Big Bear Lake Fire Protection District

FIVE YEAR STRATEGIC PLAN

2002-2007

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SECTION 1

EXECUTIVE SUMMARY

PURPOSE

The purpose of a Strategic Plan for the Big Bear Lake Fire Protection District (District) is to chart the development of the District in order to meet the demands of the community in the future. Strategic planning for the fire service is no different than that of the corporate world planning for the future to meet our customers needs.

This plan establishes a road map and work plan for the Fire District for the next five years 2001 through 2006. The plan is designed to be updated each fiscal year as the identified Goals and Objectives are accomplished and/or reevaluated.

The Strategic Plan is not meant to be an all-inclusive training manual or encyclopedia for fire protection. This document summarizes needed improvements and modifications to the District based upon nationally accepted good practices, nationally recognized standards of service, and local conditions in order to improve the current level of service and keep up with the continual and potential growth in the community and surrounding areas.

This document presents historical data, a hazard analysis, incident response data, fiscal data, a vision, values, mission statement, goals, objectives and programs for design of the District delivery system.

The plan attempts to look forward to a build-out of the community in the next century, but for purposes of realism, the scope is limited to five years. It is very difficult to project beyond that period of time.

The District has responded to all types of service requests (emergency and non-emergency) for years. It has always attempted to provide the highest level of fire, EMS, and related services. Having tended to many victims over the years, the District has itself fallen victim to economic downturn, ongoing growth, and an increasing emergency incident load. The lack of a strategic plan can result in unforeseen challenges in the future. These challenges will only escalate unless they are mitigated. They will not magically disappear. The challenges can be resolved with a balanced budget and stable revenues. Therefore, the Fire District Board of Directors must make a policy decisions as to the desired level of service, based upon recommendations.

Additional detailed technical or background information is available from if necessary staff. Typically, reader and policy makers agree with the recommendations in documents such as this, when substantiated by national, local standards and goals and objectives as well as quantitative and qualitative benchmarks. The issue of Level of Service comes down to costs and implementation dates as this document transitions from conception to the pragmatic.

BACKGROUND AND SETTING

The District's Mission development has been guided by the following history: It is the belief of current personnel that while fire suppression capabilities increased, a significant role change did not occur until the decades of the 1960s and 1970s. During this time, the District trained firefighters to the level of advanced first aid providers, and then, emergency medical technicians.

Thus, the District began to provide a significant increase in the service level to the community in the emergency medical service arena.

Legislation and fire service trends in the 1980s encouraged the District to begin training members to the level of first responder for hazardous materials incidents resulting in a greater role in protecting the environment.

After City incorporation in 1980, a rating of the District by the Insurance Services Office (ISO) was pending. Due to the City's ISO rating of 9 in Moonridge and 7 for the remainder of its jurisdiction (an ISO rating of 10 = No fire protection; 1 = Highest level of protection), the City Council directed the District to provide the necessary improvements to reduce the high ratings.

A pre-ISO analysis revealed deficiencies in three principle rating areas:

- Fire Department – staffing, training and fire prevention
- Communications/Dispatch
- The Water System

With insufficient time to make significant improvements to the water system or the Sheriff's Office Dispatch Division, the District:

- Upgraded and standardized equipment on our fire engines,
- Improved training and record keeping, and
- Undertook the development and implementation of a comprehensive fire prevention program, all of which resulted in a citywide improvement in the ISO rating to 4.
- The District will be due for another evaluation in the near future with even a better rating expected

The overall purpose of this Strategic Plan is to provide a plan of action for the development of organizational leadership, human resources, fire protection programs, and infrastructure, which will support the District's unified mission and vision into the 21st century.

This Strategic Plan is intended to outline what needs to be accomplished over the next five years and will serve as a foundation to the Board of Director's decision making process when considering implementation of the Plan's established funding priorities. The goals and objectives of the Plan are intended to support the long-term vision, implemented over time, as available funding and resources permit.

The following assumptions are used in preparing the information in this document and to establish the priority of funding needs which will serve the District's mission. These assumptions were also used to establish the basis for the District's vision.

Description – The Big Bear Lake Fire Protection District was formed in 1927. The District's service area is approximately 9 square miles in size, bordered by the San Bernardino National Forest, Bear City Community Services District, and San Bernardino County. The District

services not only the resident population but also meets the demands of the four season's mountain recreation for the entire Southern California area, which brings an increased recreational population of 14-15 thousand to the area daily[1]. The potential exists for an increased full time resident population from 8,000 to 12,000 within the first quarter of the 21st century.[2] Annual call volume has been averaging 1,200 with an average response time of six minutes from receipt of alarm. Call volume for 2000 was 1,698.

Information - Topography ranges from 6,750 feet on the valley floor (relatively flat) to over 7,600 feet in the southern boundaries of the District. Subdivisions and businesses have been built within heavy brush and timber, making the District a prime example of a wildland/urban intermix with its associated fire protection challenges. Vegetation types, fuel loading, topography, temperature, and various rainfall amounts combine to create potential, extreme fire conditions during the declared fire season, which runs between June and November.

Personnel in the Fire District provide service in a very diverse area of the County. Challenges range from providing structural fire fighting for residential areas and moderately sized commercial buildings and complexes to wildland fire protection and suppression. Services have evolved to include ice rescue, over-the-side rescue, vehicle extrication, first responder medical and hazardous materials response. Currently through automatic aid and mutual aid agreements with the Community Services District, Forest Service, and the County of San Bernardino Fire Department, the District also provides emergency services to areas outside its jurisdictional boundaries.

Governance – Authority for organization and powers (enabling legislation) are currently derived from Fire Protection District Law of 1987. The Fire Chief, hired by the Fire Administrator who is also the City Manager under the City Council/Board of Directors, is responsible for the administration of the District affairs.

Board of Directors -- The California Health and Safety Code, Section 13840 vests the governing authority of fire districts with a legislative body known as a board of directors. There are two qualifications statutorily required of an elected board member: 1) he/she shall be a resident of the district; and 2) he/she is a registered voter of the district.

GOAL: The District should adopt a comprehensive set of policies and a job description designed to help elected board members effectively function in the decision making process, effectively work as part of the administration/leadership team, stay within the legal bounds of his/her authority, and represent the District's customers in the appropriate manner.

The District recognizes the value of diversified experiences, backgrounds, and expertise provided by individual Board Members and strives to utilize and incorporate that experience and expertise at every opportunity.

[1] USFS Annual Visitation Summary, 1993
[2] General Plan, City of Big Bear Lake 1999, LU-4

Fire Department Accomplishments - Personnel in the Big Bear Lake Fire Protection District take great pride in the organization and its accomplishments. The following list highlights some of these specific points of pride. This list of accomplishments is not all-inclusive.

Services

- Initiated and operated the household Hazardous Waste Collection Program.
- Oversee the weed abatement contract with San Bernardino County
- Improved the City's ISO rating to a Class 4 from a Class 9.
- Provide fire training in excess of 240 hours per year for each full time employee.
- Inform and involve citizens and school children in a fire and accident safe community. The District provides fire and public safety services that include the presentation of a variety of public education programs.
- The District provides annual business fire inspections to all businesses in the City of Big Bear Lake, which has resulted in a decline in the number of commercial fires and annual dollar fire loss.
- FD-94 Comprehensive New-Hire Program.
- Implementation of a First Responder Paramedic program
- Implementation of a Firefighter Apprentice Program

Personnel

- The District has enjoyed a tradition of attracting and maintaining a strong well-trained and dedicated group of professional employees.
- District personnel have been actively involved in the development and maintenance of programs including safety equipment, apparatus design, equipment purchase and repair.
- District personnel enjoy the support of a strong and active paid call firefighter program, which provides firefighter and organizational support.
- Diversity among the District's workforce helps in planning and delivering services with each team member offering a unique set of skills and abilities (expertise) to the organization.
- Employees of the District would like to strive towards building a collaborative, non-adversarial labor/management relationship with the Board of Directors. The District should recognize the need for such a relationship in producing a motivated and involved workforce.
- District personnel take pride in a professional image. Perceptions of the organization play an important part in maintaining credibility with the District's customers and a professional status with allied emergency service agencies and providers.

Resources

- The District takes great pride in its fleet of emergency response apparatus. District apparatus was designed to provide flexibility, reliability, longevity and safety. Recognizing the need to balance budget efficiency and service effectiveness, the Fire Board may choose to focus on maintaining the District's future infrastructure and making

maximum use of tax dollars by investing in high quality, state of the art, long lasting equipment.

- The ongoing apparatus replacement program that began in 1983-84 has significantly reduced response times with the purchase of apparatus having high horsepower to weight ratios.

Management

- The District's financial, fleet maintenance, training, inspection, inventory, and incident records have been computerized giving access to data and information critical for good decision making and planning.
- This plan marks the beginning of a non-traditional enterprise philosophy embracing a desire and willingness to look at new markets (revenue sources), functional consolidations, contracts, customer services, and public-private partnerships as a way to enhance fire protection services.

Funding Overview - The District is supported primarily through property taxes. The ability to set property tax rates and levy property taxes remained somewhat discretionary at the local level until the passage of Proposition 13 in 1978. Proposition 13 removed most revenue raising powers and rolled back property tax revenues to 1975 levels. Proposition 13 also capped the growth of assessed values on taxable property to 2% per year, unless the property was remodeled or sold.

Following the passage of proposition 13, the District lost significant revenue, as did most special districts throughout the state. In 1979, the state provided bailout funds to counties to keep special districts afloat. This bailout became known as the Special District Augmentation Fund which, in essence, collected a percentage of property tax revenues from special districts and gave the revenues to the County Board of Supervisors to redistribute, as they saw fit, back to special districts.

As a result of the allocation formula recommended by Special District Office and adopted by the Board of Supervisors, between Fiscal Years 1984-85 and 1992-93 the District lost an undetermined amount of tax dollars.

As a result of the state budget crisis that began in fiscal 1991-92, the State legislature transferred 10% of each special district's property tax revenue to the Educational Revenue Augmentation Fund to support schools. The transfer went into effect beginning fiscal year 1992-93 and is still in effect today.

However, in Fiscal Year 1994-95, there was a countywide property tax adjustment, which resulted in a decrease in revenue of $257,475. The table 1-1 shows revenue from 1992 to present. This table illustrates that the Districts revenue stream is stable to meet today's demands. However, future revenue sources maybe required to meet demands of the future.

The district also lost its growth money with the creation of the city's Redevelopment Agency in 1985. The RDA did not establish a customary pass though agreement with the fire district, to

ensure the district realized the incremental growth of property tax. As a result the district looses a substantial amount of yearly revenue to the RDA.

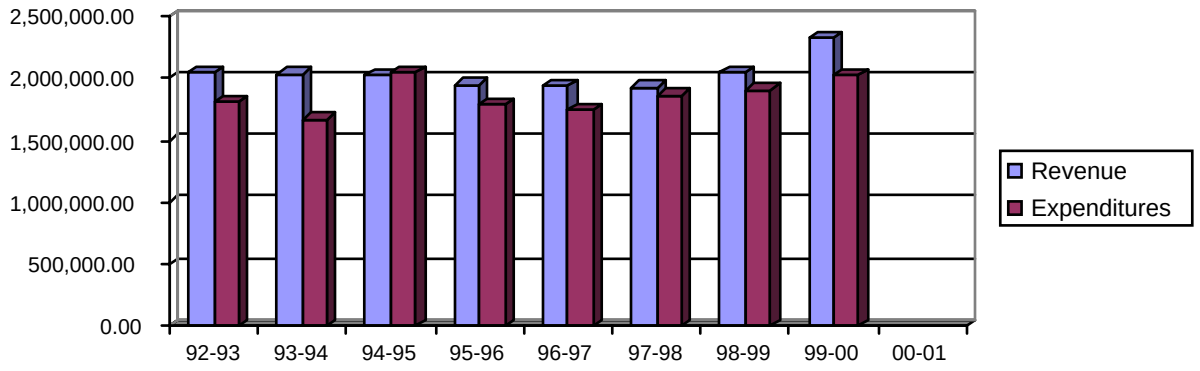

Table 1-1 Nine-year revenue/expenditures

Department Operations

The District's boundaries currently incorporate approximately nine square miles. This includes the City of Big Bear Lake and adjacent Forest Service lands encompassing Forest Service lease cabins. Annual call volume has been averaging 1,200 call per year (1992 – 2000) with an average response time of six minutes (1992 – 2000) for the entire District from receipt of alarm.

Property tax revenues are the primary source of funds for the District with limited additional fees charged for services which include annual business inspections, permits, plan checks, and medical emergency responses, which was adopted in 1999.

The District's budget provides for the operation and maintenance of:

- One 24-hour staffed headquarters fire station with a minimum staffing of three personnel and a maximum of five,
- Two Paid Call fire stations,
- Three first-line fire engines,
- Three ancillary pieces of equipment (water tender, snow cat ladder truck),
- Two rescue vehicles, and
- Five utility/staff vehicles.

Department staffing levels are:

- Fire Chief
- Administrative Secretary
- Assistant Fire Chief
- Administrative Clerk

- Fire Prevention Officer
  - Twelve fulltime personnel assigned to three shifts , with apprentice firefighters
  - An allocation for fifteen Paid Call Firefighters

To better assist fulltime personnel during indicants, paid call firefighters (PCFs) attend weekly training drills and rotate through weekend shifts for additional training and experience.

The District is currently protected daily by career Firefighters working out of one fire station. In addition, there are two PCF fire stations staffed via an on-call basis by fifteen PCFs (when available) and off-duty career firefighters. The career firefighters staff one engine company and rescue squad daily. There is no on-duty staffed ladder truck for use in applying large aerial water streams or for providing search and rescue, ventilation, salvage or heavy rescue which is common in departments that require such unique services. In Big Bear, neighboring departments, under a mutual aid agreement, provide this type of services with the exception of ladder truck service.

The District is empowered to provide services under the laws of the State of California, District Board, and the City of Big Bear Lake. The following services are currently provided:

- Fire Protection Services: Structural and Wildland
- Emergency Medical Service
- Ice Rescue
- Public Safety and Self Help Education
- Fire Prevention and Fire Code Enforcement
- Hazardous Material Emergency Response - Operational Level
- Other Services Relating to the Protection of Lives and Property
- Public Service

Public fire service is a not “for-profit” enterprise. The service is provided as a community funded defense against loss and suffering. To best serve its mission, the District plans the prioritization of expenditures based upon a philosophy that best balances the demand for service with available resources while remaining within the limits of available revenue.

The District serves a variety of customers who have divergent and at times, competing needs. The service system is equipped to provide appropriate response to both commercial areas and the numerous residential neighborhoods within the wildland urban intermix. While the District strives to provide response to emergency incidents within recognized response time criteria, because of geographical location, seasonal demands, and budget constraints response times to properties can vary. The District often has to deliver a service that reflects a balance between demands and resources. Our customers include:

- A wide variety of "external" customers including the general public, property owners, occupants, patients, appointed and elected officials, etc.
- People within the organization rendering services (internal); Board of Directors, paid staff, Firefighters’ Association, and various city Departments.

The fire service is recognized for its readiness to respond to requests for assistance. Services are expected in both urban and rural areas. The community has traditionally supported fire safety as a high priority. Emergency response services are available 24 hours every day. Business office services are available 8:00 a.m. to 5:00 p.m., Monday through Friday. Public education and prevention programs are scheduled through the Prevention Bureau.

Fires, emergency medical incidents, and other public service requests occur throughout the year. The services are generally seasonal; however, the nature of requests for service may vary with the seasons. In the winter, there is high call volume associated with the use of heating appliances; storm related hazards, and winter sports. During the summer and fall months designated as "fire season", vegetation fires may present a significant hazard along with vehicle and recreational accidents.

The District has strived for innovative and cost effective ways to deliver services. Operating as a single-purpose provider offers a non-traditional approach to fire protection. Personnel in the District are indoctrinated to a performance oriented "can do" work culture. A cooperative management style will result in a collaborative labor-management relationship.

The District is service minded and business oriented. The District's approach to decisions pertaining to major capital improvement and acquisitions is based upon balancing cost with safety (in order to meet all fire service standards for safety), effectiveness, and long term service life (reduced maintenance costs and longevity) while remaining within budget.

The District recognizes the purchase of quality equipment and facilities is not always the least expensive in the short term and may seem contrary to a conservative fiscal spending philosophy. The District believes, however, that the purchase of high quality equipment and facilities is more cost effective over the long term and will better serve the goal of maintaining the District's infrastructure over time.

All provided services help to prevent or minimize loss of life and property from fire, medical emergencies, hazardous materials release, and rescue situations. The community benefits from the following: adequate water supply and access for emergency situations through fire code enforcement; reduced threat to people, the environment, and water supply through hazardous materials regulation; increased awareness of fire and emergency situations through public education; and rapid intervention in emergency incidents. Fire protection services result in an improved quality of life and a safe environment for our customers.

<u>Resources</u>

Fixed Facilities

a. Headquarters, 41090 Big Bear Blvd.
   Built: 2000 Size: 12,000 sq. ft.
   On-duty Staffing: Administration, Fire Prevention, and Suppression
   Condition: New
   Renovation: Construct a new station.

a. Station 282
   Built: 1994 Size: 1,400 sq. ft.
   Staffing: PCF
   Condition: Good
   Renovation: 1994 after the 1992 earthquake
b. Station 283
   Built: 1994 Size: 1,400 sq. ft.
   Staffing: PCF
   Condition: Good
   Renovation: 1994 after the 1992 earthquake

Apparatus and Vehicles

a. Basic Deployment Plan - The District is configured in three Fire Management Areas broken into Fire Demand Zones within each management area. Each Fire Management Area is represented by the location of each station. First call equipment is deployed to deliver initial fire attack and EMS services within four to six (4-6) minutes approximately 70 percent of the time (1998).
b. Maintenance - Fire apparatus and staff vehicles are maintained by the District's Suppression personnel. The personnel are skilled at engine, pump, and small equipment repair. Repairs, which are too large to handle in house, are contracted out to the City's maintenance facility or sent to a private vendor for specialized repair. Pump testing and preventive maintenance is completed in- house by Suppression personnel in compliance with state and federal requirements and recommended standards
c. Vehicle Replacement Plan - The plan calls for annual review of replacement criteria including: age, mileage, parts availability, cost of repairs, type and amount of use, personnel safety, accident replacement, reliability, and reserve needs. Reserve apparatus may be maintained up to 25 years depending on condition and parts availability. All apparatus are inspected and tested annually to meet federal, state, and required certification standards. Replacement guidelines for planning purposes are:

   - Automobiles - 10 years
   - Utility Vehicles - 15 years
   - Engines - 25 years
   - Aerial - 20 years
   -

Tools and Small Equipment - First line engine companies are equipped for deployment as stand alone resources. Each engine carries EMS equipment, large diameter hose, generators, foam system, and the basic ISO and NFPA 1901 tool and equipment inventory. The Rescue squads carry salvage equipment, smoke fans, Hurst Tool, air bags, forcible entry tools, gas-powered saws, and rescue rope.

Safety Equipment - California Code of Regulations Title VIII, Article 10.1 establishes the minimum requirements for personal protective clothing and equipment (PPE) that the District

must provide for personnel exposed to the hazards of fire fighting. The District's approach to providing PPE is to provide the highest level of safety through the latest innovative and technological advances in equipment. Safety clothing and equipment selection is in an on-going review of NFPA and other applicable standards by the Safety Committee and the Chief Officers in charge of PPE procurement. Adequate quantities are provided to each employee to ensure convenience, comfort, and safety. Individual records and minimum inventories are maintained for quick replacement. Uniform cleaning is provided by an in house washer/dryer. For turnouts and wild-land gear, cleaning is done with a commercial washer designed for biological cleaning.

Water Supply - The District interacts with the Department of Water providing water for fire protection in service areas of various sizes. The sources of supply are typically local wells, watershed runoff, and storage tanks. The Department of Water is upgrading areas that are deficient in fire flow requirements in conjunction with Fire Department reviews and recommendations. Markings are provided to locate each fire hydrant during normal and snow season.

Communications – The District recently transferred its dispatch provider to Desert Communications in Victorville. This is a fully computer aided dispatch vendor. The district used San Bernardino County Sheriff's Office serves the District's communication needs. The Sheriff staff handles dispatching for Big Bear Lake, & Big Bear City Fire Departments, the Sheriff's Office, and local ambulance provider. The District basically shares one dispatcher for most of the 24-hour day for both fire and law dispatching. There are two consoles for dispatching all of the agencies served by the Sheriff's Office. Dispatching is handled via one primary, and two mutual aid frequencies. Most areas have adequate coverage on one or more frequencies.

Management Information System - Management information systems comprise those manual and automated data collection and reporting procedures and techniques, which provide information to interested parties so that they can measure the efforts and accomplishments of the units, divisions or the District. The systems can be as simple as follow-up telephone calls to clients or as complex as the automated accounting and payroll systems.

All of the District's information management systems are computer based. Automated record keeping and information management is provided in the following areas:

- Payroll and Accounting
- Incident Reporting (CFIRS)
- Training Records
- Hydrant Maintenance and Testing
- Apparatus and Equipment
- Station Activities/Daily Logs
- Hose Testing
- Mapping and Premise Identification
- Computer Aided Drawing
- Asset Tracking
- Engine Company Inspections
- Internet Access and e-mail

Traffic Signal Control System - The District operates a traffic signal control system located at the Headquarters fire station. This system allows emergency control of traffic lights to provide access to the boulevard, thus lowering response times and minimizing risks to emergency responders and the public.

Services Provided

Fire Prevention/Life Safety

The Fire Prevention Division provides fire and life safety inspection services in the areas of building construction, annual commercial building inspection, and hazardous materials regulation. In addition, the Fire Prevention Division delivers a variety of public education programs to the community.

The Fire Prevention Division provides an limited funded comprehensive program of plan review and inspection for land development, new building construction and remodel projects, and is a participant of the Development Review Committee. A plan review for fire safety compliance is provided for all commercial building plans followed by construction inspections to ensure that the final product conforms with both state and local life and fire safety regulations. For existing commercial buildings, the Division provides an annual inspection program that is delivered through both prevention and suppression personnel. All members of the District are part of the fire prevention team.

The Fire Prevention Division is currently staffed with one Fire Prevention Officer working 40 hours per week. However, all Department personnel are considered part of the fire prevention team.

The strategic goal of the Division is to provide for the fire and life safety of the public through educational programs, promotion of fire safety, implementation and enforcement of the regulatory elements of fire and life safety ordinances and recognition of the unique fire and life safety problems within this City, and effectively managing them. In addition, this Division offers the public “proactive” solutions to fire and life safety problems, which provides for a more positive relationship between the public and the District.

Emergency Operations

Personnel respond to all reported fires and fire alarms. A standard first-alarm assignment for structure fire consists of one engine, squad (when staffed), and a Duty Chief. An additional engine is sent from Big Bear City and San Bernardino County under an automatic aid agreement. Total staffing for a first alarm is 4 - 5 personnel. Daily emergency response staffing consists of 3 - 4 career fire personnel on duty 24 hours per day, operating two pieces of first-line apparatus plus one Duty Chief. The on-duty personnel handle all other types of requests for service.

Staffing Pattern - Full Time

The District maintains a 24-hour response staff of a minimum of 3 (5 maximum) on-duty personnel to handle all types of service requests. This staffing pattern, which includes a Duty Chief and 3 or 5 suppression personnel are backed up by automatic and mutual aid in case of a major incident. This type of support is common in the California fire service. The Duty Chief responds to those incidents requiring command and control expertise. The Chief Officers are involved in daily operational duties of the District.

The current staffing pattern should remain in effect to meet the service demands for today. An analysis of the future demands will require increased staffing to ensure adequate personnel are in place to meet the demands of the future.

Staffing Plan - Duty Officer Coverage

The District's Fire Chief and Assistant Fire Chief serve as the District's Duty Officers and respond to major incidents. This provides a minimum available response of four career firefighters, 24 hours per day.

Staffing Plan - Paid Call Firefighters

The District's paid staff response is supplemented by professional paid call firefighters. The District strives to maintain a roster of 15 professional PCFs whom, based upon geographical location of their residence, are assigned to one of two PCF engine companies. Response data shows that structure and wildland fires are supported on average by 5 professional PCFs. Professional PCF response varies as to the time of alarm (daytime vs. nighttime), availability, and seasonal job restrictions (available only certain times of the year).

Fire Investigation

Fire Prevention personnel respond to all suspicious fires and those of unknown cause. They are assisted by outside agencies and District personnel. Investigators can be sent to assist other fire departments with arson investigations on a mutual aid basis.

Emergency Medical Services - Paramedic

The District responds apparatus to all reported medical emergencies and rescue situations. All firefighters assigned to fire apparatus are certified as emergency medical technicians. These individuals respond along with public sector paramedic ambulances to medical service requests. The District is considered the first responder for Advanced Life Support (ALS) for medical emergencies within the City of Big Bear Lake. This has been a long-standing practice in the community and receives strong community support.

It is obvious that the District responds to more medical aid service requests than any other type of call. In fact, this is typical in California, and the trend will continue to

increase. Further escalation will occur with reductions and changes in the health care industry.

"Capitation" by the insurance industry will result in a higher impact upon District personnel, who will be looked upon even more as a replacement to doctors and emergency rooms.

Ice and Over the Side Rescues

The District utilizes specialized equipment designed to carry out rescues such as traffic collisions, ice rescue, over the side, and industrial accidents. All District personnel are trained in specialized rescue techniques and all apparatus carry a complement of various rescue tools.

Emergency/Disaster Management

District personnel provide varying levels of emergency and disaster planning assistance. The District is charged with operation of the City's Emergency Operations Center (EOC) and its state of readiness. District personnel staff the "FIRE" operation at the EOC and coordinate with the various other disciplines and agencies.

Hazardous Materials Release

The District's personnel are certified at the operational level of hazardous materials response. The primary role of the District's response to a hazardous materials incident is to protect life and property and the environment from the effects of the spill or release. Subsequent support for a hazardous materials response is through San Bernardino County Fire Health/Haz Mat Divisions. In addition, support is provided through the San Bernardino County mutual aid system.

Training

The District has adopted the California State Fire Marshal's training and education system's Firefighter 1 & 2 and IFSTA series as the standards on which fulltime and PCF personnel receive monthly training.

The District delivers the majority of ongoing skill, maintenance, and training of PCF personnel. PCF training is currently delivered Tuesday evenings and occasionally on weekends. Training goals have historically been based upon efforts to meet legislative training mandates and ISO training standards.

However, the majority of ongoing training skills and maintenance are stressed for several reasons. The primary reason is lack of a formal training manual with lesson plans and

inadequate training facilities in which to conduct career development. The District has established a training standard of 240 hours/year/person. The training is based on quantity and may not be necessarily of quality. Evaluations of emergency incidents and application of performance will need to be observed to determine if quantity vs. quality is at issue.

While the importance of training cannot be overlooked, the District recognizes the negative impact of increasing unfunded training mandates and standards on both fulltime and PCF personnel.

Administrative and Support Services

Administrative and Support provide a variety of services to support the Districts business. Services include, but are not limited to: business services; processing and issuing a variety of licenses, permits, and reports; processing a variety of records, legal documents, pre-employment, current employment, post-employment information, and employment verification; administration of employment and promotional processes; provision of general assistance to callers and visitors on a daily basis; and public information and relations during emergency and disaster situations.

The District's Administrative Division consists of a full-time Chief, Assistant Chief, Administrative Secretary and Administrative Clerk. Line personnel provide additional administrative support on an assigned basis.

Services include, but are not limited to, preparation and recommendation of the annual budget, payroll preparation, account expenditures, policy development and implementation, processing records and reports, promotional processes, public information, general office duties, emergency and disaster assistance, asset tracking and inventory control, training, and maintenance of apparatus and facilities.

The administrative support is involved in coordinated community events and city activities, such as Development Review process, cross section work teams, leadership development, community outreach programs.

COMPARISON TO NATIONAL STANDARDS

The International City/County Management Association's (ICMA) annual surveys of fire protection agencies nationwide over the past five years indicate the average ratio of fulltime fire department employees has been about 1.59 employees per 1,000 in population.[3] This includes both shift firefighters and support personnel such as chief officers, administrative, clerical and prevention personnel.

The ICMA survey also indicated that fire agencies in the Pacific Coast area, which includes California, averaged less than the national average at approximately 1.25 employees per 1,000.

[3] I.C.M.A., "Police, Fire and Refuse Collection Personnel and Expenditures – 1995, "The Municipal Yearbook – 1996, (Washington D.C.: I.C.M.A., 1992), p.106.

A similar survey by the National Fire Protection Association (NFPA) placed the average just slightly higher nationally at 1.875 per 1,000.[4] The current total of the Big Bear Lake Fire Department personnel per 1,000 (estimated 20,234 average daily population) and 17 current employees) is .84. Therefore, the District is below Pacific Coast ratio.

However, an important measurement that the community should be concerned about is how many shift firefighters are available for response to emergencies. A goal often used in the fire service nationwide which was initiated by the Insurance Service Office (ISO) suggests that 1.0 shift firefighters per 1,000 people in the community provides an adequate response for most normal communities.

On-duty staffing for the District is 3 minimum and 4 maximum, which amounts to .14 firefighters per 1,000 daily population. National Standards recommend .48 per 1000 people. Therefore, the District is behind the national average.

INCIDENT DATA

The number of incidents for year 2000 was 1,698 total calls (4.65 per day) of which 55% were for pre-hospital medical service. Only 6% of all calls were for fires, which is reflection of the departments proactive fire prevention program. This is a relatively high call volume for our area because of the diverse population (tourist and fulltime residents) we serve. At this call volume, which represents a per capita count of .70 calls per 1,000 people. Based upon the average daily population of 20,234, the number of calls in the year 2004 could reach 1,659 calls, or 4.5 calls per day which would have a significant impact on the departments ability to meet the service demands.

The fire loss for the past five years (94-98) has averaged $161,951 per year. An analysis of 1998 incident data shows this to be the busiest year in our history with 1,425 calls of service. Additionally, fire prevention efforts have resulted in the lowest fire losses in over fifteen years (the beginning of modern record keeping) with losses held to $54,660, in property with a value totaling $2,754,750. This is a relatively low fire loss and speaks well of the proactive Fire Prevention and Suppression efforts to date. Losses will increase as structure age and call volume increases causing more simultaneous alarms and thus delaying responses to fires. Incident data section of this document provided in depth information on this subject.

The Department's vehicle fleet is maintained primarily in-house. This includes annual pump tests for all fire engines, semi-annual fluid changes and lubrication, brake inspections and repairs, tune-ups, filter replacements, fire pump valve rebuilds, electrical repairs, and maintenance of all tools and equipment on the engines.

In addition, District Administration compiles data on District activities to establish benchmarks to measure our success and areas where improvement may be necessary. Administration orders supplies and materials, prepares check requests, provides payroll calculations to the Financial Services Division of the city, provides support services to the community, assigns addresses,

[4] Arthur E. Cote and Jim L. Linville, eds., Fire Protection Handbook, 16th edition, (Quincy, Ma: National Fire Protection Association, 1986).

provides technical assistance to engineers/architects/contractors, maintains a computer network system solely with in-house staff, provides general public information and assistance, prepares and maintains records of incident reports, conducts business license inspections, handles fire prevention complaints, conducts fire flow verifications for dwelling remodels/new construction, initiates notices to remove hazardous trees, investigates the cause and origin of fires, counsels juvenile fire setters, participates in the plan check process including final inspections with Building & Safety, works with the Planning Division on new and existing developments, and advises the Department of Water on system upgrades and fire hydrant placement.

YEARLY DEPARTMENT OPERATING GOALS AND OBJECTIVES

Within our present operations, the District's general goal is to maintain current service levels in respect to requests for emergency assistance and in other areas of responsibility necessary to achieve/maintain public safety while constantly reviewing and improving upon the quality of delivery.

Each year, written District goals and objectives are established in certain specific areas of responsibility, which are:

Administrative Operations	Maintenance
Communications	Safety
Driver Testing	Training
Emergency Medical Service	

With the exception of Administrative Operations, these goals are developed and overseen by the District's fire Captains.

Continuing annual objectives include the initial inspections and follow-up inspections of over 600 businesses in the community to minimize the annual fire loss and maintain our ISO rating, testing of over five miles of fire hose and replacement as necessary to ensure Firefighter safety and effective water delivery on fires, testing of 885 fire hydrants, and delivery of a valley-wide School District public education program.

Ongoing projects:

- Disaster Training
- Operations Manual
- Career Development Guide
- Department safety manual revision
- Training Manual

We will continue our efforts in these areas and will update/revise the City's disaster plan. The Department is also considering the benefits and/or detriments to forming a Valley-wide fire/emergency service JPA. Finally, the Department has a goal to develop objectives with Building and Safety to improve upon coordination and delivery of business license inspections, plan checks, and construction inspections.

The District is also setting aside revenue for the replacement of fire apparatus, staff vehicle(s), communications equipment, station construction, and a contingency fund.

Training for full-time personnel is a high priority with a goal of 240 hours per year for each Suppression member. This includes 24 hours dedicated to safety training and 24 hours dedicated to hazardous materials training. The District also has an in-house Department of Motor Vehicles-approved driver training program which meets the criteria for Class 'B' commercial drivers license testing.

Emergency medical technician certification and CPR certification are ongoing, including 12 hours of continuing education units required per employee per year with a written and skills recertification test every four years. A District employee who is a certified paramedic provides this training. Approximately three-fourths of the District members have obtained California State Fire Marshal (CSFM) Fire Officer certification with other members working toward this goal. Captains and above are strongly encouraged to take CSFM Chief Officer level courses and to apply to the National Fire Academy for advanced management courses that are provided by the federal government.

The District's ongoing training culminates in an annual promotional examination for fire captain or fire engineer for eligible personnel which also establishes a list of qualified individuals who can work out-of-classification, thereby reducing the need for overtime. It is with pride that we provide our services to this community.

MAJOR ASSUMPTIONS

Major Planning Assumptions

- The average annual rate of residential development and population growth within the District has stabilized or may increase due to economic upswing. Also, in fill development will continue.
- The average annual rate of growth for assessed valuation has stabilized and may increase if the economy continues to improve.
- While the District expects to experience increased call volume, the current infrastructure (number of stations and apparatus) will support the corresponding increase in demand for service, however, there will be a need to increase staffing levels to meet the increased call volume.
- The amount of privately owned land suitable for future residential and/or commercial development within the City limits is limited. Future development of these lands would not financially support major capital expenditures. Fire protection services for these areas would continue to be provided by facilities currently in place. Unless there is an increase in density or increased occupancy in existing vacation homes with full time residents, then a fiscal analysis for projects would be required to determine the impact on existing services in order to fund those increases in service demands.
- During the scope of this analysis, changes in the health care system will necessitate a reevaluation of the current relationship and role of the Fire District and the public EMS transport provider.

- During the scope of this analysis, there will be no ideological or philosophical shifts with changes in the Board membership affecting the plan.

SOLUTION

In order to be proactive and maintain an adequate level of service to the community, this document sets forth the Vision, Values, and Mission Statement along with Goals and Objectives for Board approval. Staff has reviewed the goals, objectives and programs. Based upon the established goals, objectives, standards, and risk-based criteria, needed levels of service have been projected and are found within the document. Based upon these criteria, programs were developed and future staffing and equipment needs were identified.

An underlying goal of this document is to develop a Safety Services Department that will continue to provide a full service to it's customers and which will be able to become accredited by the National Commission of Fire Service Accreditation. Such accreditation will result in a potential reduction in city liability, improved risk management, a positive impact on insurance rate and costs, and improved professionalism as national benchmark standards are complied with.

The District should become a point of outreach to the community by the City. Fire stations should in fact become neighborhood outreach centers and electronic city halls. The District should strive to mentor, assist, and train the citizenry in self-help, wellness, prevention of fire, and disaster preparedness.

Those who place demands upon the system, beyond the baseline level of service and risk, must share future funding of the District. This document attempts to implement such a program to cure the present inadequacies and to offset the future demands upon the system. The current revenue barely supports the existing delivery system.

As stated earlier this document is a dynamic document, which is subject to constant review, modification, and updating as it is implemented. The document creates a road map pointing the direction in which the District has to grow in order to meet current and future demands while maintaining a level of service in concert with national standards and local conditions. There are several sections in this plan, which deal with different aspects of delivering fire district services. This document has been written with input from many sources and individuals. This document will also be a living document changing as needed.

SECTION 2

OVERVIEW / INTRODUCTION

WHAT IS THE ROLE OF THE FIRE SERVICE?

In order for the Big Bear Lake Fire Protection District to determine where it is going and how it should get there, everyone must first have a common understanding of what the organization is really about. The first question asked by strategic planners is "what business are we really in?" There are many examples of companies who failed to properly answer this question. As a result, they lost business or found their companies failing. A common example is the railroad industry. Their self-imposed definition of being a railroad company rather than a transportation company limited their growth potential. Telephone companies have redefined their business from simply communications to information services.[1]

Times have dramatically changed for the professional and volunteer fire service. The traditional roles it grew to accept and master have given way to major technical and operational challenges. The fire service now faces the complexity of these challenges and also the demands to address expanded community needs. This places the fire services into a new, rapidly developing and diverse matrix of services. Simply stated, the fire service is becoming one of an "all risk" emergency provider. The fire department in the year 2010 may well be called the "Department of Safety Services."

Consider this concept: imagine, if you will, an emergency incident within a typical community that does not involve the local fire department. It is very difficult to think of an emergency not requiring the fire department. For example, if a law enforcement action has the potential for injuries, more often than not, fire department-operated EMS resources including fire companies are dispatched. Major disasters such as earthquakes, tornadoes, hurricanes, floods, and snowstorms are responded to unconditionally by the fire service during the height of the emergency. More and more, terrorist actions such as the Oklahoma City bombing disaster severely impact the fire department. A localized or widespread disaster involving a toxic spill receives an initial action and abatement by the fire service. In this role the fire service often enforces adopted codes and manages the cleanup of soil and ground water contamination resulting from leaking underground storage tanks. There are new opportunities to educate the public in disaster preparedness and survival and, moreover, to train community response teams who can help to mitigate the effects of a major disaster, such as an earthquake, within their neighborhood until emergency services can respond.

William McGowen, chairman and CEO of MCI Communications Corporation, has added an important dimension to strategic planning by asking a new question. He suggests that in addition to defining "what businesses we are in", that we be able to answer, "what other businesses must we master in order to succeeded in our field?"[2] Taking a quick inventory, it is easy to see that fire service organizations have mastered many other businesses. As strategic planning broadens our understanding of the fields we must master to succeed, we can identify and focus more clearly on the skills needed to succeed as a fire service organization in an ever-changing and expanding environment.

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[1] Paula S. McMann, "Managing in 1988, Managing for the Year 2000," International Association of Fire Chiefs, January/February 1988, p.14.
[2] William McGowen, "Strategic Planning," Sloan Management Review Fall 1986.

WHAT IS A FIRE DEPARTMENT?

The primary purpose of local government is to provide protection and service to its citizens. The responsibility of the local fire department and its emergency delivery system is to enhance life safety and property protection. A part of this responsibility is to prevent the destruction of a citizen's property by the negligence of themselves or other individuals, and to insure that business owners conduct their affairs without endangering other members of the community through actions that might result in fires, hazardous materials spills, etc.

Any fire protection and emergency response system should reflect the needs and desires of the community. It should be consistent with the overall goals and objectives of the community and it should be able to function effectively within the constraints of the real world where multiple requirements must be supported with limited resources. It is extremely important that every dollar spent achieve maximum results and that those expenditures be measured against identifiable results.

What is advocated in this Plan pertains to the exploration of alternative methods that can be used to provide fire department services more economically and/or more effectively for the community; alternatives such as variable staffing patterns, private sector responsibility, community support, or comprehensive code enforcement. Also, a clearer description of the organizational purpose is recommended so that planning can concentrate on the essential activities rather than those that might be determined less productive.

Most fire departments are normally separated into suppression (responding to emergency and non-emergency calls) and prevention. The fire department of the twenty-first century needs to concern itself with four distinct areas of management. Based on a comprehensive emergency program,[3] the fire department needs to plan in four specific phases:

- Mitigation Phase:
  Activities that prevent the occurrence, reduce the probability, or limit the effect of any emergency or disaster.

- Preparedness Phase:
  Activities that improve the ability to respond to emergency or disaster events.

- Response Phase:
  Activities that save and protect lives and property, provide emergency assistance to victims, and reduce the likelihood of secondary damage.

- Recovery Phase:
  Activities that overhaul or restore the scene, rehabilitate emergency personnel, restore services and provide needed assistance.

[3] Thomas E. Drabek and Gerard J. Hoetmer, eds. Emergency Management: Principles and Practices for Local Government, (Washington D.C.: International City Management Association, 1991), p. 138.

Exhibit 2-1 shows how a jurisdiction's hazards or risk determine the fire department system it needs to provide and how those hazards interrelate with the phases of management. All fire department services are driven by demand-mostly by potential demand, through fire departments and other organizations that intervene after an emergency has occurred are also affected by actual or realized demands. The nature of these demands and the ways they shape fire department needs are major management and planning considerations.[4]

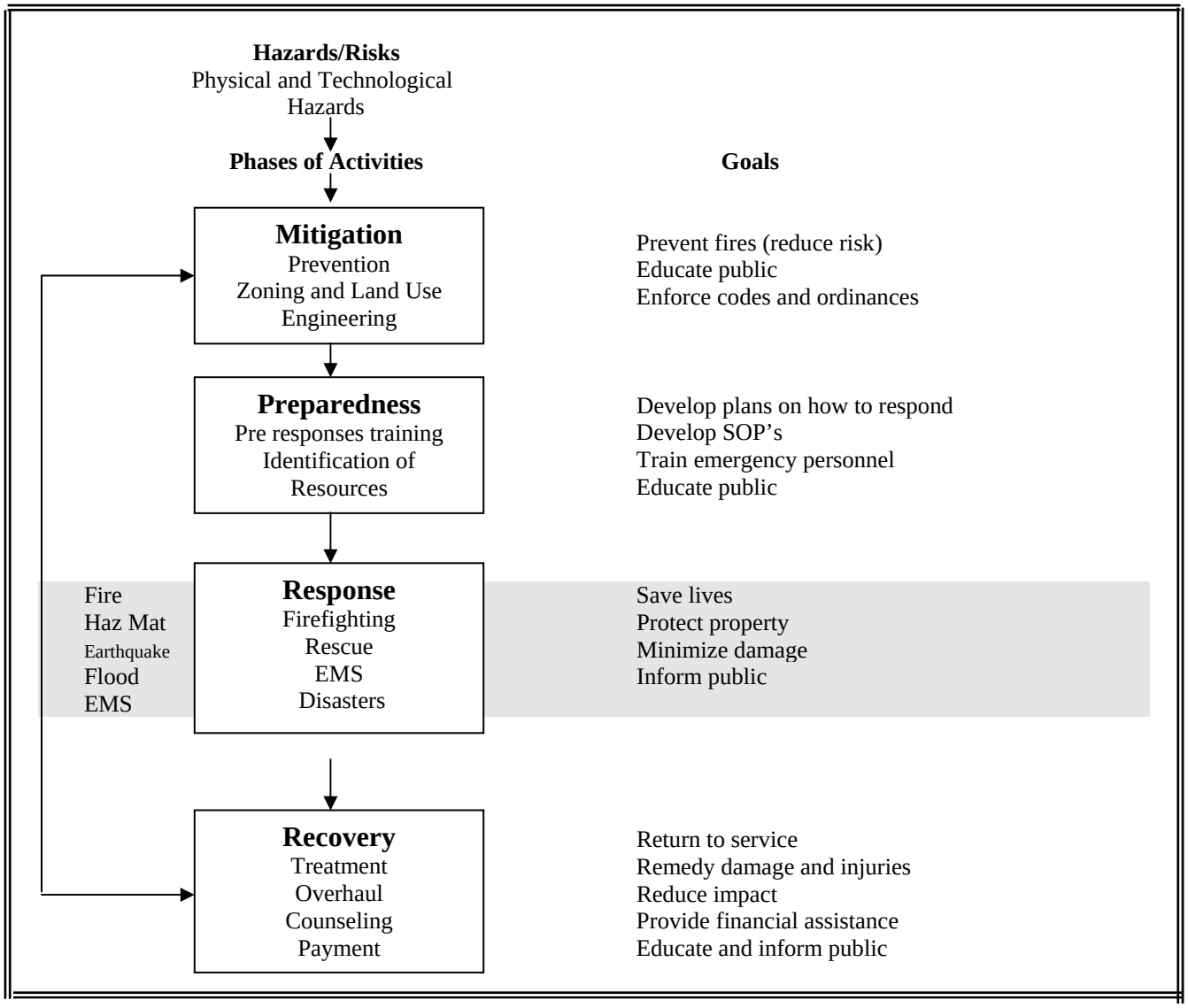


Exhibit 2-1. Fire Department Comprehensive Emergency Management

[4] New York – Rand, Public Fire Protection, 1977, p. 7.

