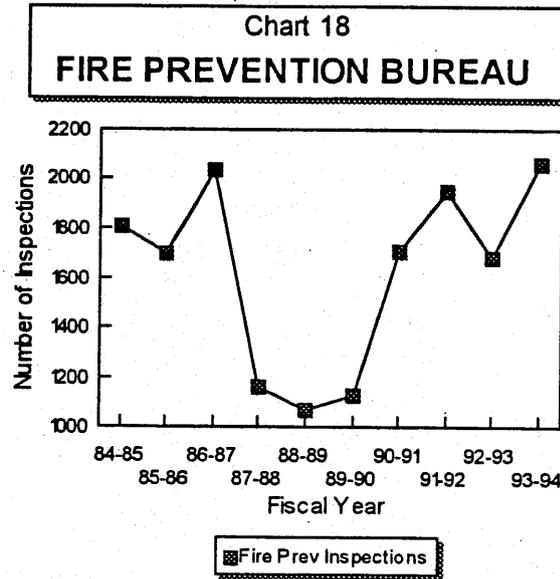
The Fire Prevention Bureau is responsible for coordinating all building field inspections conducted by Fire Services Division personnel. These are related specifically to fire and life safety issues. Inspections are conducted along two primary tracks; those which are assigned to fire engine companies (fire stations), and those which are assigned to Fire Prevention Bureau Inspectors.

There are over 5,600 smaller commercial and industrial establishments and apartment dwellings that are assigned to the fire stations for annual or bi-annual inspections. The



inspection load is distributed amongst the six fire stations and three fire teams for buildings in their districts. Notices of violation are issued for those buildings not meeting code standards. Follow-up reinspections are scheduled after an appropriate period for compliance actions to be taken.

Fire Prevention Bureau inspectors are assigned the inspections of large building complexes, institutional facilities, and educational facilities which require more technical expertise because of the nature of the occupancy, types of operations and materials used, and because they generally reflect a more serious concern for life safety issues. There are approximately 1,800 such buildings scheduled for annual inspections and appropriate follow-up reinspections.



In fiscal year 1993-94, a total of 8,811 field inspections were conducted by fire companies and 2,062 field inspections were conducted by Fire Prevention Inspectors.

Fire Prevention Inspectors are also responsible for issuing Operation and Fumigation Permits. The issuance of an Operations Permit regulates businesses that use, store or manufacture flammable materials, use hazardous processes, or by their nature of business increase the risk of fire. The fee charged helps pay for the additional level of service provided due to the need for inspections to regulate the hazard.

Self-Certification Program

Beginning fiscal year 1994-95, a Self-Certification Program has been initiated for correction of fire code violations. The program encompasses minor violations found during engine company inspections. The business or apartment owner/manager self-certifies correction by mail. The program is designed to promote active involvement by the business community in fire safety, reduce time spent by the fire

companies on reinspections, and eliminate additional intrusions by inspectors during business operations.

Although preliminary findings are favorable, the Self-Certification Program is still in its initial stages and has not yet achieved its full effectiveness. One measurement of how effective this program will be is by measuring the percentage of violations being corrected; that is, did the property owner in fact correct the violation as indicated to the department. Once the program is accepted and the statistical data indicates widespread compliance, future uses can be expanded to include various other types of business and industries, as well as the residential community.

Frequency of Inspections

At the writing of the 1985 Sub-Element, it was axiomatic that frequent inspections were necessary in a proactive fire prevention program. It is still a widely held belief for some in the Fire Service today. The Sub-Element states that there was no expectation of change in the frequency (twice a year) of inspections unless other fire services priorities necessitated a reduction. Since adoption of the 1985 Sub-Element the interval between inspections has increased from 6 months to one year. (18 months in the case of about one-third of all hazardous materials inspections.) The reason was not a change in priorities, but rather challenging the accepted idea that somehow more frequent inspections were better. Systematic reduction in frequency over the past decade has demonstrated that not to be the case as measured by all performance indicators of fire incident rate and fire loss experience.

The new Fire Management Information System (FMIS) will allow further investigation into the relationship between inspection frequency and fire cause. FMIS is due to be fully operational in July 1996. The on-going effort to determine what the appropriate frequency of inspection should be, to maximize utilization of staff and minimize government intrusion, while at the same time providing a fire-safe environment will

continue. The expectation is that frequency of inspections will decrease in the future.

Code Review and Enforcement

Society operates by rules, regulations, and laws. With them there exists a semblance of order and security; without them there would be chaos. In the fire service, the laws are fire prevention codes. These codes were established to provide minimum standards to prevent fires from starting and to limit the spread of fires that do start.

The development of today's modern building codes began with the disastrous fire incidents which this country experienced at the turn of this century. It is therefore understandable that building codes and fire protection go hand in hand in reducing loss of life and property.

A building code is a law that sets forth minimum requirements for design and construction of buildings and structures. The minimum requirements are established to protect the health and safety of the community and generally represent a compromise between optimum safety and economic feasibility.

Uniformity of the model codes is desired by both the public and private sectors to reduce the variations of interpretation and enforcement of the codes between the different enforcing agencies. Because of the varying requirements and demands for fire protection and life safety based on the topographical, geographic and geological differences within the State of California, uniformity of the codes is very difficult to achieve. Many organizations on the national, state, and local levels work together to bring as much uniformity to the model codes as possible.

The International Conference of Building Officials (ICBO) and the Western Fire Chiefs Association (WFCA) work together to assure compatibility between the Uniform Fire Code and the Uniform Building Code. Other organizations that work toward uniformity include the California Fire Chief's Association, Fire Prevention Branch (both Northern and Southern Branches)

and at the local level, the Santa Clara County Fire Chiefs Association, Fire Prevention Branch.