The demand for fire department services is increasing, and the nature of the demand is intimately related to the kinds of services needed. Fire department services inherently provide a preventive and remedial service, designed to combat social ills and physical failures. The nature and dimensions of these factors determine the nature and dimensions of the service. For example, where there is little chance that a fire could endanger life or destroy property, little fire protection in needed. Conversely, where the potential losses are great, much fire protection is needed. In a community composed mostly of senior citizens, the need for emergency medical services will be high.

The fire service, local government, and the public are all critical participants in creating fire department services. In simplified form, the exchange relationships between the fire department, local government, and the public are represented below in Exhibit 2-2.[5]

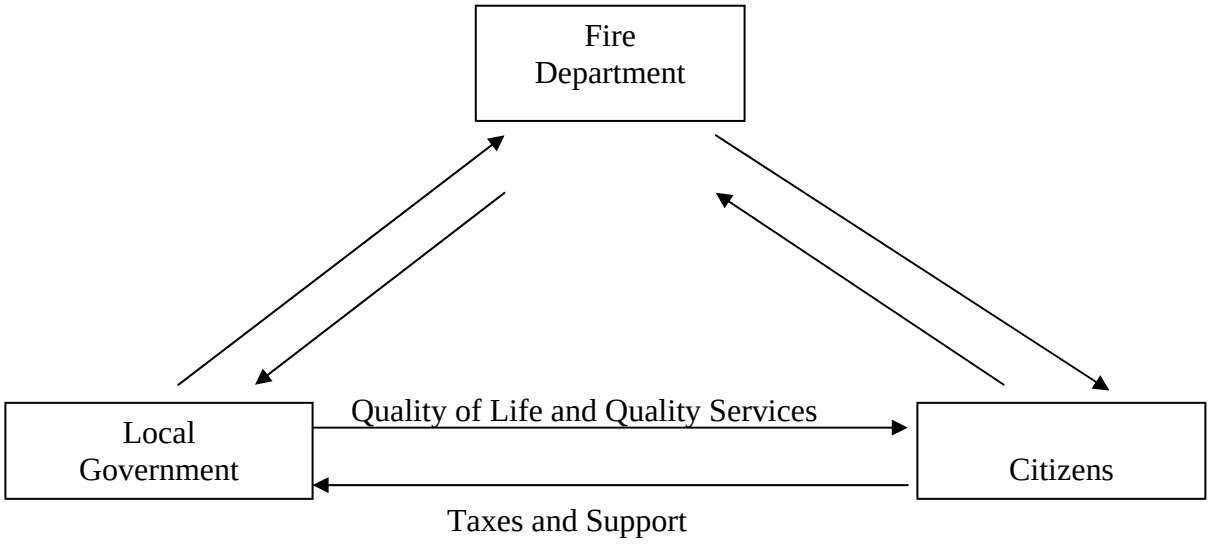


Exhibit 2-2. Exchange Relationship

Each participant has distinct perspectives, interests, and roles. Each influence the service provided and the results achieved in distinctive ways. One way of looking at these mutual influences is to consider what each group gives in exchange for what it gets. If each group feels it is receiving more in value than it is giving, the exchange, and hence the entire fire department system, will be stable. If one or more of the groups feel they are being short-changed, then instability can develop that must be remedied by revising or re balancing the exchange.

The increasing role (and strength) of local community interests in the fire department now commands more consideration than in the past. This raises serious questions of equity, and even discrimination, in planning and providing services, and force reexamination of our local needs. We find outlying areas and ourselves rethinking the balance of protection for business and

[5] New York – Rand, p. 19.

residential areas, deteriorating and solid neighborhoods, downtown and outlying areas. Traditional formulations of need for protection and services may no longer be acceptable.

Sometimes, of course, there are conflicts, even within the community. A neighborhood may want a new fire station to improve its protection, but the people who live around the best or most feasible site may just as vocally oppose having it there. Any change, whether increasing or decreasing protection, adding or deleting services, or simply realigning locations to meet changing needs, may stimulate public meetings and partisan rallies. Such interest is surely preferable to apathy. A modern fire department must solicit and welcome community input. This document should enhance that concept!

Fire Service Levels

For years, fire service and government administrators, organized labor, and other interests in the fire service have tried to find a means of defining and evaluating levels of service provided to communities by their fire service agencies. The approaches have been as varied as the fire service agencies being evaluated and the parties doing the evaluation, resulting in the application of inconsistent methodology and criteria.[6]

Any fire protection and emergency response system must reflect the needs and desires of the community. It should be consistent with the overall goals and objectives of the community, and it should be able to function effectively within the constraints of the real world where multiple requirements must be supported with limited resources. It is extremely important that every dollar spent achieves maximum results and that those expenditures be measured against identifiable results.

Measuring Performance

Performance measurements can be described as a systematic attempt to quantify and analyze a government activity by using various techniques in order to learn how responsive and efficient these services are. Another way of describing this activity is that it is a way of analyzing how to get a quality product at a reasonable cost, which is the private sector model. These techniques generally evaluate the efficiency and effectiveness of a particular service program. These are critical to know, in establishing acceptable service levels. These terms can be further defined as follows:[7]

- Efficiency – doing the job as cheaply as possible.

- Effectiveness – doing the right job as well as possible, so that it is considered successful and the supervisor/ user is satisfied with the quality.

[6] National fire Protection Association, "Evaluating Your Community fire Department," Fire News, February/March 1991, p.p. 1 and 5.
[7] Task force on Assessing Effective Service Levels, "How to Guide for Assessing Effective Service Levels in California Cities," League of California Cities, September 1990, p.1.

Performance measurement is not a very useful tool in and of itself. It is a means to accomplish other activities, which can be broadly described as decision making. It is a method of obtaining information to improve the quality of decisions. It serves a valuable role in evaluation multiple options, whether they be improving or decreasing services, choosing alternative services or delivery methods, or reducing costs.

Reasons to Measure Performance:

- **Cost Effectiveness**

Traditionally, governments do not have the benefits of the private sector in determining the cost effectiveness of their efforts. When private businesses make "widgets," they can evaluate the cost of each widget as part of their regular efforts, as it is critical in determining the price at which the widgets are to be sold. Even when private business is not engaged in producing a specific product, the success of that business is based on "bottom line." Analyzing the revenue versus cost to determine the profit and the competitiveness of their services make quantification of their efforts an essential part of their business.

However, in government, the failure to make a product or have a bottom line has been used as a reason or excuse to avoid measurement of performance. The interest in efficiency has been limited to cutting back budget requests, requiring an extensive bidding process to discourage marginal purchases, requiring a series of reviews of all purchases and personnel requests, micro-managing approvals on major expenditures and freezing purchases and hiring when financial resources are extremely limited.

Performance measurement does have a role and a benefit in government. By improving the quality by which decisions are made through improved information, it can allow local government to do more with less. That is, it can allow government to provide lower taxes or higher services and better salaries, buildings and infrastructure. It also allows for more specific and reliable goal setting for fire departments. For example, it is difficult to set a goal that a certain activity will be improved over the next year by ten percent (10%) when there is no measurement to confirm what is the existing or the future activity level. By providing a vehicle to do so, progress on a goal can be monitored, and the employees involved rewarded or counseled accordingly. Where there are specific performance incentives, measuring performance provides a quantitative and objective method of implementation.

- **Alternative Service Delivery**

Measuring performance also can be an effective way of reviewing alternate service delivery methods to determine the one most viable for a particular community. For example, evaluating contracting versus in-house street sweeping once per week versus twice per week, and using a vacuum versus a brush sweeper is not a simple analysis. Measuring performance under this variety of options can be of significant help in analyzing each option to determine what is the most cost effective and reasonable level of service for a particular community.

- **Cost Reduction**

While closely akin to cost effectiveness, a specific use of performance measurement could be to simply improve efficiency without an impact on the quality of the service. Obviously, more revenue for a community by reducing the cost of existing services results in less dependence on taxes and the general fund resources of the community. This may help balance the budget, eliminate deficits, or provide revenue for other needed efforts by the City.

- **Public Accountability**

A significant advantage of measuring performance is the credibility and improved citizen understanding that results from better analysis of the efforts of local government departments. The efforts to analyze the expenditures of City funds in a quantitative way provides citizens information and assurance that there is a strong attempt to manage the public's resources responsibly. When combined with citizen surveys, performance measurement can be an important factor in prioritizing City services and determining appropriate service levels.

Factors Impacting Fire Service Levels:

- **Zoning Density**

Zoning density affects the required level of fire service delivery in three distinct ways:

1. The higher the zoning density, the greater the potential for larger fires. For example, buildings in industrial areas are typically far greater in size than single family residential areas and thus, if involved in fire, require a much greater commitment of fire apparatus and firefighters.

2. Higher density areas have more people packed into a square mile than do low density areas. This higher volume of people produces a correspondingly higher volume of emergency response for the fire department. A higher number of responses translates into the need for more fire apparatus and firefighters.

3. The third impact of zoning deals with fire prevention. A higher density area requires a substantial increase in workload for the fire prevention bureau. The multi-family, commercial and industrial occupancies in these higher density areas require extensive development review during construction by fire prevention personnel. Even after construction, these types of development continue to burden fire prevention with the responsibility for ongoing fire inspection and code enforcement.

- **Building Uses and Types**

The correlation between building use/types and fire service delivery system requirements is the same as that for zoning density. The larger multi-family, commercial and industrial buildings require greater fire agency resources. Additionally, multi-family, commercial and industrial type

buildings require large and different types of fire apparatus than single family dwellings by virtue of their area size, height and combustibility of contents.

- **Response Time**

The most critical factor, which affects the outcome of a medical emergency or fire emergency, is the response time of the fire agency. Seconds can make the difference between life and death in a medical emergency when a patient has a life threatening condition. Reduction of life and property loss to fire is greatly impacted by the ability of the fire agency to respond to the scene within a short time frame.

- **Response Volume and Type**

The volume of responses occurring in an area is a critical factor for determining when a fire station is needed for an area. The number of fire companies that are needed for an area is also highly dependent upon response volume. Additionally, staffing patterns are, for a large part, set on volume and concurrent call occurrences. Types of incidents that are occurring and can be expected to occur in a given area also play a major role in determining staffing patterns. Types of apparatus needed for an area are also dependent upon the types of incidents to which apparatus must respond.

- **Water Supply**

Quality and quantity of water supply are important elements in the fire protection system of the community. Good protection is dependent upon an adequate fire flow from the water system as well as reliability of the water system. Areas without adequate water systems must be served differently by the fire agency than areas with good water systems. Specifically, poor water areas require different types of apparatus, as well as more apparatus on fire responses, than do areas with good water systems.

- **Population**

Population figures prominently in determining the number of firefighters and apparatus needed to properly protect the community. There is a direct relationship between the areas population and the number of emergency responses. Additionally, studies and recommendations from the National Fire Protection Association (N.F.P.A.), the federal government, and the International City/County Management Association (I.C.M.A.) tie specific numbers of firefighters and fire apparatus to specific population figures.

- **Geography**

Geography impacts the fire service delivery system in two ways: response time and types of apparatus required. Geographic features, which include rough terrain, mountain slopes, steep roads and/or poor or non-existent roads, will slow or even prevent the travel of heavy fire apparatus to an emergency scene. To mitigate this, a heavier concentration of fire stations maybe required in an area to maintain an acceptable response time to emergencies. Additionally,

different types of fire apparatus, such as four-wheel drive, may be necessary to deal with the travel problems created in these types of areas.

Fire Protection and Emergency Medical Service Standards

Standards for provision of fire and EMS services are critical for planning the cost-effective delivery of these services. Yet, such standards have been elusive. Even after 200 years of fire service history, nationally accepted standards still do not exist. Individual units of government have established standards, or they have not been directly considered. Thus, local government decision-makers generally do not have answers to such questions as:

- What are the costs and benefits associated with each increment of time in responding to a fire or EMS incident?

- What are the costs and benefits associated with each additional person assigned to a fire or EMS unit.

These, and other issues addressed in this study, are probably the most important and different issues faced by fire/EMS service decision-makers. These questions are especially critical in reviewing budget requests submitted by the Big Bear Lake Fire District and making the difficult decisions associated with insufficient revenues; i.e., where should budget cuts be made and what are the consequences?

Insurance Service Office (ISO)

The Insurance Service Office (ISO) has long been regarded as a standard setting organization. ISO is the service arm of the insurance industry and writes standard policy language, studies rates, and evaluates public and private sector risks. However, ISO makes it clear that they develop standards for insurance rating only and not for use in determining fire department resources.

In fact, the most current ISO Schedule (1980) includes the statement, "The Schedule is a fire insurance rating tool, and is not intended to analyze all aspects of a comprehensive public fire protection program. It should not be used for purposes other than insurance rating."[8] In spite of this, the ISO rating has frequently been used as a fire department measurement and comparison.

The ISO rating each community receives has some impact on the fire insurance premiums paid by homeowners and businesses. The magnitude of this impact varies, however, by the following factors:

- For residential customers, insurance premiums have less to do with the ISO rating of a community and more with the fire experience in large regions. Thus, within broad ranges of ISO rating, residential premiums in cities in that region are identical.

[8] Fire Suppression Rating Schedule, Insurance Services Office, New York, 1980.

- For large commercial/industrial occupancies, these are individually rated according to built-in fire systems, the nature of the businesses, construction type, etc. The fire premiums for these structures often have little to do with ISO rating of a community.
- For smaller businesses, a community's ISO rating can have a moderate impact on fire insurance premiums – usually in the five per cent (5%) to fifteen (15%) range between rating grades.

Although ISO still rates most cities, the insurance of their standards has lost most if its impact on the jurisdictions fire protection system.

The results of the lack of nationally recognized standards and decision-making criteria are that communities have not explicitly defined performance standards, or have developed their own standards. Frequently, such local standards are established as part of a community strategic planning project, which involves the establishment of service-delivery goals, objectives and selection criteria.

In the absence of nationally-recognized fire-rescue response, deployment, and staffing standards and decision-making criteria, the Big Bear Lake Fire District has taken the action, through this plan, of recommending the establishment of certain standards which meet local needs and are accepted and adopted by the District Board of Directors, City Manager and especially the community. Future focus depends on these groups doing two things simultaneously. First, we must constantly scan the environment to determine what is likely to influence us. Once that potential is identified, we can then assess what its impact will be upon the fire department.[9]

Changes in the Big Bear Lake Fire District

We need to ask ourselves a simple question; "Do we want to be pussycats or tigers?" Dale D. McConkey, in planning Next Year's Profit, describes organizations as "Pussycats," "Fat Cat," or "Tigers."[10] A pussycat organization operates as if today and tomorrow are reflections of the past. The word change is not in the vocabulary of the organization's leadership – they are content to follow others. McConkey describes the fat cat organization as one that has moved somewhat. They are not as settled as the pussycats, but on the other hand, will not stick their necks out too far. Finally, he says the tigers are looking at the future and making it what they want it to be for their organization. This means the tigers are committed to change and will use their people to the fullest, with no territory out of range. The Big Bear Lake Fire District must take this mindset.

[9] Ronny Coleman, Chief's Clipboard, "Scanning the Horizon, " Fire Chief Magazine, July 1990, p.22.
[10] Roger McGray, "Planning – Looking into the Future to Prevent Chaos," American Fire Journal, July 1984, pp. 34-35.

How can Big Bear Lake provide Fire Services?

Several methods exist for the provision of fire department services to the citizens of the Big Bear Lake Fire Protection District and the City of Big Bear Lake:

- Continue to provide a municipal fire department as the Big Bear Lake Fire Protection District with the recommended changes in the plan.
- Contract with another fire agency:
  - ✓ San Bernardino County Fire Department
  - ✓ California Department of Forestry (CDF)
  - ✓ Private Fire Department
- Consolidate with the other Bear Valley Fire Department

This plan visualizes the future assuming that Big Bear Lake desires to continue providing its own fire department.

"Where there is no vision, the people perish."[11] Therefore, the first step in the development of a strategic plan of change is the visualization of the desired results or outcomes of the recommended changes.

The tendency all to often is to focus on the processes involved in implementation rather than results. Projects often fail when the process of change, rather than focusing on the achievable results bogs us down. The vision or plan is our road map to success. This strategic plan attempts to focus on the results as well as set goals, objectives and action plans to achieve the recommendations.

This vision becomes the ability to formulate these future goals, objectives and action plans with discernment, commitment and enthusiasm. Once we develop our vision and make the commitment to transform our fire department, we must share our vision with the other members of the Community. Thus, our shared vision creates a focus of purpose that should be pursued with intense energy to see and anticipate the far-reaching implications of a conceived plan of action and summon attention to its implementation.

Section 2 - Recommendations

The Big Bear Lake Fire District Board of Directors considers and adopts a fire strategic plan for the future of the District.

[11] A Proverb.

SECTION 3

CITY AND DISTRICT MISSION STATEMENTS

Mission Statement

"TO SERVE AND PROTECT THE COMMUNITY THROUGH PUBLIC EDUCATION, FIRE PREVENTION, FIRE SUPPRESSION, EMERGENCY RESCUE, DISASTER PREPAREDNESS, AND OTHER SERVICES IN ORDER TO MINIMIZE THE LOSS OF LIFE AND PROPERTY, DAMAGE TO THE ENVIROMENT, AND ADVERSE ECONOMIC IMPACTS DUE TO NATURAL OR MAN MADE EMERGENCIES OR EVENTS".

The District's mission is supported by:

- The recruitment, training and retention of qualified employees.
- Fire and public safety programs to prevent fires, which threaten lives, property and the environment and promote a hazard safe community.
- Providing optimum service levels to meet community needs.
- A fuel management program to mitigate the threat of conflagration, which might otherwise result from an urban/wildland fire.
- A capital improvement and replacement program to secure the District's infrastructure (Facilities and Fleet).
- Mitigating Fire, EMS and Hazardous Materials emergencies that affect lives, property, and the environment.
- Subscribing to State Fire Marshal Certifications and Training Standards

Whom Do We Serve? – All of our community's citizens and visitors.

a. How Do We Serve Our Community and Visitors?

Deliver Emergency Services That:

- Extinguish fires
- Intercede during medical emergencies to prevent deterioration of the patients condition
- Intercede during other situations to protect persons, environment and property from harm.

Provide Non-Emergency Services That:

- Help prevent the ignition of fires
- Reduce the risk/loss of a wildland/urban intermix fire
- Reduce risk of injury resulting from fires and accidents
- Help increase public knowledge of emergency self-help techniques
- Seek Cost recovery for reimbursable State and Federal Disaster Relief
- Provide for Disaster recovery
- Plan for Disaster Preparedness

Vision Statement – The Big Bear Lake Fire Protection District pledges to focus on the highest possible quality of fire protection and EMS services through means that are efficient and practical for the citizens we serve. As a professional team, we will strive to be dynamic, and

flexible, and respond to the needs of our constituents. Respect, trust, and excellence will guide our efforts.

Value Statements – The District is committed to conducting business with the highest ethical standards and believes the following values are fundamental to our success:

- Strive To Achieve Greater Success: We exist by public approval and our function is to serve the public interest. The District is committed to listening and responding to our customers and the people within our organization. We strive to find better ways to serve our customers.
- Customer Service: The District is committed to provide functional excellence which provides a superior return on tax dollars spent and the provision of the highest level of emergency service possible.
- The Importance of Hiring and Retaining Talented People.
- Diversity: We believe in respect for individual differences and the promotion of mutual trust and respect for each other.
- Integrity: We are committed to maintain the highest ethical standards.
- Teamwork: We strive to maintain a collaborative relationship between the Board of Directors/City Council, City Departments, and we are committed to working together to resolve issues.
- Career Employees: Our employees are the organization's most valuable assets. Within all ranks we encourage promotion from within and strive to provide fully competitive compensation.
- Paid Call Opportunities: We believe in providing opportunities for all Paid Call Firefighters to develop their potential and make the best use of their abilities.
- We believe in consensus decision making so that people whose lives are affected by a decision can be a part of the process of arriving at that decision.
- Growth-Oriented Environment: We believe in promoting a dynamic, growth-oriented environment that promotes teamwork and encourages employees.
- We believe that the quality of our service is the responsibility of every employee.
- We believe in the importance of staying involved in organizations and political entities which may affect fire service delivery at the state and local level, keeping abreast of trends, political issues and funding streams.
- We believe in helping to advance the fire service in all levels.
- We believe in nurturing and maintaining positive relationships with other local, county, state and federal agencies.
- We believe in strategic planning which guides and instruct the organization towards the established goals, shared funding priorities, and shared sense of common purpose.

SECTION 4

FIRE DISTRICT/INCIDENT DATA

GENERAL BIG BEAR CHARACTRERISTICS

Big Bear Lake is situated at an elevation of 6,750 feet strategically located in the San Bernardino Mountains; adjacent to Big Bear Lake bisected by Highway 18. The communities of Big Bear City and Fawnskin are only a few miles away. The city of San Bernardino is within 40-45 miles. Big Bear Lake the hub for visitors for the entire Southern California region. Over the past several years, Big Bear Lake has grown both in resident and visitor population. The population of Big Bear has grown 8.7% since incorporation, rising from 4,923 in 1980 to 5,351 in 1990[1]. In the year 2000, the Southern California Association of Governments (SCAG) estimates the City's permanent population will be 6,967, an increase of 14.7% from 1990's population.[2] The population of the Fire District/City is still growing, however, not nearly as rapidly as before. SCAG predicts a population of 9,189 for the year 2010 and 11,629 for the year 2020.

These represent increases of 52.9% and 91.4%, respectively, over the 1995 (6,075) population. These forecasts represent tremendous growth opportunities but if not properly planned for, such an influx of people may be detrimental to our quality of life.

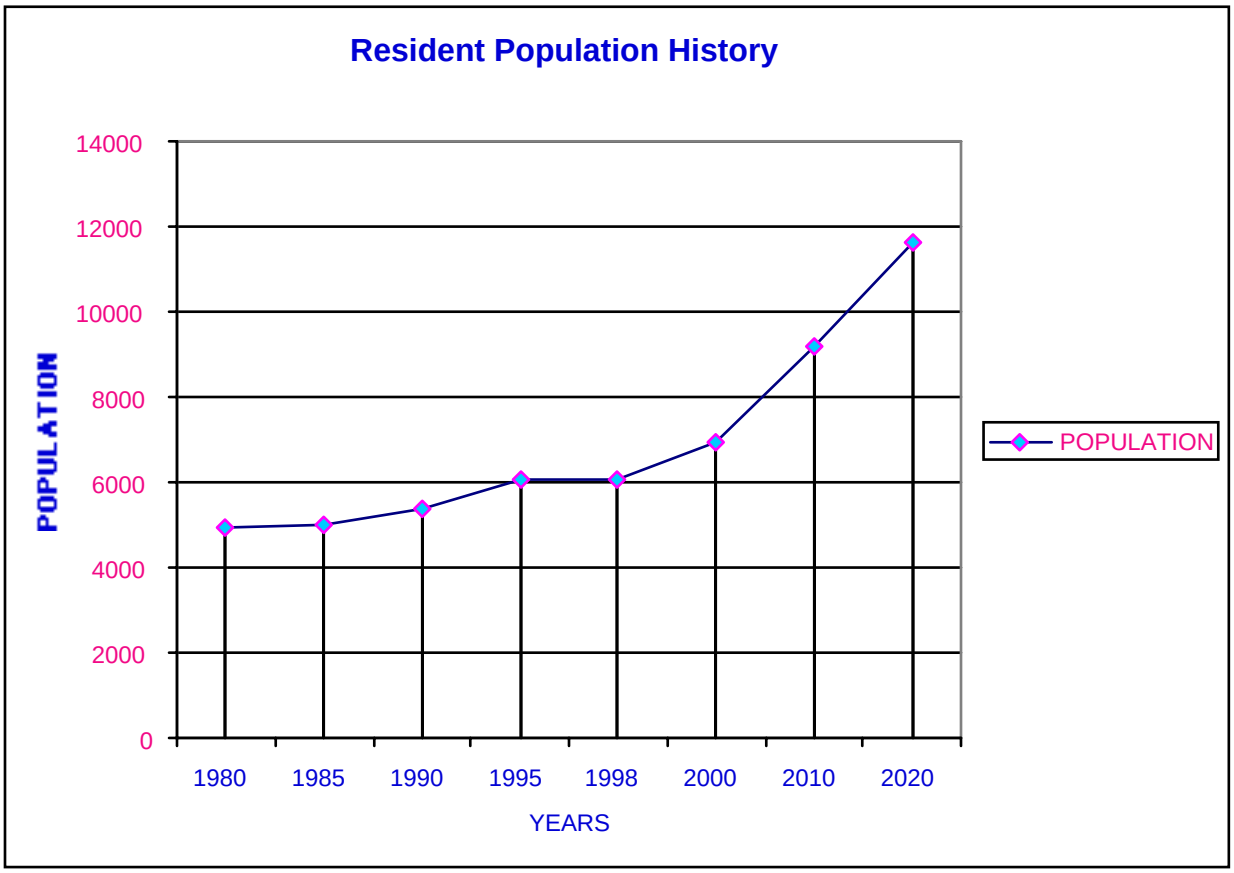


Table 4-1 Population History and Projections for Big Bear Lake

[1] U.S. Census of Population and Housing, 1980 and 1990.
[2] City of Big Bear Lake, Community Profile/Land Use, General plan., pp. II-3,4

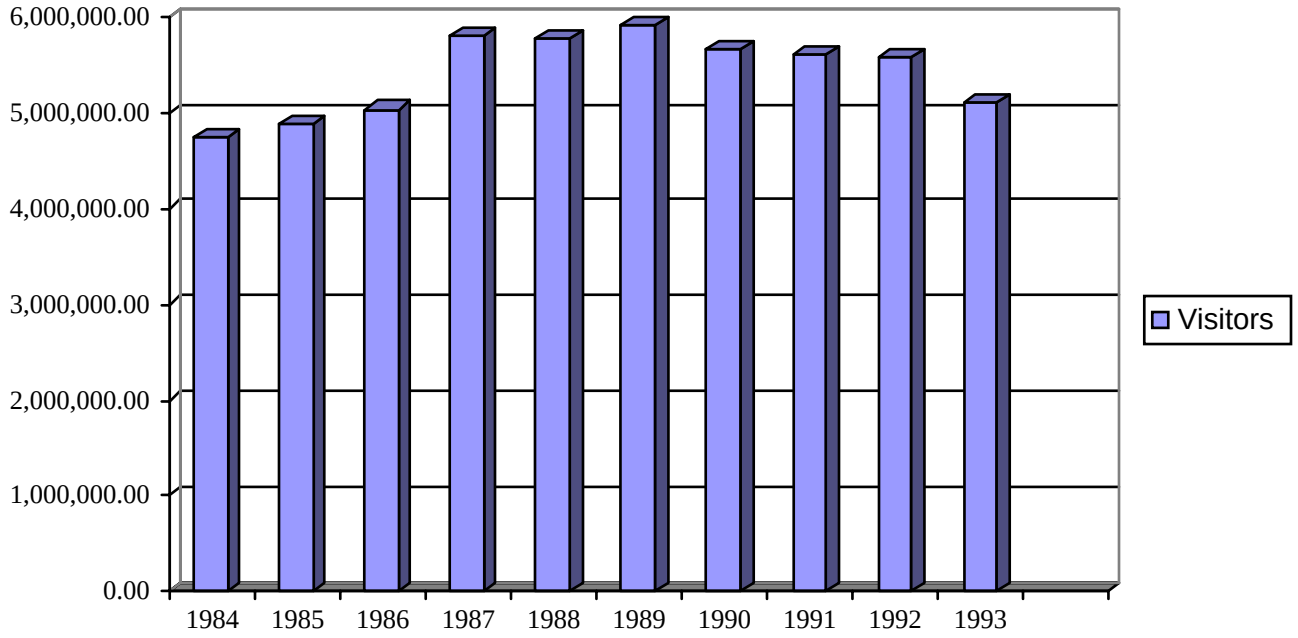


Table 4-2 Annual Visitation Summary, USFS 1993

If the resident population was all that Big Bear Lake had to deal with the existing system could maintain its present configuration. However, because the Big Bear Lake area is a tourist retreat for all seasons, the impact to the system is compounded. As many as 50,000 or more people are estimated to visit the City on a peak holiday weekend. Further, approximately 68% of the City's housing units are second homes. With total estimated housing units in 1995 at 8,821[3], 5,998 of these units are estimated to be second homes. Using an average of 2.5 persons per unit, these second homes generate an additional population of 14,995 residents. Well beyond the department capabilities.

For purposes of population calculations both the fulltime residents and average daily visitors will be used to determine the average daily population served by the department which is 20,234. The average daily visitor population is 14,185 and fulltime residents is 6,049 (1998). For purposes of planning and designing the capacities of streets, parks, parking, certain energy resources and municipal services, the seasonal population must be considered.[4] As the population increases so does the need for service. The next section shows the department activity based upon population growth.

[3] San Bernardino County Population and housing Estimates, California Department of Finance, Demographic Research Unit, 1995.
[4] City of Big Bear Lake, Community Profile/Land Use, General Plan., pII-4.

Responses by the District

Table 4-3 shows the comparison of EMS, fires, and non-fire (other) calls responded to in the ten-year period from 1989 -1998.

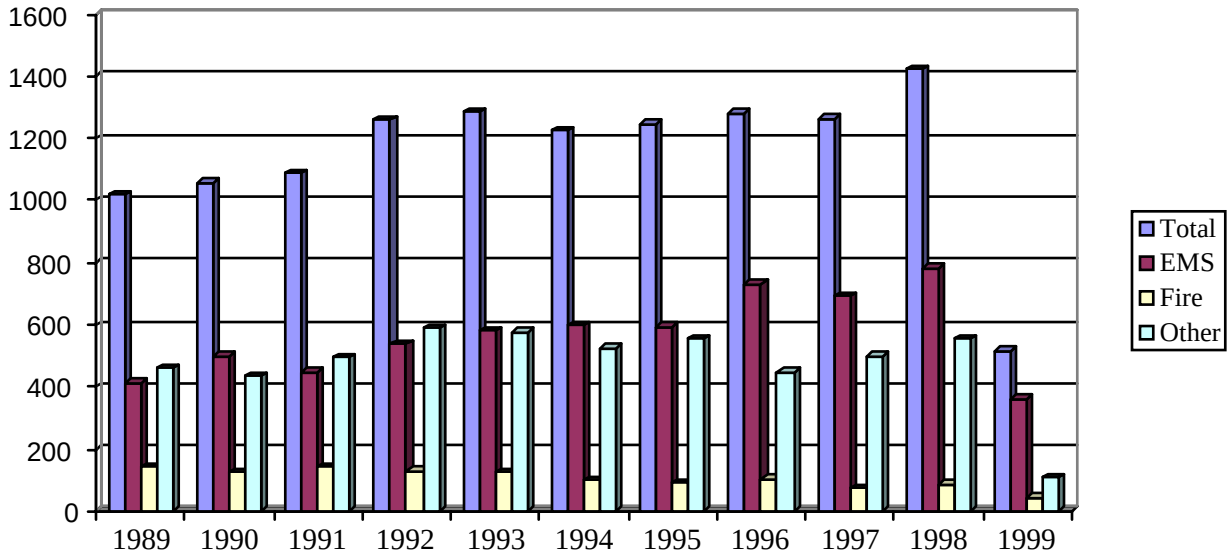


Table 4-3 Emergency Responses 1989-1998 (comparison 1999 numbers as of March 30, 1999) .

During the period from 1990 (5,351)[5] through 1998 (9,049)[6], the fulltime population increased over 13% (1.4% per year) while the annual number of emergency responses rose 34.4% (3.8% per year) over the same period. During that same period, the increase in EMS calls was 56.5% (6.27% per year) and fires decreased 31.5% (3.46% per year) due to public awareness and business inspection program. While most of the annual total number of calls has remained consistent, we can expect a steady increase in population and emergency responses based on the data. Also, during this time period staffing levels have decreased. Section 9 will address this in more detail. As referenced in Section 1 the department arrives to 70% of all district calls within 4-6. During this time period the staffing levels have decreased from fifteen suppression personnel to twelve. This reduction in staffing has resulted in increased workloads for personnel.

[5] U.S. Census of Population and Housing, 1980 and 1990, Terra Nova Planning & Research
[6] California Department of Finance, Demographic Research Unit. May 1998.

Year	Total Responses	EMS Responses	Fire Responses	Other Responses
1989	1020	416	143	461
1990	1058	499	125	434
1991	1089	450	143	496
1992	1259	538	131	590
1993	1285	581	128	576
1994	1224	600	100	524
1995	1244	595	92	557
1996	1279	729	103	447
1997	1264	692	73	499
1998	1423	781	86	556

Table 4-4 Actual from 1989 to 1998

Table 4-5 projects increases based on the previously described 10-year average increases (table 4-4). The projected emergency responses from present to the year 2004 are based on the 10-year average.

Projected Responses based on 6-year (1999-2004)
Average Annual Increase

	4% Average Call Increase	9% Average EMS Increase	-3% Average Fire Increase	2% Average Other Increase
1999	1479	851	83	567
2000	1539	927	80	578
2001	1600	1011	78	590
2002	1664	1102	76	601
2003	1731	1201	73	613
2004	1800	1309	71	626

Table 4-5 Alarm Responses/ projected 1999 to 2004

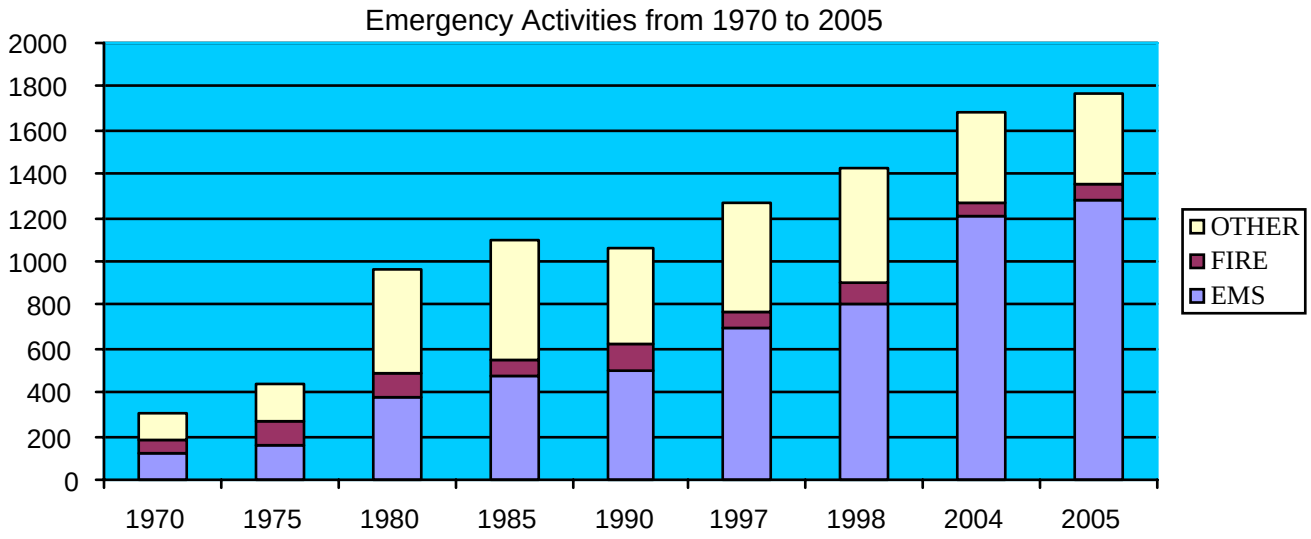


Table 4-6

Table 4-6 indicates the emergency activities of the fire department from 1970 – 1998 but also adds forecasts of anticipated emergency responses to the years 2004 and 2005 based on responses from Table 4-3 (p.p.4).

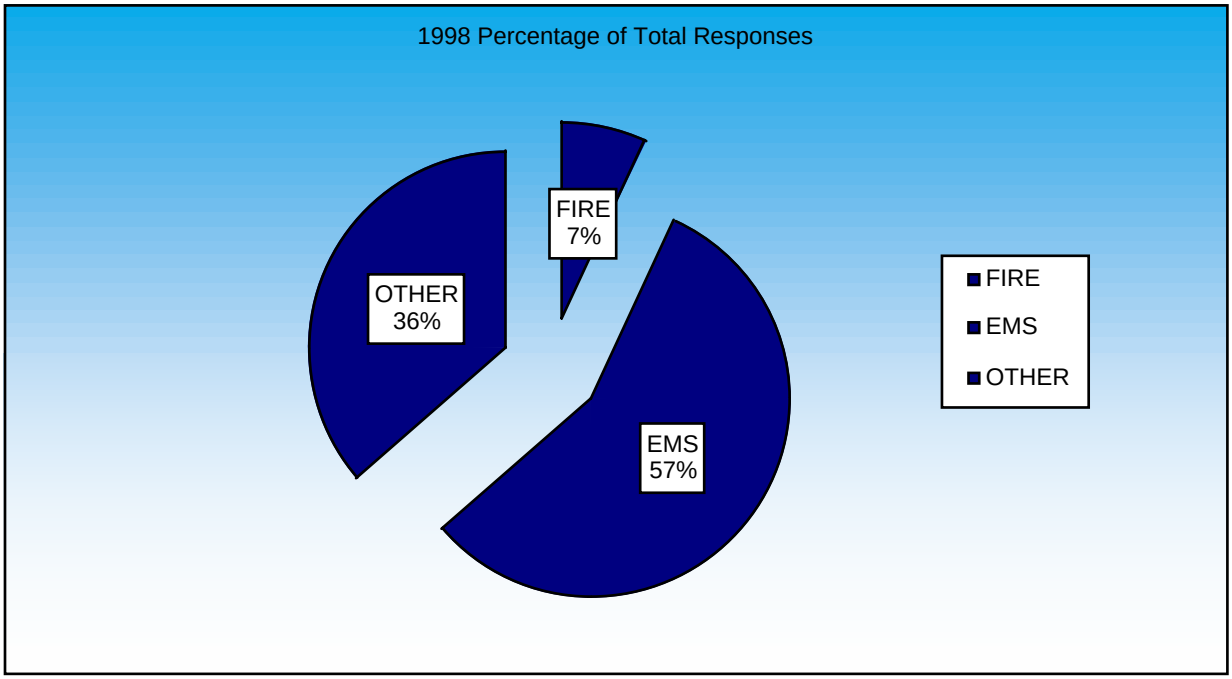


Table 4-7 Percentage of total responses by type - 1998

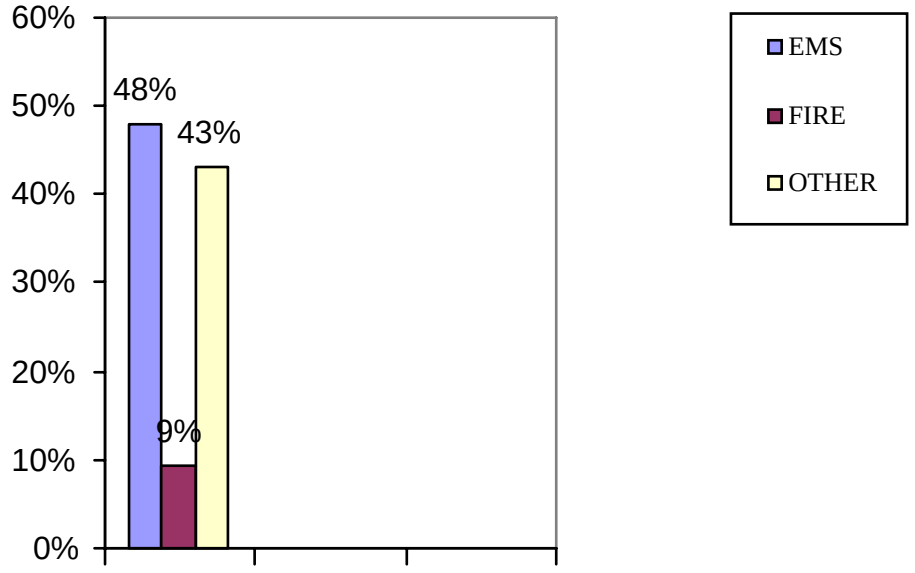


Table 4-8 Percentage of Total Responses – 10-year average (1989-1998)

Fire Experience

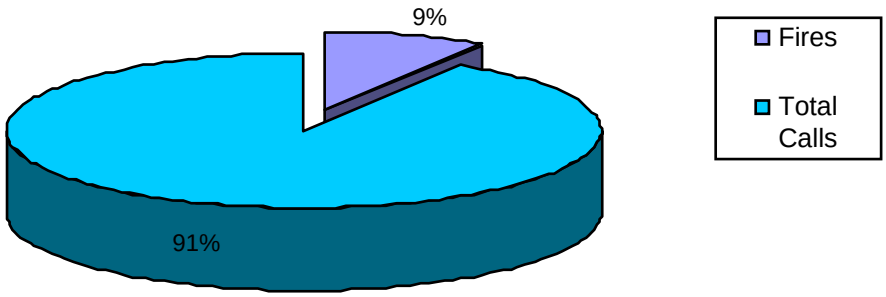


Table 4-9 “Fire” 10-year average percentage of Total Calls

Historical trends in fire experience are described in this section. In general, the overall Fire District trend is similar to that which is being experienced throughout most of the nation and in California –- the number of fires is remaining fairly constant or even decreasing. Table 4-6 indicates how fire incidents relate to the overall emergency response activity of the district over a ten-year period.

10 – Year Fire Loss History

Year	Number of Fires	Property Dollar Loss
1988	58	$158,220
1989	143	$400,500
1990	125	$646,350
1991	143	$194,740
1992	131	$750,865
1993	128	$511,528
1994	100	$90,350
1995	92	$55,450
1996	103	$227,722
1997	73	$318,490
1998	100	$54,660

Table 4-10, 10-Year Fires and Fire Loss

Emergency Medical Experience

The number of emergency medical incidents has steadily increased over the past years as shown in Table 4-13. Based on these numbers, Big Bear Lake can expect the number of EMS related calls to increase, probably close to the rate given in Table 4-5. As Table 4-11 indicates, EMS responses have been and remain a high percentage of the total responses each year. The percentage breakdown of the types of EMS calls in 1998 is shown in Table 4-12.

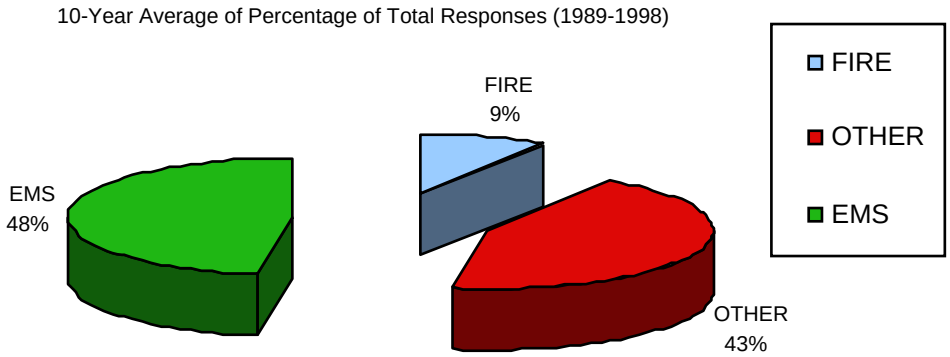


Table 4-12, “EMS 11-Year Average of Total Calls

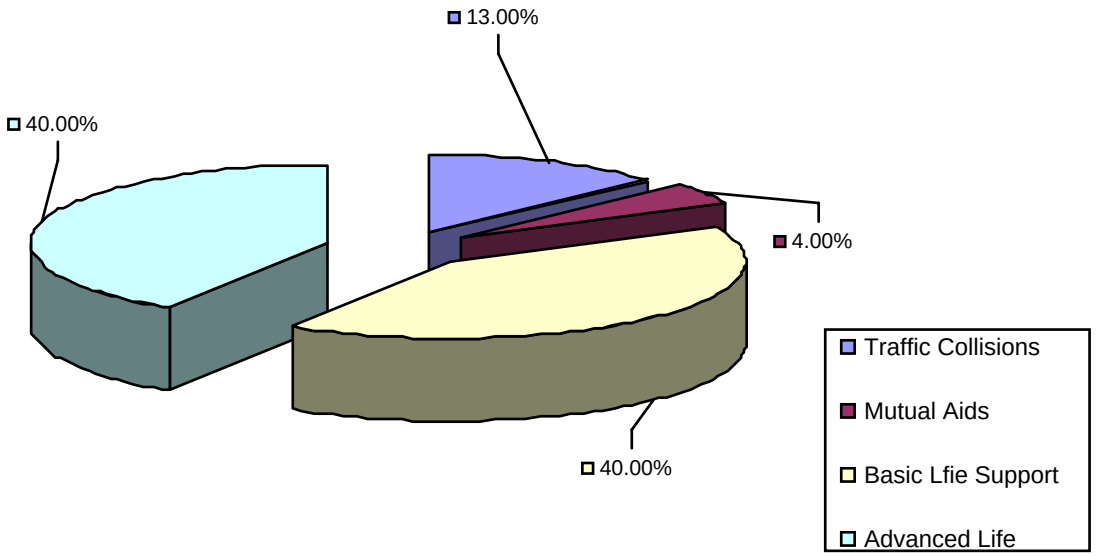


Table 4-12, 1998 Percentage of EMS calls by type

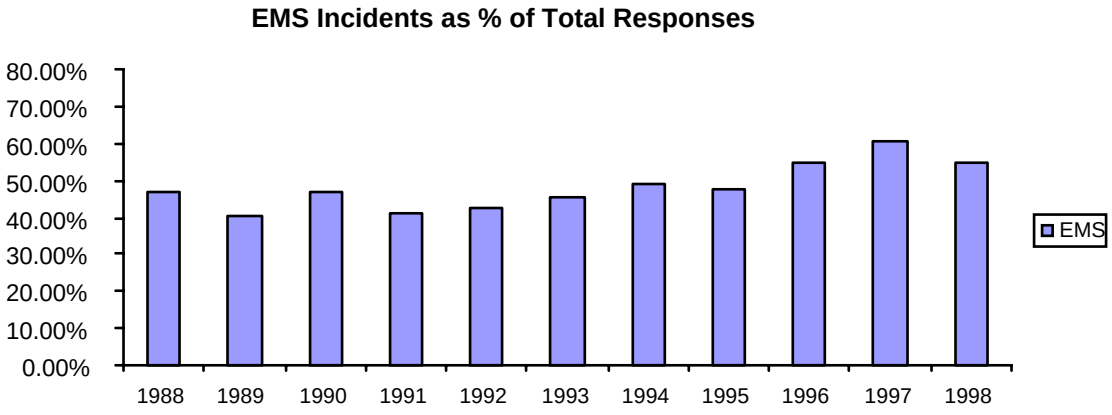


Table 4-13, EMS incidents as a percentage of all emergency responses.

Other Calls (Non-Fire and EMS) Incident Experience

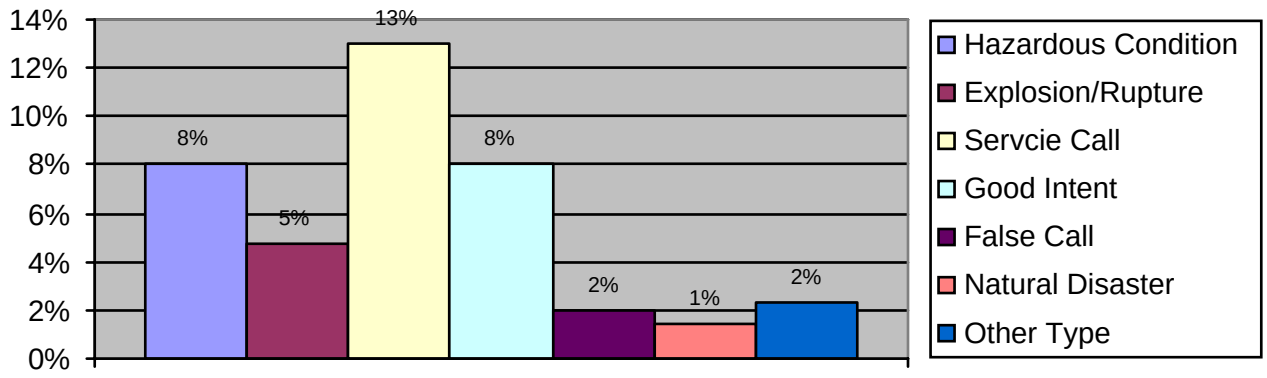


Table 4-14, 1998 Percentage of Total Calls

Non - fire and non-EMS calls are incidents other than fires or EMS and are termed "Other Calls". Such incidents include public service assistance calls, emergencies, hazardous material incidents, out of District responses, assist other agencies, investigations and false alarms.

The incident data clearly shows increases in call demands over the last ten years. The correlation is in direct line with the increases in population. As the population increases both resident and tourist, the demand for services will also. There will be a need to increase the department's capability to service this demand. As determined in 1995, there were 5,998 housing units that were second homes. Using an average of 2.5 persons per units, theses second homes could generate an additional population of 14,000 over today's fulltime residents. This has the potential of an average daily population in excess of 25 to 34 thousand people. If this were to happen the estimated call volume would exceed the department's capability.

Section 5

HAZARD ANALYSIS

HAZARD ANALYSIS

WHAT IS A HAZARD?

A hazard is a natural or technological force or event that has the potential to cause or create an emergency or disaster. To begin planning a program of proactive emergency management, a fire department should identify those hazards, which, if they occur, could harm its community. This Strategic Plan identifies key hazards, especially as they relate to the Big Bear Lake Fire Protection District and City of Big Bear Lake. Hazard analysis is a systematic approach enabling a community to determine its potential vulnerability to an emergency situation. This approach is a way of anticipating what might happen and the likely impacts various kinds of emergencies have on the community. More in-depth information about the City's hazards can be found in its multi-hazard functional emergency plan.

An emergency is a life, property, or environment-threatening incident, particularly one, which occurs suddenly or unexpectedly. As an emergency increases in complexity, so does the response to it. For example, responding to a single-alarm fire at an empty warehouse is a much simpler task than clearing a freeway after a collision in which one of the vehicles carried hazardous or flammable substances. Even together, however, these two emergencies are much less serious than a regional emergency, such as a major earthquake on the San Andreas Fault. Emergencies, which affect a wide geographical area, several different public agencies, or a large, number of people present the most complicated response problems. A hazard analysis can help managers gain a more sophisticated understanding of the relationships among hazards and the secondary effects that various kinds of emergencies or disasters may trigger.

The more demand the incident places on critical facilities—hospitals, police and fire departments, transportation routes and utilities—the more difficult a coordinated and orderly response becomes. The adverse impacts of an emergency can be lessened if agencies and individuals respond in a coordinated, comprehensive, and rational fashion. The assurance of a rational response requires thorough preparation so that all people understand what to expect in emergency situations. A hazard analysis, which explains the risks and hazards an area faces, is the first step in preparing for the possible emergencies.

A good way to judge what may happen in the future is to look at our past history of disasters and major emergencies in Big Bear Lake. For those who say, "it can't happen here," history proves them wrong! The potential is greater because of the increased population on weekends and holidays. This will limit the capability of the department/city to handle major events.

FIRE HAZARDS

People cause almost all fires, either intentionally or through carelessness or error. Appropriate site and building design, proper handling and storage of flammable materials, and careful human action can prevent most fires. The Uniform Fire Code, which the Big Bear Lake Fire Protection District has adopted, describes building standards, which help to prevent structure-related fires. Some buildings in the City, which were completed prior to comprehensive enforcement of these

standards, do not meet current or previous codes and present risks and potential that can quickly overwhelm the fire department resources.

The light to moderate (per State High Fire Hazard Area) fire hazard in the District, other than the village area and forested areas, is closely related to its land use and development patterns. Because the number of industrial complexes, mid-rise buildings, and commercial centers are limited, the fire problem is generally confined to single and multi-family dwellings. Because the frequency of fire and the opportunity for large-loss fires are less, however, does not mean that fire hazard is minimized.

Because of its extensiveness in most communities, residential uses constitute a major consideration in determining fire potential. This is especially true in high-density multiple family areas which present fire hazards not found in other types of occupancies. There are common attics and separations that are routinely violated by occupants installing electrical, plumbing and other alterations that promote fire spread in hidden areas. Occupants misuse storage areas for flammables in quantities not safely protected. Often times, access to occupancies is limited due to deep setbacks, improper parking in alleys and roadways, and security fences that inhibit movement of fire combat forces.

Major earthquakes can cause uncontrolled fires, break water mains, sever major communications, and damage utilities. Private, commercial, and military air traffic is constantly increasing, presenting the problem of falling aircraft or emergency landings, which often result in major fires.

Preparedness and mitigation, or “Proactive Firefighting”, are probably the best protections against fire hazards. Even with careful planning, however, fires are not entirely preventable. At the point when a fire ignites, firefighting becomes reactive. An adequate supply of water, good access to the source of the flames, and a quick response from the firefighting team help to assure that the fire will be suppressed before the damage becomes too widespread.

Conflagration Potential: A conflagration is so termed when a fire becomes wide spread and crosses natural or prepared barriers, i.e., streets, fire walls, or prepared fire breaks. Potential conflagrations exist in the village area. This area is identified as having conflagration potential due primarily to the structural condition of existing occupancies prior to adequate Code enforcement, lack of on-site fire protection facilities, horizontal fire spread due to inadequate fire separations, and the concentration of structures.

Wildland Fires: The Big Bear Lake Fire Protection District sets within the San Bernardino National Forest. Most developed and undeveloped properties are covered by brush, pine trees and ever present fallen pine needles. Areas having grass and weeds, fueled by shrub overgrowth, fanned by occasional winds and high temperatures, create an ever-present threat of wildland fire. Extreme weather conditions such as high temperatures, low humidity, and/or winds of extraordinary force may cause an ordinary fire to expand into one of massive proportions.

Potential fire damage is heightened in areas of wildland-urban interface, where structures and lives are at risk due to proximity of wildland areas. The risk of wildland fires in the Moonridge

area is significant due to vegetation types and quantities, topography, temperatures, wind, and lack of moisture.

HAZARDOUS MATERIALS INCIDENTS

The release of a hazardous material into the environment could cause a multitude of problems that can be discussed in a general manner. The significance of the problems to the environment, property, or human health is dependent on the type, location, and quantity of the material released. Although hazardous material incidents can happen almost anywhere, certain areas of the state are at higher risk. Jurisdictions near roadways that are frequently used for transporting hazardous materials and jurisdictions with industrial facilities that use, store, or dispose of such materials all have increased potential for major mishaps, as do jurisdictions crossed by certain railways, waterways, airways, and pipelines.

Releases of explosive and highly flammable materials have caused fatalities and injuries, necessitated large-scale evacuations, and destroyed millions of dollars worth of property. Toxic chemicals in gaseous form have caused injuries and fatalities among emergency response teams and passersby. When toxic materials have entered either surface or ground water supplies, serious health effects have resulted. Releases of hazardous chemicals have been especially damaging when they have occurred in highly populated areas or along heavily traveled transportation routes.

There has been a decrease in the reported number of hazardous material incidents in the Big Bear Lake Fire Protection District. This is mainly due to greater governmental controls and an enhanced awareness on the part of both the general public along with the Household Hazardous Waste program. Several types of emergencies involving hazardous materials are conceivable within the limits of the Big Bear Lake Fire Protection District. Among the possibilities are the following:

- A chemical spill at a commercial or industrial facility, endangering the employees of the site and/or adjacent properties.
- A highway accident involving vehicles carrying hazardous or flammable materials.
- A local street traffic collision involving trucks making a delivery to a gas station or business which uses hazardous materials.
- An accident at a water treatment plant or water wells involving chlorine gas.
- An unknown substance found on a local street.
- The illegal storage and/or dumping of hazardous materials such as used by illegal drug labs.
- Terrorism, use of biological or chemical agents.
-

- Liquefied petroleum gas leak or explosion.

- An accident involving an aircraft carrying hazardous materials in an over flight or while spraying with agricultural chemicals.

As illustrated by the above examples, a hazardous materials emergency can involve either transportation or on-site accidents, accidents that may affect a wide or unknown range, and identification of unknown substances. In most cases, these incidents will be local in nature and will not create widespread effect. However, hazardous materials can enter rivers, creeks, streams, lakes, storm drains or the atmosphere affecting several jurisdictions.

If a major hazardous materials spill or accident impacts the District, personnel assigned responsibilities for firefighting and rescue operations will be confronted by a number of problems and unusual tasks. Current training and fiscal limitations limit the department to isolate and deny entry, except for minor incidents. The community is dependent on a County Hazardous Materials response team with response time of over 1-1/2 hours. Listed below are some of the most noteworthy:

- Identification of spilled substances will require increased coordination between emergency responders and shippers.

- Responders may need to contact sources to determine the nature of spilled substances. Spilled substances may or may not be identifiable because communications may be interrupted by other disastrous events.

- Until the hazardous material is identified, a command post will have to be established a considerable distance from the impacted area.

- Identifying the health threat to firefighters could become increasingly difficult as the complexities of spills increase, especially if several chemicals mix.

- Concurrent disasters could limit the availability of specially trained personnel to respond to each incident.

- Concurrent disasters may require personnel to fill responsibilities normally handled by other services. If law enforcement or public works personnel are unavailable, road barricades and crowd control may have to be established by fire department personnel, in order to prevent a dangerous situation.

- Weather conditions could hinder cleanup operations, especially high winds or rain that might dissipate the spill or cause flooding.

- Specialized equipment and personnel may be required to operate in the contaminated environment, especially for rescue.

MAJOR EARTHQUAKE

A major earthquake of magnitude greater than the 6.7 earthquake in 1992 occurring in the District or on the San Andreas Fault could cause many casualties, extensive property damage, fires, flooding, and other ensuing hazards. If a major earthquake impacts the District/City, personnel assigned responsibilities for firefighting and rescue operations will be confronted by a number of problems and unusual tasks:

- All emergency equipment under cover should be moved to open areas to prevent damage in the event of aftershocks.

- Scattered fires throughout an affected area will have a major impact on the department. Structures in areas of severe ground shaking will be vulnerable because breaks in water mains can result in the loss of water pressure. Major fires can be anticipated in commercial areas. Other conditions contributing to the general fire threat would be high-density combustible construction, a dry season, and homes in dry brush area.

- The Fire Department should anticipate a reduction in effective fire fighting capability because of possible personnel casualties and inability of off-duty personnel to report to their stations.

- The effectiveness of fire suppression will depend heavily on whether fires can be attacked before they have the opportunity to spread and threaten nearby structures.

- Communications needed to report fires may be disrupted; debris may limit access, and there may be more reported fires than operational firefighting units can handle.

- Prompt self-help actions by the public will be necessary to suppress small fires, thereby reducing the number of fires that require suppression by organized fire forces.

- Water for organized firefighting will be an urgent need requiring the highest priority. Damaged water distribution systems will probably not be repairable in time to be useful for fighting. Alternates for providing the needed water include: the use of water trucks; rapid temporary bypasses, such as using quick-fit irrigation pipe; and, pumping from nearby stored water sources such as swimming pools, ponds, lakes, and industrial water storage systems.

- In the case of electric, gas, and petroleum lines, strategic shut-off of sections, or all, of the distribution systems will reduce hazards from short circuits, escaping fumes, and spillage, thus averting the danger of explosions and fires. Plans should pay particular attention to bulk supplies of flammable substances and hazardous chemicals, and should provide measures to protect against possible threats in locations such as gasoline stations, chemical plants, dry-cleaning establishments, and places where bulk fuels and explosives

are stored. Security should be provided for industrial buildings containing these types of potential hazards.

- The crucial determinant of how many lives can be saved will be the speed with which trapped and injured people are located and rescued, and the speed with which all injured are given first aid and medical care.

- Generally, the numbers of injured survivors will be lower at night than during the working day. Most of the injured will not require hospitalization, but large numbers will require first aid and shelter. Therefore, the normal numbers of paramedics and emergency service personnel trained in first aid will have to be greatly augmented to staff first aid stations and to accompany search and rescue teams.

- Although most of the ambulances should be functioning, immediate attention will have to be given to the proper allocation of these units, establishment of access routes, and dispatch of units to needed areas. Debris and other damage may block routes to hospitals. There may be a problem in mobilizing off-duty personnel and getting them to places of need.

Earthquake Faults Posing a Threat to the District

The City of Big Bear Lake is located in an area of potentially severe ground shaking from earthquakes. The ground shaking may result from earthquakes on any of a number of local faults, including San Andreas, Cucamonga, San Jacinto and Helendale Faults.

The City of Big Bear Lake is in seismic hazard zone IV, with strong ground shaking and maximum expected acceleration of 0.4 to 0.7 g.[1]

Faults of the San Andreas system, including the San Andreas and San Jacinto fault zones, pass approximately ten to twenty-two miles from the Big Bear Lake planning area. They are the nearest known historically active faults. The maximum credible magnitude for an earthquake on the San Andreas Fault segment near the District has been estimated to be 8.25. A major earthquake along the San Andreas Fault represents a more significant potential seismic shaking hazard to the Fire District/City than do events on the other nearby faults.

Map 5-1 shows the active and potentially active earthquake faults near Big Bear Lake.

FLOODING

Flooding occurs when a temporary rise in stream flow results in the overtopping of banks and inundation of areas adjacent to the channel. The area subject to inundation is referred to as the flood plain. Factors affecting the size and frequency include amount and distribution of rainfall, previous moisture conditions, frequency of wildfires on the watershed, and channel conditions. The amount of damage incurred during a flood depends on the depth of the flood, velocity of flow, rate of rise and the duration of flooding.

[1] General Plan, City of Big Bear Lake., November 1984, p.7.17

Once flooding begins, personnel will be needed to assist in rescuing persons trapped by flood water, securing utilities, cordoning off flooded areas and controlling traffic. These actions may overtax local agencies, and additional personnel and resources may be required. It is anticipated that existing mutual aid resources would be used as necessary to augment local resources.

In the event of a flood threat or actual flood, fire and rescue agencies will be taxed with additional duties. A number of problems could arise, requiring action by fire and rescue personnel. Following are some examples, which will be faced by the fire department:

- Relocation of fire department equipment from stations in flood plain.
- Fires could result from electrical shorts or gas main leaks caused by floodwaters.
- Persons could be trapped in buildings.
- Other agencies, such as enforcement, medical or health, may request assistance from the fire department.
- Personnel shortages or equipment in flooded areas being inaccessible may hamper firefighting.
- Fire and rescue personnel may have to assist in evacuating handicapped persons.
- Water pressure may be affected if water mains have ruptured or hydrants have been broken off by debris flow.

Historically torrential rains resulted in Rathbun Creek overflowing at Big Bear Blvd. and resulting in the fatality of a child. North Creek washed out a large section of Highway 18 at the Boulder Bay Bridge, isolating Boulder Bay from the greater community area.

DAM FAILURE

Dam failures can result from a number of natural or man-made causes such as earthquakes, erosion of the face or foundation, improper siting, rapidly rising floodwaters, and structural/design flaws. In today's technical world, dam failures are rated as one of the major "low-probability, high-loss" events.

Warning ability is generally determined by the frequency of inspections for structural integrity, the flood wave arrival time (the time it takes for the flood wave to reach its maximum distance of inundation), or the ability to notify persons downstream and their ability to evacuate. The existence and frequency of updating and exercising an evacuation plan that is site-specific assists in warning and evacuation functions.

If the District is impacted by an imminent or actual dam failure, personnel assigned responsibilities of firefighting and rescue operations will be confronted by a number of problems and unusual tasks:

A catastrophic dam failure, depending on size of dam and population downstream, could exceed the response capability of local communities. Damage control and disaster relief support would be required from other local governmental and private organizations, and from the state and federal governments.

- Mass evacuation of the inundation areas would be essential to save lives, if warning time should permit.

- Extensive search and rescue operations may be required to assist trapped or injured persons.

- Emergency medical care, food, and temporary shelter would be required for injured or displaced persons.

- Identification and burial of many dead persons would pose difficult problems; public health would be a major concern.

- Many families would be separated, particularly if the failure should occur during working hours and a personal inquiry or locator system would be essential. These and other emergency operations could be seriously hampered by the loss of communications, damage to transportation routes, and the disruption of public utilities and other essential services.

- Economic impacts to a community could be substantial.

- `Governmental assistance could be required and may continue for an extended period. These efforts would be required to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities, and provide continuing care and welfare for the affected population including, as required, temporary housing for displaced persons.

MULTI-CASUALTY INCIDENTS

A number of risks or hazards present a possibility for a multi-casualty incident. A multi-casualty incident is one where many people are injured or killed by an event, which overloads the local emergency medical response system. A major earthquake would certainly create this situation as well as the possibility of a large fire or explosion in a school or institutional occupancy. Because private, commercial and military air traffic is constantly increasing in over flights of the Fire District/City, the possibility of a crash into an inhabited area is not unheard of. The airport is a very active public use airport located in Big Bear City on the easterly boundary of the City limits.

A large hazardous material spill or discharge could create a large multi casualty incident. A major traffic accident could involve several casualties, which could seriously impact the Bear Valley's emergency medical system. Since the fire department is the first responder into all those types of emergencies, they will be the most affected by a multi-casualty incident.

WINTER STORMS

The potential for major winter storms is a concern for the Bear Valley area. Because the valley is located in an area isolated from the urban population center, it is necessary that the Department/City be prepared to handle such an event. Major snow storms can result in significant amounts of snow, impacting essential services. Specific impacts include transportation routes into and out of the valley, fuel supplies, medical care, food, medications etc.

Section 6

RESPONSE TIME

RESPONSE TIME

WHAT IS "RESPONSE TIME?"

This section deals with issues concerning the term "response time." Some communities define response time as: "The period of time between the receipt of a citizen's call and arrival of the fire department at the scene." Others use this definition: "The period of time from receipt of dispatch by the first due fire company to arrival on scene."

For the purposes of this strategic plan, the term "reflex time" will be used instead of "response time" for reasons explained below. "Reflex time" is becoming the fire industry standard as a comprehensive term for "response time."[1] Reflex time is the time period from ignition to application of extinguishing agent, and is illustrated in Exhibit 6-1. A comparable period for a medical incident is the time from occurrence of the medical problem to the initiation of field emergency medical definitive care, and is illustrated in Exhibit 6-2.[2] The reflex time concept includes all of the components of the time period between occurrence and initiation of public service assistance. Each time component can be identified and analyzed and the results used to determine how the overall reflex time might be reduced.

The amount of time required for ignition/occurrence, the Fire District/City cannot directly control detection and reporting. However, the District's fire department system response time is directly manageable. Fire system response time begins with the receipt of an alarm at a dispatch center and ends with the initiation of corrective action. It includes the following four components:

- The time required to process the alarm and dispatch units.
- Turnout time of firefighters to apparatus and readiness for response.
- Travel time of fire department apparatus to the emergency.
- Set-up time of fire department resources.

[1] Burns and McAlester, Fire Management Curriculum, Fire Management 2D, California State Fire Academy, 1986.
[2] Based on American Red Cross data.

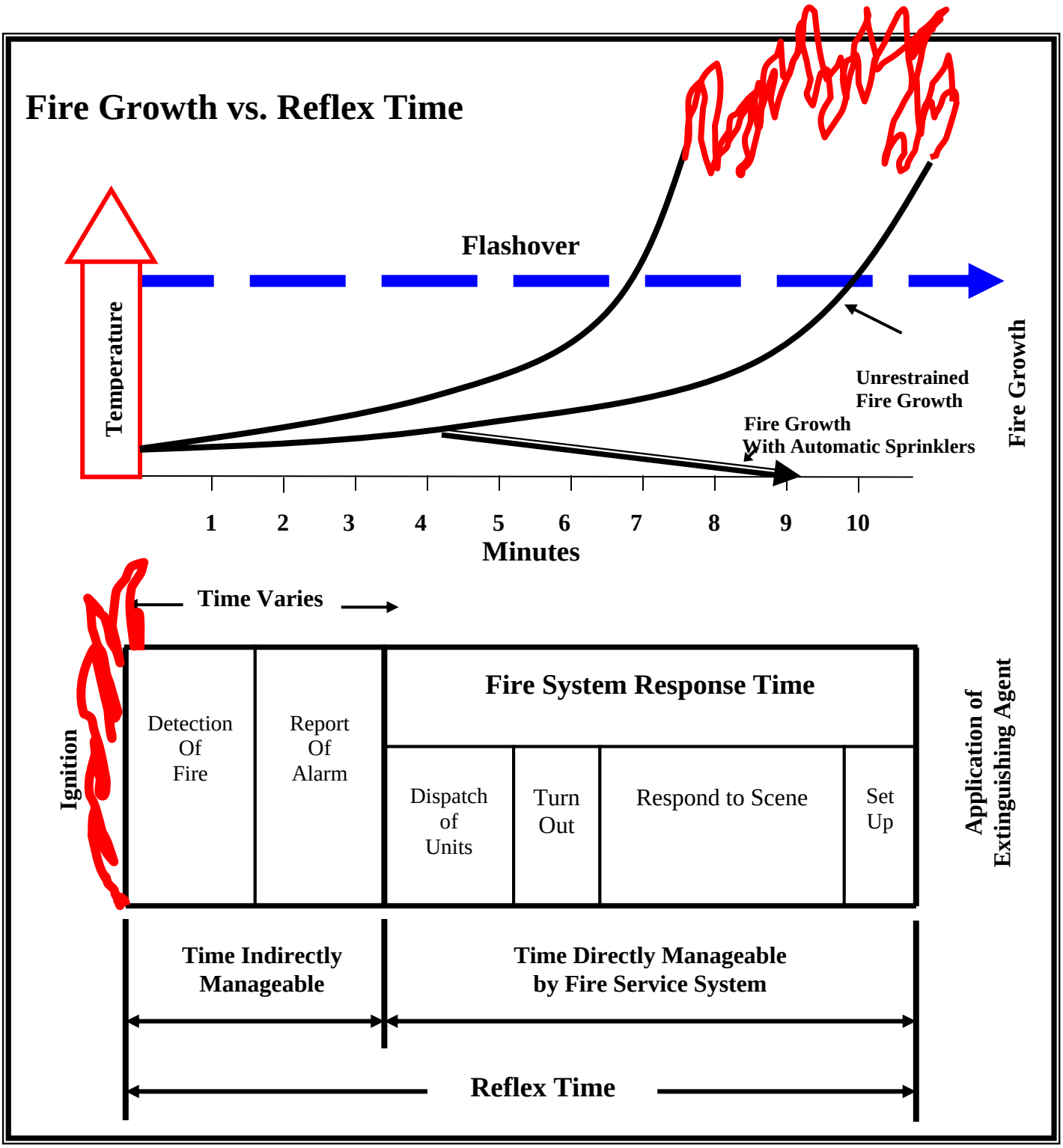
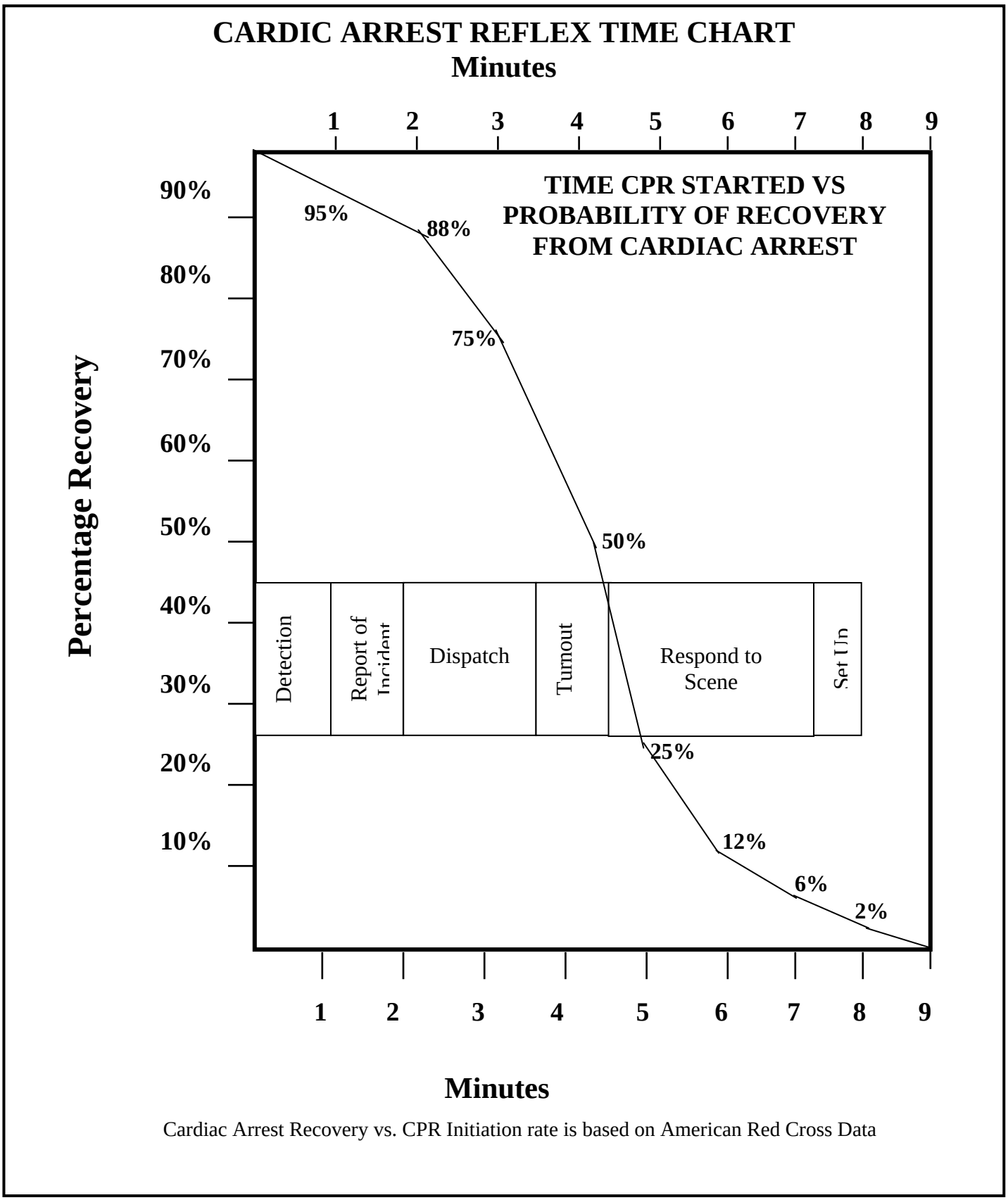


Exhibit 6-1 Reflex Time of Emergencies



Cardiac Arrest Recovery vs. CPR Initiation rate is based on American Red Cross Data

Exhibit 6-2. Reflex Time for Medical Emergencies

By using reflex time as the basis for Big Bear Lake's response standard, all components of the time period can be considered for improvement and resources can be applied in the most cost-effective manner. The individual components of reflex time are defined and discussed within the two categories:

RESPONSE TIME **INDIRECTLY** MANAGEABLE

RESPONSE TIME (REFLEX TIME)					
Detection	Report of Alarm	**Fire Protection System Response Time**			
		Dispatch	Turn out	Travel Time (Response to Scene)	Set up

RESPONSE TIME **DIRECTLY** MANAGEABLE
By the Fire District

RESPONSE TIME (REFLEX TIME)					
Detection	Report of Alarm	**Fire Protection System Response Time**			
		Dispatch	Turn out	Travel Time (Response to Scene)	Set up

There is a nationwide trend toward the use of the reflex time concept in planning for fire and emergency medical service delivery. The National Fire Academy states that "despite the commonly accepted definition of response time, the sequence of events that must be considered in that from ignition to the initiation of firefighting activities any response time reduction strategy must involve an examination of the time from ignition to intervention."[3]

TIME INDIRECTLY MANAGEABLE

Detection:

Detection period is the time from the initiation of the emergency event until it is discovered by an individual who can contact an emergency dispatch center. For fire, the initiation of the event is ignition. For a medical incident, it is the period of time from the occurrence of an injury or accident or from the onset of acute symptomatology (in case of heart attacks, strokes, etc.) until the patient or someone else contacts the dispatch center.

[3] Research project for the National Fire Academy, Executive Development III Program, "Evaluation of the Impact of Response Time and Company Staffing on Fire Alarm Capability - A Decision Making Process," March 1223, 1984, pp. 2-3.

Obviously, these time periods are dependent upon a large number of variables and are difficult to even estimate—especially for medical incidents. In structures equipped with an operable smoke detector, an alarm would be given approximately one-half to one minute after ignition.[4]

There have been medical studies of the time period from the onset of acute symptomatology to the call for emergency medical services.[5] This time period appears to vary significantly with symptomatology; however it is generally assumed that the average time period for detection of an EMS incident is one minute. A study by the United States Health Department in 1981 used the one-minute figure for their study.[6] This estimated time considers both delayed detection (i.e., an unwitnessed arrest), as well as, immediate detection by the patient or bystander.

For the purpose of figuring reflex times in this plan, the figure of **one minute** will be used for the average **detection times** for both fire and EMS incidents.

RESPONSE TIME (REFLEX TIME)					
Detection	Report of Alarm	**Fire Protection System Response Time**			
		Dispatch	Turn out	Travel Time (Response to Scene)	Set up

1minute

Report of Alarm:

This is the period of time from the discovery of a fire/emergency medical incident until it is reported to the dispatch center. This period is also difficult to estimate because of a large number of variables, such as access to a telephone and attempts to handle a situation prior to calling the dispatch center.

In the absence of any definitive estimates of this time period, it seems reasonable to assume that, once discovered, a fire or emergency medical incident would be reported in one to two minutes.

For the purpose of figuring reflex times in this plan, the figure of **one minute will** be used for the average **report of alarm** times for both fire and EMS incidents.

[4] International Association of Fire Chiefs, *Operation San Francisco* Technical Report, 1983.
[5] National Heart, Lung and Blood Institute, *The Effect of Emergency Medical Systems on Pre-Hospital Cardiovascular of Studies and an Inventory of Data Bases* (Washington D.C., April 1981), p.22.
[6] Bergner, Lawrence, et at., *Evaluation of paramedic Services for Cardiac Arrest* (Washington D.C.: U.S. Department Hyman Service, 1981), p. 33.

RESPONSE TIME (REFLEX TIME)					
Detection	Report of Alarm	Fire Protection System Response Time			
		Dispatch	Turn out	Travel Time (Response to Scene)	Set up

1 minute	1 minute

TIME DIRECTLY MANAGEABLE

Dispatch of Units:

This component is the interval between the time a call is received by the Dispatch Center and when proper responding units are notified. Functions, which have to be performed during this time period, are receiving the call, determining the nature of the request for service, identifying the appropriate available response, and alerting the correct response units.

The current average **dispatch time** for the Fire District is estimated to be 55 **seconds.** The estimated national average for dispatch of units is equal to 53.75 seconds according to a 1992 survey conducted by the International Fire Chiefs Association Accreditation Committee (September 1992).

RESPONSE TIME (REFLEX TIME)					
Detection	Report of Alarm	Fire Protection System Response Time			
		Dispatch	Turn out	Travel Time (Response to Scene)	Set up

1 minute	1 minute	1 minute

Turnout Time:

This time period begins with the receipt of an alarm at a fire station and ends when the fire/EMS apparatus leaves the station. Turnout time for fires is generally longer than that for EMS responses. This is due to the safety clothing and equipment that must be put on before responding. (Units which are dispatched while they are “on the air and available” generally are not associated with a turnout time.)

Big Bear does not track its turnout time. However, it is estimated that Big Bear’s current (1998) average **turnout time** for fulltime personnel is approximately 1.5 **minutes**. The turnout time for fires is 2 minutes, EMS responses, is 1 minute. The reasons for these long turnout times will be

discussed in the sections on fires and EMS responses. Turn out time for PCF's and recall of off duty personnel is longer do to the time necessary to travel to the stations. The estimated national average for turnout is equal to 57.55 seconds according to a 1992 survey conducted by the International Fire Chiefs Association Accreditation committee (September 1992).

RESPONSE TIME (REFLEX TIME)					
Detection	Report of Alarm	Fire Protection System Response Time			
		Dispatch	Turn out	Travel Time (Response to Scene)	Set up
1 minute	1 minute	1 minute	2 minutes		

Travel Time:

Travel time is the time required for the responding unit to drive to the scene of the incident. Travel time is generally a function of distance, road and traffic conditions, time of day, etc. Studies have shown that, on an overall basis, travel times are relatively constant. A study by the Rand Institute indicated little or no difference in travel velocities at different times of day, perhaps because less traffic congestion is offset by poorer visibility at night.[7]

The location of fire stations defines the basic fire department coverage of any area within the City. Of prime importance to the adequacy of that coverage is travel time which is basically a function of the distance from the fire station to the incident location and the average speed of travel by fire apparatus. This travel distance may be increased considerably by street patterns, natural barriers such as railroad tracks, freeways, street work, etc.

Fire Station Locations:

There are three (3) nationally recognized models for establishing where and how far apart fire stations should be. The criteria for the basis of these models revolve around fire department response specifically to fires. There will be more discussion and analysis of these models under Fire Protection Response in Section 7.

1. Insurance Service Office (ISO) Model:

For years ISO has only been concerned with a fire department's ability to deliver a sustained attack fire flow. However, a significant change occurred in the 1980 rewrite of the ISO rating schedule. Since that time, ISO is not only concerned with the fire department's ability to provide a sustained attack on the fire, but also their ability to provide an initial attack. It is this initial attack that needs evaluation. The criterion required by ISO is that a fire station must be located within a mile and one half distance from the built-upon areas of a community. This provides for

[7]Arthur Swersey, The New York City Rand Institute, *Fire ptoection and Local Government: An Evaluation of Policy Related Research* (New York, September 1975), p. 54.

a maximum of 3 minutes for response, 1 minute for notification and 3 to 5 minutes from the time that the fire department arrives on the scene for fireground operations, thus attacking the fire at or before the 10 minute time period illustrated in Exhibit 6-1.

2. International City/County Management Association (I.C.M.A.) Model

This second model suggests that the location of a fire station be within 1 mile of industrial commercial property and 2 miles of a medium density residential unit (6 to 8 units per acre) and 3 miles of low density residential units (where homes are separated by more than 100 feet).

3. Public Technology Model

The third model is based on computer travel time formulas to determine future fire stations based upon a maximum travel time of 5 minutes. It divides the response areas into zones. In the center of these zones a node is placed, then through computer modeling the time rate from each proposed site to the node is determined. However, an important note is that one must build the parameters to plot on the computer. For instance, one must determine where a proposed fire station location is needed, as well as establish the maximum time frame limitations for response before the computer will analyze it. The human element is then a significant factor in the Public Technology model. Yet, most generally, this model is given a 5-minute response time, which could equate to 2.5 miles.

In both the ICMA and ISO models the following mathematical formula for travel time is used:

Travel Time = 0.65 + 1.7 Distance

Using this formula it can be determined that travel time is equal to 2.35 minutes per mile. Doubling that for 2 miles equates to 4.70 minutes and 3 miles equals 7.05 minutes.

Fire Station Scanning Model:

A key process of focusing on the future is to develop strategies that mitigate the impact of response times that do not fit into the recommended response reflex times. Building and staffing new fire stations in strategic locations mitigates this problem. There is a simple scanning model used to determine when and where mitigation is necessary to keep reflex times within standards.

Illustrated in Exhibit 6-3, this model has two factors. The first is the likelihood that an emergency is going to occur, which ranges from low to high. Map 6-1 shows where and how many emergencies are located in the Big Bear Lake Fire Protection District per fire demand zone. The second factor is the expected travel time from existing fire stations, ranging from low to high, if fire department emergencies should occur. Map 6-2 shows the average emergency travel time per fire management area in the Fire District.

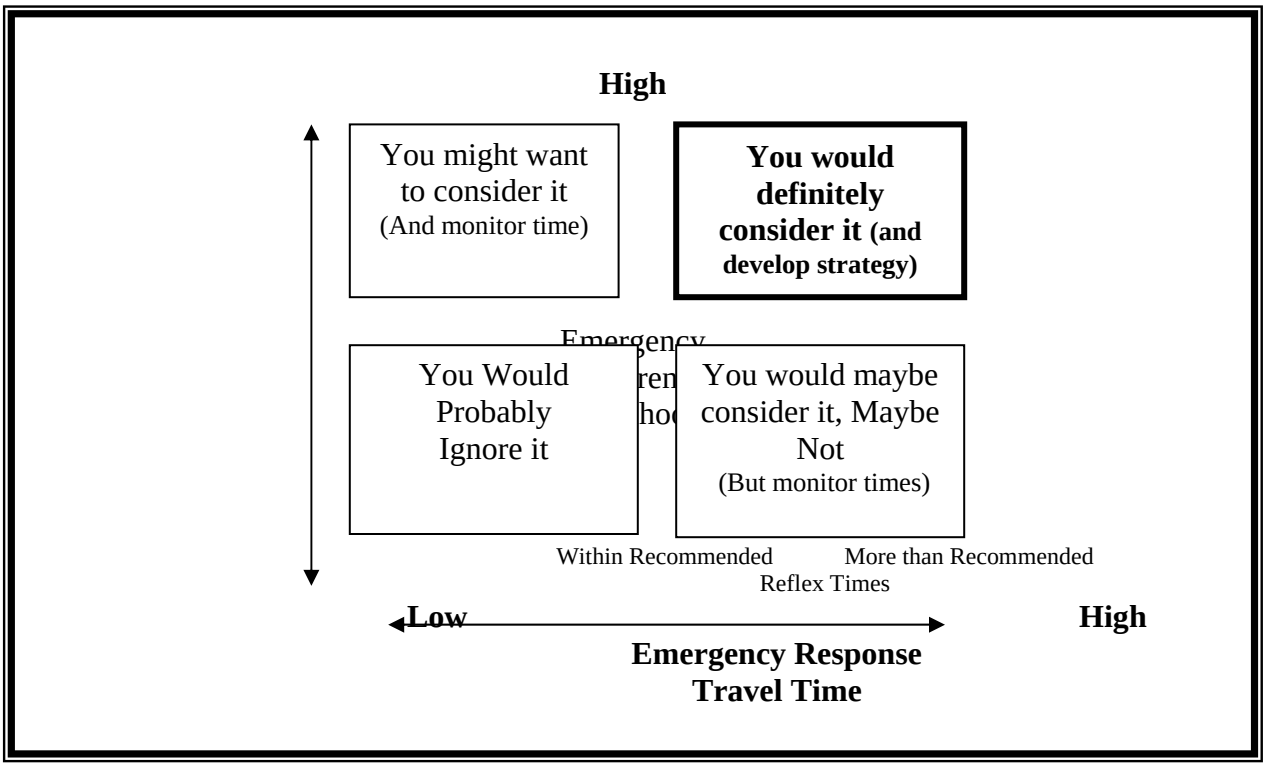


Exhibit 6–3 Fire Station Needs Model

The fire station model provides four potential sets of circumstances. In the first, if an emergency is likely to occur and the travel time is within the recommended reflex time, we may want to consider it and monitor it, but not get too concerned. In the second circumstance, if an emergency is unlikely to occur and the travel time is within recommended reflex time, we can choose to ignore it. The far right bottom box holds a set of circumstances in which an emergency is not likely to occur, but if it does, the Fire Department's travel time would be more than the recommended reflex time. In that case, the Fire District should have a plan and be monitoring that event, for when it occurs, the consequences could be severe. That leaves us with the last box of circumstances, in which an emergency is highly likely and response will take longer than the recommended reflex time. This is the box where fires may expand beyond the room of origin and out of control for a long period of time necessitating more resources. It's also the box where people with severe medical problems may die due to the slow response. There is only one strategy the Fire District can have to survive in that box -- mitigate the long response times to the best of its ability to fund needed fire stations & staffing.

Based on this scanning method and looking at the travel time to all the areas of the Big Bear Lake Fire Protection District, the following recommendations are made for the next five- (5) years to significantly reduce the travel time.

An analysis of Big Bear Lake Fire Department emergency responses in 1998 produced a calculated average travel time to all emergencies of 5 minutes and 51 seconds (5:51). Map 6-3, at the end of Section 6, shows the locations of the existing Big Bear Lake fire stations. Map 6-4, at the end of Section 6, illustrates where the recommended fire stations are located and response distances from each.

Traffic Pre-emption Devices: Another way to reduce the travel time of emergency units is to automatically change traffic lights to green from a safe distance with a beam of light from the responding emergency unit. This allows the emergency vehicle when responding code three to proceed through the traffic signal safely and quickly.

Detection	Report Of Alarm	**Fire Protection System Response Time**			
		Dispatch	Turn out	Travel Time (Response to Scene)	Set up
1 minute	1 minute	1 minute	2 minutes	5 minutes & 51 seconds	

Setup Time:

This component is the period of time from arrival on scene until suppression or medical treatment activities are initiated. Activities within this period are dismounting, unloading equipment, and gaining access to the building, sizing up the incident, and taking action. National estimates of setup time (for a one or two-story dwelling) range from 1 - 3 minutes for fires, and 0.5 - 1 minute for EMS incidents. For the purpose of this discussion, the time period of 1.5 minutes will be used for a set up time.