Members of the Sunnyvale Department of Public Safety Fire Prevention Bureau take an active role on code committees and organizations at both the State and local levels. They support standardized enforcement practices with other agencies and to represent Sunnyvale's needs for its residential and industrial communities. This progressive stance is valuable and very beneficial to accomplish Department and City goals as they pertain to economic development.

In addition to the adoption of Uniform Codes and Standards, it is often necessary to adopt City Ordinances in order to address fire and life safety issues specific to this community. In this regard, Sunnyvale City Council over the years has adopted a number of ordinances pertaining to the safety of the community. Included are the ordinances addressing buildings exceeding 75 feet in height, fireworks, regulation of hazardous materials, residential sprinklers, and residential roofing.

The philosophy of the Fire Services Division in meeting its responsibility of fire and life safety protection through code enforcement reflects the general philosophy of the City. Code enforcement is sought through voluntary compliance. It is the intent of the Division to work with business and industry to discover cost effective alternatives for compliance which satisfies the intent rather than the letter of the law. Meeting the needs of Sunnyvale's clientele and citizens is a priority and appropriate avenues of appeal are provided.

In those rare instances where non-compliance with code requirements are at issue or criminal action is evident, there are various actions which may be taken. Depending on the severity of the situation, the actions which may be taken include, but are not limited to: denial of permits, revocation of permits, obtaining criminal complaints, and invoking authority to immediately halt construction or operations.

The code review and enforcement process is a dynamic, everchanging one. Amendments to model codes and standards, as well as to the Sunnyvale Municipal Code will continue to be reviewed for appropriateness, consistency with other codes, and applicability to local needs.

Fire Investigation

Fire investigations were begun by the National Board of Fire Underwriters at about the turn of the century. There was a need to identify causes in order to prevent fires in the future. Among the first to be identified were non-regulated construction standards and occupancy hazards. This was the beginning of standard and enforced fire and building codes.

The fire service of today has that same pressing need to determine why a fire started. The job is complicated by changing building standards and materials, the many new appliances and products available to consumers, and a greater population. The job is also complicated by intentionally set, or arson, fires. Arson fires are among the most difficult types of crimes to investigate, because the fire burns most of the materials an arsonist used to start the fire. Since arson fires are sometimes set to destroy evidence of another crime, fire cause/arson investigators must be able to read the scene accurately to determine what type of fire occurred.

One of the activities of the Fire Prevention Bureau is to investigate the origin and cause of ignition in certain fires. Fire companies frequently request the assistance of the fire cause/arson investigator for a number of reasons including the following:

- When fires involve a fatality, or injury which may result in a fatality.
- The cause of the fire was arson and expert investigation and testimony is required.

- The original cause of the fire was not readily determined by firefighting personnel due to the extent of destruction or necessity for a lengthy investigation, or when the estimated structural damage exceeds \$20,000.
- The cause of the fire was due to unusual circumstances, malfunction of equipment, or code violations requiring Fire Prevention Bureau follow-up.
- When City liability may be involved or other times as needed at the discretion of the Incident Commander.

In general, all fires can be classified as accidental or intentional. Once the cause of a fire has been determined, the findings can be put to their best use. They may provide lessons for the public education program, the inspection program, and the process used to revise and adopt codes and standards. Findings of arson may also have an effect on the criminal justice system by causing a revision of arson-related laws as a deterrent.

Each of the fire cause/arson investigators have been certified through the State Fire Marshal's Office as a fire cause/arson investigator. In addition to formal training, these investigators attend various seminars throughout the year to keep up with new technology and techniques related to the field.

Between fiscal year 1987-88 and the most current year 1993-94, fire cause/arson investigators responded to and investigated 341 fires. Of those 341 investigations, 162 were determined to be arson and 55 of those were directly linked to a juvenile who was either playing with matches, lighters, etc., or deliberately set the fire. The bureau was able to determine the cause of the fire in 327 of the cases, a 96 percent clearance rate. As mentioned in the fire suppression section, arson is not a significant problem in Sunnyvale.

Future Issues

A building code is called a mini-max code when it prohibits the adoption of any construction requirements that differ from the building code. Local jurisdictions cannot adopt construction requirements that would be *less* restrictive than the state code's minimum requirements, nor can they adopt anything that would be *more* restrictive than the state code's maximum requirements.

The current trend is toward mini-max building codes. This is considered a threat by Fire Departments as it eliminates the right of Cities to enforce ordinances that are more restrictive than those passed by the State. Not only are there more mini-max building codes being passed within a state, there are more states passing these types of codes. In 1985, only four states had mini-max building codes. There are now sixteen. The building industry encourages mini-max building codes because it makes for uniform construction requirements in all of a state's jurisdictions. The Fire Service opposes mini-max building codes, feeling that often the maximum required by the state is not sufficient to ensure the safety of lives and property.

An example of this is the current debate over residential sprinkler ordinances. It is clear that the fire service recognizes the positive impact that sprinkler systems have on a community's fire risk. The growing number of sprinkler ordinances in California alone attest. Fire departments adopt local ordinances because the sprinkler requirements in the model building codes cannot produce a reasonable balance between a community's fire risk, the level of built-in fire protection, and fire department capability. The minimum sprinkler requirements in the model building codes, which became the *de facto* maximum requirements in mini-max states, are simply too weak for that purpose.

Hazardous Materials Control

History

In the early years of the semiconductor industry, the use of substances such as toxic gases and chlorinated solvents grew faster than the technology to control emissions to the environment. There is still uncertainty as to the ultimate impact that the toxic substances will have.

Until the 1970s, there were few regulatory provisions for the safe transport, storage, and disposal of hazardous and toxic materials. Agencies at the federal, state, and local levels did not want to become involved, manufacturers and transporters of toxic substances ignored regulations because of the high cost, and public sentiment and subsequent outcries were not strong enough to generate increased regulatory provisions. Once the need for jurisdiction over hazardous materials and toxic substances was established, a barrage of regulatory provisions followed.

Aside from the problems posed by leaking underground storage tanks and lines, there was the ever present danger of sudden release spills of chemicals and materials widely used in local industries while being transported over the transportation system.

Present Services

It is evident that the use of harmful chemicals in today's society must be controlled. The threat to health and environment demands it. It is less clear, however, how best to exercise that control. The problems are of such magnitude that regulatory efforts often overlap, conflict, and cause confusion among the many agencies designated at each level of government to deal with the issue.

In Sunnyvale, the 1991 Uniform Fire Code, and the Hazardous Materials (Title 20) and Toxic Gas ordinances have been adopted. The ordinances which have been adopted are comprehensive in their coverage of hazardous materials use and storage. Before new storage and use of hazardous materials can occur, a permit must be issued by the City. Finally, the ordinances contain provisions for the reporting of unauthorized discharges, cleanup, inspections, and record keeping.

The Fire Prevention Bureau has the responsibility of issuing the hazardous materials storage and toxic gas permits to businesses who use these substances. As of August 1994, a total of 688 businesses have been issued permits; 659 for the storage of hazardous materials and 29 for the use of toxic gases. The types and quantities of hazardous materials stored and used at Sunnyvale businesses varies from gasoline in underground storage tanks at the corner gas station to the use of toxic gases in the manufacturing of semiconductor devices. All of these facilities are inspected annually by Fire Prevention Bureau Hazardous Materials Inspectors. Since the adoption of Title 20 (currently Titles 20 and 21), there has been a marked reduction in reported discharges and hazardous materials emergency responses.

As of August 1994, Sunnyvale has 254 sites (134 petroleum fuel and 120 toxic materials) with underground contamination. The State Water Resources Control Board maintains an inventory of all ground contamination sites while the Regional Water Quality Control Board has the responsibility to ensure the clean up of these sites. However, because of local interest, the Fire Prevention Bureau monitors progress of the underground cleanup and provides input and or assistance as needed. Cleanup of these sites is an ongoing process.

Although there are a myriad of regulations existing at the federal, state, and local levels addressing the production, transportation, use, and disposal of hazardous materials, enforcement is primarily a local issue. These ordinances have attempted to meet the safety needs of the community while not

burdening industry with unnecessary constraints and regulations. As enforcement is a local issue, the Fire Prevention Bureau has actively sought compliance through education efforts, however, in those rare instances when education fails in gaining compliance, they aggressively seek criminal complaints and/or civil sanctions against the violator. The enforcement of the various laws and regulations pertaining to the transportation of hazardous materials including the California Vehicle Code, is the responsibility of the Police Services Division's Traffic Unit.

Responsibility for using hazardous materials can be summed up in two words, knowledge and compliance. Users must acquire and maintain specific knowledge of the characteristics and hazards present in the materials they use. Additionally, they must be aware of increasing regulations with which they must comply. The pressures exerted on governmental agencies to enforce applicable regulations are mounting with each new incident. Ultimately, the effects will be felt by the users who do not comply through criminal and civil sanctions for continued violations.

Private industry, partly through their own initiative and partly through legislative requirements, have taken a more safety conscious role in how they store, dispense, and handle hazardous materials in the workplace. They are also much more knowledgeable and better prepared to deal with hazardous materials incidents at their workplace today, than at anytime in the past. Some have response teams in place on-site with the training and equipment necessary to deal with most incidents that may occur; most, however, do not.

In maintaining the spirit of cooperation between private industry and Department of Public Safety, a joint hazardous materials response program has been implemented. The Public Safety HazMat Team participates in regularly scheduled training exercises and has conducted drills with hazardous materials response teams from different companies in Sunnyvale. This training not only benefits individual private industry hazardous

materials response teams, but Sunnyvale's HazMat Team as well. It allows each to become more aware of each others capabilities, and limitations when dealing with these types of incidents. In addition to the benefits received during these training exercises, information is shared and new ideas are explored which might have future application.

The Fire Services Division has a number of resources available to private industry in the areas of regulations, training, emergency response, and contamination cleanup. Fire Services Division staff currently participate on several boards and committees including the Joint Venture Silicon Valley Committee, Advantage Plan Check Committee, and the Facilities Managers Group; all of which evolved to help private industry. Private industry is encouraged to actively participate on these boards and committees. By working together with City staff in developing regulations the Fire Services Division can make the community a safer place to live and work.

The City of Sunnyvale also has a unique program to assist residents in the proper disposal of household hazardous materials such as pesticides, flammable liquids, paint, and cleaning supplies, used in and around the home. Several times each year, residents can take the materials to a designated location and drop them off, free of charge. This program has greatly reduced the number of non-industry related illegal disposal calls for service the Hazardous Materials Response Unit has received. The HazMat Team has been involved with this program since its inception.

As previously mentioned, Sunnyvale participates in the Santa Clara County Local Fire Service and Rescue Mutual Aid Plan as well as the State Mutual Aid Plan. Although, there is no Hazardous Materials Mutual Aid Plan in effect within Santa Clara County, the fire agencies with hazardous materials programs will informally provide any agency with the resources necessary to effectively deal with hazardous materials emergencies.