RESPONSE TIME (REFLEX TIME)					
Detection	Report of Alarm	**Fire Protection System Response Time**			
		Dispatch	Turn out	Travel Time (Response to Scene)	Set up
1 minute	1 minute	1 minute	2 minutes	5 minutes & 51 seconds	1.5 minutes

REFLEX TIME ISSUES

There is agreement in the literature and among fire protection emergency medical experts concerning the need to minimize response time in order to protect life and property. Tests carried out by the Los Angeles City Fire Department and other agencies demonstrate conclusively that a delay in the application of fire suppression agents significantly increases both the amount of water and time required to control a fire.[8] Response time is also critical for provision of emergency medical services. Common sense, as well as numerous studies, has substantiated the requirements for rapid initiation of basic life support services (airway maintenance, bleeding control, CPR and shock prevention and control). For example, a report by the Los Angeles County Fire Department states: "Another study conducted by the American Heart Association showed that the amount of time to initiation of basic life support was critical to overall survival rate."[9]

Response Time Summary
1992-2001

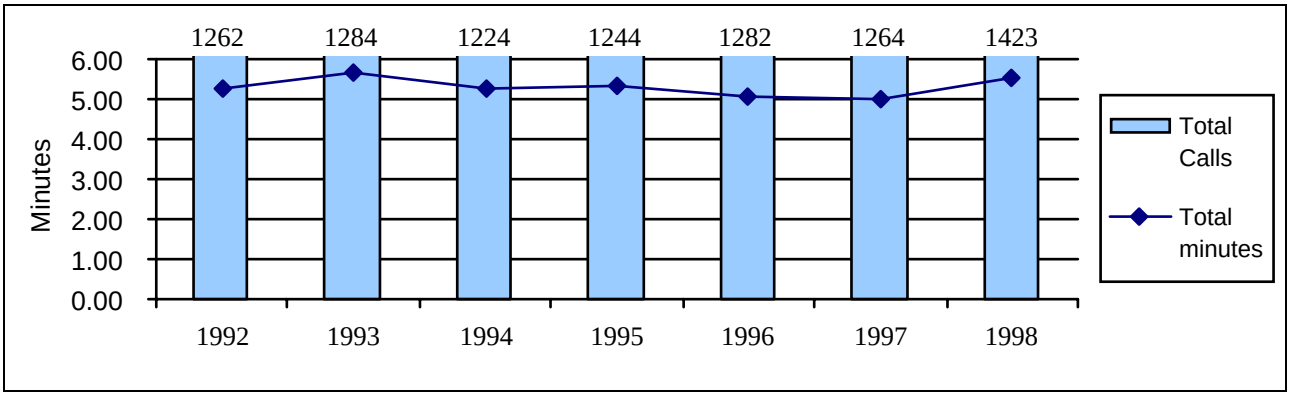


Table 6-1 Response Time Summary 1992-1998

[8]For Example: Andrews, Davis, Bettman, et al., *Methodologies for the Evaluation and Improvement of Emergency Medical Systems* (Washington D.C.: U.S. Department of Transportation, July 1975) and American Red Cross, *Cardiopulmonary Resuscitation* (Washington D.C., 1974).

[9] Los Angeles County Fire Department, "Fire Protection and Emergency Medical Services Delivery System," April 1980.

Table 6-1 shows that with the increased call demand the average response time to any incident is also increasing. This average for the entire district combined is shown in Table 6-2. The table shows the break down of response time for each response district within the department for 1998.

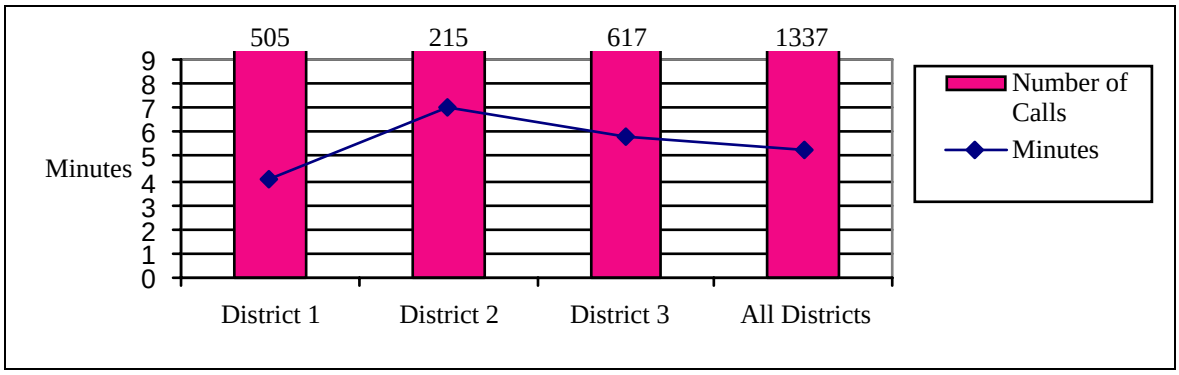


Table 6-2 Response Time by Districts 2001

Thus, there is no question that it is important to minimize fire and emergency medical reflex time, but to what levels and at what cost? Building a fire station on each corner could significantly reduce unit travel times; however, our society could not afford to pay for such a level of service. What, then, is the appropriate balance of service level and cost. A review of Exhibits 6-1 and 6-2 shows that the development of a fire or emergency medical incident can be considered a continuum from initiation to conclusion. And, it has been established that emergency services should be provided as early on the continuum as possible, considering that appropriate "balance."

Reflex Time Goals:

For the purpose of this plan and resulting recommendations, reflex time goals will be established based on the most critical events in the development of a fire or life safety incident.

1. For “fire,” the recommended critical event is:
   "Flashover"
2. For “EMS,” the recommended critical event is:
   "The time after cardiac arrest at which the chance of recovery falls below 50%."

District 1 (Station 281) is located at Knickerbocker Rd. and Big Bear Boulevard. It services the entire village, surrounding residential and commercial areas. District 2 (Station 282) located across from the Civic Center on Highway 18, serves the west end of the District. This station along with Station 3 is a paid call station staffed by paid call firefighters and recalled off duty personnel. District 3 (Station 283) located off Moonridge Rd. and Fir St. serves the east end of the District. District’s 1 and 3 have the majority of calls. District 1 is well within the response time norm of 4 to 6 minutes for travel time. District’s 2 & 3 exceed or are very close to exceeding the norm. This increase can be attributed to several factors, however the main cause is the increase in calls. The department is experiencing multiple queuing of calls. Multi queuing of calls is multiple calls occurring in a short period of time without the necessary resources to handle them in the prescribed time frame.

SECTION 7

FIRE RESPONSE

WHAT IS FIRE PROTECTION?

The science of reducing loss of life and property by fire, including both fire prevention and fire extinguishment by public or private means is fire protection.[1] What does this mean? The statement says that fire protection should be treated as a system, with the fire department being the coordinating agency. This system consists of a variety of components that act together to achieve the common goal of fire protection which is to protect people and property from fire. The fire department is just one of those components in local government which influences fire protection. Law Enforcement, Building & Safety, Public Works, Utilities (water and sewer) and Engineering Departments are also integral parts of the Fire District/City's fire protection system. In addition, the Telephone Company, the Electric Company, the Gas Company, schools, ambulance service, Planning Commission and water district play important and sometimes vital roles.

Obviously, the fire protection system in a community is quite broad. It encompasses among other things the fire prevention and suppression activities of the fire department, the community's building codes and its water supply system, the private investment of building owners, and the activities of the occupants of the buildings. Therefore, all of the organizations pooling their expertise and resources make up the fire protection system. There is interdependence between public and private agencies, which has a significant impact upon the quality of fire protection for a community.

The Primary Elements of the Fire Protection System:

Fire Department

The fire department provides fire protection services which include: fire code enforcement, fire safety education, fire control or suppression, hazardous materials, rescue and emergency medical services, fire cause determination, arson investigation, and arson prosecution support.

Political Board of Directors

A critical element of the fire protection system is the political body, which governs the fire department. These policy makers are directly responsible to the citizens who pay taxes to support the fire service delivery system. Big Bear Lake's political board is a Fire District Board of Directors who also serve as the City of Big Bear Lake's City Council.

Building Department

The building codes adopted by a community and the enforcement of those codes are a major factor in the establishment and control of fire risks and fire protection costs.

[1] John L. Bryan and Raymond C. Picard, eds., Managing Fire Service, (Washington D.C.: I.C.M.A., 1979), p.145.

Planning Department/Planning Commission

Community planning and development regulates the land use within a community. These land use controls include industrial, commercial and residential zoning limitations, development density controls, height limitations, open space requirements, transportation systems, utility system requirements and user projections. These factors profoundly influence the fire protection risks and the fire protection system requirements of a community. Community general plans contain the long-range goals and policies, which are the guidelines for these land use controls.

Water Department

Adequate water supplies are essential to Firefighting operations and to automatic fire sprinkler system design and performance. Fire protection requirements should be a key element in the design and construction of community water systems. Progressive communities not only include fire protection as an essential element of water system design but also utilize the resulting reduced "fire flow" requirements of automatic fire suppression systems to limit the costs of water systems. Critical factors of the water system include adequate water mains and fire hydrants, fire flow and storage capacity.

Public Works Department

A Public Works Department is traditionally responsible for engineering and design related to utility systems, public roads, and traffic signal systems. Factors such as road width, cul-de-sac length, maximum load capacity of road structures, etc., impact the fire department's ability to provide fire suppression.

Law Enforcement

Law enforcement participation in the fire protection system includes arson investigation and prosecution, crowd control at emergency incidents, hazardous condition reporting, and evacuation of persons exposed to fire or hazardous materials risks. In some communities, especially rural communities, law enforcement personnel actively participate in fire suppression and fire prevention activities. Other communities have consolidated the law enforcement and fire protection functions into one "public safety" department.

School System

Fire safety education is increasingly recognized as an effective and essential part of a community fire protection system. Fire safety education provided in schools is generally optional for the school district. Requirements and/or curriculum guidelines for fire safety education are found in only a few school districts. Fire departments frequently conduct limited fire safety education programs for certain elementary grade school children.

Private Sector Fire Protection

The private sector of the fire protection system includes: water companies, fire protection engineering firms, industrial or commercial emergency response teams (fire brigades), fire protection system manufacturers, contractors, and service companies. The fire protection responsibilities of managers and supervisors in the private sector is expanding as a result of improved loss control programs and legislation. Fire insurance companies are a diminishing element of fire protection system design.

Regional, State, and National Agencies

The Community Fire Protection System is frequently supported by regional, state, and national fire protection agencies, i.e., County Fire Department, State and Federal Forestry, Military Fire Department, and State and Federal Offices of Emergency Service. These agencies provide mutual support to each other in the time of need for extreme events.

Emergency Communications Centers

One of the most critical links in the fire protection system is the answering and dispatch point for emergency communications. Public Safety Answering Points (PSAP's) are where 9-1-1 calls come into a dispatch center. The emergency information is then either sent to the appropriate dispatch center not actually in that facility or emergency units are dispatched. If the system is interrupted at the emergency communications center the emergency will only escalate.

FIRE PROTECTION REFLEX TIME GOAL

As discussed in Section 6 “Response Times”, it was determined that time was the critical factor for both fire (flashover) and EMS (brain damage) activities. It was established that arriving to a fire before flashover occurs made the difference in the outcome of the situation. Because this section deals with fire responses, we must establish a foundation to start from. In doing so, certain recommendations will be made to ensure that our 4-6 minute norm is met to the best of the departments abilities.

Fire Reflex Time Goal:

RESIDENTIAL - In **residential** dwellings initiate fire suppression actions after flashover, but confine the fire to the room of origin.

COMMERCIAL - In **commercial** occupancies initiate fire suppression actions **prior** to flashover.

This recommendation means that for buildings without automatic suppression systems the first arriving fire suppression unit should be on-scene and applying an extinguishing agent prior to the occurrence of flashover for commercial occupancies and just after flashover for residential dwellings. To fully understand this goal, a little more knowledge of fires is necessary.

Fire Growth Potential:
There are four key factors associated with the fire growth potential:

- **Fire Load**
- **Size and shape of the room**
- **Interior finish**
- **Air supply**

The conflict lies in the relationship these four characteristics display in residential fires versus commercial fires. Commercial occupancies are at greater risk due to fuel load, but residences have a greater risk due to interior finish, air supply and reduced compartment size. These factors provide an opportunity for more rapid distribution of heated air, smoke, and fire gases throughout the residential structures. The following Fire Growth Hazard Potential chart, Table 7-1, illustrates this phenomenon.

FIRE GROWTH HAZARD POTENTIAL

		Commercial		Residential
Fuel Load	4	Moderate to High	1	Low
Interior Finish	2	Low to Moderate	2	Low to Moderate
Air Supply	1**a**	Low	4**b**	Moderate to High
Size & Shape of Room	1	Low	5	High
TOTAL		**Low to Moderate**		**Moderate**

Hazard Scale: 1 = Low Hazard 3=Moderate Hazard 5= High Hazard

a
Air supply concerns for commercial occupancies assume that building standards have incorporated smoke removal in the building or the type of building does not need to incorporate life safety measures.

b
Air supply in residential occupancies is indicative of rapid distribution of smoke and fire gases throughout the structure.

Table 7-1 Fire Growth Hazard

Flashover

Flashover is defined as the point at which fire gases and all combustible surfaces of a room burst into flame at once.[2] Deaths, injuries, and property loss can be expected to increase significantly after flashover has occurred. In addition, the fire department resources needed to extinguish the fire increase greatly after flashover. Thus, fire suppression initiated prior to flashover will generally require fewer resources, and will provide greater protection of life and property.

The implementation of this recommendation requires a definition of when (on the continuum) flashover can be expected to occur. Like many other factors associated with the provision of fire/EMS services, flashover is a complex phenomenon and the time to flashover can vary significantly based upon materials and furnishings, source of heat of ignition, available oxygen, use of an accelerant, etc.

Scientists believe flashover to be caused by thermal radiation feedback from the ceiling and upper walls, which have been heated by the fire. This radiation feedback gradually heats the contents of the fire area. When all the combustibles in the space have become heated to their ignition temperatures, simultaneous ignition occurs.[3] Temperatures reach 1000 degrees between 2 and 8 minutes. Nationally accepted tests indicated that flashover can occur in residential occupancies within 2 to 3 minutes. Consequently, the potential exists for the fire to grow in an exponential manner beyond the room of origin. This severely effects the exit way adjacent to the fire room involving the ceiling and reaching untenable conditions over 20 feet away in a range of time between 1.5 to 3 minutes after flashover. [4]

Studies on flashover help support the theory of where fire stations should be, how many personnel are required and how much equipment will be needed to extinguish the fire. One objective is to ensure the provisions of an initial attack assignment within a ten (10) minute time frame, because approximately 95 percent of the time flashover occurs before 10 minutes. At this point the objective is to extinguish a fire in a residential dwelling after flashover; however, with only one room engulfed in flame and to confine the fire to the room of origin. The objective for commercial occupancies is to extinguish a fire prior to flashover.

Fire Reflex Time Goal:
Initiate initial fire suppression actions within 10 minutes of ignition for at least 90% of all fire incidents, and 95% within 12 minutes.

[2] Arthur E. Cote and Jim L. Linville, eds., Fire Protection Handbook 16th Edition, (Quincy, MA: NFPA, 1986), p. 4-7.
[3] Fire Protection Handbook, 16th Edition, p. 4-8
[4] Fire Protection Handbook, 16th Edition, p. 18-1

The 90% and 95% accomplishment levels are suggested because it is not reasonable to expect that the standard can be met in every case. The fact remains that the fire department has no direct control over the detection and reporting times in the fire reflex time continuum. In addition, arson fires normally have an accelerated time to flashover.

Fire Defense Models

As discussed in Section 6, different models are used throughout the United States to accomplish the objectives of an acceptable fire defense:

Insurance Service Office (ISO) Model

The most predominate model used in communities to achieve the initial attack is the Insurance Service Office (ISO) model. It is the basis for how fire departments receive alarm notification, where they place stations and how they deliver water to the scene of a fire. It encompasses training of personnel, developing model projections of fire flow demands, design and construction of fire apparatus and a number of other criterion.

For years ISO has only been concerned with a fire department's ability to deliver a sustained attack fire flow. However, a significant change occurred in the 1980 rewrite of the ISO rating schedule. Since that time, ISO is not only concerned with the fire department's ability to provide a sustained attack on the fire, but also their ability to provide an initial attack. It is this initial attack that needs evaluation. The criterion required by ISO is that a fire station should be located within a mile and a half distance from the built-upon areas of a community. This provides for a maximum of 3 minutes for response, 1 minute for notification and 3 to 5 minutes from the time that the fire department arrives on the scene for fireground operations, thus attacking the fire at or before the 10 minute time period. Once personnel and equipment are on the scene the next critical issue is determining the quantity of water in gallons per minute (gpm) needed to extinguish the fire. Much of ISO's emphasis is on this needed fire flow. This will be more fully discussed in Section 9 on staffing needs and requirements.

International City/County Management Association (I.C.M.A.) Model

This second model suggests that the location of a fire station be within 1-mile of industrial commercial property and 2 miles of a medium density residential unit (6 to 8 units per acre) and 3 miles of low density residential units (where homes are separated by more than 100 feet).

Concerning the industrial or commercial occupancies, it seems logical to assume that a fire station is needed within a 1-mile radius. This is where the highest risk (dollar loss) potential is located. A 1-mile radius would facilitate the arrive of an engine company more quickly than the ISO model for this area. This would result in smaller fires, lower dollar loss and greater dollar savings. However, this model is extremely labor intensive and would greatly increase costs for personnel, equipment and capital expenditures compared to the ISO model.

Fire tests may weaken the argument for the 1-mile radius. These tests revealed that the variable of the size and shape of a compartment (room) affected the speed of flashover. These tests also

indicated that flashover occurred within 2 to 3 minutes in smaller compartments like bedrooms and small living rooms; whereas, a larger compartment fire such as a warehouse might take an extended time frame of 20 to 30 minutes to flashover. The test results weaken the argument of a 1 mile radius for commercial or industrial buildings, unless one considers multi-story buildings or buildings with high hazards such as storing, mixing and handling flammable or combustible liquids and gases, or explosives or other extremely toxic substances. Fortunately, most of these occupancies require automatic fire sprinklers.

Other aspects of the ICMA model such as fire stations distributed within 2 or 3 miles may also be invalid. This model for station distribution in medium and low-density residential areas from a fire defense standpoint is also highly deficient. First, assuming that notification time, as well as fireground tactics are equal throughout all these models and allotting 1 minute for notification and 3 to 5 minutes for fireground tactics, it leaves travel time as the only variable. It can be determined that travel time is equal to 2.35 minutes per mile. Doubling that for 2 miles equates to 4.70 minutes and 3 miles equals 7.05 minutes.

Therefore, the initial attack would begin after the 10 minutes for the two-mile station location and after 13 minutes for the 3-mile station location response zones. The information gained from these models would continue to support the present State fire damage statistics, since approximately 90 percent of the fires using either the ICMA or the ISO models would be in post flashover phases. If one used a less comprehensive time travel model and estimated the mean response speed of an emergency vehicle at 30 miles per hour traveling a 2-mile distance would encompass a 4-minute response time. In 3 miles a 6 minute response time. The use of this approach would result in the initial attack occurring in approximately 10 minutes.

Public Technology Model

The third model is based on computer travel time formulas to determine future fire stations based upon a maximum travel time of 5 minutes. It divides the response areas into zones. In the center of these zones a node is placed, then through computer modeling the time rate from each proposed site to the node is determined. However, an important note is that one must build the parameters to plot on the computer. For instance, one must determine where a proposed fire station location is needed, as well as establish the maximum time frame limitations for response before the computer will analyze it. The human element is then a significant factor in the Public Technology model. Yet, most generally, this model is given a 5-minute response time, which could equate to 2.5 miles.

What Do These Fire Defense Models Mean?

These models infer that in most cases the design of our community's fire defense system can adequately provide an initial attack approximately 10 minutes after notification. Yet, is that an acceptable time frame? Where is the fire problem? What should our goals and objectives be? Should our goals be to protect commercial occupancies because ultimately they have the most dollars at risk? This goal may be questionable since residential occupancies account for 56 percent of the total dollar loss, 74 percent (national average) of the fire deaths and 64 percent of the fire injuries. It would appear that our system is weighted in favor of protecting commercial

occupancies. Yet the statistics indicate that residential dwellings are approximately 33 to 36 percent at higher risk than commercial occupancies based upon the differential between the four fire factors. The answers may lie in reducing these indicators to a relationship equivalent to that of commercial buildings. This dilemma involves the emergency medical service (EMS) which has become a significant service of the Big Bear Lake Fire Department. EMS will be discussed at length in Section 8 of this plan. Often it is considered as the driving force behind the current station location. Both the fire models and the EMS model must be considered to evaluate fire station location needs and reach a final conclusion.

COMPARISON WITH CURRENT ESTIMATED OR AVERAGE TIMES

The portion of the fire reflex time directly manageable by the Big Bear Lake Fire Department is estimated using current averages and summarized in Table 7-2. Remember that the time directly manageable is the total reflex time minus the detection and reporting components.

1998 AVERAGE COMPONENTS OF REFLEX TIME TO FIRES BY THE BIG BEAR LAKE F1RE DEPARTMENT

Component	1998 Average Minutes: Seconds
Dispatch Time	1:00
Turnout Time	1:30
Travel Time	6:25
Setup Time (recommended goal)	1:30
Total Current Manageable Time to Fires	09:85

Table 7-2 1998 Average components of fire reflex time

These figures are averages; if, for example, the maximum travel time is used instead of the average, the reflex time period will greatly be increased. Using Big Bear Lake's current average manageable fire reflex time of 09:85 and adding the detection and reporting functions (an additional estimated 2 minutes), puts the Fire Department 1:50 seconds over the recommended 10 minute fire reflex time standard.

ATTACKING THE FIRE PRIOR TO FLASHOVER

Table 7-3 illustrates how fire sprinklers (automatic suppression system) provides an immediate suppressant action.

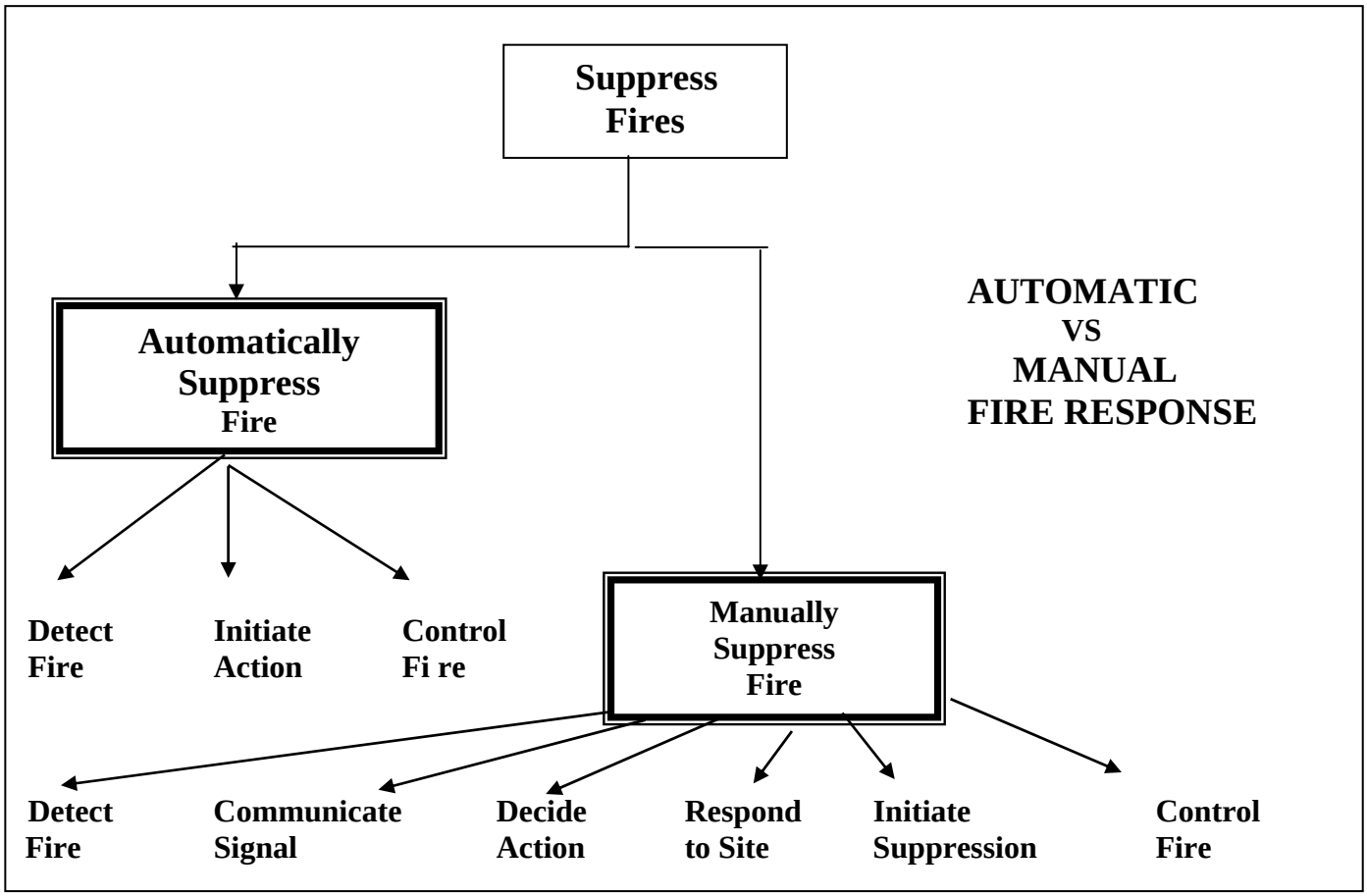


Table7-3 Automatic vs. Manual Fire Suppression Response

Automatic sprinklers attack a fire in its earliest stages by spraying enough water to put out the fire or keep it from spreading. Sprinkler heads are held closed until heat activates them. Only the sprinkler head(s) near the fire open, spraying water on the fire to extinguish it or control it and keep it from spreading. In contrast, the manual system requires that human detection, communication, decision, and response take place prior to suppression activities.

It needs to be made clear, however, that although sprinkler systems are automatic, they still will require a human response to completely suppress a fire. Sprinkler systems should not be considered a substitute for a well-organized and operated fire service!

According to the National Fire Protection Association (N.F.P.A.), the following facts on automatic sprinklers are based on their collection of fire data:

- There is no record of a multiple-death fire (killing three or more people) in a residential property where a complete sprinkler system was installed and operating properly.

- In commercial properties, the life-saving record of sprinklers is almost as good. The few exceptions involved explosions, flash fires, or other special circumstances.

- More than 6,000 people die in fires in the United States each year. Sprinklers could save thousands of these people.

- N.F.P.A. estimates that about half of all fire deaths in hotels and motels could be prevented if all hotels and motels were fully equipped with automatic sprinklers.

- In one and two family homes, where two-thirds of all fire deaths occur, sprinklers could save thousands of lives each year.

- Automatic sprinklers' ability to save property often translates to lower insurance premiums for sprinklered properties. Often a sprinkler system can be paid for in as little as five years through savings on insurance premiums alone.

Harry Hickey in an I.C.M.A. publication, "Fire Management Review," stated that numerous studies have proved the tremendous value of automatic systems:[5]

> "A community policy to control and reduce property hazards by requiring automatic sprinklers can have a significant impact on holding the line with fire department staffing requirements. In addition to improved life safety and property protection, automatic sprinklers may reduce property insurance premiums and the demand on the community's fire suppression delivery system. This may open new service delivery options, such as improvements of emergency medical services with existing personnel."

Automatic sprinkler systems can be broken down into two types: property protection sprinkler systems and life safety sprinkler systems. Up to this point, the discussion has mostly concerned property protection sprinkler systems, which are installed in commercial, industrial and institutional occupancies when required by the Uniform Building Code or Uniform Fire Code or City Ordinance. In the 1980's a new breed of automatic sprinkler system, the life safety sprinkler system, has come on the scene for residential properties. They use lightweight, inexpensive piping and fittings of plastic, copper or thin-walled steel in place of traditional materials. Their "quick response" residential sprinkler heads open faster than those in industrial and commercial properties and operate from the household water supply.

Reduction in all forms of government spending, resulting from public pressures to reduce property taxes, is a prime factor in the future growth of the residential sprinkler concept (life safety sprinkler systems). As in Big Bear Lake, many fire departments find themselves forced to protect larger areas and more subdivisions with the same number of (or even fewer) people since financial restrictions sometimes hamper a fire department's ability to grow with the community.

[5] Harry, Fire management Review, (Washington D.C.: ICMA, 1979).

As a result, alternate methods to traditional firefighting techniques must be found. One of them is the use of residential sprinklers for the protection of life.

San Clemente, California, was the first community in the United States to pass a residential sprinkler ordinance in 1980 as part of the fire department's master plan. Many communities in California have passed similar residential sprinkler ordinances since 1980. These ordinances require automatic sprinkler systems to be installed in all new residential construction. A prime motivation for the passage of comprehensive sprinkler ordinances has been cutbacks in the cost of government.

Many communities across the country face similar situations. Automatic sprinklers in residences may be the answer to fewer fire fighters responding and longer response times from the fire department and most obviously a reduction in detection and reporting times by the occupants. Most importantly, the National Bureau of Standards has estimated that adding sprinklers in residential occupancies could reduce fire deaths in homes by as much as 60 to 70 percent - saving about 2,500 lives each year. For maximum effectiveness, home sprinklers must be used along with smoke detectors and escape planning.

Over the past five years in California, many communities with residential sprinkler ordinances have reassessed these requirements due to a recent court decision. The Vallejo court decision required the City of Vallejo to rescind its ordinance mandating residential fire sprinklers in a particular development. There still seems to be arguments over exactly what this court decision means. Since it was a Superior Court decision and was not appealed, this decision has no "precedent value" according to Fire District legal counsel. Many communities in California still enforce mandatory residential fire sprinkler ordinances in all new residential construction. The Building Industry Association (BIA) has continued to file suits in some of these jurisdictions attempting to overturn their ordinances.

REDUCTION OF FIRE REFLEX TIME

The various components of reflex time offer a number of opportunities for Big Bear Lake to keep this time period within the standard. Even the components which are only indirectly manageable (detection and reporting) can be reduced.

Detection:

Rapid-fire detection is critical to meeting the reflex time standard. The estimate of current reflex time was based on a detection time, which assumed the presence of an operable smoke detector. But, what about those structures in Big Bear Lake, which currently do not have operable smoke detectors or other automatic detection and suppression devices?

Smoke detectors are proven life savers, for example, a study by the Los Angeles Fire Department established that: [6]

[6] Los Angeles City fire Department, Measurements of Comparative Effectiveness, Company Fire Fighting Operations,"1980.

"Knockdown time and loss would go down dramatically if the alarm was given when open flame first appeared. If, through use of such warning systems as smoke detectors or sprinklers, the alarms were received six minutes earlier and the company present on the scene six minutes sooner, flashover might not have occurred and loss might be reduced to approximately half the loss anticipated if the first-in company arrives after flashover.

Reporting

There is little that the City of Big Bear Lake can do to further reduce reporting time except through public education and the increased use of automatic reporting systems. For example, public education programs could be used to reach residents (especially children) to call 911 immediately, rather than trying to fight the fire first and then calling. The City already uses the 911 system, which is considered important in reducing the reporting time. Automatic reporting systems (with or without an associated sprinkler system) provide significant benefits in reducing reporting time - especially for fires in unoccupied buildings. Such systems could be installed in single and multiple family dwellings and commercial/industrial occupancies, where not currently required by code, to reduce reflex times.

Dispatch of Units

As stated earlier, the current average fire/rescue dispatch time is approximately one minute. The Big Bear Lake Fire Department utilizes the County Sheriffs Department, to dispatch fire department emergencies, The current dispatch times can be improved upon through the use of a Computer Aided Dispatch system.

Turnout Time

The 1998 average turnout time for the Big Bear Lake Fire Department units for fires was estimated to be 1 minute and 30 seconds. This time can be considered average. The national average is closer to 1 minute. Turnout time for fires requires the proper safety clothing and equipment be donned prior to the apparatus moving. Slow dispatching of dispatch information in the stations has also been blamed for the slow turnout times for both fires and EMS calls. Calls are processed via telephone and not by radio communications.

Travel Time

In general, the best way to reduce travel time is to relocate and/or add fire stations and companies. An automatic traffic signal device can safely reduce the travel time of responding emergency vehicles. As indicated previously in Section 6, the travel time component presents the greatest opportunity to significantly reduce the reflex response times. However, it also represents the most costly improvement. The 1998 average travel time to fires is 6 minutes and 25 seconds.

Setup Time

The time required for setup can often be reduced through improved procedures, training, and the use of additional personnel. The goal for setup time at a fire should be 1.5 minutes. However, it is recognized that setup time is highly dependent on the fireground environment – for example, setup time for a multi-story building could be 15 minutes or more. The Big Bear Lake Fire District should establish Company Standards/Procedures to accomplish this 1.5-minute set up time.

Section 7 –Recommendations

It is recommended that Big Bear Lake do the following to lower the indirect manageable fire reflex time:

1. The single most important action the District can take to meet the reflex time standard is to encourage and in certain instances require the installation of automatic detection and suppression systems in new and existing structures. This action will increase the level of protection of life and property from fire and reduce long-term costs for provision of fire suppression services. Thus, it is the most cost-effective approach in meeting the fire reflex time standard.

   It is specifically recommended that:

   * All new structures over 5,000 square feet be fully sprinklered, including residential units or fire alarm systems be installed.

   * Residential developers are encouraged to fully sprinkler their developments by the use of incentives to reduce their costs.

   It is recommended that Big Bear Lake do the following to lower the detection time:

   - The Big Bear Lake Fire Department should initiate a smoke detector program to ensure that all structures (especially dwellings) are equipped with detectors and that existing detectors are operable.

2. Recommend changing dispatching to a fire based CAD dispatch center with capabilities of multi agency coordination abilities.

3. The recommended turnout time to fires by the Big Bear Lake Fire District should be 1 minute 30 seconds or less.

4. Increase minimum staffing by one additional full time firefighter per shift over the next three years.

5. Expand the Paid Call Program to provide additional personnel to assist at the scene of a fire.

SECTION 8

EMERGENCY MEDICAL RESPONSE

WHAT IS EMERGENCY MEDICAL SERVICES (EMS) RESPONSE?

The report of a heart attack, an automobile accident, or any other medical emergency brings the same competent life safety response as the report of a fire. During the past decade, the fire service has become increasingly involved in emergency medicine. In spite of some initial resistance, fire departments are finding that operating their own emergency medical service is extremely valuable. It has not only saved lives, but also has helped gain public support and improved the image of the fire service.

The role of the fire service has expanded to meet community needs for improved emergency medical services. This development coincides with and is related to advancements in emergency medical technology and the philosophy of delivering sophisticated life support services at the scene of the medical emergency and during transportation of the patient to a medical facility. The expansion of the fire service role also coincides with growing economic pressure to use the available time of fire protection personnel more effectively. Skillful planning and good management can produce optimum results in improved public service.

The goal of an EMS system is to provide organized, rapid, quality care to persons suffering from sudden injury or illness. The fire department is most often concerned with providing either all or a portion of the care that the patient receives between the time of the incident and arrival at a medical facility. Other elements of the EMS system such as private ambulance services, hospital emergency room personnel, and law enforcement personnel provide additional services necessary to maintain EMS as a system. And there is no doubt whatsoever that quick, skillful, well-equipped emergency medical services save lives.

The EMS industry in America has changed dramatically in recent years and is continuing to evolve rapidly. It is extremely complicated and involves a broad spectrum of professionals in both the public and private sectors. Poor systems can result in liability judgements for preventable injuries and loss of life. For these reasons, local government must continually evaluate their EMS systems. For a well-designed and effectively implemented EMS system, opportunities exist to align the profit motive with public interest and minimize costs to the taxpayer.

Health care reform has become a topic of national debate. Spiraling costs which exceeded inflation and mountains of paperwork now threaten to collapse the entire system. In 1994 the Clinton Administration set out to reengineer the country's health care system with a clear goal of providing access to basic health care for every citizen. Managed care has introduced a new vocabulary to the health care industry and has become the single most influential force in delivery of health care to most Americans. To date, however, discussions on health care reform have yet to adequately address delivery of out-of-hospital emergency medical services, an estimated $4.5 billion industry.

MANAGED CARE AND HEALTH CARE REFORM

The current EMS design is predicated on the most prevalent out-of-hospital emergency care health care financing structure of the time (1970's). This was the "indemnity" insurance plan that reimbursed patients for care received at almost any health care facility. Most health care facilities were predicated on the "fee-for-service" financing method. Simply stated, in fee-for-service settings, profits are derived by fees charged to funded patients for services performed. The more procedures performed on a larger number of patients - the greater the profits generated.

Market share among fee-for-service facilities was determined largely by geographical positioning. Most patients went to the facility closest to where they lived, or where their doctor practiced. Some competition occurred in situations where the clustering of facilities caused some overlap of these market or "catchment" areas. Fee-for-service facilities have historically competed with one another in those overlapping catchment areas for patients/ health care dollars through marketing the superiority and accessibility of their services to patients and creating incentives for physicians.

Because the most prevalent health care financing at the time of system design was the fee-for-service setting, providers (especially fire providers that already had resources distributed in these catchment areas for other emergency work) designed operational or delivery systems predicated on transporting patients to the nearest receiving center. The existing system is therefore predicated on short transport times and rapid return of resources to available status.

In the 20 years since this EMS delivery system was designed, the financing of health care has been subject to tremendous change. The most significant of these changes is the proliferation of managed care as a means to control health care costs. The financing practices used by managed care differ from those in the fee-for-service setting.

In the managed care setting, patients are cared for in a system of "member" health care providers organized and managed under a single management entity. Providing health care to an “insured” group of patients with the revenues generated by health care plan membership fees derives profits. Any funds in excess of operating costs at the end of the fiscal year may be retained as profits. Simply put, the fewer procedures performed on a larger number of subscribers - the more profits are generated.

Managed care facilities compete for patients by offering cost efficient health care plans directed at keeping patients healthy and not performing unnecessary procedures, thereby controlling costs. Reimbursements for health care costs are funded by the memberships' insurance plan as long as the patients care is provided at a member health care facility or preferred receiving center. Reimbursements for health care costs incurred at other than member facilities are paid as fees out of the insurance plan revenues. These fees paid to nonmember health care facilities are much higher than the cost of providing those services with member health cares providers.

The current EMS system design philosophy of transporting all patients to the nearest receiving center regardless of acuity or funding sources creates a revenue drain for the growing number of managed care insurance plans.

EMS DEFINITIONS

"BLS" - Basic Life Support:
BLS is generally limited to airway maintenance, breathing support, CPR, bleeding control, splinting of fractures, management of spinal injuries, stabilization and transportation of the patient in accord with accepted procedures.

This is generally ambulance care and transportation by certified Emergency Medical Technicians (EMT's) or Paramedics rendering only basic medical assistance and treatment. All firefighters of the Big Bear Lake Fire Department are required to be certified EMT's.

"ALS'"- Advanced Life Support: ALS includes all BLS measures, plus field medical procedures, including: intravenous therapy; cardiac defibrillation; administration of anti-arrhythmic medications and other specified drugs, medications and solutions; use of adjunctive airway devices; and other procedures which may be authorized by state law and performed under medical control (the doctor and/or nurse at the hospital in radio/telephone contact with the paramedic). "Field care" is another term for ALS and at times is used in place of ALS.

This is emergency ambulance care and transportation by licensed Emergency Medical Technician Paramedics (EMT-P's). They are capable of receiving orders from and are able to contact the emergency department physician at the base hospital. Routinely, the paramedic evaluates and treats patients using state and local protocols. If necessary, the paramedics will relay the patient's condition, history, vital signs, and EKG over special radio telemetry to the emergency room. The physician then decides whether further critical advanced life support care is needed in the field. If the physician feels that the patient's condition is serious and needs immediate stabilization, the doctor will direct the paramedics to immediately begin advanced medical treatment. This enables the patient to be stabilized at the scene instead of racing to the hospital trying to "beat the clock." It is important to remember that if a patient's condition is critical, the paramedics become the eyes, ears, and hands of the emergency room physician and complete several procedures that would have to be done at the emergency room anyway. This allows the physician and nurses to go on to more sophisticated care immediately upon the arrival of the patient at the emergency room.

EMT - Emergency Medical Technician:
EMT is a generic term referring to at least four emergency care positions:

EMT-1[1]
An individual trained in all facets of basic life support (BLS) according to standards prescribed by the State.

EMT-11's[2]

[1] California Health and Safety Code, Division 2.5, 1797.80

This is an EMT-1 with additional training in limited advanced life support according to State standards. "Limited advanced life support" means special service designed to provide prehospital emergency care limited to techniques and procedures that exceed basic life support but are less than advanced life support and are approved by the State. EMT-II programs are initiated only where geography, population density, and resources would not make the establishment of a paramedic program feasible.

EMT-P[3]
The "P" stands for paramedic. This is a person who has been trained in a recognized program and has been certified as proficient in advanced life support by the State and County.

EMT-D The "D" designates defibrillation. This is a person who is trained in basic life support and authorized to use portable automatic or semi-automatic cardiac monitors and defibrillators.

Trauma Care A primary objective of providing care for traumatic incidents, i.e. vehicle accidents, is to have the patients in surgery within the first hour. Specialized hospitals, which offer the availability of the entire field of specialists and physicians, and health care providers needed for trauma are called Trauma Centers. These trauma centers are located at Loma Linda and Arrowhead Medical Center.

Golden Hour: The EMS profession calls this first critical hour for trauma patients the "Golden Hour Rule." The time elements making up this hour include the reflex time standard; time on-scene for emergency medical operations; the travel time to the trauma center; and, the period of preparation time for surgery. Obviously, the closer a patient is to the trauma center the better the chances of the patient benefiting from the golden hour.

EMS Exclusive Operating Areas (E0As): A geographic area which may be created by a local EMS Agency in the development of a local EMS plan, whereby a single ambulance service is permitted to serve that area. It is required that a competitive process be used to select the provider which will be authorized to serve the area, except that no competitive process is required of existing providers who continue to operate in the manner and scope which the services have been provided without interruption since January 1, 1981.

The EMS Authority and local EMS agency view E0A's as a powerful tool to redistribute the revenue received from a more lucrative service area to fund EMS in a less lucrative one. Areas are lucrative generally due to good reimbursement patterns from either high numbers of privately insured payors as occurs in affluent communities or large service demand such as encountered in dense metropolitan areas or retirement communities. Areas that are not lucrative are generally those with a high number of poor or indigent patients without insurance or sparsely populated rural communities with low demand for services. This shift is accomplished by awarding a large area such as a county, or a patchwork of EOAs so that a single provider can be financed to provide an equal level of service across the entire area. In this manner the dollars collected from one area subsidize services in another that otherwise could not afford the same levels of service.

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[2] Ibid, 1797.82.
[3] Ibid. 1797.84.

EMS FLOW AND REGULATION IN CALIFORNIA

Table 8-1 illustrates the flow and regulation of EMS in the State. Note that even though the fire department arrives on the scene first, they are at the bottom of the flow and the type of patient care above them, including the private Ambulance Company if the ambulance is the ALS provider. EMS activities in California are governed by the Emergency Medical Services System and Prehospital Care Personnel Act (Division 2.5 of the Health and Safety Code of California).

The interpretation of the existing Health and Safety Code favored by ambulance companies, local EMS agencies, and the State EMS Authority seeks to centralize decision making regarding the level and financing of EMS services with those local EMS agencies. This interpretation allows a county to unilaterally select a single provider of EMS services and a single system financing option for use in districts and municipalities.

Local EMS agencies and the State EMS Authority argue that centralized decision making is necessary in order to ensure that system participants do not “opt out" of the larger system thereby degrading the availability of EMS services in other areas. Opting out would create this situation by a participant keeping the revenues and resultant service within its own geopolitical boundaries.

The Health and Safety Code is seventeen years old and was constructed for a health care and public safety financing system no longer in existence.

Emergency Medical Services Authority: Through adoption of Div. 2.5. of the Health and Safety Code in 1980 (The California Medical Services System and Prehospital Emergency Medical Care Personnel Act) the state legislature intended for a state agency (the Emergency Medical Services Authority) to "coordinate and integrate" all state activities concerning emergency medical services. It is clear that the legislature intended for the Emergency Medical Services Authority to achieve the desired coordination and integration through a network of local EMS agencies based at the county or multi-county level.

The State Commission on EMS is comprised of sixteen appointed representatives who meet quarterly. They review and approve regulations pursuant to implementation of state law and provide direction to the State EMS Authority. Representation on the EMS Commission is currently weighted toward the physician community.

Local Emergency Medical Services Agency: The local EMS agency's (San Bernardino County for Big Bear Lake) duties are to:

- Plan, implement and evaluate the emergency medical services system in the service area (H&S 1797.204).
- Implement all ALS and limited ALS services and monitor the ALS training programs (H&S 1797.206).
- Monitor and approve all EMT training programs (H&S 1797.208).

- Have an EMS medical director who certifies and recertifies the EMT's and paramedics (H&S 1797.202 and 1797.2 10).

- Authorize providers to operate at the ALS level (H&S 1797.218).

- Arrange for medical -control for the ALS providers (H&S 1797.220).

- May create exclusive operating areas within the agency service area that must be awarded by competitive bid and must be compatible with a plan approved by the state (H&S 1797.224).