Future Issues

California recently enacted yet another law, SB-1082, Certified Uniform Program Agency (CUPA) which the Governor signed into law September 1993. The intent of the CUPA is to consolidate the administration of specific state environmental programs to simplify the process of compliance for the affected business community. Additionally, the law establishes a procedure for unifying the hazardous materials and hazardous waste programs which are currently administered by local governments. The State Secretary for Environmental Protection is required by January 1, 1996, to adopt regulations to implement a unified local program for the following State mandated programs:

- Inspection and enforcement of laws and regulations governing hazardous waste generators and facilities that treat hazardous waste (Chapter 6.5 Health & Safety Code);
- Underground storage of hazardous substances (Chapter 6.7 Health & Safety Code);
- Hazardous materials release response plans and inventories (Chapter 6.95, Article 1 Health & Safety Code);
- Risk management and prevention program (Chapter 6.95, Article 2 Health & Safety Code);
- Requirements for hazardous materials inventories as required by the UFC and if determined to be appropriate by the State Fire Marshal, hazardous materials permits also required by the UFC;
- Spill prevention and control plans for aboveground storage tanks (Chapter 6.67 Health & Safety Code).

As the bill was originally drafted, each county through its environmental health unit, was required to apply for certification as the uniform program agency within its jurisdiction. Through the lobbying efforts of the fire service and League of California Cities, the bill was amended to allow cities and joint power agencies to also apply for certification. At this time the City is interested in being certified as a Uniform Program Agency. Once the State Secretary of Environmental Protection makes available the procedures for application submittal, an evaluation of the current program will be made.

As mentioned in previous sections, the character of industry in Sunnyvale is changing. The orientation of the semi-conductor industry in the city has shifted away from manufacturing and chip production. This has prompted a reduction in the types and amounts of chemicals being used and stored. At the same time, Sunnyvale is encouraging growth in the bio-technology industry in the community. The emergence of bio-technology will bring with it a new variety of chemicals and other bio-hazards. The Fire Services Division will continue to monitor the changes in industry in an effort to provide appropriate training and service levels to meet the new challenges that may develop in the future.

With the change in the character of industry in the community, the reduction in the use of chemical, and the conversion of industrial property to residential developments, alternative uses and/or staffing of the hazardous materials apparatus need to be considered. Several alternative approaches include re-examination of staffing, operational hours, countywide consolidation of hazardous materials response teams, hazardous materials pre-fire planning, and hazardous materials prevention inspections.

According to a recently published report, a greater number of hazardous materials incidents are occurring in residential

areas.¹ Thus far regulations and enforcement has been directed toward the business community. A future issue may be more attention to residential controls regarding hazardous materials storage and environmental waste. Although the business community has been the focus of most of the environmental regulations locally, according to the WPCP the greatest contributor to most of the environmental problems is the residential community.

¹ Hazardous Materials Incidents CALIFORNIA, Governor's Office of Emergency Services, January 1990 through December 1991, Hazardous Material unit, April 1994.

Fire and Life Safety Education

Despite attempts to reduce fire losses through inspection programs, codes, and ordinances, the United States consistently suffers the greatest annual loss (among modern industrial nations) whether the measure be property loss, death and injury, or fires per capita. These efforts aimed at the physical environment have not solved the problem. The reality is that, in most cases, buildings and their contents do not start fires, people do.

Innumerable studies have shown that fire prevention, especially through public education, is the most effective way to reduce fire losses. Public fire education efforts date back to the 1930s. Early programs were directed more at educating the public on the role of the fire service than gaining public support for provisions of the fire code. Public education today is much more externalized; focusing on the consumers rather than the producers of fire protection. It is viewed essentially as an intervening strategy to prevent fires from occurring or help control them at the incipient stage. Now public fire education has become an organized network of information and consultation, picking up where codes and ordinances leave off.

Since the President's Commission on Fire Prevention and Control released its report in 1973, there has been more of a national awareness concerning the effects of fire. Television specials, public service announcements, and other media campaigns have stressed safety and fire prevention. Some of the most successful public education programs have been those targeted at specifically young audiences, such as "Stop-Drop-And-Roll," Operation EDITH (Exit Drills in the Home), and the Learn Not To Burn curriculum.

The attitude and concern of individuals toward fire should be the basis of a good fire safety education program. Programs and activities should constantly remind the public to avoid careless activities, to recognize potential hazards, and teach the proper methods for individual first response to fire. Probably the most critical group of citizens to reach are

children. Not only are they the most receptive to elementary fire education programs, but they also influence adult behavior. Tomorrow, they will be community leaders who can see to it that sound prevention programs are continued. Other target populations include the elderly, who, like children, are frequently the victims of fire, and disabled individuals, who often have special communication or mobility needs. Programs that involve members of these groups can be very effective in creating awareness and widespread support.

In Sunnyvale, the Community Services Bureau within the Support Services Division has been designated as the lead for all public education being provided to schools, businesses, service organizations, and citizens. In 1975, the Department and the Sunnyvale School District cooperatively developed a Fire Safety Education program for elementary schools. The program was developed using the expertise of Public Safety Officers, School District Administration and teachers. The following year, the program was expanded to include public elementary schools from other school districts in the city, as well as, parochial schools.

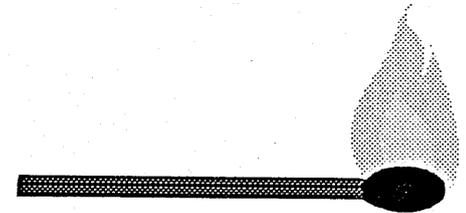
Recently, public education has been extended to include service organizations, business establishments, local industry, neighborhood groups and associations, community groups or clubs, and all Sunnyvale residents. The content of each fire safety education program varies to meet the needs of the targeted group. Tours of fire stations and apparatus are also arranged allowing residents, school children, and service organizations an opportunity to visit and learn the wide variety of activities firefighters are involved in as well as the types of incidents to which we responded. The safety message will be taken wherever an interest or need is evident. Sunnyvale fire company officers and Neighborhood Resource Officers (NRO's) fulfilled 202 requests for talks, demonstrations, and tours of fire stations and apparatus with a total audience of more than 7,716 during fiscal year 1993/94.