Base Hospitals:
Where patients receive basic life support in the field and then are transported to a hospital, the relationship between hospital and patient commences upon admission of the patient at the hospital. Where patients require and receive advanced life support in the field, the relationship between base hospital (the hospital that the paramedics must contact) and patient is presumed to commence when paramedics establish radio or telephone contact with the base hospital. At that point, the paramedics operate under medical control. When that medical control is exercised in part by base hospitals, as a means of controlling and supervising the care given to patients, the presumption is that establishing communications between paramedics and base hospital creates a relationship between that hospital and the patient. In the event the patient is transported to a hospital other than the base hospital, the relationship between that receiving hospital and the patient commences when the patient arrives at the receiving hospital. Upon arrival of the patient at the hospital, the relationship is formalized by the execution of consent and admission documents.

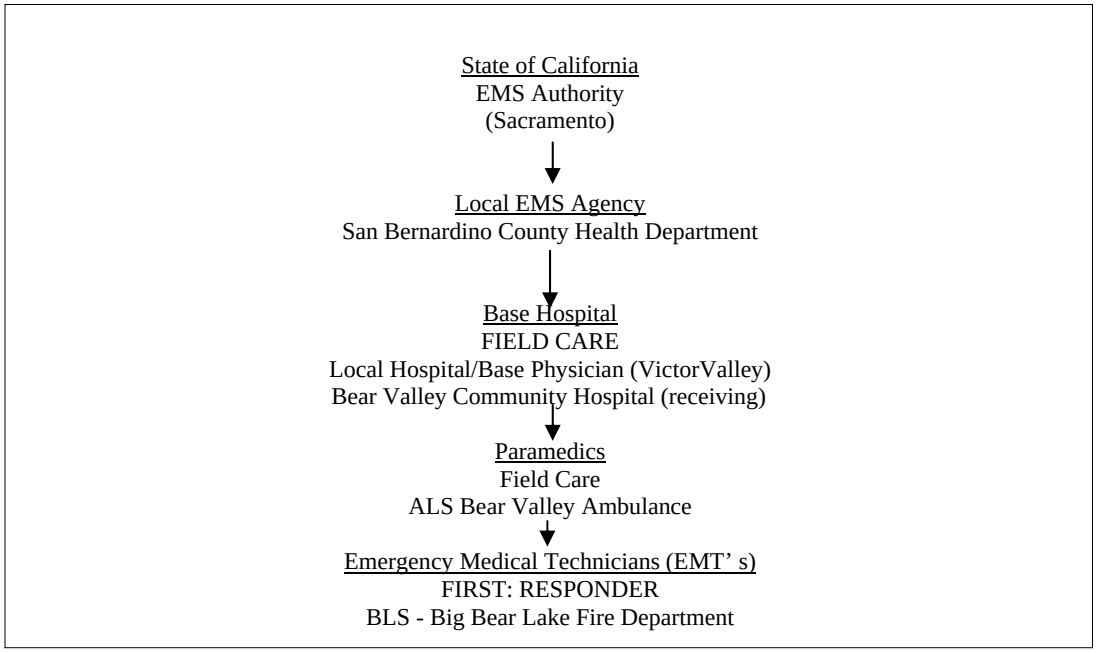

Table 8- 1. The EMS Hierarchy in California

THE CURRENT STATE OF EMS IN CALIFORNIA

In California, the existing system, which regulates delivery of emergency medical services, is also under considerable stress. The EMS Act of 1980 established permanent statutory authority for this system fifteen years ago and was codified in the Health and Safety Code. Since then, however, this statute has been amended by 60 different pieces of legislation. Four separate bills since 1993 alone have been signed into law to deal with statewide certification or licensure of paramedics. Organized constituent groups with widely divergent agendas constantly lobby for change.

Revenues, which drive the out-of-hospital component of the EMS system, are derived primarily from a single source: ambulance transportation. Smaller companies are being absorbed through large corporate mergers and takeovers as the private ambulance industry competes for this lucrative market. Cities and fire districts, faced with economic uncertainty or an unsatisfactory private provider, are also competing for these dollars by establishing or maintaining ambulance service within their geopolitical boundaries.

No less than six lawsuits have been litigated over the last three years in California pitting cities and fire districts against counties and private ambulance companies. At the heart of these lawsuits is a debate over exclusive operating areas and the need of local government to exercise control over its own resources to serve its constituency. Ones viewpoint may be determined by whether delivery of emergency medical services should be regarded a public health issue or a public safety issue. Public health policy is best served by distribution of available resources (public or private) within a region in an equitable manner. Public safety policy however, would distribute these resources primarily within the community, which pays for them. Obviously there is merit in both perspectives.

As a result of the opposing interests, numerous legal and legislative battles have become the focus of EMS administration in California. When municipalities and fire districts have decided to provide their own ambulance services, local EMS agencies along with private ambulance companies and EMS Authority have filed or participated in lawsuits seeking to block their actions. Failing to reverse this trend through litigation, the ambulance industry authored or sponsored three bills in the last two legislative sessions designed to amend the existing statute. These bills were bitterly contested by a coalition of local government and the fire service, resulting in failure of each. It is now clear that unilateral attempts by any group to create a legislative solution are likely doomed from the outset.

PUBLIC HEALTH OR PUBLIC SAFETY?

The conflict with various EMS constituent groups taking opposing positions on various issues has failed to acknowledge the fundamental philosophical differences that make this issue so difficult to resolve. Those differences revolve around on ones orientation to public safety or public health.

Public Safety Policy
Public safety policy has traditionally accepted differing service levels in communities based on each community's ability and willingness to fund these services at specific levels. For fire protection services, the concept of sharing resources through automatic or mutual aid agreements has helped maximize resources in urban and suburban areas, but the reality of differing service levels is accepted throughout the state. This philosophy extends beyond emergency services as well. Schools, libraries, roads and sewers are other community services viewed as used and enjoyed by persons supporting that community's infrastructure with taxes, bonds or other financing vehicles. Whether public or private, the quality and availability of services still differs from community to community.

Public Health Policy
In contrast, public health policy has traditionally focused on distributing certain services equitably to all persons regardless of their ability to fund those services. This philosophy usually relies upon the resources of persons having the ability to pay supporting the provision of services to those who do not. The concept of "revenue shifting" from a profitable function to support a non-profitable one is a frequent practice in health care. Hospitals are often willing to operate emergency rooms at a loss or as marginally profitable in order to attract patients into more lucrative centers in the facility.

Conflicts in EMS Policies
When viewed in the context of these opposing points of view, the conflicts and resulting positions of constituent groups become easier to understand and predict.

State and county medical directors and administrators are concerned with only the single component of public safety they are associated with, which is EMS. As a result they tend to advocate interpretations of existing statute or introduction of new legislation that favors their ability to construct a system which distributes services equally across a broad area.

Ambulance companies are likewise specialized to provide service for only a single aspect of public safety (EMS). They seek to preserve or improve their industry's market share by supporting the centralizing of decision-making power with agents that will likely favor the public health system design. This creates an alignment of interests and therefore an alliance between the existing regulatory structure and the private ambulance industry.

Conversely, cities and fire districts are generally concerned with a broader spectrum of public safety, including EMS, for citizens living in their communities. These local governments tend to advocate any interpretation of existing statute or introduction of new legislation that favors their ability to make the determination of how and at what level those services are to be provided and financed.

EMERGENCY MEDICAL SERVICE (EMS) MODELS

Private ALS and Fire Department BLS

In one model which uses full service EMS, a private provider ambulance company provides advanced life support (ALS - Paramedics) and the fire department provides basic life support (BLS) functions and assists with CPR and first aid prior to the arrival of the ambulance. The reflex time is equivalent to the fire service models discussed previously, but is divided into two categories. The first category is the response of the basic provider, usually the fire service. This response is similar to the one previously addressed and their responsibility is to provide BLS until an ALS provider arrives. The second category is that the ALS provider is regionalized; located in one area servicing several fire stations response zones or in other words, serving a greater population. In fact, to support a private provider the number of transports is crucial in order to cover the cost of operation. However, in recent years a new form, still keeping with the regional approach concept, is gaining notoriety. This is where the private transport unit (ambulance) is housed in a fire station as a joint tenant. These units are located strategically around the jurisdiction and encompass a broader, much larger response area with not every station having an ambulance.

Victorville Fire Department: currently delivers EMS in this manner with a private ambulance company.

Fire Department BLS and ALS Public Transport

Another EMS model provides both the BLS and ALS by the local fire department. In this form the fire department is a public provider. The ALS is provided by public employees (usually firefighter/paramedics) and the transport units are publicly owned. Most commonly a fee is charged either on a per-run cost recovery system or through property tax assessments. In this model, ALS is still regionalized as cost recovery, since placing a transport unit in every fire station does not generally support the program operational cost. In this model the ALS is provided almost simultaneously with the fire department's BLS services depending on the size of the jurisdiction and the number of ALS units available for response into fire station districts. Public safety officials point out that this approach has numerous advantages. First, it creates a seamless system in which the patient receives initial response, early intervention, stabilization and transportation from a single agency. The economic benefits of the fire service being able to provide multiple public safety services in addition to fire suppression such as fire safety education, fire prevention, hazardous materials management, high angle rescue, vehicle extrication as well as EMS initial response and EMS transportation with the same "all risk" workforce is viewed as both effective and efficient. As a result, many cities and fire districts have recently decided to provide transportation services themselves.

Lake Arrowhead: currently delivers EMS in this manner.

Fire Department BLS and ALS – Public or Private Transport
A third model of EMS has a BLS and ALS provider, usually the fire department, yet they use non-transport units. Therefore, the transport services are provided by a private ambulance provider, giving them the transport fees. This approach may make it more difficult for the public agency to charge for services unless through tax supported assessments.

Adelanto Fire Department: currently provides their EMS delivery using paramedics on their engine companies with transportation provided by a private ambulance company.

Rescue Services

Because of Big Bear's proximity to active earthquake faults, it is important that the fire department have the capability, including training and equipment to provide all facets of "heavy rescue," especially "urban rescue." This is the ability to rescue people from collapsed buildings, after a major earthquake. Because of potential flooding in the area there exists a potential for a "swift water" rescue problem. Due to the amount of development for the next twenty years, the Fire District and City will also continue to face the possibility of trenches collapsing on workers or children playing in them. All of these types of rescues may be termed "heavy rescue."

Response Time

Response time is extremely critical for the provision of emergency medical services. Specific time requirements were specified in the American Academy of Orthopedic Surgeon's report, Emergency Care and Transportation of Sick and Injured: "There must be a maximal sense of urgency in starting basic life support. Time is critical. If the brain is deprived of oxygen for four to six minutes, brain damage is likely to occur. After six minutes without oxygen, brain damage is extremely likely."[4] Information in Table 8-2 from the American Red Cross document, Cardiopulmonary Resuscitation, also establishes the need for rapid response to strokes, heart attacks, airway obstruction, and serious bleeding incidents: [5]

BRAIN DAMAGE AS A RESULT OF LACK OF OXYGEN

0 Minutes	**4 Minutes**	**6 Minutes**	**10 Minutes**
Clinical Death		Biological Death	
0-4 minutes	4-6 minutes	6-10 minutes	over 10 minutes
BRAIN DAMAGE Not Likely	BRAIN DAMAGE Probable	BRAIN DAMAGE Probable	BRAIN DAMAGE Probable

Table 8-2 Brain Damage

RECOMMENDED EMERGENCY MEDICAL REFLEX TIME GOAL

The emergency medical critical event is the 50% probability of resuscitation following a cardiac arrest - that is, to initiate CPR prior to the point on the continuum where the probability of resuscitation drops below the 50% level. The chart presented in Table 8-2, based on American Red Cross data, illustrates the point that each minute beyond four minutes reduces the chance of recovery by 50%.

Of course, the Big Bear Lake Fire District responds to many types of medical incidents other than cardiac arrest. However, this critical event was selected because it is the single most frequent cause of death preventable by rapid application of both basic and advanced life support skills. Moreover, other medical incidents such as asphyxiation, drowning, Sudden Infant Death Syndrome (SIDS), drug overdose, traffic collisions, illness and other respiratory failures also

[4] American Academy Of Orthopedic Surgeons, Emergency Care and Transportation of Sick and Injured. (Chicago, Ill, 1981).
[5] American Red Cross, Cardiopulmonary Resuscitation, (Washington D.C., 1974).

require rapid intervention and at times cardiopulmonary resuscitation (CPR). These other incident types typically constitute 20% of the incidents requiring CPR skills, with cardiac incidents making up the remaining 80%.

Field emergency medical assistance (ALS level of care) includes establishing an airway, defibrillation, and medication. This standard is based on studies which indicate that field medical assistance for cardiac arrest provided within this time period, together with CPR initiation within 4 minutes, will result in a successful resuscitation in over 40% of the cases.[4]

These studies show that there is a decrease in positive cardiac arrest outcomes as measured by patient discharges from hospitals when field care exceeds a 10-minute response. The percentage of patients discharged from the hospital drops from 43% down to 22% when field care is delayed from a 6 to 8minute range to a range of 8 to 10 minutes. When the time to field care exceeds 10 minutes, the percentage of patients discharged from hospitals falls below 17%. Table 8-3 illustrates this critical relationship between the time CPR is initiated and the time until field emergency medical care begins.[5]

EMS Reflex Time Goals:

1. Initiate CPR within four (4) minutes of occurrence of cardiac arrest for 50% of incidents. This is done through citizen involvement.

2. Initiate field emergency medical assistance (ALS level of care) within eight (8) minutes of occurrence of life critical symptoms for 75% of incidents, with a maximum reflex time of ten (10) minutes for 95% of the responses.

Initiating CPR before four minutes has elapsed from arrest, and paramedics beginning field care (defibrillation, intubation, and medication) within an eight-minute period, are both critical to initial resuscitation and long-term recovery. For example, research showed that if CPR was initiated within 4 minutes and field care provided within 8 minutes, 40% of patients were discharged. If one of these times was exceeded, the percentage of patients surviving fell dramatically; and if both times were exceeded, only 10% were discharged.[6]

Time to initiation of CPR and time to field care jointly affect the outcome. If both intervals are short, the highest survival results. One short interval without the other is less likely to result in survival. Research and studies emphasize the findings that the percentage discharged fell dramatically within each four-minute interval of time to initiation of CPR. If time to initiation of CPR was greater than 12 minutes and time to field care greater than 12 minutes, there were no survivors.

Both elements significantly affect outcome. Response time standards have been recommended for CPR and field care response.

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[4] American Red Cross, Cardiopulmonary Resuscitation, (Washington D.C., 1974).
[5] Lawrence Bergner, et al., Evaluation of Paramedic Services for Cardiac Arrest, (Washington D.C.: U.S. Department of Health and Human Services, 1981), P.33.
[6] Lawrence Bergner, p. 33.

DISCHARGE VS. TIME TO CPR AND FIELD CARE		**Time Until Field Care Started**	
		Less than 8 min	**More than 8 min**
Time Until CPR Started	**Less than 4 min**	**40% Patients** Discharged	**17% Patients** Discharged
	More than 4 min	**27% Patients Discharged**	**10% Patients Discharged**

Source: Bergner, et. al, Evaluation of Paramedic Services for Cardiac Arrest

Table 8-3. Percentage of Cardiac Patients' Discharges vs. Time to CPR and Field Care

Arguably, the closest emergency medical equivalent to flashover is the function of the time to initiate cardiopulmonary resuscitation in a cardiac arrest incident. The proposed response time limit is the time to initiate cardiopulmonary resuscitation prior to the point that the probability of resuscitation drops below 50%. Looking back at Table 8-2 confirms the importance of starting CPR within the first four minutes following the patient's collapse due to cardiac arrest.

While there can be little doubt about the importance of the four-minute timeframe for the initiation of CPR in cardiac arrest incidents, achieving it within four-minutes will require involvement by both the community and public sector as will be discussed later in this section.

COMPARISON WITH CURRENT ESTIMATED OR AVERAGE TIMES

Estimates of the portion of the emergency medical reflex time directly manageable by Big Bear Lake are summarized in Table 8-4. Field care, or "ALS" care, begins upon the arrival and setup of the Big Bear Lake BLS Firefighter and/or the public ambulance provider.

EMERGENCY MEDICAL REFLEX TIME DIRECTLY MANAGEABLE BY THE BIG BEAR LAKE FIRE DEPARTMENT

Component	**1998 Average** Minutes
Dispatch Time	1:00
Turnout Time	1:00
Travel Time	4:98
Setup Time (recommended goal)	1:00
Total Current Manageable Time	**7:98**

Table 8-4. Estimated Current Average EMS Reflex Time

In the period since 1992 the time for EMS response from receipt of the call has increased from 4:73 minutes to 4.98 minutes in 1998. This is due to an increase in numbers of EMS calls for service, more traffic and traffic signals, and more people impacting the District **without** an increase in the number of fully staffed fire stations and firefighters. The District is experiencing more back to back to calls, which is affecting our service delivery capability.

REDUCTION OF EMERGENCY MEDICAL REFLEX TIME

Response time goals for EMS incidents are set more by nature than law, regulation, custom or consultants. If EMS response time goals are set which do not provide the needed medical interventions within the necessary timeframes, a percentage of cardiac arrest victims will be deprived of an opportunity for resuscitation and survival. Few issues in emergency medical services are as clear-cut.

Self Help Programs

As was the case with fire (i.e., use of automatic detection and suppression devices), there is a single most important action, which the City of Big Bear Lake can take to improve life safety. Self-help programs for CPR are vitally important to the service level of a community's emergency medical system. A study in Pittsburgh of the discharge-alive rate of bystander initiated CPR was 42.9% compared to a 15.8% discharge-alive rate of paramedic CPR initiated within 4 minutes. Self-help or first provider care often comes from individuals who have been trained to administer CPR and first aid.

Numerous studies have proven the significant value of CPR, which is immediately initiated by a family member or bystander. For example, the following are some quotes from different sources:

"… it is evident that there was a significant improvement in the percentage of patients who were initially resuscitated and in the percentage of patients who became long-term survivors . . . ...

(Leonard Cobb, "A Medical Response System for Out-of-Hospital Cardiac Emergencies," Medical Clinics at North America. March 1976)

"Whatever the level of the rescuer's training, immediate CPR can double survival rate after ventricular fibrillation while lessening the neurological damage. " (Leonard Cobb)

"Only a third of those (patients given immediate bystander CPR) whom a layman aided died; only a third of the rest survived. ("Laymen May Outscore Physicians in Cardiopulmonary Resuscitation," Journal American Association Medical January 30, 1978)

"The patient group that had been helped by bystander-administered CPR also fared better in quality of survival. " (Seattle Fire Department)

Seattle's Medic II program had a goal of training all King County residents 12 years of age and older; training at the rate of 3,500 citizens per month. As of 1978, more than 100,000 citizens had been trained (approximately a quarter of the City's population). The Seattle and other programs have shown that citizen CPR training is not only feasible, but also a critical link in an excellent EMS program.

Options, which should be considered to reduce the time to initiation of CPR, include:

- Increasing the number of citizens trained in-CPR.
- Selective training of family members of high-risk patients.
- Further enhancements to “instant CPR" instructions that dispatchers give callers when a cardiac arrest is verified.
- Train all Fire District and City employees.
- Selective training of employees and office workers in high occupancy buildings and facilities.
- Public education reinforcements.
- Requirement for CPR prior to graduation from high school.

Detection

Unfortunately, there is not a device for emergency medical incidents, which is analogous to the smoke detector. There are a few promising devices that may one day offer high risk cardiac patients a reliable mechanism to detect the onset of potentially life-threatening arrhythmia; however, a single device to detect life-threatening emergency medical conditions shows no signs of becoming available in the near future. Therefore, detection is almost entirely up to the patient and/or a bystander, and Big Bear Lake can do little to reduce detection times, except for public education and providing CPR and first aid courses.

A significant spin-off of self-help programs is the education of millions of people concerning "preventative measures." Wellness, risk factors, signs and symptoms of heart attacks and other immediate life safety concerns such as choking and drowning are part of these public education programs. The sudden onset of heart attack often occurs with warning signs! Medical or health education courses educate the public concerning these signs and symptoms and act as an early warning detection system to alert an individual to seek help well before clinical death occurs. It also provides information on rescue procedures and techniques for rescuing choking victims. This spin-off can be used as a catalyst to enhance the EMS reflex time of the community. Some fire departments like the City of Bakersfield even provide fire safety education as a portion of first aid and CPR courses.

The general public's familiarity with symptoms of serious illness, how to access the EMS system, along with a large percentage of the public being trained in CPR will have a positive effect on the overall survival rate in medical emergencies. The goal of an EMS education program would be to actively educate the community in the Fire Department's role in medical emergencies the 9- 1 -1 system and how to use it, disaster preparedness, simple first aid and self-diagnosis. Using fire companies and paramedics to educate residents in these areas would effectively limit the number of unnecessary calls for assistance while better preparing them for emergencies including disasters? The overall impact would be reduced service demands, stabilizing future expenditures.

Many EMS education programs have given training in drowning prevention and some fire departments are even expanding into prevention of domestic violence and the promotion of child safety and general health.

Reporting

Direct-line (or automatic dialer) emergency medical reporting systems are currently available, but generally are used only by persons with a high-risk medical history. As with fire reporting, there is probably little that the Fire District/City can do to further reduce reporting time for the general population. The recommendation will greatly enhance the "reporting" component by teaching the community how best to access the EMS reporting system.

Dispatch

The earlier discussion of an emergency dispatching system is especially applicable to emergency medical reflex time. In addition, the training of all dispatchers in emergency first aid as well as courses on selective medical dispatching would improve the system tremendously. The Big Bear Dispatch Center trains their dispatchers in medical dispatching.

An additional process that has aided the self-help concept is "dispatch assisted CPR training." This approach has resulted in saving numerous lives. Several studies indicate that a bystander can administer successful CPR even without formal CPR training. In fact, one study indicated a 7 percent higher save ratio from bystander initiated CPR (dispatch assisted) versus ALS personnel. In the local EMS system dispatchers are properly trained, to calm excited callers and instruct them in CPR or other first aid techniques prior to arrival of first responders and paramedics.

Turnout Time
The BBLFD 1998 average turnout time to EMS incidents was one minute (1:00). While this time is substantially better than the turnout time for fires, it is still consistent with the national average.

Travel Time
The BBLFD 1998 average travel time to EMS incidents is generally the same as for fires, approximately 4.98 minutes.

Setup Time
Typical emergency medical setup time for field patients' care is on the order of 30 to 60 seconds, which offers minimal opportunity for significant time reductions.

EMS Responses

Year	#EMS Responses	Projected /EMS Responses	
1988	532		
1989	416	1999	829
1990	499	2000	880
1991	450	2001	935
1992	538	2002	993
1993	581	2003	1055
1994	600	2004	1121
1995	595		
1996	703		
1997	692		
1998	802		

Table 8-5. EMS Response Projections

EMS OPTIONS FOR BIG BEAR

This EMS growth planning assumption must be qualified by the fact that many communities experience an increase in emergency medical incident rates as the population increases. Factors that may contribute to this increase are the increasing age of the population and the resulting increase in health-related problems requiring more emergency medical services. The important thing to remember is that the EMS response probably will not decrease significantly from the 10-year average increase of 5.21% per year.

There are two very viable options to consider for decreasing the time to field emergency medical assistance. Both are critical links in the "Chain of Survival" as shown in Table 8-6. All four of the links have been discussed in this study with recommendations being made for early detection and early CPR. However, the next two recommendations are for EMS options concerning early defibrillation and early ALS (field care).

EMS CHAIN OF SURVIVAL

- **Early Detection**

Time is the most critical factor in combating sudden cardiac arrest. Even seconds are precious. It is vital that people in our community be educated to immediately recognize the signs of a serious illness. The faster they can call 9-1-1 for EMS, the greater the victim's chances of survival.

- **Early CPR**

CPR alone rarely restores heartbeat in primary cardiac arrest but CPR immediately initiated maintains oxygenation of vital organs, such as the brain and head. This is vital if later defibrillation and drug therapy are to be effective.

- **Early Defibrillation**

Rapid application of defibrillation cannot be overemphasized. If the victim receives CPR within four minutes and defibrillation follows within eight to twelve minutes, there is a significantly better chance the victim will survive. One of the keys to early defibrillation is to have first responders and EMT's available with defibrillators that are simple to operate and failsafe.

- **Early ALS**

Advanced Life Support, such as medications and airway stabilization by pre-hospital paramedics or rapid in-hospital care, increases the chances of survival even further.

Table 8-6 EMS Chain of Survival

EMT-D Program: On September 15, 1988, The New England Journal of Medicine published a study on the use of automated external defibrillators (AED's) for managing prehospital cardiac arrests. The 25-month investigation involved the treatment of 1,287 patients in cardiac arrest by firefighters (both EMT's and non-EMT's) of the Seattle (Washington) Fire Department. The study concluded that the use of AED's by first responder firefighters doubled the survival rate of arrest victims.[7] The Seattle study does more than just re-emphasize the importance of early defibrillation. It is a leap in the direction of providing cardiac arrest victims with defibrillation within four to six minutes.

The defibrillators employ adhesive electrodes for both EKG monitoring and defibrillation. Advanced digital-signal processing then analyzes the cardiac rhythm. Basically, with a fully automated defibrillator, the unit will automatically charge and deliver a shock if ventricular fibrillation (VF) or rapid ventricular tachycardia (VT) is detected. A semi-automated unit will notify the user by liquid crystal display and/or voice prompt that indicates a defibrillation is needed. The operator must then respond by pushing a button to deliver the shock. If the patient responds to the activities such as CPR and respirations are detected, the unit will not advise a shock. Only 10 to 30 seconds are needed to analyze the rhythm, charge and deliver a shock if the criteria are met.

[7] Seattle Fire Department, "Medic II," Citizen Cardiopulmonary Resuscitation (CPR), January 1978.

According to Fire Chief Dennis Murphy, of Springfield (Oregon) Fire and Life Safety Department, "Every fire apparatus needs to be equipped with an automated defibrillator. It's that simple. Anything else is a matter of not getting there fast enough."[8] AED's offer many advantages. Most importantly, they are extremely accurate and nearly 100 percent reliable. In addition, they are easy. Because the operator does not need to interpret rhythms, training is minimal and usually accomplished in three to five hours.

"They are a bargain for what they do," said Franklin Pratt, MD, medical director of the Los Angeles Fire Department. In terms of EMS equipment and firefighting budgets, it's a very reasonable sum." AED's have not proven to be a liability problem in programs with strong medical direction. "The devices do what they are supposed to," Pratt said. "Remember, these people are clinically dead, and we can only make them better. I would ask, what happens if you don't have that piece of equipment down the road when it has become a standard of care?"[9]

Although the use of AED's is in an early stage, they are seen as rapidly picking up momentum. "With this technology," according to Kenneth Stults, director of the EMS Learning Resources Center at the University of Iowa Hospitals and Clinics, "there's no reason why the first responder cannot defibrillate." [10] Certainly, people are seeing the necessity of putting them with traditional first responders - firefighters, police officers and ambulance personnel. By prescription, they are already in the homes of people with high-risk heart problems. However, the fact should be emphasized that early defibrillation does not eliminate the need for CPR and is not a substitute for the full services of paramedics.

According to several physicians in a study: "Any community without paramedics that can achieve average times from collapse to arrival of EMT's of about 6 to 8 minutes should consider training and equipping EMT's to provide defibrillation."[11] Another study in 1985 stated: "An EMT-D program has the ability to independently save lives without paramedic services but the best survival is obtained when EMT-D and paramedic services are combined."[12]

City of Big Bear Lake ALS Program

Who should provide advanced life support care (paramedics) for the City of Big Bear Lake? The level of service desired becomes the threshold question. That is, if the City is not interested in increasing the level of service, the current arrangement presents the most viable option; perhaps enhanced with the addition of an EMT-D program for existing engine companies. If not, the city should explore the implementation of a fire based paramedic program. Communities that have their own paramedic system are providing a substantially higher level of service than other non-fire-based systems.

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[8] Nancy Peterson, "Future Shocks," Rescue, January 1898, p.22.
[9] Nancy Peterson, p.22.
[10] Nancy Peterson, p.23.
[11] Alfred, Marilyn Bergner, Mickey Eisenberg, "Service Factors and Health Status of Survivors of Out-of-Hospital Cardiac Arrest," American Journal of Emergency Medicine, 1983, 1:259-263
[12] Mickey Eisenberg and Richard Cummins, Defibrillation of Emergency Medical Technicians," Critical Care Medicine 13, No 11:921-922, 1985.

WHO SHOULD PROVIDE ALS CARE (PARAMEDICS) FOR THE CITIZENS OF BIG BEAR LAKE?

Big Bear Lake Fire Protection District

Advantages	Disadvantages
Full time paramedic service	Increase in personnel costs
Control of personnel	Billing and collection costs
Control of equipment	Increased equipment and maintenance costs
Control of user fees	Ongoing-training requirements
Offsets fire personnel costs	Capital expense for equipment
Revenue source	
Consistent teams	
Reduced cost to user	
Community pride and identity	
Emphasis on patient care, not profit	
Already responds to all EMS calls	
Enhanced service for annexations	

Public Ambulance

Advantage	Disadvantages
No cost to the City	Loss of revenue
No increase in personnel	Possible limited service
No capital expense	Possible delayed response
No ongoing training requirements	Inconsistency in teams
No billing and collection costs	No control of apparatus during emergencies
	No added fire protection
	No control of user fees
	Emphasis on profit

Table 8-7. Who Should Provide ALS in Big Bear Lake?

The data presented in this plan definitely reveals that the current arrangement is not the best possible method to provide ALS care within 4-6 minutes of occurrence as recommended by this strategic plan. The only way the Fire District and City can consistently meet this goal is to use the first responders, the Big Bear Lake Fire District, as field care (ALS) providers. If the Big Bear Fire District chooses to continue and enhance as necessary its own paramedic program, there are at least two options to consider as to how best provide those ALS services:

BIG BEAR LAKE ALS OPTION #1
ALS Transportation

This option would require having a Fire District ALS ambulance staffed with firefighters/paramedics, which would respond to all EMS calls and transport all emergency patients backed up and supported by fire engine companies. However, this would require an agreement with the Health Care District.

Advantages	Disadvantages
Lower cost to residents	Collection of fees
Faster transport time	Slower turn-around at hospital
Increased revenues to the District	Capital costs higher
	More possibility of overlapping calls

Table 8-8

BIG BEAR LAKE ALS OPTION #2
ALS Squad or ALS Engine - No Transportation

If a squad or engine provided ALS services, the paramedic on that unit could accompany the patient on the ambulance and administer ALS care.

Advantages	Disadvantage
No collection of transport fees	Slower transport time
Less capital costs	Same cost to citizen as present
Fast turn-around time at hospital.	Less revenues to the City
Less chance of overlapping calls	Equipment out of service to support-public provider.
Faster response Time	Subsidizes the public ambulance Company.

Table 8-9

The Fire District could offer an EMS Membership Program where subscribers can pay a membership fee per year for their families to receive Emergency Medical Services at a lower cost than other providers could. Also, if the users have insurance the district should bill the insurance company to recover the cost of providing the service, which is consistent with other California fire departments.

Expanded Scope of EMS Service
EMS officials and agencies across the country are examining their EMS programs and looking at ways they can respond to EMS calls in a way that's both cost-efficient and community-oriented. The phrase most commonly used for this idea is "expanded (or extended) scope of service."

Under the various trial programs that are in operation and planned, expanded scope is a catchall phrase that covers many things. It can mean any non emergency service, such as transporting the elderly to regularly scheduled hospital appointments. It can refer to educating the public on injury prevention and first aid (as previously discussed and recommended). It can mean sending EMT's into the community to run wellness checks and health screening. Fire stations can be converted to immunization clinics or prenatal care locations for people in their neighborhoods. Or, most controversial, it can mean using EMT's as gatekeepers to the health care system by assessing patient's needs and delivering routine medical care in the field. Several fire departments have already started providing "mobile" EMS care. The Phoenix Fire Department has initiated a program of training some of their paramedics to a higher level of EMS expertise! That of Physician Assistant. Units with Physician Assistants will provide mobile health care in the field.

Big Bear Lake Fire Department should continue to monitor these EMS options for future adoption. However, a specific recommendation will be made only in the following area:

Inter-Facility Transports: A common type of service fire department EMS agencies are beginning to offer is inter facility patient transport, traditionally the domain of private companies. This level of service involves medical transportation of patients between hospitals, between extended care facilities and patients' homes, between health care facilities and specialty clinics, etc. Most transportation of this nature is scheduled and compensated. It generally does not require that personnel be trained to the paramedic level. The non-emergency nature of this service, and the fact they tend to occur during the daytime hours, reduces wear and tear on ambulance vehicles and reduces the risk of collisions. This profile of medical transportation tends to be more lucrative than emergency ambulance service.

For a fire department to be involved in inter-facility ambulance transportation generally there must be single-role personnel assigned to this function (exclusive of fire protection duties). The frequency of long-distance transports - to locations beyond the City/District limits - requires flexibility of working hours and conditions which are incompatible with those of cross trained, dual-role firefighters/EMS personnel. In essence, it would require the employment of a cadre of non-sworn (civilian) employees who would be committed exclusively to this function. In many cases where fire departments have assumed the responsibility for inter-facility transportation, a high level of customer satisfaction has been achieved while generating "profits" (revenues exceeding costs) for local government.

This program would be staffed with non-safety personnel consisting of one EMT and one EMT-P. They would also be trained in other emergency service areas to better utilize them during disasters or prepare them for future fulltime positions. These personnel would perform a dual role. They would primarily perform transports from hospitals to home or hospital to hospital or doctor's office to hospital. Secondly, they would respond to medical emergencies during high call volume periods. Utilizing part-time non-safety staff would offset overall paramedic service costs. The revenue received from each transport would more than cover the cost of providing this service to our community, thus generating a profit to the Fire District.

KEY FIRE SERVICE EMS REFORM ISSUES IN CALIFORNIA

Big Bear Lake Fire District must keep up with current reform issues and proactively participate in this reform. Following are recommended EMS reforms as advocated by the California Fire Service. These reform position statements come from a publication distributed by the California Fire Service, "California Fire Service EMS Platform, A Design for the Future." This publication was put together after an invitational summit in Sacramento in July of 1994 to develop a consensus for reforming California's EMS system. Although representatives of the medical directors and EMS administrators were also invited, all declined to attend. The fire service moved ahead with the summit and published this document in January of 1995. Following are some of their recommendations as position statements for EMS reform in California:

Position Statements: [13]

1. System design principles should include a mechanism(s) to accurately differentiate between emergent and non-emergent patients. This may happen in the dispatch and/or field service phase.

2. System design principles should include a mechanism(s) to triage non-emergency patients to the preferred receiving center.

3. System design principles should include a mechanism (s) to transport non-emergent patients to their preferred receiving center.

4. System design principles should allow for the assignment of some reimbursable value to fund this assess/triage component of out-of-hospital care.

5. Medical control is the responsibility of a qualified Medical Director and should be absolute with regard to clinical issues such as treatment, protocols and patient care. The physician should have an advisory role on operational issues.

6. Operational control is the responsibility of the Provider Agency and should be absolute with regard to operational issues such as staffing, Quality Assurance, scheduling,

[13] California Fire Service, “California Fire Service EMS Platform, A Design for the Future,” January 1995.

vehicles, equipment and dispatching. Provider agencies should have an advisory role on medical issues.

7. Public Safety Answering Points (PSAPs), dispatch-centers with 9-1-1, could provide a "gatekeeper" function for the system by triaging requests for service and assigning the most appropriate resources.

8. Provider Agencies should have a co-equal position with the medical Director and/or licensing authority in disciplinary matters involving their employees.

9. The current law regarding indigent care should be revised or repealed. Statutory responsibility for indigent care belongs to counties and cannot be subrogated without changing current law (i.e., Welfare and Institutions Code, Sec. 17000).

10. Scope of Practice for EMT- I and EMT-P's should be based on minimum statewide standards and include statutory authority to enhance the Scope of Practice to meet local needs, which is occurring.

MEDICAL CONTROL	OPERATIONAL CONTROL
Physician-based	Provider-based
Physician role is absolute	Provider role is absolute
Provider role is advisory	Physician role is advisory
Deals with clinical issues	Deals with operational issues

Table 8- 10. A Comparison of Medical vs. Operational Control Reform

11. The role of local EMS agencies should become one of facilitation more than regulation.

12. The make-up of the Commission on Emergency Medical Services (EMS Commission) should be revised to provide balanced representation of constituent groups.

13. The role of provider agencies should be expanded in areas of: discipline, accreditation, Quality Assurance, etc.

14. Local governments should be empowered to select the method of essential service delivery and financing that allows the use of public, private, or public/private partnerships for the benefit of the patient and members of the community.

15. The existing statutory framework in the state should be changed from the current restrictive law to permissive law that allows for local innovations.

16. System designs that allow a cooperative approach to EMS delivery have the potential of distributing transportation revenue to partially or completely offset the costs of all components.

17. System participants should collectively work to establish a reimbursement structure that recognizes and provides long term stable funding for all aspects of pre-hospital care.

18. Exclusive operating areas should not be used as a financing tool or for system design or control.

19. Exclusive operating areas should be used specifically to protect local government from anti-trust violations.

Section 8 – Recommendations

1. Big Bear Lake should provide and equip a "Light or Medium Rescue" piece of apparatus. This vehicle would have the capability of all heavy rescue functions including trench rescue, confined space rescue, high angle rescue, vehicle extrication, urban search and rescue and swift water rescue.

2. It is recommended that City of Big Bear Lake do the following to lower the indirectly manageable EMS reflex time:

3. The single most important action the City of Big Bear Lake can take to improve life safety and also meet the indirectly manageable portion of the EMS reflex time goal is to conduct citizen training in cardiopulmonary resuscitation (CPR).

   The objective for this recommendation is to provide CPR training to all residents twelve (12) years or older in the City of Big Bear Lake in the next three (3) years, including all Fire District and City employees.

4. It is recommended that Big Bear Lake do the following to possibly reduce EMS detection time:

   * Develop and implement an emergency medical education program in support of CPR and first aid courses, which will enhance the rapid detection of life critical symptoms.

5. The recommended Turnout Time for Fire Department response to EMS - incidents should be 1 minute or less.

6. Initiate an EMT-D Program in order to have the ability to defibrillate patients using fail-safe defibrillators that reduce inappropriate use. All emergency response units should be equipped with the appropriate defibrillators.

7. Implement a District-run Advanced Life Support (ALS) Program -- Big Bear Lake Fire Department paramedics.

8. As part of the EMS delivery system, it is recommended that the EMS Membership Program be developed in the following ways:
   * Household Medical program
   * Offer an EMS membership rate to businesses.
   * Offer a contract to HMOs and PPO's for ALS transport.
   * Provide more benefits to members other than just "no cost “ medical service:
   * CPR and First Aid training; Membership Newsletter

9. It is recommended that Big Bear Lake Fire District research, develop and implement an Inter-Facility Transport Program staffed with part-time non-safety personnel

Section 9

STAFFING AND ASSIGNMENT

Staffing and Assignment

Most of this section will analyze the operational staffing capability and needs of the Big Bear Lake Fire District. However, it is critical to the successful operation of this department that staffing for administration, fire prevention and support services also be considered. The issue of how many firefighters should respond with each piece of fire equipment is a local decision but one which should be made with the involvement of the community. The Board with input needs to establish objectives for each fire service response and those objectives should then be transferable to tasks, standard operating procedures and numbers of firefighters needed.

WHAT DOES A FIRE DEPARTMENT DO?

Despite the familiar hardware - engines, hoses, tools, and ladders - the fire service is still basically a personal service provided at widely distributed local sites by groups of firefighters having specialized interests, skills, and physical capabilities. They lay hoses and advance them. They size up buildings, to expose flames to hose streams and to ventilate heat and smoke. They brave heat, flames, toxic gases, and collapsed structures to perform rescues. They respond to people who are in physical and/or emotional distress and thereby may become exposed to serious life-threatening contagious diseases such as Aids and Hepatitis B and C. Facilities and equipment are neither insignificant nor inexpensive, but the primary strength of a fire department is in its staffing, and the preponderant annual expenditure is still on personnel.

Productivity Analysis

Attachment 1 to this section includes a Production Analysis Report explaining what the actual skills capabilities and knowledge of the job entail. This analysis provides a broad view in the day and a life of the firefighting profession.

SCHEDULING FIRE DEPARTMENT EMPLOYEES

Scheduling fire department suppression employees in fully paid departments is not necessarily based on the premise that the basic level of service, the responding fire company, must be available at all times. Work schedules have evolved over many years into a range of average workweeks between 40 and 72 hours for line employees. With a myriad of scheduling options being utilized in the U.S., a vast majority of career fire suppression personnel work within these parameters, with most working no more than 56 hours and no less than 42 hours per average workweek.

Most fire departments in California staff their fire stations with a firefighting force of three shifts (A, B and C). Each shift works alternating 24-hour shifts averaging 56 hours per week. There has been much discussion over the past twenty-five years of eliminating the 24-hour shift for firefighters due to the question of productivity, in relation to hours worked

Factors Affecting Fire Department Scheduling Choices:
Table 9- 1 portrays some of the factors that influence fire department scheduling choices.[1]

Employee Fatigue	Number of Funded Positions
Negotiated Agreements	
Hours to be covered	
State and Federal Mandates	
Work Load/Demand Per Shift	
Actual Hours of Productivity Expected	

Table 9-1 Factors affecting fire department scheduling choices.

Hours to be covered
In most cases, 24 hours, 365 days per year, will need to be covered. However, in some situations where volunteer or paid call personnel are available during certain hours, coverage by these personnel may be an option, however, it could impact the total delivery of service

State and Federal Mandates
Certain state and federal laws may affect scheduling by setting maximum hours for career personnel. The federal Fair Labor Standards Act (FLSA) requires the U.S. Department of Labor periodically review average fire service workweeks and establish maximum allowable hours (at straight time compensation) in accordance with their findings. OSHA also impacts the staffing levels due to safety requirements requiring certain numbers of firefighting personnel before entry into a building or confined space.

Negotiated Agreements
Negotiations with organized labor will generally include the establishment of work schedules, especially the work cycle. Unions often attempt to decrease average workweeks.

The Big Bear Lake Fire Protection District's Memorandum of Understanding (MOU) with the Firefighters Association provides that employees in the Fire Department work twenty-four (24) hour shifts during a twenty-eight (28) day work period pursuant to Section 7(k) of the Fair Labor Standards Act (FLSA). The twenty-eight day work period is split into two, fourteen- (14) day pay periods.

During each 28-day work period, two-thirds of the employees work nine shifts (216 hours) and one-third of the employees work ten shifts (240 hours). The MOU also provides that employees receive a monthly base salary, which is set forth in the salary schedule, Article 11.

Each Big Bear Lake Fire Department shift employee works a standard fifty-six hour workweek. This schedule is common throughout California. However, FLSA has provided that fire department shift employees be compensated at time and one-half the hourly rate when working more than 53 hours in a week. Therefore, in a 28-day work period, firefighters who work more than 212 hours (4 weeks X 53 hours) must be compensated at an overtime rate of one and

[1] International City Management Association, Municipal Fire Administration, (Washington D.C.: ICMA, 1989), p. 103.

one-half times their normal hourly salary. On the average each shift employee requires a minimum of 12 hours of overtime per month.

In determining an employee's eligibility for FLSA overtime compensation in a work period, paid leaves of absence and unpaid leaves of absence shall be excluded from the total hours worked. Paid leaves of absence include, but are not limited to, the following:

1. Vacation.
2. Holiday leave.
3. Sick leave.
4. Administrative leave.
5. Compensatory leave.
6. Workers Compensation leave.
7. 4850 time.
8. Jury leave.
9. Bereavement leave.
10. Military leave.

Big Bear Lake Fire District personnel does not fall under these provisions per the MOU with the labor unit.

Actual Hours of Productivity Expected
The actual hours of productivity expected from an employee have a major impact on scheduling. Although there may be many other advantages to a 24hour shift, it is unrealistic to operate a scheduled shift of that length without planning for a significant rest period. These rest periods decrease actual productivity by creating periods of paid time when work is not being accomplished. The extent to which productivity is decreased depends on the number of occasions on which the rest period is interrupted for emergency or other activities.

Employee Fatigue
Fatigue affects productivity but also safety, morale, and general job performance. If long shifts are selected, fatigue must be managed. Fire suppression personnel should be in a reasonable state of physical and mental readiness at all times during their shift.

Number of Funded Positions
All scheduling factors must be weighed against the number of funded positions. A reduction in work hours will typically mean that a corresponding increase in the number of personnel will be necessary to maintain predefined task group sizes or numbers. In the situation of BBLFD a minimum staffing of three persons on duty requires a shift compliment of four persons. Although some compensation for staff reductions may be generated by overtime funds, this strategy arrives at a point of diminishing returns very quickly. New fulltime or part time positions will almost always be the result of significant hour reductions for line or staff personnel unless there is a corresponding reduction in service levels.