One aspect of Fire and Life Safety education that has experienced growth over the last decade is the Juvenile Firesetters programs. Juveniles are responsible for a significant proportion of both the accidental and intentional fires that occur each year in Sunnyvale.

In the past, juvenile firesetting was not seen as a fire service problem. During the last decade, the manner in which these juveniles are handled has come under close scrutiny. Traditional counseling for a juvenile firesetter consisted of someone, usually a firefighter or investigator, "talking" to the youngster, frequently using scare tactics. That counselor was not trained in interviewing or counseling techniques, nor was there any provision for guidance or education in fire safety for the child.

In response to these concerns, the Office of Juvenile Justice and Delinquency Prevention (OJJDP) and the U.S. Fire Administration began a new research and development program intended to conceptualize, design, develop, and evaluate a variety of community-based approaches to prevent and control juvenile firesetting. The initiative was known as the National Juvenile Firesetter/Arson Control and Prevention Program (NJF/ACP). In Sunnyvale, the Juvenile Firesetter program is coordinated through the Community Services Bureau. The goal of the program is to stop curious children from playing with fire and targets all children who have set fires regardless of the size. Children can be referred to the program by a Public Safety Officer or any concerned adult. This comprehensive intervention program provides education to the children and their parents and has successfully reduced the number of juvenile set fires.

The effectiveness of Public Education programs have sometimes been questioned. They are soft programs, whose results are difficult to measure. Traditionally the public is apathetic until a major fire has occurred. Despite this several major studies have shown a dramatic reduction in fire loss and deaths as a direct result of education programs. While the Community Services Bureau has participated in a number of fire prevention education programs, there are areas still left to



explore. Home inspection programs similar to crime prevention home inspection programs have had success in other cities.

There is a saying in the fire service that there are three causes of fires: men, women, and children. Changing their attitudes and behavior with respect to fire conditions can have a significant impact on the incidence of fire.

Community Involvement

Community relations is an important part of the Fire Services Division's mission. A visible presence in the community heightens the awareness of the citizens to issues such as fire prevention, hazardous material control, and life safety. It cultivates a positive attitude toward the Public Safety Department.

The Community Services Bureau is currently developing a program which will be named "Friends in Blue." As it will pertain to the Fire Services Division, individual fire station teams will be able to adopt a school for the school year. Once the fire team adopts a school, various activities will be developed and scheduled around school activities. Fire teams will then conduct hose drills, demonstrations, and tours of the fire apparatus at the school giving a greater number of students the opportunity to observe these activities. By providing the children with safety education and positive role models, the Fire Services Personnel hope to influence the attitudes and actions of the community.

Additionally, since fire stations are strategically located throughout the city, they serve as focal points for a number of community activities. Fire stations serve as polling places, voter registration points, bicycle registrations, and collection places for Christmas toys, clothing, and food for the needy. Infrequently the stations have served as facilities for neighborhood meetings.

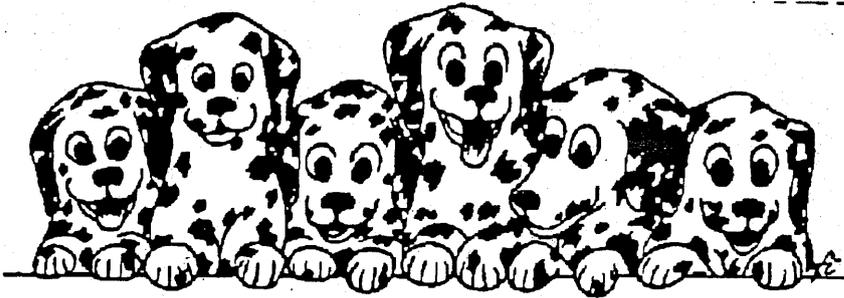
Existing programs such as the Sunnyvale Neighborhoods Actively Prepared (SNAP) Program's First Aid and CPR training have come about in recent years with the assistance of the Fire Services Division. Instructors from the Fire Services Division provided the initial first aid training to select SNAP's members that allowed them to become first aid instructors in the community. The continued and expanded support of the Division in this area should become a priority in order to increase the ability to provide first aid in the first critical minutes of all EMS responses.

Sunnyvale has taken a proactive approach to helping business and industry prepare for and recover from a seismic event by coordinating the Sunnyvale Emergency Preparedness Organization (SEPO). The program is coordinated by the Support Services Division's Emergency Preparedness unit acts as a catalyst to bring business representatives together to discuss common needs. The objectives are to promote communication among neighboring companies and to strengthen relationship with each other as well as with the City.

Although not a direct function of the Fire Services Division, fire services personnel do, however, provide the necessary facilities, equipment, and expertise to train SEPO members in specific areas of their training. SEPOs coordinated training programs are designed to provide professional training for business and industry employees. These classes include: Hazardous Materials Technician Response, HazMat Recertification, Emergency Response Team (ERT), First Aid/CPR, Medical Emergency Response Training (MERT), MERT Recertification, Search & Rescue, and Other Programs. During fiscal year 1993-94 fire services personnel provided training to over 329 industry employees who attended these training classes.

In addition to SEPO, Sunnyvale has also developed and implemented the Sunnyvale Employee Emergency Response Team (SEERT). Thus far, forty-six employees from all city departments are involved in the program. Each attended and completed the twenty-four hour training program that included fire suppression/hazard identification, first aid/CPR, triage, search & rescue, and communications protocol. SEERT members have increased their knowledge, experience, and confidence in their response abilities and will meet on a monthly basis to receive additional training and to discuss issues. The majority of the training was provided by fire services personnel.