Work Load
Examination of the workload in relation to differential scheduling schemes sometimes has a bearing on the scheduling decision. This concept has been called "peak load" staffing. It consists of using nontraditional work assignments to put the maximum personnel on duty when the workload is expected to be the highest. This theory has been applied primarily in the EMS field. It has been less successful in fire suppression. Los Angeles County fire Department has staged fire station "brown outs" due to budget cuts using the peak load concept to guess what fire stations should be closed and when.

Fire Department Scheduling Alternatives
Some large fire departments (mostly on the East Coast) have eliminated the 24-hour shift due to the large number of emergency calls, which makes it impossible for firefighters to work twenty-four hours straight. Many of these large departments work a combination of ten and fourteen hour shifts instead. However, they must still maintain the same number of on-duty firefighters, which increases their costs due to the necessity of adding more firefighters to cover the same staffing level. Potential increased costs have been the reason the 24-hour shifts remain in almost all fulltime fire departments in California To keep the same staffing levels for the twenty-four hours per day and to eliminate the twenty-four hour shift would necessitate hiring more firefighters to staff the additional shift(s). The California Department of Forestry (CDF) works with only two shifts with their firefighters working seventy-two hours per week. This eliminates one entire shift, which significantly reduces their costs, even paying the additional FLSA requirements for overtime. However, labor organizations have fought this concept due to the longer work hours and the subsequent reduced hourly wages.

Another alternative could be that fulltime personnel work during normal business hours until their positions could be filled by volunteers or paid call firefighters (PCF's) who normally have "day" jobs. However, the firefighters would continue to receive their monthly wages and the reduced work week would increase their hourly wages because of existing labor contracts. Pay is not reduced because of reduced work hours. Using a combination of fulltime personnel during the day and volunteers or PCF's after the "normal work day" around 6:00 p.m. and on weekends would reduce the number of fulltime firefighters needed. Some departments in the High Desert have utilized this staffing methodology to staff new fire stations for the first year to keep their costs down, yet, increase the staffing levels to the community. Following the first year, fulltime personnel have been added to fully staff the fire station.

FIRE AND EMS OPERATIONAL STAFFING ISSUES

Fulltime versus Part -Time Personnel
It is important to define the two types of response personnel involved in the Big Bear Lake Fire Protection District: fulltime and paid call. Fulltime personnel make up the first type. These are employees who work fulltime for the District as a career. They range in rank from firefighter to the Fire Chief. The second type is paid call employees. These are personnel who work for the District on a part time/on call basis only. Big Bear Lake’s past experience has shown that a combination of the two types of personnel is best. While paid call personnel are the most cost effective; they are less "response reliable" than fulltime personnel in that they are not normally on duty at the fire station ready for immediate response. Additionally, it is often difficult to

recruit paid call personnel who are available during the normal workday. Fulltime personnel provide reliable, on-duty staffing for fire apparatus; however, this type of staffing is also the most costly. A blending of the two types provides a good level of reliability at a reasonable price for the taxpayers.

Determining Minimum Recommended Staffing Levels

The determination of minimum recommended staffing levels for fire/EMS companies is probably the single most controversial issue in the fire service especially for engine and truck companies. This issue is best defined by the question:

"What is the minimum number of personnel required to safely perform the associated functions of protecting life and property?"

Two fundamental factors must be considered in addressing this key question:

- Saving lives, reducing injuries, and protecting property of the community's residents.
- Performing this service safely; that is, without unwarranted endangering of fire/rescue personnel.

From the standpoint of safety, firefighters should not be operating alone in hazardous areas or in a structure involved in fire except in areas remote from the fire and then under a well organized incident command system that ensures the firefighter is accounted for at all times. In fact recent Federal and State Law has required a two-in, two-out rule for all interior fire fighting. Firefighters involved in active fire suppression inside a structure are required to work in teams of at least two persons. In addition, someone outside the immediate area should be aware of their activity at all times and should be ready to assist them if they get into trouble.

Firefighters should not be expected to perform tasks or operate in areas where their own safety is in serious jeopardy. A serious injury to a firefighter or a missing firefighter can totally throw a fire scene into a state of confusion as fellow firefighters try to assist the injured firefighter or find the missing firefighter. NFPA 1500, Fire Department Occupational Safety and Health Program, states in 6-2. 1: "The fire department shall provide an adequate number of personnel to safely conduct emergency scene operations. Operations shall be limited to those which can be safely performed by the personnel available at the scene." More recently, NFPA will be adopting standards 1710 and 1720. These two standards outline staffing and response criteria for the entire nation. The standards are being challenged as to their validity and impact to local fire department.

The planning process needs to determine how extensive the average operation is and how many persons are necessary to support that level of operation. The community needs to understand that because not all of those personnel will be arriving simultaneously at the incident, only partial operations can be conducted until all required persons are at the scene. The extent of the partial operations will depend on the number of personnel on each company as it arrives. From there it is a case of planning for scaling up the size of the incident and determining where the additional resources will come from when needed.

Unfortunately, there are no definitive answers to the staffing question - at least, answers that are generally accepted. The following quote from Phoenix Fire Department Chief Alan Brunacini, recognized by fire service professionals as one of the most progressive Fire Chiefs in the nation, substantiates this conclusion.[2]

"In the final sense, the decisions relating to manpower levels (and reductions) are made by politicians. In cases where manpower is reduced gradually, the cities do not summarily or suddenly burn down. Statements like 'we must have four on an engine and five on a truck' cannot be backed up with logic because nobody knows what the optimal staffing of a work unit should be. Modern fire chiefs must work aggressively in the system to develop and manage fire force levels that balance cost and benefit. "

In the absence of generally accepted staffing standards, fire departments have frequently used the Insurance Services Office (ISO) Grading Schedule as a justification for fire company staffing.[3] Previous editions of this Schedule were more definitive in specifying staffing requirements. For example, ISO suggested 5 as the staffing level for an engine company in a normal fire district and 7 to 10 for a truck company.[4]

As discussed earlier in this plan, the ISO Schedule was developed for insurance rate-setting purposes, and not as fire department standards. Over the past decade, the use of the Grading Schedule as a basis for fire department planning has declined significantly. In addition, the ISO has revised its policies concerning the use of the Schedule. The future of the Grading Schedule in its present form appears to be in question.

A comprehensive nationwide survey of fire suppression company staffing was conducted in 1982, which included a question pertaining to the criteria used by each department to establish staffing levels. Respondents stated that " . . . budget considerations, crew safety and departmental operation or tactical policy were among the most important criteria in determining their Department's current suppression crew sizes."[5] It was interesting to note that most of these respondents also reported that "OSHA, mutual assistance, national studies, and NFPA recommendations had not been important criteria in determining existing crew size." Thus, it becomes apparent each community should establish its own level of suppression capability (sometimes by default) based upon some combination of these factors:

- Budget limitations
- Employee agreements
- Community fire risks

[2] Alan Brunacini, "A Difficult Question to Answer, "The International Fire Chief, January 1987, pp. 17-18.
[3] Insurance Service Office, Fire Suppression Rating Schedule, (New York, NY: IOS, 1980).
[4] American Insurance Association, Standard Schedule for Grading Cities and Towns of the United States with Reference to Their Fire Defenses and Physical Condition, (New York, NY, 1956 with 1963 and 1964 amendments).
[5] Centaur Associates, Report on the Survey of Fire Suppression Crew Size Practices, (Washington D.C.: June 1982), p.18.

- Total number of companies available (i.e., higher staffing vs. fewer companies)
- ISO, NFPA, OSHA or other criteria

The result of suppression crew size decision making is that crew sizes from one to eight firefighters can be found on comparable apparatus with some correlation with community size, but not necessarily with fire load.[6]

Fire Service Terms

Engine Company
The Engine Company is the basic fire-fighting unit in a fire department. The fire engine (or fire pumper) carries water, hose, ladders, a 1,000 to 1,500 gallon per minute pump, and miscellaneous equipment such as nozzles and breathing apparatus. The responsibility of the personnel assigned to the engine company is to place hose streams in operation and apply an extinguishing agent to the fire. In Big Bear Lake, the Engine Company also responds on rescue and emergency medical services as well as other emergencies and public assistance calls. Each engine must have structural fire fighting capability. Big Bear Lake engine companies are all equipped the same. Which includes all wheel drive capability.

Truck Company
A truck company is a piece of equipment designed to augment engine companies at structure fires. A truck company carries ladders of various lengths and specialized equipment for forcible entry, rescue, ventilation and salvage. A truck company will have either an aerial ladder or aerial platform that can reach 50 to 120 feet depending on the truck. The members of a truck company are usually responsible for rescue, laddering the building, affecting entry, ventilating and thereby making it possible for the Engine Company to enter a structure and attack the fire. In jurisdictions that do not have a "truck," the Engine Company must do the truck company operations. However, in a large fire or a fire in a multi-story structure or large area complex, a truck is needed. A rule of thumb for this vital piece of structural fire fighting equipment is one (1) truck company needed for every five-(5) engines. Big Bear Lake has the only Truck Company in the valley. However, it should be noted that in most instances the truck requires off-duty personnel to staff and then respond if necessary.

Brush Engines
our-wheel drive brush engines are essential apparatus to control vegetation fires. This type of equipment is designed to get into normally inaccessible off-road areas where a standard engine cannot. Additionally, a brush engine carries a full complement of brush firefighting gear. As the area within Big Bear Lake Fire Protection District builds up in the years ahead, the area subject to wildland fires will decrease. Big Bear Lake does not have a brush engine.

[6] Centaur Associates, p.1.

Water Tenders
Water tenders are vital to the Big Bear Fire District in suppressing brush fires. Tenders carry from 1,000 to 4,000 gallons of water. 4,000-gallon water tenders can support up to four (4) engines. During-water shortages or earthquake emergencies, they are regularly used to support effected water systems. It is anticipated therefore, that water tenders will continue to play a major role in the future. The general rule for determining the number of water tenders is one for every four- (4) engines. Big Bear Lake currently has one all wheel drive water tender with a capacity of 1,250 gallons of water.

Paramedic Ambulance
Paramedic ambulances are specialized units, which carry medical equipment and supplies to care for the sick and injured and then transport patients to local hospitals. The criteria for determining the number of ambulances needed are the volume of calls and the distance they have to travel to local hospitals. Additionally, an ambulance should not average more than ten responses per 24-hour day. Big Bear Lake does not operate ambulance service and relies on the Bear Valley Health Care District for ambulance transportation.

Rescue Squad
Rescue squads are specialized units, which carry a vast multitude of emergency rescue equipment, such as "Jaws of Life", Ice Rescue, Vehicle Extrication equipment. The vehicle itself is normally a lightweight utility vehicle, which is faster and more maneuverable than a fire engine.

Comparison Standards

The International City/County Management Association's (ICMA) annual survey of fire protection agencies nationwide over the past five years indicated the average ratio of fulltime fire department employees has been about 1.60 employees per 1,000 in population.[7] This includes both shift firefighters, support personnel such as chief officers, administrative/clerical and prevention staff.

The ICMA surveys also indicated that fire agencies in the Pacific Coast area, which includes California, averaged less than the national average at approximately 1.25 employees per 1,000. A similar survey by the National Fire Protection Association (NFPA) placed the average just slightly higher nationally at 1.875 per 1,000.[8] The current total of Big Bear Lake Fire Department personnel per 1,000 (estimated based on 6,049 resident population and 18 current employees) is 2.9.

An important measurement that a community should be concerned about is how many shift firefighters are available for response to emergencies. A goal often used in the fire service nationwide which was initiated by the ISO suggests that 1.0 shift firefighters per 1,000 people in the community provides an adequate response for most normal communities. A " 1994 Fire

[7] I.C.M.A., "Police, Fire and Refuse Collection Personnel and Expenditures – 1995, "The Municipal Yearbook – 1996, (Washington D.C.: I.C.M.A., 1992), p.106.
[8] Arthur E. Cote and Jim L. Linville, eds., Fire Protection Handbook, 16th Edition, (Quincy, MA: National Fire Protection Association, 1986).

Wage and Benefit Survey for Cities Under 50,000" by the Labor Relations Information System determined that the national average was 1.42 firefighters per 1,000 population.

However, it also indicated that California cities with populations over 50,000, who responded to their survey, averaged only 0.84 shift firefighters per 1,000 people in their communities. A survey by the California State Firefighters Association (CSFA) of 1994 salaries and benefits showed that the 21 cities and fire districts which responded to the survey with populations between 50,000 and 80,000 averaged 0.98 firefighters per 1,000 population. Big Bear Lake's current shift fire-fighters (5) per 1,000 is .082, which is consistent with the national and state benchmarks if the district only serviced its resident population the staffing levels would be sufficient.

However, because Big Bear services more than its resident population the departments staffing needs fall well below national benchmarks. Currently, Big Bear services an average daily population of 20,234. This includes fulltime residents, visitors and migration movement from other local communities. Using the average daily population as a benchmark for service demands capabilities, the department does not meet the standards for our existing service demand. Therefore, the strategic plan is designed using the average daily population for staffing benchmarks.

Fulltime Staffing Levels

In addition to the 1 firefighter per 1,000 people recommendation, it is also recommended that the Fire District maintain at least 0.20 support staff per 1,000 people. Currently, the support personnel ratio is slightly over this recommended 0.20 at 0.23 employees per 1,000. This support staffing includes administration, fire prevention, and support services. Administration includes the chief officers who lead and manage the department as well as all accounting, analytical and clerical employees. Fire prevention is the portion of the Fire District which conducts pre-construction plan review, code enforcement, public education, fire cause determination and arson investigation. Mitigation staffing will be fully discussed later in this section. Support services are those functions, which contribute to or enable the primary services to be accomplished. This might include several areas within a fire department: training, vehicle and equipment maintenance and supply. As the size of any organization grows larger, so do the administrative responsibilities and challenges. In order that the organization does not become strangled at the top, the administration must grow at the same pace as the overall organization. Administration has kept pace with growth; however, shift personnel have fallen significantly behind acceptable standards.

Over the next five (5) years, Big Bear Lake's primary objective should be to increase its Firefighting and EMS force as service demand increases.

Paid Call (PCFs) Staffing Levels

Insurance Service Office estimates it takes approximately 3 PCF's to staff an equivalent of one (1) fulltime position. Adequately staffing 1 fire engine requires approximately 15 PCF's (5 times 3) based on past Fire District history. However, history shows that the average recall of PCF is

three personnel per recall. Therefore, it recommended that the PCF staffing be increased to 25. This will provide the necessary coverage in the PCF positions.

Total Firefighting Staffing Levels

The goal for the next five (5) years based on the recommendations for fulltime (1.0) and paid call (1.2) personnel should be 2.2 Fire District personnel per 1,000 people in the community based on the above recommendations. Table 9-3 shows the recommended staffing recommendations projected to the year 2003/04.

RECOMMENDED BIG BEAR FIRE DISTRICT STAFFING
2002 to 2007

	Actual/	**Recommended/Projected**			
	1999/00	00/01	01/02	02/03	03/04
Shift Personnel	12	13	14	15	15
Support Personnel	5	5	5	5	5
Total Full Time Personnel	17	18	19	20	20
Paid Call Firefighters	10	25	25	25	25
Total FD Personnel	27	43	44	45	45
Population*	20,234	20,456	20,681	20,909	21,139
Shift Personnel Per 1000 population	0.59	0.63	0.67	0.71	0.70
Support Personnel	0.25	0.24	0.24	0.23	0.23
Personnel Per 1000 pop.	**0.84**	**0.97**	**0.91**	**0.94**	**0.93**
PCF's per 1000 pop.	0.49	1.2	1.2	1.1	1.1
Total Fire Department Personnel per 1000 pop.	1.33	2.07	2.11	2.04	2.03

Table 9-3. Recommended Staffing to 2003/04

*Average annual resident's population increases since 1990 is 1.1% per year (5,402-1990, 6049-1998). Average daily visitor population is 14,185/day based upon USFS traffic counts. Total daily population is resident plus visitor population to equal service demand population.

The following exhibit illustrates the staffing recommendations by fiscal year 2003/2004).

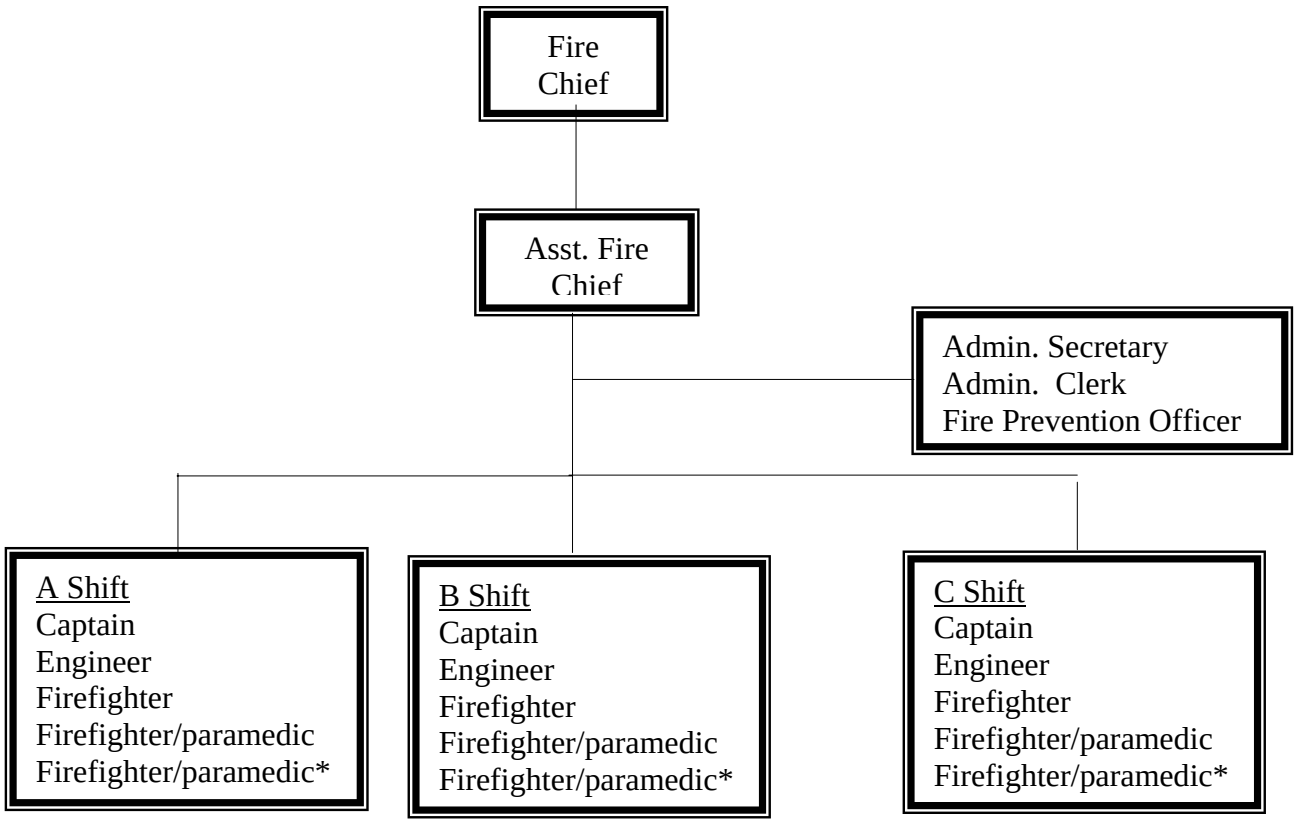


Table 9-4 Proposed Staffing by 2003/04
*Indicate Apprentice FF/PM's if the department has an established program.

RECOMMENDED BIG BEAR LAK FIRE AND EMS STAFFING GOALS

Considering the demonstrated difficulty in setting rigorous quantitative staffing standards, staffing standard recommendations for engine, truck, and EMS units should be based on: the minimum number of personnel required to safely perform a basic function critical to the protection of life and property. Following are proposed functions to be used in deriving the staffing standards. The recommendation is to staff a minimum of 2 units (engine and squad) with a minimum of 2 personnel each on a regular basis.

Engine Company Function
The 150 gallons per minute (GPM) stream capacity is sufficient to control and knockdown of a fully involved room fire in a typical dwelling. A 200 GPM stream is required to establish an initial exposure protection or initial attack upon a fully involved compartment fire in a typical commercial building.

A study conducted by Iowa State University stated that the water flow of one gallon per minute (gpm) properly delivered can absorb the heat from a fire space of one hundred (100) cubic feet.[9] Using these criteria, they determined through further research that a factor of fifty- (50) gpm per firefighter should be used to determine staffing requirements for fires in un-sprinklered buildings.

Because of the requirements that all functions be accomplished "**safely**" and because the function specifies that firefighters enter a smoke-filled room, there is no choice but that the minimum staffing be three firefighters. This conclusion is based on Occupational Safety and Health Administration (OSHA) regulations that a two-person team is required to enter a toxic atmosphere, and a two-person safety group must remain outside to call for help if necessary.[10] It turns out that three firefighters are also required from a water delivery standpoint, based on the estimate of fifty- (50) GPM delivery capability per firefighter. Moreover, two firefighters are required to maneuver a 1 1/2 inch or 13/4 inch hose line, which when combined with a pump operator, also results in a three-person (minimum) company.

Three firefighters on an engine seem to be the industry standard in California jurisdictions similar to the size of Big Bear Lake. The ICMA 1995 survey with populations between 10,000 and 24,999 use three (3) as their minimum standard staffing for engine companies and 2 for rescue units. Comparable fire agencies in the Inland Empire (Redlands, Rialto and Upland) were surveyed for their minimum staffing for fire engines and all require three (3) firefighters per fire engine.

Truck Company Function
Off-duty and PCF personnel support Big Bear Lake's truck company. The truck is not staffed with fulltime personnel on a daily basis. Therefore, to operate the truck a minimum of three personnel should assigned to the unit with recall personnel.

It is felt that the initial function most critical to reducing life and property loss is ventilation. To safely accomplish ventilating the rooftop of a two-story dwelling takes a two-person team as a minimum; however, a three-person truck company is much safer and more efficient.

[9] Iowa State University, Fire Service Extension, Water for Firefight: Rate of Flow Formula, (Ames: Iowa State University Press, 1967), p.18.
[10] Ralph Wirts, "Firefighters," Job Safety and Health Magazine, U.S. Department of Labor, OSHA, June 1978.

APPARATUS/PERSONNEL ASSIGNMENT GOALS

The ultimate goal is to place the needed number of personnel at the scene of an incident in the appropriate number of apparatus within a given period of time to perform their required tasks. These standards are concerned with the kinds and numbers of apparatus and personnel (i.e., fire suppression and rescue companies) that should respond to fire and EMS incidents. Such standards are used by every fire department (although not necessarily called "standards"), and generally specify the numbers and types of companies required, as well as, the total number of personnel needed on the fireground.

Some fire departments establish these incident assignment standards in advance for various alarm levels (e.g., first alarm, second alarm, etc.), although the trend is to define a full first alarm assignment with additional resources requested on an individual assignment after an on-scene size-up has been accomplished.

Standard first alarm assignments are of course, a function of the characteristics and fire hazards in the community. However, general guidelines and criteria for establishing these standards are prevalent in the fire service literature.

For example, the following might be considered generic fire service guidelines for first alarm assignments:[11]

- **Low Hazard Occupancies**
  2 engines, 1 truck and 1 chief officer with a total of 13 personnel

- **Medium Hazard Occupancies**
  3 engines, 1 truck, and 1 chief officer with a total of 17 personnel.

- **High Hazard Occupancies**
  4 engines, 2 trucks, and 2 chief officers with a total of 26 personnel.

Initial Attack and Sustained Attack

The National Fire Academy suggests a philosophy of an “initial attack" and “sustained attack” to determine the resources needed to extinguish a fire. The initial attack is the attack available and necessary to extinguish a fire within ten (10) minutes after receipt of an alarm. Thirty (30) minutes is used as the basic time frame for measurement of the fire department's ability to provide the full gallons per minute fire flow for a particular location and is called the sustained attack.

A great deal of very significant fireground activity takes place between the extremes of initial attack and the maximum flow capability of sustained attack. The fire department reinforces the initial attack by attempting to limit the spread of the fire before it reaches "full involvement".

[11] National Fire Protection Association, Management in the Fire Service, (Boston, MA: N.F.P.A., 1977), p.279.

These two extremes are used simply as benchmarks. They examine a fire department's suppression capability in two different configurations, which suggest effectiveness under varying circumstances.

Fire Flow as a Determinant for Staffing

"Fire flow" is defined as the estimated water delivery rate in gallons per minute required providing adequate fire protection for a specified structure. As discussed earlier, a fireground estimation of the water needed to extinguish a fire is one (1) gallon per minute for every one-hundred (100) cubic feet of fire space. On the fireground, the incident commander will estimate the number of cubic feet of space involved (or soon to be involved) in fire and divide by one hundred (100) to figure the approximate gallons of water per minute necessary to put the fire out. This fire flow divided by fifty (50) is the estimated number of firefighters needed to produce that fire flow.
However, much research has been done to determine a scientific formula to determine the "Needed Fire Flow" for occupancies. Needed fire flow estimates for a building are calculated using a formula which is based on 1,450 actual fire flows as plotted with respect to total building floor area. The fire flow formula takes into account the following factors: [13]

- Affected floor area (considering potential for fire spread) - The largest single open area of a building or floor plus corridor
- Type of construction
- Building use (i.e., fuel loading
- Exposures (i.e., surrounding structures)
- Combustible/non-combustible roof

It is felt that the fire flow estimate is the best currently available quantitative measure of the fire suppression capability required for specific buildings. The formula can be used for all structures except very high hazard occupancies, such as lumberyards, petroleum storage, refineries, grain elevators, and large chemical plants.

When a fire flow requirement has been calculated, then the resources required to deliver that fire flow can be determined. The results of a number of studies have been used to establish the relationship between fire flow and corresponding required resources (i.e., engine and truck companies).

There is little controversy concerning the fire flow defined resource requirements, especially compared to the controversy involving response time and company staffing level criteria. The primary issue, which is debated, is the need to dispatch a full first alarm assignment; for example the New York City, Rand Institute in a 1975 study determined that: “A full response is needed only a small percentage of the time (i.e., 2 or 3 per cent). One could argue, therefore, that a small initial response should be sent since it will be adequate such a high percentage of the time.

However, it is those few times a full response is needed that a quick and complete response by the fire department may save lives and property."

RECOMMENDED BIG BEAR LAKE FIRE SUPPRESSION ASSIGNMENT GOALS

The approach to setting fire incident assignment standards is to establish standards defining the assignment based on the resources required to control a fully-involved structure fire (i.e., an entire building or the area between four hour fire walls, whichever is smaller). It is recommended Big Bear Lake endorse the philosophy of the National Fire Academy and use requirements for initial attack and sustained attack.

These recommended levels are based on the fire flow resource requirements established by ISO and discussed earlier. In addition, it is felt that the requirement for personnel is more important than the exact mix of companies (beyond what is specified in the standards) that are used to get them to the fireground. This view is substantiated by a statement in the classic fire fighting tactics book, Fire-Attack 1: ". . . in the vast majority of instances, the gallons per minute that can be applied on a fire within a stipulated time after arrival of the apparatus depends upon the available manpower, rather than rated pumping capacity".[12]

Initial Attack Assignment

Initial attack capability should be considered in terms of a reflex action by the fire department. When an alarm is received, the fire department should be capable of responding quickly to place a reasonable fire attack into action without delay. Fire suppression is a series of tasks usually involving entry (sometimes forcibly), search and rescue, suppression agent application, ventilation, salvage and overhaul. Each of these tasks can be broken into a group of sub-tasks or standard operating procedures. Sometimes these tasks need to be done simultaneously, while at other times they can be done sequentially. The actual incident scene must be managed by an incident command system. Table 9-5 illustrates these initial attack requirements.

The planning process for determining the number of personnel on the apparatus must start with defining the objectives and tasks to meet those objectives. If the objective is merely to arrive and apply water from the fire engine's tank through (1) one, 1 1/2 inch hose line, that can probably be done with three (3) firefighters (a pump operator/outside observer and two (2) firefighters on the hose line) from the outside of the building. . However, if the hydrant is more than 100 feet or so away, the operation will have to cease when the fire engine's tank runs out of water (about 5 minutes) unless another Fire Company can establish a permanent water supply from a hydrant in the interval. Otherwise, the original Engine Company will need to regroup and establish that supply or delay initial attack until that supply is established. Therefore, it is important to look at how soon additional resources will be available to the first group of firefighters. If additional resources are going to be considerably delayed, a fourth firefighter with the initial company could assist in establishing a water supply initially as the remaining firefighters begin their fire attack.

[12] Warren Kimball, Fire Attack I, (Boston, MA: NFPA, 1966), p.55.

INITIAL ATTACK REQUIREMENTS

Table 9-5 Initial Attack Requirements

Function	Number of Firefighters Required: Commercial	Number of Firefighters Required: Residential
Hose lines		
Requires 1 pump operator	6	3
1 1/2 inch =150 gpm requires 2 people		
2 1/2 inch = 250 gpm requires 3 people		
Search and Rescue (2in/2out)		
Requires 2 people per team		
Residential = 1 team per 2,000 square feet	4	2
Business = 1 team per 4,000 square feet		
Public Assembly = 1 team per 100 occupants		
Health Care = 1 team per 5 occupants		
Support Functions		
minimum of 1 firefighter	1	1
Ventilation		
minimum of 2 firefighters	2	2
Command		
minimum of 1	1	1
TOTAL NUMBER OF FIREFIGHTERS REQUIRED FOR INITIAL ATTACK	14	9

The company officer is typically inside in the three person scenario so there is little or no overall command or size-up until a chief officer arrives. If the engine company officer is to assume a role of incident commander on arrival, then he needs to remain outside to size up the situation and direct other companies arriving at the incident. The fourth firefighter can relieve the officer inside once the water supply is established and assist with the fire suppression effort.

Where the situation on arrival dictates both a search and rescue task and a fire suppression task simultaneously, the numbers of firefighters that are needed will be significantly more. Search and rescue sometimes cannot commence until fire suppression has established a safe path and in these cases, multiple companies need to be available to support the various tasks.

Initial attack capability should be measured based on the ability to place effective hand-lines in operation in interior positions. This assumes that the initial attack team will engage in interior offensive fire fighting attempting to gain control of the fire before it exceeds their capability. This requires the assignment of personnel to activities that are not strictly involved in water application, such as search and rescue, forcible entry, and ventilation. The necessary commitment to these activities depends on the type and complexity of the structure on fire.

The19initial attack is19geared19toward19offensive19fire19fighting19tactics. Firefighters attempt to rapidly gain control of the fire before it grows too large. If the fire has already surpassed this stage, the initial attack force should be able to initiate some form of holding action until reinforcements' arrive. An effective initial attack of 150 gpm may be reasonable for some locations, such as single-family dwellings. For multi-story occupancies, an initial attack of 350 or 400 gpm may be required. Very few departments can provide more than 500 gpm as an initial attack within a 10-minute time period.

This initial attack standard will provide adequate protection for typical fires in structures having total floor areas ranging from 2,000 square feet to 10,000 square feet (low hazard).[13] Of course, it is always possible to create fire demands in those structures which exceed the fire flow capability of an initial attack. For example, arson fires involving accelerants and delayed alarms. However, the cost of providing the resources required for such situations, within the stated reflex time, is generally not considered cost-effective. Thus, the initial attack standard provides protection for single family residential neighborhoods, small apartment houses, neighborhood shopping centers, etc.

Sustained Attack Assignment

Thirty minutes is used as the basic time frame for measurement of the fire department's ability to provide the full gpm fire flow for a particular location. This reflects a time that permits the initial attack force to arrive, begin operations, call for reinforcements, and then allows time for the additional units to respond and get into action.

The full gpm fire flow demand is based on maximum involvement of the fire building and normally calls for the application of master streams or large handlines. The application of large volumes of water is more feasible if apparatus and equipment are adequately set up for this type of operation.

Heavy gpm fire flow supply and the necessary deployment of apparatus and equipment to place large streams in effective operating positions.

The term "sustained attack" means that defensive fire fighting operations may require the application of the full gpm fire flow for extended lengths of time. When a defensive operation is necessary, it is assumed that the fire building itself cannot be saved and the purpose of the attack is to protect the community from the fire.

[13] National Fire Prevention and Control Administration, Urban Guide for Fire Prevention and Control Master Planning, 1977, p. IV-5.

Fire Reflex Response Times for Emergency Resources

BIG BEAR LAKE FIRE PROTECTION DISTRICT

Needed F Flow GPM	Initial Attack 10 Minutes	14 Minutes	Sustained Attack 20 Minutes	30 Minutes	Mutual Aid 40 Minutes	Totals
500 to 1, 000 gpm	3 Engine (8) 1 MA (2) 1 Sq (1)	1 Chief (1)	1 Engine (2)			4 Engines (10) 1MA (2) 1Sq (1) 1 Chief
Cumulative Personnel	11	12	14			14
1,000 to 1,500 gpm	3 Engine (8) 1 M (2) 1 Sq. (1)	1 Chief (1)	1 Engine (2) 1 Chief (1)	1 Engine (3) 1 Truck (3)	1 Engine (3)	6 Engines (16) 1 MA (2) 1 Truck (3) 2 Chiefs 1 Sq.
Cumulative Personnel	11	12	15	21	24	24

GPM = Gallons Per Minute, MA = Medic Ambulance, Sq = Squad, () =Number of Personnel per Unit
Fire Department response to structures protected by automatic sprinklers may be altered as determined by the Fire Chief

Table 9- 6. Fire Reflex Response Times for Emergency Resources

The first alarm response assignments includes a BLS or ALS unit ambulance/squad. This recommendation is based upon:

- The firefighters assigned to that unit are necessary to provide the total number of personnel required.
- The availability of emergency medical personnel on the fireground would be invaluable for rescue and treatment of firefighters and civilian injuries.
- The equipment on the squad may be needed at the fire scene.

The use of EMS units could satisfy all of these needs; of course, the inclusion of such units in the first alarm assignment means that the personnel must be cross-trained and carry their turnout gear and breathing apparatus. It would be even more suitable to have ALS units provide this needed staffing level.

High Risk Assignment
It is recommended that occupancies having a fire flow requirement in excess of 1,500 gpm, high rise buildings, high life risks (e.g., hospitals, schools, and nursing homes), and hazardous materials facilities be considered target hazards and be pre-fire planned on an individual basis - that is, that the alarm assignments be established as necessary to meet the special requirements associated with these high risk hazards.

Mutual and Automatic Aid
No community can bank on being able to handle all emergencies without outside assistance. It is the community's responsibility to manage that outside assistance and to be ready to give assistance when called. This is the essence of mutual aid.

Outside aid agreements usually take one of two forms. The first and most common is a written agreement among two or more departments to respond to formal requests for assistance under specified conditions. The second is an automatic aid agreement, which, as the phrase implies, permits dispatchers to send the nearest available unit automatically, regardless of jurisdictional boundaries.

Mutual aid is one of the fire service's oldest and finest traditions. The concept began as informal understandings among fire departments that they would respond to one another's calls for assistance. Later, neighboring departments formalized these agreements in writing. Thus, for a major fire, personnel and equipment from surrounding areas can be asked to respond to the affected jurisdiction. Command and control of the incident remains with the host jurisdiction and each department assume responsibility for its own personnel and apparatus. What makes this system work is that the aid is truly mutual; that is, it is reciprocal.

POSSIBLE REDUCTIONS OF FIRE ASSIGNMENTS

If 100% of the occupancies in a response district are fully sprinklered, and there are no high hazard facilities, then the initial attack assignment would be reduced to a single engine company (with a minimum staffing level of 3).

It is obvious that if the Fire District/City adopted an automatic fire sprinkler ordinance requiring all new structures be sprinklered, the required response could be sharply reduced in all new areas of Big Bear Lake.

OCCUPATIONAL SAFETY and HEALTH PROGRAM FOR THE BIG BEAR LAKE FIRE DEPARTMENT

Fire fighting has been recognized as the most hazardous occupation in North America in terms of occupational death and injury statistics. Deaths and injuries of firefighters continue at an unacceptably high level. Each year in recent history, over 100 line-of-duty deaths have been recorded among career and volunteer firefighters in the United States.[14] The statistics compiled annually by National Fire Protection Association on fire service deaths and injuries are more

[14] National Fire Incident Management Information System statistics.

than sufficient to demonstrate the need for increased efforts to reduce this toll. Stress-related problems are also impacting the health of firefighters. Table 9-7 from the American Heart Association illustrates this problem:[15]

According to the American Heart Association, the following is a list of the most stressed workers in America, in order of stress level:

1.	Firefighters	6.	Police officers	11.	Jockeys
2.	Race car drivers	7.	Osteopaths	12.	Public relation workers
3.	Astronauts	8.	State police officers	13.	Photojournalists
4.	Surgeons	9.	Air traffic controllers	14.	Advertising executives
5.	NFL players	10.	Mayors	15.	NCAA Basketball coaches
16.	Real estate agents	21.	Taxi drivers		
17.	Commercial fishers	22.	Reporters		
18.	Members of Congress	23.	Architects		
19.	Commercial pilots	24.	Loggers		
20.	Stockbrokers	25.	Lawyers		

Table 9-7. High-Stress Jobs

In addition to the direct line-of-duty deaths, there is growing concern with the number of firefighters who suffer disabling injuries or develop occupational diseases and conditions that often have debilitating or fatal consequences and force them to discontinue their fire service activities. The link between respiratory and heart diseases and fire service careers has been well documented and established. There is growing evidence of a similar link to cancer and related diseases, derived from occupational exposure to carcinogens, toxic products of combustion, and hazardous materials.

As discussed earlier, the fire service is not only involved in fire suppression activities but has an increasing role in the delivery of emergency medical and rescue services and response to incidents involving hazardous materials. The firefighter may be exposed to a wide range of dangers arising from these activities that present an even more complex set of occupational health and safety concerns. There is a growing concern, as well, with the aspects of fire department activities and functions that are directly related to stress and the emotional and psychological consequences of providing emergency services.

In 1987 the National Fire Protection Association (NFPA) Standards Council issued its NFPA 1500 Standard on Fire Department Occupational Safety and Health Program. This standard has generated more concern, controversy, and interest than any other standard in the recent history of the fire service. NFPA 1500 is an extensive and potentially expensive proposition.

NFPA 1500 requires the drafting of standard operating procedures, policy statements and an incident command system. Permanent records must be maintained regarding all accidents, injuries, illness and deaths that are, or might be job related. A data collection system must be

[15] Focus Psychological Services, "Focus on Stress," Wellness Newsletter, Number 1.

established to maintain individual records of any occupational exposure to known or suspected toxic products or contagious diseases. Training records must be maintained for each department member recording dates of training, subjects covered and certificates achieved. Inspection, maintenance, repair, and service records must be kept for all vehicles and equipment used for emergency operations.[16] All of these requirements are currently being met by the Big Bear Lake Fire Department. NFPA 1500 also requires certain requirements for new fire apparatus and equipment such as minimum number of seats, protection, appropriate safety clothing, and personal alert safety systems all of which we are meeting.[17]

Firefighter safety has been a key legal issue of the 1990's and will continue into the year 2000. Safety can be a factor in union contract negotiation, administration budgeting and fiscal matters, insurance and worker's compensation policies, and injury litigation. The best way to avoid liability and keep firefighter safety from becoming the legal issue of the next decade in Big Bear Lake is to avoid having incidents, which cause needless injury. Recognizing the need to comply with NFPA safety and training standards and adopting a reasonable implementation period is the only prudent course of action.

Apparatus and Equipment

All new purchases of apparatus, vehicles, firefighting and personal equipment should be specified to meet NFPA 1500 and/or related fire service safety standards and meet all Fed OSHA and Cal OSHA requirements

Health and Wellness Program

The wellness of firefighters has brought some of the more vocal concerns relative to the adoption of NFPA 1500. Medical monitoring and physicals used by many fire departments to address these fitness programs have been vital concerns.

Although medical monitoring may carry the most significant on-going financial burden, the benefits derived from such a program far outweigh the financial implications involved. The fire service has increased its involvement in hazardous materials incidents and potential exposure to the toxic by-products of fire will always exist.

In October of 1998, the Big Bear Lake Fire District initiated a Fire Department Fitness Evaluation Program, which was developed and coordinated by Pacific Health Ways. This program conforms to the following NFPA 1500 recommendations:

3-1 The fire department should establish a comprehensive physical fitness and health enhancement program for current firefighters.

3-2 The goal of this program is to reduce the frequency and severity of injuries and illness, assist the firefighter in meeting the physical demands of the job, and

[16] National Fire Protection Association, NFPA-1500, Standard on Fire Department Occupational Safety and Health Program, 1987, pp. 7-8.
[17] NFPA 1500, pp. 9-10.

prepare the firefighter for successful completion of the physical performance assessment.

3-3 The physical fitness and health enhancement program should include a physical fitness assessment. The physical fitness assessment should include tests to assess aerobic capacity, flexibility, body composition, muscular strength, muscular endurance and anaerobic power.

The medical portion of the fitness evaluation had the following results:

Big Bear Lake
Summary of 1998 Medical Fitness Evaluation

Parameters	Department Average	Ideals
Weight	198.4	
Body fat %	20.7%	< 19%
Resting Heart Rate	60.5 bpm	<70
Blood Pressure	119/80 mmHg	<120/80
Total Cholesterol	196 mg/dl	<190
HDL Cholesterol	4605 mg/dl	>50-60
HDL Ratio	4.2	<3.5
LDL Cholesterol	119 mg/dl	<130
Glucose	97.6	<120
Triglycerides	182 mg/dl	<100
Number of Smokers	0 or 0%	0
Max Vo2	43.9 ml/kg/min.	>42
CHD (heart) Score*	18	<25

* The CHD (heart) score was calculated using findings developed in the Framingham Heart Study. An ideal score of 100 represents all heart risk factors are ideal. A score of 400 would indicate that risk factors are present and the risk for heart disease is 4 times greater than an ideal risk classification,

Table 9-8 Results of 1998 Medical Evaluation of Fire District Personnel

A medical monitoring program becomes vital for establishing baseline medical data. More importantly, it allows for the diagnosis of health related problems resulting from chronic exposure to various chemical substances early enough to permit the most effective treatment. Because of these extreme risks, in California all firefighter cancer, heart and lung problems are considered to be job related unless the employer can prove otherwise. It must also be recognized that there is clear and overwhelming evidence that shows a relationship between smoking and obesity to coronary disease. As discussed, all diseases of the lungs are considered as occupational "injuries" for firefighters in California.[18] Therefore, the following recommendation is made:

Firefighters begin their careers as healthy persons. Most often they must pass rigid physical and psychological testing to qualify for work in the fire service. Yet as an occupational group, the

[18] Lawrence D. Sukay, " Only the Beginning," Chief Fire Executive, January/February/March 1989, p.40.

health of fire department personnel in general, deteriorates rapidly. The 1989 Firefighter Fatality Report published by the NFPA indicated that heart attack once again was the leading fatal "injury" accounting for almost fifty percent of firefighter deaths.[19] With this information in hand, every fire department should be making a conscientious effort to encourage firefighters to achieve the high level of physical fitness required to do the job. Since all fire departments test for physical fitness before a person can become a firefighter, no excuse exists for any fire department to discourage or prohibit firefighters from exercising on-duty the Table 9-8 shows the fitness performance summary for Big Bear Lake Fire District personnel taking the Fitness Evaluation Program testing by Health Ways in October of 1998 and the average performance score for the Fire District.

FIT FOR DUTY

PHYSICAL PERFORMANCE STANDARDS

POINTS RANGE	Performance Scores—5/98		
1200 or Less - BELOWSTANDARDS	Parameter	B.B.L.F.D.	Ideal
1201-1349 - AVERAGE	Abdominal Crunch	84.6	80/12 minutes
1350 –1499 -GOOD	Vertical Jump	18.2	18.0 inches
1550 or Above - EXCELLENT	Grip Strength	67	60 Kg.
	Performance Score	**1488**	**1500**

Table 9-9 Physical Performance Standards

The District has room for significant improvement. The overall performance score was barely in the "Good" range. Following are significant factors and evaluation of Fire District personnel as recorded by Health Ways:

Coronary Heart Disease Risk:
"Firefighters are reported to have both a higher incidence of heart disease and a higher premature death rate than persons in other high risk occupations. The Coronary Heart Disease risk factors revealed a low to moderate risk overall for the Big Bear Lake Fire District. According to the American Heart Association, the major cause of heart attack and stroke deaths is a process called atherosclerosis or "hardening of the arteries." The development of atherosclerosis is associated with high cholesterol levels, high blood pressure, smoking and lack of physical activity. **There was 1 firefighter (7.1%) with a cholesterol level in the high risk zone and 5 firefighters (36%) who were at border line high risk according to AHA and Cholesterol values."**

Cardio-Respiratory Fitness: "Cardiovascular- respiratory fitness, as determined by the treadmill test, is the most important determinant of a firefighter's capacity to do work for extended periods of time. In addition, it provides information regarding the risk of heart disease. Research has suggested that the recommended minimum V02max (measurement of cardiovascular fitness) standard for firefighters is 42 to 45 ml/kg/min. **There were 4 firefighters (28%) who scored a V02max at or below 42 ml/kg/min. The optimal standard for V02 max is 52 ml/kg/min.**

[19] N.F.P.A., "1989 Firefighter Fatality Report," Fire Journal, March 1989.