The Fire Services Division plays a vital role in the well-being of the community. The Fire Services Division personnel provide information and resources to the community to help prepare them for any emergency that may arise.



OPERATIONAL SUPPORT

The Fire Services Division Personnel must be ready to act in a matter of moments to any emergency situation that may arise. When Public Safety personnel provide fire services, it often involves situations where lives and property are in peril. It is essential then that all support components necessary for response to emergencies be of high quality, well maintained, and directed toward prompt and effective performance. The condition of facilities, apparatus and equipment; quality of training; compliance with safety standards; and the knowledge and use of new technology all play a major role in the services provided by the Division.

Facilities, Apparatus, and Equipment

Facilities

In 1962, there were only three fire stations in the city. Two were older structures and one was relatively new, built in 1960 to increase protection in the rapidly growing south side. As the City developed its vacant land, responding to the growth and population explosion of the 1960's, it became necessary to expand fire protection capability. Three new fire stations were completed in 1963 and 1964 bringing the total to six stations, and the two oldest fire stations were replaced by new buildings.

The map on the facing page depicts the locations of the six fire stations in relation to the geographical boundaries of the city. Regardless of the methodology employed, it is important to recognize that fire station location is a significant resource commitment. Generally speaking, fire stations and other fire protection facilities such as the training center, are placed in the community on the basis of risk analysis and response time

requirements. Choosing the location of a fire protection facility involves several years of planning.

A considerable amount of coordination is required between the Fire Services Division and other City Departments having responsibility and authority to deal with the community's development. Zoning and land use have a real effect on fire station location and utilization.

Original considerations of acceptable travel distances between fire stations and properties on the periphery of their response district could have been impaired by increasing vehicle traffic particularly during peak commute times. This has not been the case. Although the number of vehicles on the City's streets has increased substantially since 1985 (and only recently began to level off), actual traffic congestion has decreased. Improvements in street design and arterial capacity plus traffic signal sequencing and timing have dramatically improved traffic flow despite the increased volume. Traffic signal preemption capability for fire apparatus has provided an additional enhancement for reducing emergency response time.

Generally speaking, all six fire stations have the same basic design except for fire stations 1 and 2 which have three bays for fire apparatus; the remaining stations each have two bays. At this time all bays are being utilized by the 12 first line fire apparatus and two reserve apparatus. There is no capacity for housing additional fire apparatus.

All six fire stations are one story in height and of masonry construction. At the time of construction over 30 years ago, the height of the fire apparatus bay entrances was more than adequate for the size of apparatus in service. With the purchase of the 102 foot aerial truck, minor modifications were made to station bay entrances at fire stations 1 and 2. Height and length requirements for recently purchased fire apparatus to meet operational needs required significant modifications to the apparatus room doors. As fire apparatus requirements change, so must the facilities that house them.

With the entrance of women into the Fire Service there is a need for dual facilities. Fire stations designed today incorporate dual facilities for restrooms, dormitories, and other amenities. A capital project is currently under consideration to address this issue in Sunnyvale's fire stations and headquarters. The Department actively recruits women as Public Safety Officers. (See Support Services Sub-Element)

Sunnyvale's emergency service buildings and other city facilities have received considerable re-engineering in recent years to ensure their ability to withstand a major earthquake. Each of the six fire stations received seismic retrofitting between 1988 and 1993. All fire stations currently meet established state and federal seismic safety standards. In addition to the retrofit, each station's heating system was upgraded and central air conditioning was installed. The buildings were repainted inside and received new roofs. For emergency purposes, higher output generators were installed for use during power outages.

In addition to the seismic retrofitting and general minor repairs and remodeling done to each of the six fire stations, two major remodeling projects were completed. Both projects involved fire station 2. The first project added additional dormitory and office space, enlarged the restroom (to accommodate additional personnel during training), and added a laundry room and classroom for use during training sessions. The project also added a work/storage shop for special equipment repairs and storage. This project was completed in 1987. The second project involved the purchase of additional property surrounding the station and enlarging the property so more realistic fire drill evolutions could be conducted. The project also included lighting for night drills, and a master control panel for interior and exterior tower lighting for special drills. This project was completed in 1992.

A capital project has been proposed for the construction of a new training tower at station two. Concerns about the seismic safety of the existing tower and the inadequacies of the existing tower in relation to training needs prompted the proposal. The

Division continues to be open to the regional use of the tower and expects the Regional Joint Training Academy to utilize the facility in the future.

In Sunnyvale, rather than each department managing their own facilities, all city facilities are managed and maintained by the Parks and Recreation Department's Building Services Division. Each department rents their facilities. These funds are used by Building Services to maintain, repair, and remodel those buildings as needed.

Minor fire station maintenance and general house cleaning is done on a daily basis by officers assigned to the station. Officers are encouraged to find discrepancies and to make repairs before causing a notification to Building Services. However, when more complex repairs are needed, e.g., plumbing, electrical, overhead doors, and painting, Building Services management is informed. After reviewing the request, a decision as to whether the repairs are to be completed by building services or contracted to a private company is made. Most major repairs are contracted to private companies.

Future Issues

Facility age is a critical influencing factor as it has a significant relationship to the functionality of the facility. As the facilities grow older, they tend to also exceed their intended use. All six fire stations are at least 30 years old. When planned and constructed, they were designed to house two pieces of fire apparatus and a mission primarily focused on firefighting. The stations' continuing functionality is a tribute to a planning effort that allowed for change and expansion.

Despite this foresight, with each passing year the age of the facilities increase and the needs of the community change. Major remodel or rebuild of the existing stations will become necessary in the future. As the stations are relatively close in age, formulation of a plan in the coming years to phase out the old stations and rebuild over the next few decades would be required to ensure that adequate funds are available and to provide for continuity of service.

The Futures Study raised the issue that additional fire stations and apparatus might be required with significant increases in population. The study's Environmental Impact Report (EIR) suggested the need to consider response routes, station placement and strategic deployment of personnel and apparatus within an eight station framework as the community approached build-out under the high-end (maximum population) alternative. This alternative was not chosen. In fact, under the General Plan amendments which were adopted in 1993, the build-out numbers of housing units, residents and jobs were limited to even less than the low-end alternative outlined in the Futures Study. It is not anticipated that additional fire stations will be required at community build-out under the current General Plan.

Apparatus

Fire apparatus and equipment continues to be the benchmark against which the capability of a fire service organization is measured. If anything, the diversity of the tasks an apparatus is called upon to perform has increased during the past decade. In the myriad of other activities of the fire service, such as rescue, first aid, fire inspection, and training, fire apparatus must be suited and equipped to serve a number of functions.

The basic fire apparatus is a diesel driven truck specially constructed and modified to carry a varied assortment of tools and equipment for fighting fires. These include a water pump, hose, water tank, ladders, and other portable appliances and tools. The amount and capacity of the components depends upon the particular use for the apparatus and varies from city to city, according to local needs. Larger capacity pumps are specified for Sunnyvale fire engines which are stationed in combination with fire truck companies in the high value districts.

Sunnyvale Fire Services Division continues to use four major types of fire apparatus: triple combination pumpers, squads, aerial trucks, and a special unit. Over the next ten years, 10 of

the 14 fire apparatus and the incident command vehicle are scheduled for replacement. Consequently, any change in apparatus design and specifications will have an immediate and significant impact on future purchases. The NFPA Automotive Fire Apparatus Standard 1901 specifies performance requirements and provisions applicable to various components of all types of fire apparatus. The standards have been accepted by the International Association of Fire Chiefs and ISO. Those standards have been incorporated and followed in Sunnyvale's apparatus specifications. The descriptions of the four broadly classified types of fire apparatus Sunnyvale uses are provided.

Engines - Engines are also known as triple combination pumpers because each has a water pump, water tank, and carries a complement of fire hose. They also carry a variety of other equipment and tools necessary to perform firefighting and life safety functions.

Squads - Squads have the same capability of triple combination pumpers, but are configured differently. They are equipped with a larger variety of tools and equipment including additional ladders, forcible entry tools, generators, lights, and powered rescue equipment.

Trucks - Trucks may also be referred to as "quints" because they carry a small water tank, limited hose, large capacity pumps (1500 GPM), longer ground ladders, and heavy equipment. More importantly, they are equipped with power operated elevated booms or ladders. These allow delivery of large fire streams and "reaching" to upper floors and roofs for rescue or for movement of personnel and equipment.

Special Unit - The Special Unit is designed to provide a number of support functions, primarily as a response apparatus for hazardous materials incidents. The apparatus has no pump, water, or hose, but provides generated power, lighting, breathing air cylinders, heavy rescue capability, and special hazmat clean-up and containment supplies.

The choice of design and specifications of fire apparatus is highly dependent on the service requirements and emergency

operation policies of the Department. The greatest factor affecting the design and specifications of fire apparatus continues to be preparing for the worst fire potential existing in the protected area, tactical policies for the use of the fire apparatus, and any special requirements present.

Fire apparatus bid specifications are developed by a committee composed of knowledgeable public safety employees working with the City's Fleet and Purchasing Officer. A schedule projecting the years in which fire apparatus are due for replacement is maintained by the Fleet Manager. Generally, the history of on-line fire apparatus use for Sunnyvale which includes emergency responses, training, and fire prevention activities, has been 20 years. When replacement is necessary, the fire apparatus is removed from line service and is used as one of the two reserve units. The reserve units provide the necessary cover for periods of maintenance and repairs of on-line fire apparatus. They serve in reserve status for an additional three to five years.

The 20 year replacement schedule for fire apparatus appears practical and most likely will continue. Beyond the 20 year span of service, repairs become more frequent and costly. Additionally, the dependability required for emergency fire apparatus declines to an unacceptable level. The replacement scheduled is as follows and includes purchase date, type of apparatus, assigned station, and replacement date.

Table 1
Fire Apparatus Replacement Schedule

<u>Year</u>	<u>Description</u>	<u>Station</u>	<u>Schd Repl Yr</u>
1983	1500 GPM Engine/Pumper	1	2006/07
1986	1500 GPM Aerial/Platform Truck and Pumper	1	2005/06
1975	1500 GPM Engine/Pumper Reserve	1	1997/98
1987	1500 GPM Engine/Pumper	2	2006/07
1981	1500 GPM Aerial/Ladder Truck and Pumper	2	2000/01
1983	Hazardous Materials and Heavy Rescue	2	2002/03

FIRE SERVICES SUB-ELEMENT

1986	1000 GPM Engine/Pumper	3	2004/05
1983	1000 GPM Squad/Pumper	3	2002/03
1986	1000 GPM Engine/Pumper	4	2004/05
1983	1000 GPM Squad/Pumper	4	2002/03
1974	1500 GPM Engine/Pumper	5	1997/98
1981	1000 GPM Squad/Pumper		
	Reserve	5	2001/02
1981	1500 GPM Engine/Pumper	6	2000/01
1993	1500 GPM Squad/Pumper	6	2013/14

Sunnyvale's fire apparatus is designed with a number of important features. Among these are:

- Engine and drive components for dependable service over a minimum of 20 years;
- Adequate passenger cab space to accommodate radio equipment, computer terminals, map books, and breathing apparatus which is donned enroute to emergency fire calls;
- Adequate equipment areas and compartment space to accommodate required fire hose, tools, and equipment;
- Sufficient pumping capabilities in all firefighting apparatus to deliver required fire flow;
- Sufficient reach capabilities in truck apparatus to position elevated fire streams and to provide rescue capabilities from multi-story buildings; and
- Standard features necessary for operational and training requirements existent in the Public Safety practice of personnel rotation.