Body Composition: "Excess body fat has a negative influence on the ability to perform simulated fire fighting tasks and leads to adverse cardiovascular effects which may increase the risk of premature death. Extra fat also inhibits body heat dissipation and is associated with an increase in the likelihood of musculo-skeletal injuries. **There were 7 firefighters (51%) who had a body fat % above the ideal standard of 19% for firefighters**.

Flexibility: Musculoskeletal sprains and strains are the leading cause of fire department on-duty injuries. Poor flexibility suggests that the soft tissues in the body, (i.e., your muscles, tendons, and ligaments) are not allowing for an adequate range of motion for safe and efficient movement. Most overuse (over stress) injuries result from problems with flexibility, muscle weakness and poor posture. **Flexibility tests revealed 8 individuals (57.5%) with poor flexibility (sit and reach below 2 inches).**

Fire Performance Scores: "Overall the fitness scores for the Big Bear Lake Fire District were above average for traditional norms but below average compared to other fire department personnel. **The Big Bear Lake Fire District scored an average performance score of 1488, with 1500 or higher ideal**."

As evidenced by the overall summary by Health Ways, the Big Bear Lake Fire District's safety personnel need to continue in a health and wellness program that is balanced and comprehensive.

There should be no fear of firefighters incurring a worker's compensation injury as a result of physical conditioning if the program is organized and well managed. It has been documented that physically fit firefighters who are injured have a quicker recovery period versus those firefighters who are not physically fit. The kinds of injuries that may occur as a result of physical conditioning can be classified as low severity.

Employee Assistance Program

Members of the fire service are constantly exposed to stress producing events. Firefighters see and experience many terrible and life-impacting events. Mangled bodies and emotional trauma such as suicide and overdoses eventually take their toll on the firefighter. In addition, the very nature of the fire service is stressful. For example, shift work causes poor or inadequate sleeping patterns, irregular eating habits and usually inadequate diet as well as strains on the personal and family life of an individual.

One of the greatest threats of prolonged stress is the impact to the health of the individual. Experts in the study of stress and disease estimate that as many as fifty percent of all cancers, cardiovascular problems, colitis and intestinal trait disorders, rheumatoid arthritis, ulcers and stroke are directly related to stress.[20]It is evident from the research that many minor ailments also occur as a result of stress. These minor ailments result in the individual using sick leave in an effort to recuperate. As the pressures of the job increase, so does the level of stress, which in turn lowers the individual's resistance. Within many fire service organizations, operating at less than

[20] Robert W. Shearer, "Occupational Stress in the Fire Service: The Quiet Killer," The California Fireman, September 1988, p.8.

full strength increases the workload of each employee who is present as well as raising the overtime budget.

Another major problem encountered in the fire service is substance abuse. Recent studies reveal that fire department personnel experience a higher percentage of alcoholism and drug-related problems than other occupations. One can begin to see the dangers involved in having employees in responsible fire service positions, affected or under the influence of some type of illegal substance.[21]

In addition to alcohol and drug abuse, prolonged stress and the nature of the fire service take their toll on the personal and family life of many fire department members. Divorce rates are high because many fire personnel are unable to communicate with their spouses. Firefighters tend to shelter their families from the unpleasant experiences they encounter at work. This lack of involvement places additional strains on the relationship, which is already under tension from shift work, extra off-duty work as well as other additional personal interests.

One factor regarding stress that has a tremendous effect on the fire department is called "burnout." Burnout seems to occur quicker in the helping professions such as the fire service and law enforcement. Burnout occurs when you have more energy going out than you have coming in. It is a cumulative process of gradual wearing down of your reserves, with little time allowed for recharging your energies. Burnout is a combination of mental, physical and emotional exhaustion.

Because of the many reasons given above on the stressful occupation of Firefighting, the fire department should establish some type of psychological services for department members when needed. The purpose of an employee assistance program in a fire department is to provide assistance to members who encounter problems in their personal lives that have the potential of negatively affecting their job performance and/or personal well being. If managed properly, the program provides a confidential method of seeking counseling, guidance, or treatment for substance abuse, and other personal and/or work-related problems. These services should be adequate to handle a wide range of problems and should be used by department personnel on a voluntary basis. Only those members with problems that endanger themselves or others should be brought to the attention of the administrators. If every visit to the psychologist is reported to the District, firefighters will not use the service due to possible repercussions.

Besides employee assistance programs being a good business practice, the NFPA Standard 1500 has placed significant importance on providing fire department members with access to an employee assistance program by identifying the need in Chapter 9 of the standard.[22] Adoption of the standard includes providing services to all members and their families.

The Big Bear Lake Fire Department recognizes the fact that their employees are its most valuable resource. No piece of equipment will ever replace the human completely. Every effort should be taken to make working and the workplace as pleasurable and healthful as possible.

[21] Robert W. Shearer, p. 9.
[22] Philip C. Stittleburg, “Coping with NFPA 1500,” Fire Chief, December 1988, p.29.

This effort along with an employee assistance program will greatly reduce and/or avoid potential stress. A program such as this is an integral part of maintaining the physical, mental, and emotional welfare of fire department members.

MITIGATION ACTIVITIES AND STAFFING ISSUES

Mitigation activities are those that reduce the probability or limit the effects of an emergency or disaster. They often take the form of regulations, ordinances, and similar initiatives that achieve prevention through engineering, enforcement, or education. In most fire departments, the Fire Prevention Bureau or Division is the key to their mitigation activities.

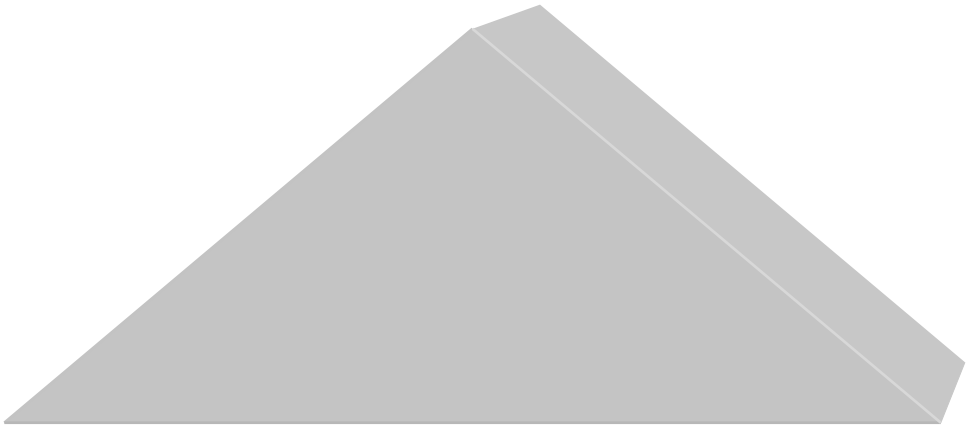
The fire service is often the first responder to emergencies caused not only by fires and medical problems, but also by other environmental hazards floods, building collapse, wind storms, hazardous materials incidents, and so on. Consequently, a department's mitigation efforts need to focus not only on fires but also on this expanded range of concerns. It is important to the fire service that it have some control of these mitigation measures because it will directly impact their eventual response.

Fire and building codes and sprinkler ordinances are examples of disaster prevention through mitigation activities. The fire service can consider other options as well. Floodplain management and other aspects of land use planning are areas for greater fire service involvement. By taking part in land use planning decisions, the fire department can influence actions that will later determine the risk to the community from man-made and natural hazards as well as the capability of the department to protect the community from these hazards.

Hazardous materials is another area in which increased mitigation is needed. Like fire prevention, mitigation in hazardous materials storage and transportation means increasing safety and reducing excessive risks; educating the public as well as those directly involved in handling hazardous materials; and enforcement, which may include restricting and monitoring storage and shipment.

FIRE PREVENTION DIVISION

The purpose of fire prevention is to lessen the physical, occupational, and social hazards, which contribute to the occurrence and spread of fire. The entire personnel of the fire department are trained and utilized toward fire prevention. Most fire departments also have a Fire Prevention Division. This division provides for coordination and management of the department's prevention program, which usually includes the three "**E'**s" of prevention: **E**ducation of the community, **E**nforcement of Uniform Fire Code and related codes, and **E**ngineering of the structural construction. Table 9-10 shows this "Fire Prevention Triangle." Remove one side of the triangle and your fire prevention program suffers significantly.



Engineering

Fire
Prevention
Triangle

Education

Enforcement

Table 9-10

Comprehensive Code Administration
To protect the health, safety, and welfare of their citizens, local governments enact and adopt a multitude of codes and ordinances. In doing so, governments take on added responsibility for ensuring that the rules are followed, both by providing information and assistance to facilitate compliance with the codes and ordinances and by enforcing their provisions.

All major building codes are replete with requirements that are assigned to limit or control the spread of fire. Requirements dealing with means of egress, travel distance, alarm systems, and many other construction features designed to provide for immediate passage during emergency evacuations are life safety concerns as well. Considering that a fire code is a maintenance code for the life of the building and is usually based on construction requirements, a natural relationship between building and fire prevention inspection activities can be seen.

Depending on the priorities of a particular community, enforcement programs may develop around a variety of regulations; building construction, fire prevention, health and sanitation, housing, land use, business and commercial property, animal control, and environmental pollution. Often, the responsibility for enforcement is scattered among various government departments. Recognizing that such decentralization of responsibility may lead to duplication of effort and poor coordination among related functions, many local governments have brought these functions together into a comprehensive code administration program.

A comprehensive code administration program with the objective of protecting life and property from hazards associated with the physical environment requires a clear commitment from the fire and building departments, the administrative leadership, and the elected officials of the jurisdiction. The best course is to design a program that provides a cost-effective way to deliver the services that logically could be the responsibility of a multipurpose safety-oriented agency. In many local governments, comprehensive code administration is the single responsibility of the fire department, community development department or a combined fire and life safety department.

The establishment of a fire prevention program within a fire department is an important step toward achieving better protection of life and property. However, the establishment of a comprehensive code administration program by collaboration of Big Bear Lake's inspection departments through a joint venture is a second important step toward that same goal. By taking this second step, the community, elected officials, government administrators, and employees all make an important contribution to better protection of life and property.

Suggested Benchmarks

1. The Fire District continue the current Staffing System of using both full-time and paid call personnel

2. The District should establish a staffing target of 1.20 total Fulltime Fire Department personnel per 1,000 people in the Fire District. The 1.20 employees per 1,000 people should be distributed as 1.00 shift firefighters and 0.20 support personnel per 1,000 population.

3. The Fire District should establish a staffing target of 1.2 Paid Call Firefighter (PCF's) per 1,000 people in the Fire District. The 1.2 should be maintained to augment full time staffing levels for engines, squads, and ambulances as directed. Current authorized staffing for PCF is 15.

4. It is recommended that an engine company be able to enter a smoke-filled dwelling and put into operation a minimum of 150 gallons per minute (GPM) with the engine operating from a hydrant.

5. It is recommended that a truck company be able to accomplish rooftop ventilation for a two-story dwelling or greater.

6. It is recommended that Basic Life Support (BLS) unit is able to conduct a patient assessment and initiate CPR when cardiac arrest conditions are established.

7. It is recommendation that an Advanced Life Support (ALS) EMS unit be able to successfully conduct a patient assessment and initiate definitive care measures to intubate, defibrillate, and medicate a patient in the field.

8. Initial Attack Assignment

- Residential
  The initial Attack assignment in residential occupancies should be capable of providing 150-gpm fire flow. To accomplish this, a minimum of nine (9)

firefighters will meet a 10-minute reflex time in 90% of dispatches and 20-minute reflex time in 95% of the cases

- Commercial
  The Initial Attack assignment in commercial occupancies should be capable of providing 400-gpm fire flow. To accomplish this, a minimum of fourteen (14) firefighters will meet a 10-minute reflex time in 90% of dispatches and a 20 minute time in 95% of the cases.

9. The Fire District should be capable of providing up to 1,500 gallons per minute in a Sustained Attack. All occupancies a fire flow greater than 1,500 gpm (most occupancies over 5,000 square feet) should be sprinklered

10. It is recommended that Big Bear Lake continue to actively participate in the San Bernardino County Fire Mutual Aid Plan.

11. It is recommended that Big Bear Lake sign automatic aid agreements with other jurisdictions as necessary for response to certain areas and the use of specialized equipment on a regional basis with the County of San Bernardino.

12. All new purchases of apparatus, vehicles, firefighting and personal equipment should be specified to meet NFPA 1500 and/or related fire service safety standards and meet all Fed OSHA and Cal OSHA requirements.

13. It is recommended that an annual comprehensive Medical Monitoring Program continue for all Fire District safety personnel.

14. The specific recommendation is that 90% of all safety employees should score in the Ideal range in 50% of the parameters and no less than "Average" in any parameter.

15. It is recommended that a policy of no smoking and no use of tobacco products be adopted for all newly hired Big Bear Lake Fire Department members. This policy should apply to off-duty as well as on-duty hours.

16. It is recommended that a Physical Fitness Program be established for all Fire Department employees. Within two (2) years all Safety personnel of the Big Bear Lake Fire Protection District should achieve and maintain the following physical fitness standards:

- 50% should achieve an "Ideal" fitness performance score.
- 40% achieve a “Good” fitness performance score.
- NO Safety employee shall fall below the "Average" Fitness Performance Score.

17. It is recommended that the Fire Department continue to provide an excellent Employee Assistance Program that identifies and assists members with substance abuse, stress, and personal problems adversely affecting job performance.

SECTION 10

COST OF SERVICE

WHY DOES THE BIG BEAR LAKE FIRE PROTECTION DISTRICT NEED A COMPREHENSIVE FINANCIAL PLANNING STRATEGY?

In the simplest terms, the Big Bear Lake Fire Protection District's business is service. The Fire District's Mission Statement reflects this fact. Our customers include the members of the community, and tourist trade. Our primary services are fire suppression, prevention, emergency medical services, etc. Most of our customers don't pay taxes for the services we provide and in very few instances directly pay for the services they receive. As part of our service to the community, the Fire District has the duty to protect, preserve and maintain cash investments and other assets on behalf of the citizens of the community. One of the District's primary responsibilities is for planning the community's fire service needs now and in the future and how best to use the people's money to accomplish our mission. The Fire District's financial planning strategy will directly impact the following:

- Public's perception of value of service.
- Public's perception of the Fire District.
- Public's ability or desire to build for the future.

What are the Challenges?

Fire department services in the 1990's faced hard times because traditional sources of the Fire District and City General Fund revenues were decreasing and in some cases, being eliminated altogether. This, coupled with the expensive labor-intensive nature of fire protection, makes it increasingly important to expend and responsibly maintain, existing revenue sources and also develop new sources of funding for Fire Department services. Unfortunately, several forces contribute to shrinking revenues and budget crunches:

- Money is not coming in from taxpayers like it used to before Proposition 13.
- The cost of government is going up because the cost of providing services has been going up.
- The demand for services has increased.
- The taxpayers in increasing numbers are blaming government and its cost for more and more of their woes. For angry, unhappy, combative taxpayers, local government is an accessible point of attack, much easier than government at other levels.
- The State Of California's budget woes are significantly impacting local governments and especially special districts. Projections for further negative fiscal impacts on local government in 1999 present a serious concern to the Fire District.

Economists project that the California "boom" of the past decade will now be mitigated by several factors:

1. World political stability has increased resulting in fewer wealthy immigrants into Southern California.
2. Real estate values are leveling off or decreasing.
3. Real estate values are relatively high, forcing more industrial companies to seek relocation or expansion in other areas of the United States.

4. A chronic lack of water, air pollution, a desire to avoid large population, and other personal factors combine to cause families to relocate outside of the state.

The operating costs of the fire department, both now and in the future, and the capital costs of replacement of existing apparatus, vehicles and equipment must be carefully considered and planned for. A well-rounded fiscal program to accommodate paying for the costs of fire protection, emergency medical services, and other fire department services becomes critical to the future of the Big Bear Lake Fire Protection District. There is a need to prepare adequate financing plans to ensure continued fire service capability in the community. At the current time, neither the Fire District nor the City has short or long-range plans for financing future fire protection and emergency medical services programs.

These plans must be made in order to adequately fund the fire department now and into the future. The following concerns must be addressed:

- How can the Fire District continue to fund and maintain existing fire department services at the current level of service.
- How can the Fire District possibly fund and maintain increased level of fire service at a level consistent with nationally accepted standards or current service demands.
- How will the Fire District fund the replacement of existing capital equipment and apparatus.
- How will the Fire District fund the increased demand for future fire department services, including future fire department capital equipment and apparatus needs, facilities, caused by new development and increased growth to acceptable levels with no detrimental impact to the existing population's current level of fire department services.

Increased demands by citizens for fire and emergency medical services have imposed continued burdens on fire departments. They include evaluating new dangers and hazards to both firefighters and citizens; reconsidering equipment, staffing needs, and facility locations; adding new training programs; upgrading technical abilities; reassessing standards of service; providing a higher level of safety education for the public; and absorbing increased activity and workloads. To the extent that all this implies a need for more resources, especially more firefighters, the issue is money and the money may not be currently available. Hopefully, the necessary funds can be located and assigned. If not, one of the few short-run solutions is to continue doing as well as possible in meeting demands for fire protection and emergency medical services with available resources.

Fire Department Budgeting

All physical resources and services other than services provided by volunteers are obtained with money. So that available monies will be distributed in such a way that a balanced mix of resources are available, the fire department uses an annual budget to plan and control revenue and expenditures. Budgets thus serve many useful purposes, including the following:

1. They are guides, or forecasts, that can make planning easier.
2. They are a communications link, joining the department with the public and with elected officials.

3. They present an accurate picture of what types and amounts of revenues are funding the expenditures.
4. They show how fast available monies are being spent and the nature of the expenditures.

Expenditures to Revenues

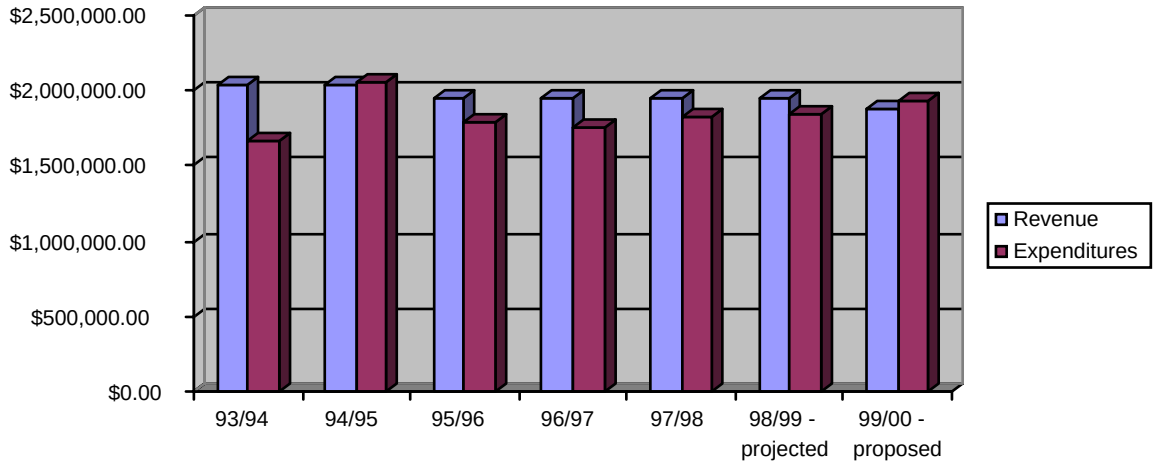


Table 10-1 compares the expenditures to the revenues of the Fire District for the past five years.[1]

Expenditures

As shown in Table 10-2, the Fire District's expenditures have increased by approximately 9.7% since 1993-94. Expenditures have averaged $1,814,943 per year during the last five annual budgets.

Big Bear Lake Fire District Five-Year Budget History

FiscalYear	1993/94	1994/95	1995/96	1996/97	1997/98
Expenditures	$1,666,917	$2,045,653	$1,785,881	$1,746,402	$1,869,348
Expenditure Difference from Previous Year	-7.93%	22.07%*	-12.21%*	-2.21%	4.5%

Table 10-2 Five Year Expense History
* Eathquake related damage and fire station preperation(main st.)

Expenditure Distribution 1997/98

[1] Big Bear Lake Fire Protection District Annual Audit Reports

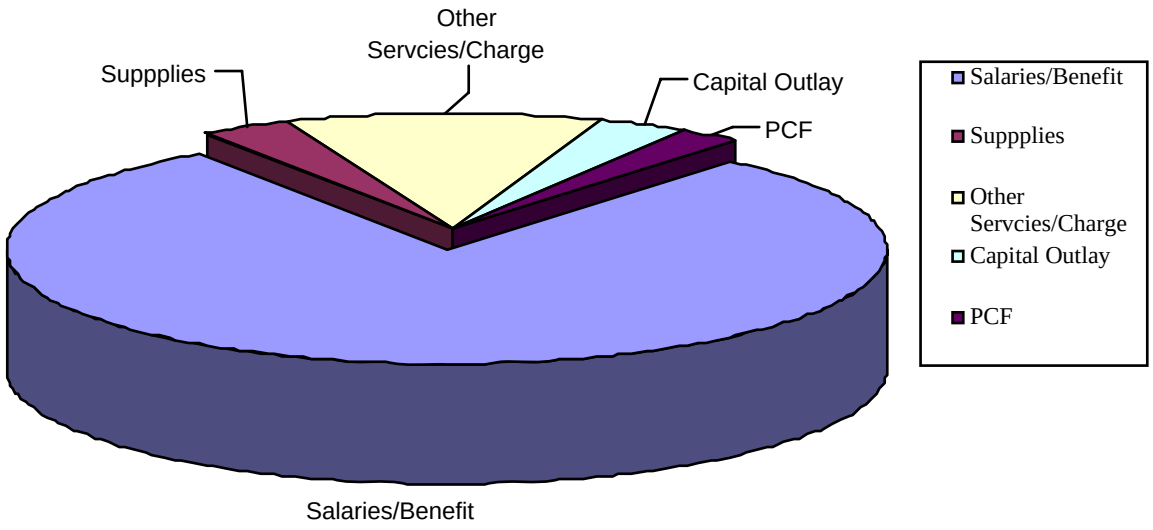


Table 10-3 Expenditure Distribution 1997-98

Revenues

As Shown in Table 10-4, the Big Bear Lake Fire District revenues have decreased by approximately 3.86% since 1993/94. Revenues have averaged $1,978,159 per year during the last five years.

Big Bear Lake Fire District Five-Year Budget History

Fiscal Year	1993-94	1994-95	1995-96	1996-97	1997-98
Revenues	$2,029,755	$2,026,469	$1,944,465	$1,938,822	$1,951,286
Revenue Difference from Previous Year	-0.68%	-0.16%	-4.0%	-0.29%	0.64%

Table 10-4 Revenue History

Revenues must be received to cover the costs of the fire department, thereby making the Big Bear Lake Fire Protection District dependent on revenue sources. Revenues include the Fire District's portion of the property tax (average of approximately 15% of the 1-% total property tax collected). The remainer of the revenues are made up of non-tax fees and charges. Table 10-5 shows how the different types of revenue collected by the Fire District are distributed by percentage.

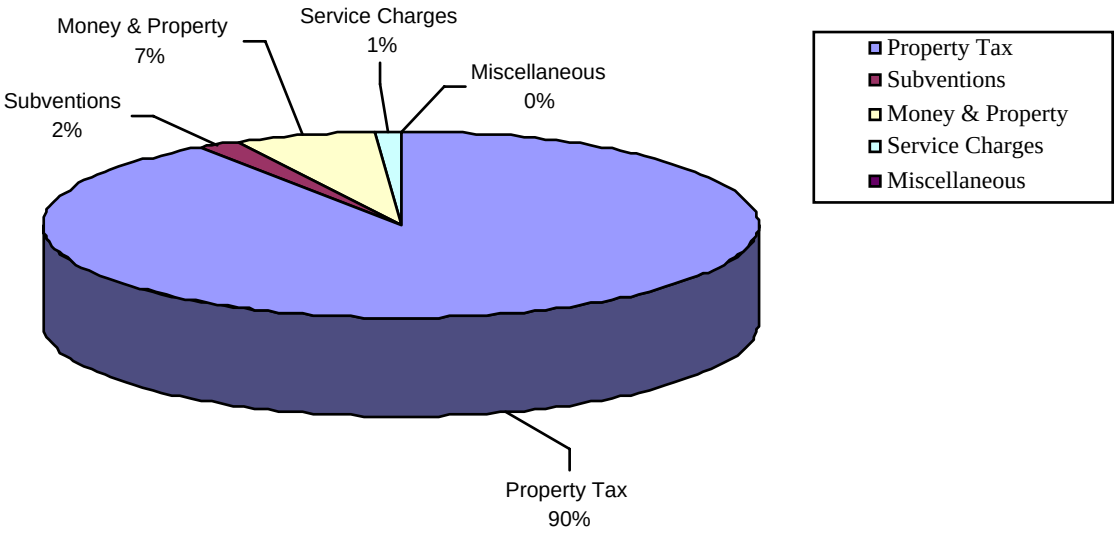


Table 10-5 Revenue Distribution in 1997/98

Table 10-6 compares the 1997/98 actual revenues and total expenditures of these agencies.

Fire District	Average Tax Rate	Property Taxes	Assessments	EMS Fees/User Fees	Community Facilities District	Actual 1997/98 Expenditures
Big Bear City	8%	$819,465	$630,152	$26,911	0	$1,422,706
Apple Valley	10%	$2,251,348	$1,209,190	$49,000	0	$2,509,874
Barstow	23%	$2,161,922	0	0	0	$2,308,495
Rancho Cucamonga	11%	$5,792,119	0	$240,000	$2,610,978	$7,238,393
Victorville	6%	$1,519,615	0	$68,237	$1,442,214 (City Subsity)	$3,030,001
Hesperia Fire	15%	$3,628,344	$496,872	$1,274,210	0	$5,285,903
Big Bear Lake	15%	$1,744,768	0	18,662	0	$1,668,107

Table 10-6 comparision 1997/98 actual Revenues and Expenditures

Table 10-7 estimates the annual fire taxes for Big Bear Lake and other local fire districts based on a single family home valued at $100,000. Official representatives from those agencies provided all the data from the other agencies and accuracy is dependent on those sources.

Big Bear Lake Fire District	$150.00	Property Tax
	0.00	Assessment
	$150.00	Total Fire Tax
Barstow Fire District	$230.00	Property Tax
	0.00	Assessment
	$230.00	Total Fire Tax
Hesperia Fire District	$150.00	Property Tax
	$ 15.00	Assessment
	$165.00	Total Fire Tax
Big Bear City Fire Dept.	$ 80.00	Property Tax
	$ 49.00	Assessment*
	$129.00	Total Fire Tax
Apple Valley Fire District	$100.00	Property Tax
	$ 47.00	Assessment
	$147.00	Total Fire Tax
Rancho Cucamonga Fire District	$130.00	Property Tax
	$ 0.00	Assessment
	$ 130.00	Total Fire Tax

Based on single family home valued at $100,000
*proposed to increase to $79.00

Annual Fund Balance

Fund balance is the amount of money left in the budget at the end of the fiscal year. It is determined by the difference between revenues and expenditures and previous fund balances. The goal obviously is to end the fiscal year with a positive amount (more revenues than expenditures) thus creating a reserve for the following fiscal years. Based on past audits the average annual fund balance for the last four years has been $1,853,092.

Big Bear Lake Fire District Five-Year Budget History

Fiscal Year	1993-94	1994-95	1995-96	1996-97	1997-98
Fiscal Year End-Fund Balance	$2,288,188	$2,269,004	$2,427,588	$2,427,588	$2,751,767

Table 10-8 Fire District's Five-Year Annual Fund Balance

The fund balance is made up of the following items (1997-98):

Vehicle Replacement	$ 333,000
RR Property	$ 52,000
Machinery & Equipment Replacement	$ 0
Self-Insurance-Pasis	$ 364,092
Self-Insurance-SCJPIA	$ 43,469
Cash Flow(property tax carryover)	$ 500,000
Fire Station Reserve	$1,224,547
Radio Replacement	$ 10,000
Compensated Absences	$ 224,659
	$2,751,767

Anticipated Big Bear Lake Fire Protection District Tax Supported Shortfalls:

Table 10-9 illustrates costs with and without strategic plan (when tax supported expenditures are greater than tax revenues). Figures come from Tables 10-10 and 10-16.

BIG BEAR LAKE FIRE PROTECTION DISTRICT
Anticipated Tax Supported Shortfalls
5-year Tax Supported Revenues and Costs – 1999/00 to 2003/04

Maintaining Existing Level of Service

Total 5-Yr Tax Revenues	$9,605,423	
Total 5-Yr Tax Supported - Expenditures	$9,358,203	
Total 5-Yr Unfunded Tax Supported Surplus		$ 247,220
5-Yr Average Annual Tax Revenues	$1,921,084	
5-Yr Average Annual Tax-Supported Expenditures	$1,871,640	
5-Yr Average Annual Tax Supported Surplus (over)	$ 49,444	

Strategic Plan Level of Service

Total 5-Yr Tax Revenue	$ 9,605,423
Total 5-Yr Tax Supported Expenditures	$10,761,782
Total 5-Yr Unfunded Tax Supported Shortfall	$(1,156,359)
5-Yr Average Tax Revenues	$1,921,084
5-Yr Average Annual Tax Supported Expenditures	$2,152,356
5-Yr Average Annual Tax Supported Shortfall	$ (231,272)

Table 10-9 Fire District Projected Tax Supported Revenues/Expenditures
Fiscal Year 1999/00 to 2003/04 - Anticipated Tax Supported Shortfalls

CURRENT BIG BEAR LAKE FIRE PROTECTION DISTRICT ANNUAL TAX-SUPPORTED OPERATING COSTS

Big Bear Lake Fire Protection District
Existing Level of Service

Table 10-10 shows the breakdown of tax and non-tax generated revenue resources to the District as well as corresponding expenditures (without anticipated fund balances) to maintain the existing level of fire services for the next five years.

	FY 98-99	FY 99-00	FY 00-01	FY 01-02	FY 02-03	FY 03-04
Revenues						
Property Tax	1,753,000	1,776,000	1,802,640	1,829,679	1,857,124	1,884,980
Subventions&Grants	63,496	46,000	46,000	46,000	46,000	46,000
Use of Money	(6)119,000	(7)38,000	38,000	38,000	38,000	38,000
Service Charges (non-tax)	7,202	7,000	7,000	7,000	7,000	7,000
Total Revenues	1,942,798	1,867,000	1,893,640	1,920,679	1,948,124	1,975,980
Expenditures						
Salaries & Benefits	1,379,925	1,435,000	1,435,000	1,435,000	1,435,000	1,435,000
Paramedic Training	0	(3)40,000	0	0	0	0
Supplies	48,750	57,700	58,565	59,443	60,335	61,240
Other Services	192,402	207,400	210,511	213,668	216,873	220,126
Capital Outlay	103,500	54,300	27,500	27,500	27,500	27,500
Reserves(equipment)	120,000	90,000	120,000	120,000	120,000	120,000
Retriement	0	(4)38,945	0	0	0	0
Total Expenditures	1,844,577	1,923,345	1,851,576	1,859,708	1,859,708	1,863,866
Variance	98,221	(56,345)	42,064	65,068	88,416	112,114

Table 10-10 Fire District Projected Revenues/Expenditures
Fiscal Year 1999/00 to 2003/2004 - Maintain Existing Level of Service[2]

Fiscal Assumptions:

1. Property tax growth rate is 1.5% annually
2. Operating costs: Salaries 0%; Supplies 1.5%; Other 1.5%
3. Budget includes added o.t. for paramedic training none reoccuring.
4. $38,945 retirement retro contribution (Ventura decision) none reoccuring.
5. Includes estimated $39,638 reoccuring retirement contribution.
6. Earned interest on station conttruction reserve (delay) and subvention adjustment from prior year.
7. The budget revenues include the use of earned interest as ongoing revenue which is not recommended.

[2] Finance Department, City of Big Bear Lake, and 5-Year Budget Projection.

Projected Financial Status with No Changes

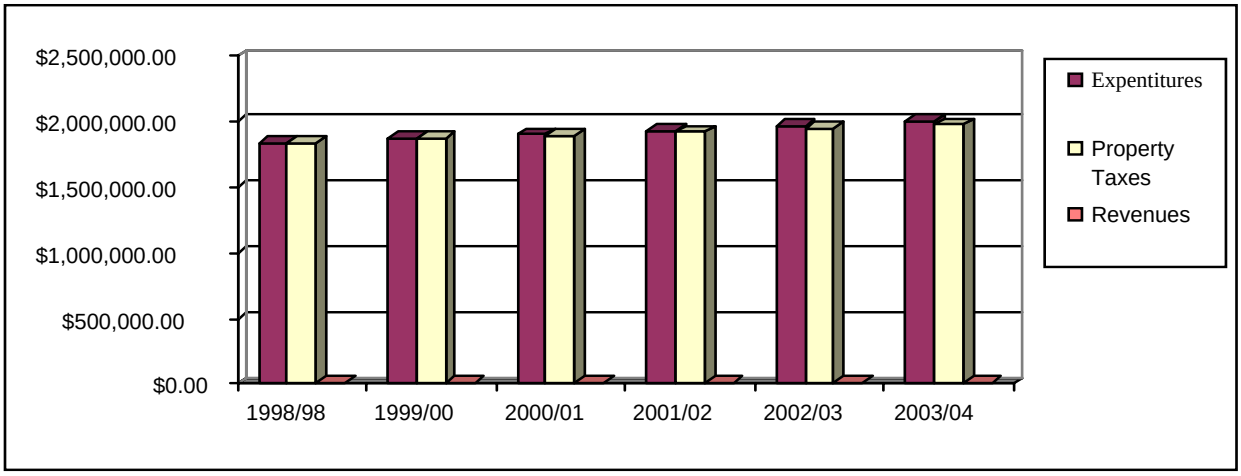


Table 10-11 Forecast Financial Status of Fire District with No Changes

I. Per Employee Tax-Supported Annual Operating Costs

The Fire District's annual tax-supported operating costs are based on the total annual cost to the Big Bear Lake Fire Protection District in providing its existing level of services to the community. Operating costs include personnel, supplies, equipment, and support services. Based on the FY 1998/99 Fire District's estimated tax supported expenditures of $1,844,577 (Table 10-10), the total cost is equal to $108,504 per Fire District employee (i.e., $1,844,577 total Fire District annual tax supported budget divided by 17 currently budgeted full-time equivalent personnel, suppression and administrative).

II. Alternate Methods to Estimate Annual Operating Costs for Fire Service:

Although several methods may be used to estimate the annual costs of the Fire District to the community, this study compares the following two alternative methods:

1. Fire Department employees per 1,000 population.

2. Distribution by the number of active population by land use type.

A. Annual Operating Costs Based on the Fire District's Current Employees per 1,000 Resident Population:

Using the current Fire District figure of 2.8 Fire District personnel per 1,000 residents in the City of Big Bear Lake (*17 tax supported Big Bear Lake Fire Protection District personnel divided by the 1998 estimated population of 6,049),* the annual operating costs can be figured as follows in Table 10-12. Utilizing this method tells us that an average single family residence in Big Bear

Lake costs $ 763.00 per year for fire services. As can be seen, the cost per single family resident is not balanced when costing out the cost of fire service. This inequity does not take into account the total fire service system exposure. It only takes in the full time residents, when in actuality the District services all residential units regardless if they are occupied or not. The District also serves our annual visitors, which increases the District system exposure significantly. The average daily population for the District is 20,234.[3]

Unfortunately, assigning an annual operating cost per square foot for commercial and industrial occupancies is very difficult using this methodology since the costs are assigned per person rather than per square foot.

Therefore, to shift the burden for fire protection based on population would be unbearable to the resident taxpayer.

ANNUAL TAX SUPPORTED OPERATING COSTS
BIG BEAR LAKE FIRE PROTECTION DISTRICT BASED ON EMPLOYEES PER 1,000 PEOPLE IN BIG BEAR LAKE

2.8 Fire Employees x $108,504/employee / 1,000 people	=	$304.00 per person
$304.00 x 2.51 people per Single Family Residential Unit	=	$763.00 per Single Family Residential Dwelling Unit
$304.00 x 2 people per Multi Family Residential Unit	=	$608.00 per Multi Family Residential Dwelling Unit

Table 10-12- Annual Tax Supported Operating Costs Based on Employees Per 1,000 People in Big Bear Lake[4]

B. Distribution by the Number of Active Population In the City/Fire District by Land Use Type:

The Big Bear Lake Fire Protection District operating costs may be distributed by the number of active population in the City/Fire District using a factor called the Active Daily Resident or ADR. An ADR is one person remaining in the City for a 24-hour period. According to the California Department of Finance, Demographic Research Unit (1998), ADR rates are assumed to be 2.537 per single family residential dwelling unit and 2 per multi-family dwelling unit. Commercial and industrial ADRs are calculated at 3.1 per 1,000 square feet for commercial and 0.65 per 1,000 square feet for industrial buildings.

These calculations are reflected in the "Land Use" column in the following tables. The number of units (residential) or the square footage (commercial and industrial) to calculate the total ADR units multiplies the ADR rates by land use type. These figures are in the "ADR Rate" column on

[3] Full time resident-1998 is 6,049/Average daily population transient -14,184
[4] 17 fire district employees divided by 6,049 residents.

the following tables. The percentage of ADR distribution of each land use type is calculated by dividing the total units by the land use ADR units. This distribution is shown on the "% Distribution" column.

Each land use type is then responsible for a like percentage of the annual Fire Department expenditures. This percentage is determined by applying the % Distribution to the tax supported annual expenditure and is reflected in the "Annual Share of Cost" column. The annual cost per unit is determined by dividing the share of the annual budget for each land use, by the number of units (residential) or square footage (commercial and industrial). This is shown in the "Annual Cost Per Unit" column.

Table 10-13 shows the calculation for FY 1998/99 Fire Department tax supported costs needed to maintain existing levels of service using this method.

Land Use	ADR Rate	Total ADR Units	% Distribution	Annual Share of Cost	Annual Cost Per Unit
Single Family	2.53/Dwelling 8066	20,406	76.47%	$1,410,548	$175.00
Multi-family	2.0/Dwelling 953	1,906	7.14%	$131,702	$138.00
Commercial	3.1/1,000 sq. ft. 1.2m sq. ft.	3,720	14.05%	$259,158	$0.21
Industrial	0.65/1,000 sq. ft. 100,000 sq. ft.	650	2.34%	$43,163	$0.43
Totals		26,682	100%	$1,844,577	

Table 10-13 - Big Bear Lake Fire Protection District Annual Tax Supported Operating Costs
Based on Distribution in the Number of Active Population in the Big Bear Lake Fire Protection District and Maintaining the Existing Service Level (1998-99)

Table 10-14 shows the calculation for FY 2003/04 Fire Department tax supported costs needed to maintain existing levels of service using this method.

Land Use	ADR Rate	Total ADR Units	% Distribution	Annual Share of Cost	Annual Cost Per Unit
Single Family	2.53/Dwelling 8469	21,426	74.8%	$1,506,146	$178.00
Multi-family	2.0/Dwelling 953	1,906	6.65%	$133,902	$140.00
Commercial	3.1/1,000 sq. ft. 1.5m sq. ft.	4,650	16.23%	$326,801	$0.22
Industrial	0.65/1,000 sq. ft. 100,000 sq. ft.	650	2.2%	$44,298	$0.044
Totals		28,632	100%	$2,013,565	

Table 10-14- Big Bear Lake Fire Protection District Annual Tax Supported Operating Costs
Based on Distribution in the Number of Active Population in the Big Bear Lake Fire Protection District and Maintaining the Existing Service Level (2003-04)

Table 10-15 shows the calculation based on a five year average from FY 1999-00 to FY 2003/04 Fire Department tax supported costs needed to maintain existing levels of service using this method.

Land Use	ADR Rate	Total ADR Units	% Distribution	**Annual** Share of Cost	**Revenue** Cost Per Unit	Annual Share of Cost	Expend. Cost Per Unit
Single Family	2.53/Dwelling 8,264	20,307	74.7%	$1,435,049	$173.65	$1,456,494	$176.00
Multi Family	2.1/Dwelling 953	2,001	7.32%	$140,623	$147.55	$142,724	$150.00
Commercial	3.1/1,000 sq. ft. 1.4m sq. ft.	4,340	15.89%	$307,373	$0.22	$309,821	$0.22
Industrial	0.65/1,000 sq. ft. 100,000 sq. ft.	650	2.38%	$45,721	$0.46	$46,405	$0.46
Totals		27,298	100%	$1,921,084		$1,949,792	

Table 10-15 - Big Bear Lake Fire Protection District Five Year Average Annual Tax Supported Operating Costs Based on Distribution in the Number of Active Population in the Big Bear Lake Fire Protection District and Maintaining the Existing Service Level (2003-04)

Clearly, Tables 10-13 and 15 show that the amount of operating revenue is not sufficient to meet the operating expenses for the next five years and beyond, under the current system.

Using the ADR Method to Estimate Future Costs, Revenues, and Anticipated Shortfalls:
As discussed earlier in this section, the ADR method assumes that expenditures will be evenly distributed according to the percentage of these occupancies to the total in the Fire District. Therefore, if we also assume that revenues are distributed in the same manner, we can estimate what future costs and revenues will be based on all the occupancies, then project the anticipated shortfalls and the necessary funds that must be found for each type of occupancy. As has already been established, in most cases the expenditures will be higher than the revenues thus creating shortfalls.

Tables 13 and 15 uses the information in Table 10-10 and the five-year average expected growth to determine the ADR and use the financial information from Tables 4- 1 and 2 to determine the estimated five-year annual average tax supported revenues and expenditures for the Fire District's Strategic Plan Level of Service.

Big Bear Lake Fire Protection District
STRATEGIC PLAN LEVEL OF SERVICE

The strategic plan makes recommendations for increasing the level of service to a acceptable level over a five-year period to meet the communities needs. The financial ramifications of the strategic plan are thoroughly discussed in the plan. Table 10-16 illustrates the increased revenues and costs of implementing the strategic plan.

	FY 99-00	FY 00-01	FY 01-02	FY 02-03	FY 03-04
Revenues					
Total Tax Revenue	1,860,000	1,886,640	1,913,679	1,941,124	1,968,980
Non-Tax Fees	7,000	7,000	7,000	7,000	7,000
Total Revenues	$1,867,000	$1,893,640	$1,920,679	$1,948,124	$1,975,980
Expenditures					
Total Tax Supported	2,190,117	2,033,737	2,141,553	2,178,557	2,217,798
Unfunded Expenditures	$(323,117)	($140,097)	($220,874)	($230,453)	($241,818)
Total Unfunded Shortfall	$(323,117)	($140,097)	($220,874)	($230,453)	($241,818)

Table 10-16 Fire Protection District Projected Revenues/Expenditures
Fiscal Year 1999/00 to 2003/2004 - **STRATEGIC PLAN LEVEL**

ASSUMPTIONS FOR TABLE 8:

Revenues:

1. Total Tax Revenues from Table 10-16, this report. ($9,605,423)

2. The Strategic P1an recommends several changes that would enhance fees in non tax supported programs.

Expenditures:

1. Total Tax Supported Expenditures include Total Tax Supported amounts from Table 10-9, this report plus Unfunded Net Total amounts from Table 10-21.

Table 10-17 shows the calculation based on a five year average from FY 1999-00 to FY 2003/04 Fire Department tax supported costs needed to implement the strategic plan level of service using the Annual Operating Costs Based on the Fire District's Current Employees per 1,000 Resident Population as shown in table 10-9**.**

ANNUAL TAX SUPPORTED OPERATING COSTS
BIG BEAR LAKE FIRE PROTECTION DISTRICT BASED ON EMPLOYEES PER 1,000 PEOPLE IN BIG BEAR LAKE

2.8 Fire Employees x $126,609/employee / 1,000 people	=	$354.00 per person
$354.00 x 2.51 people per Single Family Residential Unit	=	$885.00 per Single Family Residential Dwelling Unit
$354.00 x 2 people per Multi Family Residential Unit	=	$708.00per Multi Family Residential Dwelling Unit

Table 10-17 Strategic Plan annual tax supported operating costs based on employees per 1,000 resident population.

Using the ADR as we did in the establishing the existing levels of service cost, the ADR provides a balanced distribution of the cost of service. Table 10-18 shows the cost of service delivery staring in Fiscal year 1999-00.