The most recent apparatus purchase took place in 1993. After consideration of several factors including the possibility of high rise construction and isolation of the northern area in a natural disaster, the Division purchased a custom designed 1500 GPM triple combination pumper with the capability of carrying many pieces of equipment (extra air bottles, hose packs, and rescue

equipment) used in high rise structure incidents. Its cab is completely enclosed with room for five firefighters, breathing apparatus, and radio equipment. Additionally, a telescoping light boom and generator were installed, as well as foam capability, rescue equipment, ladders, pre-connected hose lines, and a 5" supply line for fire suppression efforts were included.

Public Safety vehicles are managed by the Public Works Department's Field Services Division Fleet Manager. All major items such as fire apparatus and specified equipment have a determined useful life. The fleet manager reviews historical data associated with the purchase price and maintenance costs, and translates it into a rental rate which the Fire Services Division is charged. These fees provide the funding for maintenance, overhead, and replacement.

A major part of resource management consists of carrying out a sound maintenance program. Intermittent or poorly managed maintenance programs will have a high cost later in terms of repair dollars and downtime. Fire apparatus and equipment maintenance have been given a high priority by our department as well as the Fleet Manager. The Fire Services Division has assigned one officer to be the liaison between Public Safety and fleet maintenance. The officer evaluates, prioritizes, and schedules the routine preventative maintenance of all fire apparatus. Although the staff maintenance officer schedules the routine maintenance, the Fleet Manager is responsible for assuring that all maintenance and repairs including emergency repairs are completed in a timely manner when required.

The Fleet Manager works closely with Fire Services personnel when developing fire apparatus specifications. Through this cooperative effort both departments benefit. Fire Services receives the fire apparatus that is responsive to the needs of the department and community while the Fleet Manager satisfies maintenance concerns, reliability and ease of maintenance. The Fire Services Division enjoys an excellent working relationship with the fleet department which is expected to continue into the future.

Future Issues

Although the types and sizes of fire apparatus currently in use in Sunnyvale are adequate to meet present needs, changing community conditions may require rethinking the design of future apparatus. For example, with the increased demand in providing emergency medical services experienced during the past decade, smaller, less expensive, more mobile vehicles may be necessary in the future.

Equipment

Fire apparatus must be equipped to accomplish assigned fireground operations according to the type of fire apparatus, engine, squad, truck, or special unit. Pumping engines carry a wide assortment of tools and equipment needed to make them self-sustaining firefighting units. Several thousand feet of hose, nozzles, fittings, and appliances necessary for effective delivery of water, make up the most extensive and costly components on engines. Squads and trucks carry similar equipment, but also have more heavy tools and power equipment, longer ladders, and a wide array of rescue, lighting, and breathing equipment. The Department's special unit is specially equipped for heavy rescue and hazardous materials incidents. Additionally, it has a cascade system for refilling air bottles at the scene of fires and a telescoping light boom for illumination during hours of darkness.

In addition to that carried on the fire apparatus, other items necessary for maintenance, testing, and inventory stock are kept at the appropriate fire station facilities. While some items have a long life of use, others are subject to frequent and hard use, or are extremely critical to life and safety and must be replaced more often. Additionally, some equipment is constantly changing and evolving due to technological advancements and improvements through design changes. Detailed computerized equipment records have been developed and are stored in the Department's computer data base. Regardless of the quality of the original purchase or the

maintenance, all equipment has an optimum service life. If this is exceeded, equipment will breakdown more often and for longer periods since parts will not be readily available.

In evaluating fire attack capabilities and comparing service levels, the importance of water supply and its delivery to the scene of a fire must not be ignored. Of all the equipment carried on fire apparatus, fire hose is the one item most frequently used for extinguishing fire. Fire hose, therefore, is absolutely essential to accomplish our primary mission; to save lives and property. Firefighters worldwide still put out fires by moving water through fire hoses and directing it onto the fire.

To assure an adequate and reliable supply of water is available at the scene, the Division conducted a study of various hose sizes and configurations which would increase the fire flow capabilities. As a result, the available water was effectively increased by replacing the traditional 2½ and 3 inch hose lines with 5 inch hose. The five inch hose used as a supply line effectively extended the city water distribution system to the scene of a fire, literally creating portable water mains above ground.

Also in an attempt to deliver greater quantities of water onto the fire, larger hand lines were evaluated. During the past several years, several of the 1½" quick attack hose lines on all fire apparatus were replaced with larger 1¾" hose lines. These larger 1¾" hose lines are pre-connected, mobile, and supply 30% more water.

All new hose purchased is made of synthetic material. The older cotton hose required many hours of maintenance to clean and dry, preventing mildew and deterioration which would affect the serviceability of the hose during emergency operations. The new hose requires less maintenance and is not subject to mildew, therefore, after a fire or training it could be loaded on the fire apparatus wet without worry.

Personal protective clothing for firefighters is issued to all officers in the department regardless of assignment, as all may

be called upon to perform firefighting duties. Items such as helmets, coats, pants, boots, and gloves, which afford personal protection under adverse conditions must meet Occupational Safety and Health Administration (OSHA) standards of construction and resistant qualities.

Equipment is tested regularly to ensure NFPA standards are met. A replacement schedule has been set up based on the optimum life for each piece of equipment and the cost of replacement has been incorporated into the budgetary process.