Land Use	ADR Rate	Total ADR Units	% Distribution	Annual Share of Cost	Annual Cost Per Unit
Single Family	2.53/Dwelling 8,066	20,406	76.47%	$1,674,782	$208.00
Multi-family	2.0/Dwelling 953	1,906	7.14%	$156,374	$164.00
Commercial	3.1/1,000 sq. ft. 1.2m sq. ft.	3,720	14.05%	$317,566	$0.26
Industrial	0.65/1,000 sq. ft. 100,000 sq. ft.	650	2.34%	$51,248	$0.51
		26,682	100%	$2,190,117	

Table 10-18 Big Bear Lake Fire Protection District Annual Tax Supported Operating Costs Based on Distribution in the Number of Active Population in the Big Bear Lake Fire Protection District with Strategic Plan (1999-00)

Table 10-19 shows the calculation for FY 2003/04 Fire Department tax supported costs needed to support the strategic plan level of service.

Land Use	ADR Rate	Total ADR Units	% Distribution	Annual Share of Cost	Annual Cost Per Unit
Single Family	2.53/Dwelling 8,469	21,426	74.8%	$1,658,912	$196.00
Multi-family	2.0/Dwelling 953	1,906	6.65%	$147,483	$155.00
Commercial	3.1/1,000 sq. ft. 1.5m sq. ft.	4,650	16.23%	$359,948	$0.24
Industrial	0.65/1,000 sq. ft. 100,000 sq. ft.	650	2.2%	$48,791	$0.49
Totals		28,632	100%	$2,217,798	

Table 10-19 Big Bear Lake Fire Protection District Annual Tax Supported Operating Costs Based on Distribution in the Number of Active Population in the Big Bear Lake Fire Protection District Strategic Plan Service Level (2003-04)

Table 10-20 shows the calculation based on a five year average from FY 1999-00 to FY 2003/04 Fire Department tax supported costs needed to maintain the strategic plan level of service.

Land Use	ADR Rate	Total ADR Units	% Distribution	**Annual** Share of Cost	**Revenue** Cost Per Unit	Annual Share of Cost	Expenditure Cost Per Unit
Single Family	2.53/Dwelling 8,264	20,907	75%	$1,440,813	$174.00	$1,614,204	$195.00
Multi Family	2.1/Dwelling 953	2,001	7.0%	$134,475	$141.00	$150,659	$158.00
Commercial	3.1/1,000 sq. ft. 1.4m sq. ft.	4,340	16.0%	$307,373	$0.22	$344,363	$0.25
Industrial	0.65/1,000 sq. ft. 100,000 sq. ft.	650	2.30%	$44,184	$0.44	$48,650	$0.49
Totals		27,898	100%	$1,921,084		$2,152,272	

Table 10-20 Big Bear Lake Fire Protection District Five Year Average Annual Tax Supported Operating Costs Based on Distribution in the Number of Active Population in the Big Bear Lake Fire Protection District with Strategic Plan Service Level (2003-04)

Fiscal Impacts of Strategic Plan Recommendations

This strategic plan makes many recommendations, many of which will have a significant fiscal impact on the Big Bear Lake Fire District. Implementing this strategic plan would necessitate increasing expenditures over the next five years. The costs of providing services now and in the future and the level of those services depend upon funding these recommendations- and if and how the District can afford them. The good news is that some of the recommendations also generate increased revenues.

Type of Fiscal Impact	**1998-99**	**1999-00**	**2000-01**	**2001-02**	**2002-03**	**2003-04**	**Totals**
Fire Station Funded- New Unfunded-replacement	$1,298,000						
Personnel: Funded Unfunded	$1,379,925	$1,464,017 $60,000	$1,493,297 $121,200	$1,523,163 $193,624	$1,553,626 197,496	$1,584,699 201,446	$7,618,802 $773,766
Operations: Funded Unfunded - paramedic	$344,652	$349,400 40,000	$296,576	$300,611	$304,708	$308,866	$1,560,161 40,000
Replacement Capital Outlay: Funded Unfunded	$120,000 0	$90,000 0	$120,000 0	$120,000 0	$120,000 0	$120,000 0	$570,00 0
General Contingencies Funded Unfunded	0	0 $186,700	$2,664	$4,155	$2,747	$2,787	199,053
Funded Totals **Unfunded Totals** **Totals**	1,844,577 0 1,844,577	1,903,417 286,700 2,190,117	1,909,873 123,864 2,033,737	1,943,774 197,779 2,141,553	1,978,334 200,243 2,178,577	2,013,565 204,233 2,217,798	9,748,963 1,012,819 10,761,782
Revenues	$1,942,798	$1,867,000	$1,893,640	$1,920,679	$1,948,124	$1,975,980	$9,605,423
Unfunded Net Totals	98,221	(323,117)	(140,097)	(220,874)	(230,453)	(241,818)	(1,156,359)

Table 10-21 Fiscal Impact of Strategic Plan Recommendations

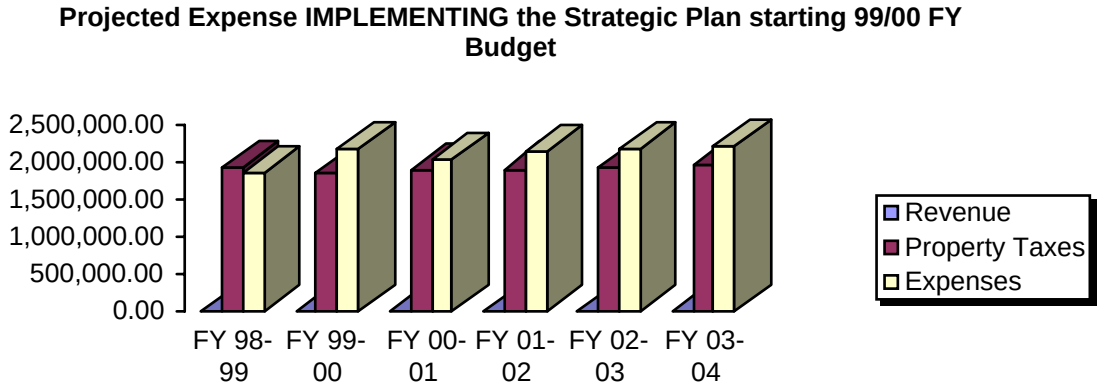


Table 10-22 Projected Fiscal Budget with Strategic Plan

CAPITAL COSTS IN THE BIG BEAR LAKE FIRE PROTECTION DISTRICT

The Big Bear Lake Fire District has had a history of funding for equipment. Long before the Fire District became a Subsidiary District and before City incorporation, equipment needs were satisfied through capital reserves. Normal personnel and non-personnel object designated district monies funded accounts.

Maintaining current levels of fire protection services (and increasing to acceptable national standards if possible), as well as providing equal services to new development, will require new fire protection facilities and equipment. In addition, consideration must be given to the **replacement** of current facilities, apparatus, vehicles, equipment and other capital items. This becomes especially true if the recommendations of this strategic plan are implemented.

The City has established a five year capital improvement plan (CIP) to provide future facilities and equipment to serve a growing population and expanding service area, which includes the "funded" needs of the Fire District. However, the "Unfunded" capital needs of the District have not been adequately addressed.

At the present time, a five year projected equipment and facilities purchasing and replacement schedule exists within the Fire District as part of this plan.

However, no **systematic** process has been implemented as a part of the budget process to begin to accrue earmarked funds for such purchase and /or replacement.

The decision to prepare a capital improvement plan is based on an apparent need to revise the method to fund, acquire, utilize, replace and dispose of fire equipment in Big Bear Lake. The current budget process for the replacement of fire equipment and apparatus in Big Bear Lake is fragmented. That condition results in sporadic replacement purchases from year to year. Budgetary decisions to purchase replacements for obsolete equipment seem based on a traditional revenue distribution competition rather than an orderly process which evaluates equipment maintenance costs, age and obsolescence. The correct purchase solution requires a reasonable and accurate knowledge of historical costs and a capability for estimating future costs.

Service, Technical and Economical Life Considerations: Service Life:

Service life is the amount of time a unit is c able of operating and rendering service. If sufficient maintenance commitments are met, many older pieces of equipment are capable of rendering some level of service. Nonetheless, it seems extreme to require first line service from a thirty-two year old engine or a twenty year old aerial ladder truck pressed into operation while first line equipment is being repaired.

Technological Life: Technological life represents the relative productivity decline of the unit when compared to newer models on the market. A fifteen year old reserve unit may only be 50 percent as productive as current models.

Economic Life:
The economic life of a unit is of critical importance to equipment managers because it relates to the total stream of costs associated with the unit through time. Economic life significantly impacts both capital and operating budgets. That life includes Depreciation, operation cost, maintenance, downtime, obsolescence (technical life), overhead, alternative capital value, and inflation.

Consideration upon one or the other of these cost elements, without considering the total will cause Big Bear Lake to sub-optimize, i.e., to choose replacement life parameters which result in higher overall costs. Likewise, the absence of a replacement working capital fund makes it more difficult to obtain capital outlay dollars for replacement which can result in a critical condition for a fire department which relies heavily on its equipment to provide the proper level of service to the citizens.

Replacement Schedules: As the Big Bear Lake Fire Protection District approaches a decision to replace major pieces of fire apparatus or vehicles and capital equipment the following decision points should be considered:

- Adopt realistic replacement guidelines for replacement of fire facilities, major pieces of equipment, apparatus and vehicles.

- Rotate equipment to balance mileage accumulation for individual pieces of equipment.

- Stagger equipment replacement to the extent that is possible as a consequence of balancing utilization. A common consequence of not staggering replacement is that replacements are delayed because of jurisdictional financial pressures.

Capital Funding Alternatives: Capital resources in Big Bear Lake are becoming scarce and the competition for them intense. Lump sums provided by property taxes, fire benefit assessment fees, redevelopment, CDBG funds, development impact fees or the City's general fund to replace obsolete fire equipment are predictably more difficult to obtain. As fund availability decreases, the need to create a separate fund and an orderly replacement schedule increases. Alternatives should be developed and examined. Some alternatives are presented below:

Maintain a working capital fund: Through this funded depreciation, a reserve of funds can be accumulated, replacement programmed on a long-term basis, and annual requirements to finance replacement will level out. Replacement equipment is purchased from an established fund. If a working capital fund were implemented, replacement funds would accumulate. The Fire District Board would then need to make appropriations only for additions to the fleet. Appendix VIII-A lists approximate costs for a working capital fund for the next five years for the replacement of all capital - existing and needs projected by this plan.

As vehicles near full depreciation they are evaluated and re laced according to an orderly schedule. The system is flexible and allows retention of a few vehicles of each class beyond the

assigned life when the evaluation documents economic feasibility. In other words, a few units, although depreciated, continue to show a decline in overall costs. These are retained for further use. The using agency does not pay a depreciation charge beyond the assigned life expectancy date.

A working capital fund only provides for replacement of existing equipment. That aspect of the fund controls fleet size. Additions to the fleet must be approved in the routine budget process, i.e., and competition with other departments.

Evaluate the merit of government ownership versus commercial lease:
Government ownership is considered economical when:

- The fleet is sizable.
- The use of equipment is consistently high for individual units.
- The jurisdiction has or can obtain proper facilities and personnel to maintain its equipment.
- Good operators are available for specialized equipment.
- Obsolescence is not likely to be rapid.
- Parts are readily available.
- There are no legal or fiscal obstacles to purchasing.

Lease/purchase can be considered as a viable funding option provided that certain criteria are met. The most critical factor in these criteria is the need to have the life span of the equipment exceed the term of the lease/purchase agreement.

Regardless of whether or not the lease/purchase agreement has a term that exceeds the life of the equipment, the utilization of this financing method places the Fire District in a posture that only increases the long-term capital outlay-funding deficit. Purchasing capital equipment should be done with cash whenever possible.

Lease equipment or leaseback arrangement schemes should be compared to an in-house depreciation schedule: A lease or leaseback arrangement may not be feasible for the entire fleet, but there may be low utilization equipment which could be leased more cheaply than through ownership. Commercial leasing of equipment is usually desirable when:

- High priced equipment that is infrequently used is required.
- Special operating skill is necessary.
- The jurisdiction cannot provide adequate maintenance facilities and/or personnel.

- An item is subject to rapid obsolescence.
- The purchase cost is prohibitive.

A leaseback arrangement works this way: Government sells a building or fleet of vehicles, and then the buyer leases it back to the governmental unit. The government unit gets the purchase money. The private owner gets valuable tax breaks through depreciation. The government continues to use the vehicles as if nothing had happened.

Each of the alternatives offer both advantages and disadvantages. A working capital fund may require a large initial lump sum to begin an orderly replacement process. On the other hand, once the fund is established, a level, long-term, resource demand will exist; fleet size will be controlled; and, equipment will be replaced as the result of reviewing the assigned life cycle of equipment and its economic history.

Government ownership of the fleet is considered advantageous and most likely to cost less than commercial leasing or leaseback arrangements. Alternative 3 could be considered in the event further study shows these arrangements to be economically advantageous.

New Development Mitigation Fees: Growth impacts the fire service in almost every community. Except for large annexations where fire service equipment response times can be critical and easily identified, the fire service generally accepts growth without increases in equipment or personnel. The impacts of new subdivisions on the fire department, for example, are often incremental and seemingly indirect. Rarely does one new residential subdivision, one new shopping area or office buildings require an easily identifiable piece of apparatus and a company of firefighters. Although an individual development may not require additional resources, two, three or four similar developments will. The fire service and city administrators usually do not adequately measure these increment impacts (or costs).

The increased development of land within the Big Bear Lake Fire District <u>will</u> impact the level of fire service provided by the Fire District/City. New annexations and developments create a need to expand fire protection service, fire station facilities and fire department equipment, and personnel. The need for such fire department protection improvement results directly from the increase in density in the Fire District/City by the development of land and the construction of residential, commercial, industrial and mobile home units.

The most practical and equitable method of collecting the funds necessary to provide such public improvements and mitigating the impacts of growth is to impose a development fee on new construction and new projects within the City/Fire District.

With the increase in population, development and related emergencies, the Big Bear Lake Fire Department's ability to generate revenues for fire defense facilities and equipment, commensurate with growth, has been curtailed. For years, recommendations to developers to mitigate fire protection impacts have been made, at times resulting in agreements with developers to mitigate impact with new fire station sites, and/or facilities and/or equipment. No

matter the methodology used to calculate the development impact fee, above all else the development impact fee calculation effort must simply be easy to understand for the average person. For example, does the construction of dwelling units on the side of a hill with wild-land and urban interface create specific needs for fire protection? Would 500 new residents increase the demand on fire department services? Would 100,000 square feet of new commercial development cause a need for more fire inspection services by engine companies? Would an industrial park create a need for more specialized fire department equipment and expertise? Would a new 1,000 resident's senior convalescent center impact the present emergency medical response? Obviously, the answer in these cases is "yes." But the real question is "how much?"

In a "Report to the Big Bear Lake City Council on Development Impact Fees," dated August 19, 1993, the Big Bear Lake Fire Department's capital list totaled $23,760,000 to the year 2013 for fire facilities and equipment. This list was based on estimated capital costs to "build-out" of the Fire District and City. The required development impact fees for the Fire Department were estimated to be $430 per single family dwelling unit, $293 per multi family dwelling unit, $0.43 per square foot for commercial, and $0.08 per square foot of industrial land use.

In 1991 City of Big Bear Lake adopted a Growth Management Program, the City Council approved City Ordinance No. 91-199 which requires developers to pay impact fees for new development in the City of Big Bear Lake, including the Big Bear Lake Fire Protection District. However, there are no records indicating if the city did or is still collecting fees for capital improvements as identified in the Growth Management Plan Table 3 "Fire Protection Improvements."

However, today the City of Big Bear Lake doses collect developer impact fees of $539.00.

The developer impact fees should be reviewed as part of this strategic plan. However, due to the continued slump in building, several economic development schemes have been advocated to encourage building including reducing some developer fees.

Redevelopment Agency Tax Increment: A portion of the Fire District's share of the redevelopment increment should be used to fund fire capital outlay items as determined in the agreement between the Fire District and Redevelopment Area. Although this increment will be slow in adequately funding capital outlay, eventually it could be a very viable source of needed revenue to fund capital outlay and capital improvements.

RECOVERING THE TAX SUPPORTED COSTS FOR BIG BEAR LAKE FIRE PROTECTION DISTRICT (Strategic Plan)

Using the five year average (1999/2000 to 2003/2004) tax supported cost to the Fire District of $2,152,356 and the breakdown by land use types in Table 10-20, the following examples would be the additional annual amounts to the tax supported revenues needed to fund the strategic plan:

Single Family Dwelling:	Tax Supported Cost	$195.00
	Current Tax Support	$150.00
	Costs to be Recovered	$ 45.00
Commercial:	Tax Supported Cost/sq. ft.	$0.25
	Current Tax Support/sq. ft.	$0.22
	Costs to be Recovered/sq. ft.	$0.03

Table 10-23 Tax Supported for Strategic Plan

Following are examples of methods to recover the amounts necessary to fully fund this strategic plan:

Fire Benefit Assessment District: As discussed earlier, the Big Bear Lake Fire Protection District does not have a fire benefit assessment.

Fire benefit assessments are very popular in California as a means for fire districts to supplement revenues and pay for needed services. It remains the quickest and fairest method for the Big Bear Lake Fire District to recover the tax supported costs of implementing this strategic plan. The current benefit assessment would need to be raised to cover the difference of expected revenues and the tax supported cost of this plan. An increase would also put the Big Bear Lake Fire District in line with surrounding fire benefit assessments.

Community Facilities District (CFD): The Mello-Roos Community Facilities Act of 1982 was enacted by the California Legislature to provide an alternative method of financing certain essential public facilities and services. The Act is especially useful in financing facilities in developing or rehabilitating areas. The Act can be used by cities, counties, or districts insofar as these entities have the power to legally construct any of the facilities or provide any of the service authorized under the Act.

The following **facilities** may be provided through the Act:

Police protection facilities
Fire protection facilities
Local park, recreation and parkway facilities
Elementary and secondary school sites and structures
Libraries
Other governmental facilities

The Act authorizes four classes or categories of additional **services** that can be provided, and they are as follows:

Police protection services, including criminal justice.
Fire protection, suppression, ambulance and paramedic.
Recreation program services, library services, etc.
Flood and storm protection services, including all costs and expenses relating to operation.

A Community Facilities District is a governmental entity to be formed by local agencies for the purpose of providing certain designated additional public services and empowered to finance a broad range of public capital facilities through the levy of special taxes against the area where said services and/or facilities are being provided (Community Facilities District). Bond authorization is available for assisting in the financing of the public capital facilities, but is not available for financing any of the public services. Any authorization relating to the levy of the special tax and/or the bond authorization is subject to a favorable two-thirds vote of the qualified electors of the Community Facilities District.

All new development in the Fire District should pay their full share of the tax-supported costs necessary to fund the Fire District. If a benefit assessment district is not used to recover these costs, then all new development in the Fire District should be required to join a CFD to fund their full share of the tax support needed to fund the Fire District.

User/Cost Recovery Fees:

User/recovery fees are those non-tax-supported fees for non-tax supported services such as:

Emergency Medical Services
Plan Reviews
Inspections
Permitted Occupancies
Special Events
State Regulated Inspections
Fire Flows/Water Systems
Fire Extinguishing Systems
Hazardous Materials Incidents
Traffic Collisions for Non-residents

These are a partial list of generally non-tax supported services provided by fire departments. The fees are similar to planning, water/sewer, and building & safety fees which are not traditionally a general fund supported service. The Big Bear Lake Fire Protection District is loosing a significant amount of money by not recovering these fees. It is estimated that the District could recover an estimated $50,000 annually from cost recovery.

Section 10 – Recommendations

1. The Big Bear Lake Fire District should develop short and long-range capital and operating plans to meet anticipated future funding requirements.

2. The Big Bear Lake Fire District's annual budget should be tied to its goals and objectives—especially its annual program objectives.

3. The Big Bear Lake Fire District should strive to maintain a 10% cash reserve as a contigency for major events. This would be beyound the cash flow reserve for property tax dirtribution. This reserve would be consistent with the city of Big Bear Lake.

4. The Big Bear Lake Fire Protection District's facility replacement schedule should be based on a twenty-fifty year life cycle**.**

5. Fire District's Apparatus and Vehicle replacement guidelines should be:

Type	First-Line Service Years	Reserve Years	Total Service Years
Engines (Type 1)	20	5	25
Trucks	15	5	20
Water Tenders	15	5	20
Ambulances	4	2	6
Chiefs, Command & Staff Vehicles	10	0	10

6. The Big Bear Lake Fire District's Equipment replacement guidelines should be:

Type	Total Service Years
Hose	10
Engine Equipment	15
Rescue Tool ("Jaws of Life")	10
Air Refill Device	10
Paramedic & Rescue Equipment	6
Personnel Safety Equipment	5
Copy Machine	3

7. The Big Bear Lake Fire Protection District should make every attempt to use cash for capital outlay purchases; however, if a lease/purchase proves to be of benefit to the District, the term of the lease/purchase should not exceed the effective life span of the equipment being purchased.

Fire District Replacement Costs
1999-2004

Vehicle/ Equipment/ Station	**FY 99/00**	**FY 00/01**	**FY 01/02**	**FY 02/03**	**FY 03/04**
Communications	10,000	10,000	10,000	10,000	10,000
Office Copier	2,400	2,400	2,400	2,400	2,400
Computers	7,800	7,800	6,000	6,000	6,000
Hose	1,000	1,000	1,000	1,000	1,000
Rescue Tool	3,800	3,800	3,800	3,800	3,800
Engine	14,000	14,000	14,000	14,000	14,000
Engine	14,000	14,000	14,000	14,000	14,000
Engine	14,800	14,800	14,800	14,800	14,800
Truck	27,500	27,500	25,000	25,000	25,000
Prevention Staff	2,000	2,000	2,666	2,666	2,666
Staff Asst. Chief	2,800	2,800	2,800	2,800	2,800
Water Tender	5,000	5,000	5,000	5,000	5,000
Air Compressor	3,000	3,000	3,000	3,000	3,000
Utility Vehicle	2,133	2,666	2,666	2,666	2,666
Rescue Vehicle	7,400	7,400	7,400	7,400	7,400
Staff Chief	3,800	3,800	3,800	3,800	3,800
Snow Plow	1,600	1,600	1,600	1,600	1,600
Fire Station	0	0	0	0	0
Total	123,033	123,033	119,932	119,932	119,932

SECTION 11

GOALS &
ACTION PLANS

FORWARD

Historically, cities have not developed standards for adequate fire protection to meet the specific needs of their communities. As a result, fire protection costs and fire losses of life and property continue to be excessively high. Communities such as Big Bear Lake have the ability to control their fire protection costs and losses. Big Bear Lake should specifically identify the level of fire protection that will be provided with community resources.

The resources, which a community chooses to devote to fire protection, may not provide adequate protection for all existing hazards or those produced by new developments. The balance of the resources needed for adequate fire protection should be identified and methods of providing the desired protection should be specified.

Fire protection standards in the form of goals and objectives should meet existing and future needs and specify programs for attainment of objectives. Such objectives should also include methods of measuring effectiveness. The assembly of these items is what is referred to as strategic planning for fire protection.

The fire protection goals and objectives recommended also identify current situations as ongoing (currently being done) or future program development.

OBJECTIVE BASED PLANNING

This section of the plan identifies and describes the philosophy behind the Big Bear Lake Fire District's Strategic Plan recommendations and its required goals and objectives. Since the goals and objectives establishes the types and levels of service to meet the community's needs, they should be reviewed, prioritized and approved by the Fire District Board/City Council, Fire Administrator, and the Fire District.

The goals and objectives, when tied to the Fire District's mission statement, become the fundamental basis and foundation for the strategic plan. The goals and objectives are derived from the various components of the plan. All future district fire and emergency medical activities should be directed toward the satisfaction of the goals and objectives until changed.

This comprehensive planning system is based upon yearly goals, objectives, priorities and alternatives. This system can be used to identify exactly what is to be accomplished and the most cost-effective means of doing so. In the most simplified description, objective based planning is a seven-step process:

- ❑ Develop a clear and comprehensive mission statement, which identifies the purpose and responsibilities of the Fire District.
- ❑ Formulate clear goal statements, which define desired results and which collectively, serve to accomplish the organizational purpose identified in the mission statement.
- ❑ Sharply focus the planning process by reducing the goal statements to a series of clearly phrased, measurable target objectives.
- ❑ Determine the factors, which hinder or prevent the accomplishment of the target objective.

- ❑ Identify and analyze alternative methods and resources available for mitigating obstacles and accomplishing target objectives.
- ❑ Select the alternative activities and programs that are determined to be the most cost effective and develop a plan of action for implementation.
- ❑ Implement action, evaluate progress and make modifications as determined appropriate.

Definitions of Planning Terms

Considering that many different interpretations are given to these planning terms, it is necessary to define the terms as used in this plan before proceeding further.

Mission Statement
The scope of responsibility assigned to the organization and the purpose for its existence.

Goals
Major components of the mission statement that have separate activity requirements - They may or may not be measurable, but they do require an individual planning approach.

Objectives
Statements of desired results, the accomplishment of which provide incremental steps toward reaching the goals. Objectives must be measurable and constitute the foundation for program planning.

Priorities
In reality, priority setting occurs throughout the planning process, from deciding which order to pursue goals to choosing among alternatives to carry out programs. Priority setting at the goal-setting level is where you may have to decide which goals are most important and which can be postponed to a latter time. Since money is often a key factor, setting priorities at the objectives level may mean making choices on the basis of what is affordable.

General Plan

The general plan represents a vision for the future. This vision ensures adequate public safety is provided to the community. Each system goal is referenced to a specific general plan goal and program.

Table 2-1 illustrates the relationship of the Mission Statement with the goals for system programs; Mitigation, Preparedness, Response and Recovery:

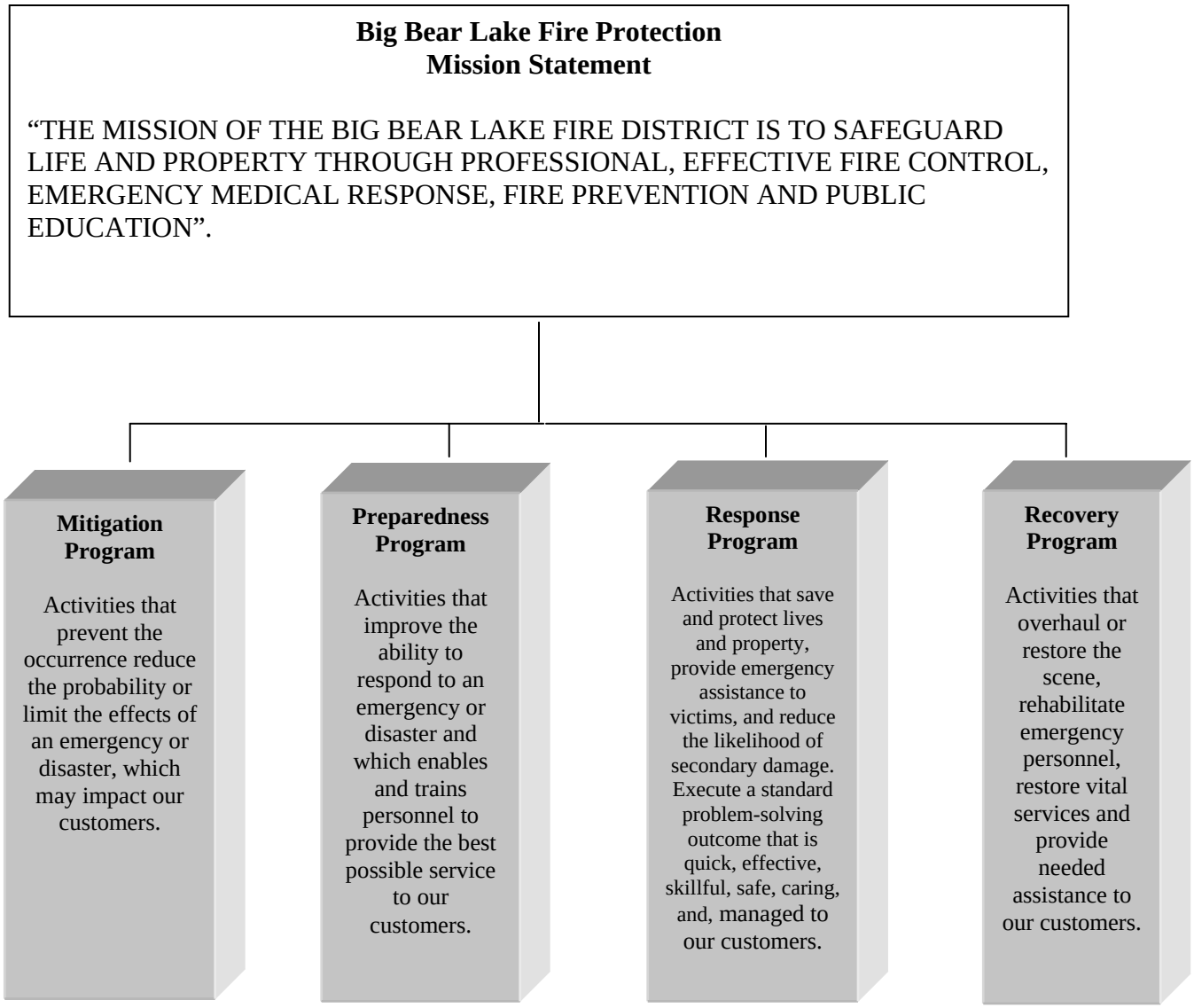


Table 11-1 Relationship of Mission to Goals

Strategic Planning

The goals and objectives are established to meet the Districts/communities needs over the next five years. The annual budget will establish which goals and objectives will be implemented. The annual budget cycle will also set the annual priorities for implementing the plan. Each of the goals and objectives will be assigned to a specific program to ensure they are accomplished.

Mitigation Program

Goal 1
The Big Bear Lake Fire District Board of Directors considers and adopts a fire strategic plan for the future of the District.

Status: Ongoing
General Plan: PS 7.1
Reference: Section 3, pg.

Goal 2
Reduce fire hazards to an acceptable level by any and all appropriate means during the review development applications.

Objective 1:
All new occupancies 5,000 square feet and larger will be sprinklered. A property protection sprinkler system will be used for occupancies other than residential and a life safety sprinkler system will be used for residential.

Status: Future
General Plan: PS 7.3.1
Reference: Section 3, pg.

Objective 2:
Development proposals within designated fire hazard areas will include plans for mitigation of potential vegetation fires. These plans should address the need for life safety automatic fire protection sprinkler systems, water availability, secondary emergency access routes, construction requirements, and landscaping (or clearance) around structures.

Status: Ongoing – Slope Density Ordinance
General Plan: PS 7.2.3
Reference: Section 3, pg.

Objective 3:
Continue to coordinate with other City Departments to achieve proper design in planning of new developments to insure effective and adequate fire protection.

Status: Ongoing – DRC process
General Plan: PS 7.3.2
Reference: Section 3, pg.

Objective 4:
Provide adequate fire flow water supply to combat fire, which is consistent with land use**.**

Status: Ongoing – Uniform Fire Code
General Plan: PS 7.2.1, 7.2.2
Reference: Section 3, pg.

Goal 3

Implement a fire prevention program that designs, presents, implements and enforces laws established to control the size of the fire, the potential for explosion or ignition, and life loss.

Objective 1:
Reduce the possibility of fire in all buildings in the community through a quality fire prevention inspection program.

Status: Ongoing – Fire prevention bureau and engine company inspections.
General Plan: PS 7.4
Reference: Section 3, pg.

Objective 2:
Adopt a District Fire Protection Ordinance, which enforces the recommendations made by the strategic plan.

Status: Ongoing - Every three years
General Plan: PS 7.3.3
Reference: Section 3, pg.

Objective 3:
Inspect all commercial, industrial, assembly and high hazard occupancies at a frequency commensurate with the degree of hazard, but at least annually.

Status: Ongoing – Fire prevention and engine company inspections.
General Plan: PS 7.3.4
Reference: Section 3, pg.

Objective 4:
Maintain a fire prevention program that is self-sustaining and based on the "fee for service" concept.

Status: Ongoing – Fee ordinance in place.
General Plan: PS 7.1
Reference: Section 3, pg.

Objective 5:
Implement and maintain a comprehensive smoke detector program.

Status: Ongoing –Multi-family residential inspections, yearly. Smoke detectors provided upon request.
General Plan: PS 7.2
Reference: Section 3, pg.

Objective 6:

Provide a year-round hazard abatement program to eliminate fire or health hazards due to weeds, rubbish, abandoned refrigerators, or other hazards.

Status: Ongoing – Household Hazardous Waste Program, County weed abatement.
General Plan: PS 7.4.2
Reference: Section 3, pg.

Goal 4
Maintain a program of public education and information that meets the needs of the community to mitigate all hazards

Objective 1:
Provide fire safety education to all residents over the age of (5) five.

Status: Ongoing – Annual elementary school prevention program and community events, open house and press releases.
General Plan: PS 7.1.4
Reference: Section 3, pg.

Objective 2:
Develop and implement a program where firefighters within 24 hours after a fire in a neighborhood, promote and conduct a meeting in a home in that neighborhood to explain the cause of the fire and present a fire prevention program.

Status: Future
General Plan: PS 7.1.4
Reference: Section 3, pg.

Objective 3:
Educate the business community to increase the perception that a fire inspection is a positive experience.

Status: Ongoing – Annual business inspection survey cards.
General Plan: PS 7.3.4
Reference: Section 3, pg.

Goal 5
Mitigate the consequences of natural and human-made disasters.

Objective 1:
Identify hazardous materials (storage, manufacturing, use, and transport) in cooperation with the San Bernardino County Fire Department.

Status: Ongoing – Business plans submitted by the county.
General Plan: PS 6.2.4
Reference: Section 3, pg.

Objective 2:

Implement a program that designs, presents, implements and enforces laws approved to control the use, storage and transportation of hazardous materials.

Status: Ongoing – Annual inspections, Uniform Fire code, San Bernardino County Fire Department.
General Plan: PS 8.1.7
Reference: Section 3, pg.

Preparedness Program

Goal 1
Operate the Big Bear Lake Fire District effectively and efficiently and at the lowest possible cost to reduce the burden on taxpayers and attract new business and industry to the Fire District/City

Objective 1:
Annually establish Fire District program objectives to accomplish its organizational goals and objectives and be consistent with the strategic plan.

Status: Ongoing – Annual budget preparation
General Plan: PS 7.1, 7.2, 7.16
Reference: Section 3, pg.

Objective 2:
Reduce costs for public fire protection.

Status: Ongoing – Department operations are within budget allocations.
General Plan: PS 7.1.3, 7.1.1
Reference: Section 3, pg.

Objective 3:

The funding policy of the Big Bear Lake Fire District will be to minimize the District's dependency on traditional funding sources by developing new fees and charges to the greatest extent possible.

Status: Ongoing – Fee ordinance adoption
General Plan: PS 7.1

Objective 4:
Implement an effective system to clearly identify levels of personnel performance by specifying the use of measurements, such as physical work (productivity, quality, accuracy, etc.) and mental work (attitudes, team participation, ingenuity, aggressiveness, etc.).

Status: Ongoing – Yearly work plan and staff input.
General Plan: PS 7.3.3
Reference: Section 3, pg.

Objective 5:
Develop a Fire District report(s) that identifies the Fire District's present level of service, personnel, equipment, apparatus, station locations, services, and operational methods, the capabilities and limitations with alternative direction and recommendations to achieve policy direction consistent with the strategic plan and operations manual.

Status: Ongoing – Accomplished through the Strategic Plan.
Reference: Section 3, pg.

Objective 6:
Minimize firefighter injury. Provide a safety program and provide the safety equipment for District personnel, which will assure adequate protection in all atmospheres, and under all working conditions.

Status: Ongoing – Safety program
Reference: Section 3, pg.

Goal 2
Develop and implement an effective educational campaign to educate and inform the citizens of Big Bear Lake of all fire department activities and all measures to take to prepare themselves for emergencies

Objective 1:
Provide the opportunity for all residents to receive CPR training.

Status: In progress
General Plan: PS 11.3.2
Reference: Section 3, pg.

Objective 2:
Write comprehensive lesson plans for the public education programs:

Status: Future
General Plan: PS 11.3.2
Reference: Section 3, pg.

Objective 3:
Develop and implement an educational campaign for all school age children K-8th grade with a scheduled monthly activity for all schools.

Status: Future
Reference: Section 3, pg.

Objective 4:
Develop and implement an effective educational campaign and involvement of special target groups such as the handicapped (blind, mental, physical, etc.) mobile homes, senior citizens, and special languages.

Status: Future
Reference: Section 3, pg.

Objective 5:
Educate citizens in basic first aid and life safety measures.

Status: Future
Reference: Section 3, pg.

Objective 6:
Initiate a public education program, which will support the rapid detection of life critical medical symptoms.

Status: Future
Reference: Section 3, pg.

Goal 3
Establish and maintain communications with other public and private agencies, which have an impact on, or are affected by, the Big Bear Lake Fire District.

Objective 1:
Maintain mutual and/or automatic aid agreements with all fire jurisdictions in San Bernardino County as applicable.

Status: Ongoing
General Plan: PS 7.1.3

Objective 2:
Develop reciprocal support with City of Big Bear Lake Departments and related agencies so as to maximize community service.

Status: Ongoing – District part of the County Mutual Aid plan. Automatic aid with Big Bear City and County.
General Plan: PS 7.1.2
Reference: Section 3, pg.

Goal 4
Provide and maintain all Fire apparatus, equipment, buildings, and fire hydrants in the Big Bear Lake Fire District.

Objective 1:
Provide and maintain a fleet of vehicles and apparatus capable of accomplishing the mission and goals of the Big Bear Lake Fire District with a high level of effectiveness, reliability and safety.

Status: Ongoing – Routine maintenance is done by fire personnel. Major repairs are contracted out for service.
General Plan: PS 7.1.7
Reference: Section 3, pg.

Objective 4:
All new purchases of apparatus, vehicles, firefighting and personal equipment will meet NFPA 1500 or related fire service safety standards.

Status: Ongoing – District has and will continue to purchase the most modern apparatus.
General Plan: PS 7.1.6
Reference: Section 3, pg.

Objective 5:
Maintain and annually inspect/service and flush (if possible) each fire hydrant in the Fire District in conjunction with the Water District and arrange for repairs when needed.

Status: Ongoing – Yearly inspections.
General Plan: PS 7.3.3
Reference: Section 3, pg.

Objective 6:
Provide all field units with appropriate communications capabilities.

Status: Ongoing – Yearly through the annual budget.
General Plan: PS 7.1.6
Reference: Section 3, pg.

Goal 5
Provide a continuous and progressive training program, which will enable all Big Bear Lake Fire District personnel to serve the community at the highest possible level.

Objective 1:
Educate and train all Fire District personnel, including PCF, to effectively responsibility and prepare them to function in the next higher position.

Status: Ongoing – Personnel receive ongoing training. PCF progam needs to be revised.
General Plan: PS 7.1
Reference: Section 3, pg.

Objective 2:
Facilitate the acquisition, development, and monitoring of the knowledge and skills necessary for members to fulfill their duty to the public.

Status: Ongoing – 240 hours per year for full time personnel.
General Plan: PS 7.1
Reference: Section 3, pg.

Objective 3:
Conduct pre-fire planning inspections on all target hazards.

Status: Ongoing – Each shift is assigned annual inspection areas, which include target hazards.
General Plan: PS 7.3
Reference: Section 3, pg.

Goal 6
Establish adequate staffing and equipment to respond to emergencies within an acceptable and reasonable time frame.

Objective 1: Provide adequate staffing and equipment to respond to emergencies within an acceptable and reasonable time frame.

Status: Ongoing
General Plan: PS 7.6

Objective 2: Support and enhance the Paid Call Firefighter (PCF) Program to provide additional personnel to assist at emergencies.

Status: Ongoing
General Plan: PS 7.6

Goal 7
Maintain a comprehensive disaster preparedness program

Objective 1:
Assume a leadership role in regional disaster planning and emergency services.

Status: Ongoing
General Plan: PS 11.1, 11.1.1

Objective 2:
Implement a Neighborhood Disaster Preparedness Program and Business Disaster Program.

Status: Future
General Plan: PS 11.3.

Objective 3:
Develop, adopt, and maintain an Integrated Emergency Management System **(I.E.M.S.).**

Status: Future
General Plan: PS 11.1.1, 11.1.1

Objective 4:
Be prepared to be a first responder to any and all disasters, which occur within the Fire District/City.

Status: Future
General Plan: PS 11.1.4

Objective 5:
Educate and train the citizens of Big Bear Lake in life-safety and property conservation before, during, and after a disaster.

Status: Ongoing
General Plan: PS 11.1

Objective 6:
Prepare all Fire District facilities with the necessary food, water, first aid and emergency supplies sufficient for seventy-two (72) hours.

Status: Ongoing
General Plan: PS 11.1

Response Goals

Goal 1
Reduce the severity of property loss and human suffering from fire or explosion in structures, vegetation, processes or vehicle by providing an emergency response system that will aggressively attack fires, will attempt rescue where possible, will extinguish remaining fires and will mitigate any remaining hazardous conditions.

Objective 1: Initiate fire suppression actions after just after flashover for residential fires and prior to fires for commercial/industrial fires.

Status: Ongoing
General Plan: 7.1.7, 7.1.6

Objective 2:
Initiate fire suppression action within 10 minutes of ignition for 90% of all fire incidents, and 95% within 12 minutes

Status: Future
General Plan: PS 7.1.6

Objective 3:
Control 90% of all structure fires with the first alarm assignment and confine the fire to the building of origin.

Status: Ongoing
General Plan: PS 7.1.6

Objective 4:
Confine 95% of all vegetation fires to the property of origin with the first alarm forces.

Status: Ongoing
General Plan: PS 7.1.6

Objective 5:
For an initial attack assignment for fire flows of 1,000 gallons per minute, provide a minimum of nine (9,) firefighters (3 engines, 1 squad, 1 chief officer) within a 14-minute reflex time in 90% of dispatches and a 20-minute reflex time in 95% of the cases. Provide one (1) more engines for a sustained attack within thirty (30) minutes.

Status: Ongoing
General Plan: PS 7.1.6

Objective 6:
Use the Incident Command System, (ISC) to manage all emergencies.

Status: Ongoing
General Plan: PS 7.1.6

Goal 2
Reduce the severity of property loss, the loss of human life and the severity of human suffering from emergencies other than fire or explosion by providing an emergency response system that will manage or provide resolution of such emergencies as rescue, emergency medical care, hazardous material incidents, unidentified smoke, electrical emergencies, and structural collapse that may threaten the community's health and welfare.

Objective 1:
Initiate definitive emergency medical assistance within eight (8) minutes of occurrence of life critical symptoms for 90% of incidents, with a maximum reflex time of ten (10) minutes for 95% of the responses. Always attempt to execute a standard problem-solving outcome: quick, effective, skillful, safe, caring and well managed.

Status: Ongoing
General Plan: PS 7.1.6

Objective 2:
Initiate CPR within four (4) minutes of occurrence of cardiac arrest for 50% of incidents.

Status: Ongoing
General Plan: PS 7.1.6

Objective 3:
Provide basic emergency first aid treatment with all emergency responding units.

Status: Ongoing
General Plan: PS 7.1.6

Objective 4:
Initiate an EMT-D program for all emergencies responding units.

Status: Future
General Plan: PS 7.1.6

Objective 5:
Equip and maintain a "light or medium rescue" piece of equipment.

Status: Future
General Plan: PS 7.1.6

Goal 3
Provide response to non-emergency requests for service to resolve the cause or potential danger. Work to manage outcomes such as cleanup or repair only when such services are not within the capabilities of responsible persons and not provided by a private agency in the business of conducting such services.

Objective 1:
Provide non-emergency services as a secondary activity.

Status: Ongoing
General Plan: PS 7.1.6

Objective 2:
Maintain a positive image providing these public assistance type responses even though they may be less than glamorous. Regard everyone as a customer.

Status: Ongoing
General Plan: PS 7.1.6

Goal 4
Maintain fire department staffing to achieve a response consistent with the strategic plan.

Objective 1:
Staffing for an engine company, as a minimum, will be two (2) firefighters.

Status: Ongoing
General Plan: PS 7.1.6

Objective 2:
Provide two (2) EMT/FIREFIGHTERS as staffing on a BLS squad as a minimum.

Status: Ongoing
General Plan: PS 7.1.6

Objective 3:
Staffing for a truck company, as a minimum, will be two (2) firefighters on a recall basis.

Status: Ongoing
General Plan: PS 7.1.6

Objective 4:
Provide one (1) EMT-P on an ALS Engine and/or squad.

Status: Ongoing
General Plan: PS 7.1.6

Objective 5:
Assign a safety officer at all major emergency incidents.

Status: Ongoing
General Plan: PS 7.1.6

Goal 5
Provide adequate radio communications for dispatching fire apparatus and equipment and maintaining contact will all personnel while on emergency service or routine calls.

Objective 1:
Maintain a current and update to date communications and dispatch system.

Status: Ongoing
General Plan: PS 7.1.6

Goal 6
Promote a positive image to the community during emergencies and other non-emergency services and activities.

Objective 1:
Be professional - promote the idea that the citizen's the Big Bear Lake are in the hands of the best Fire District in California.

Status: Ongoing
General Plan: PS 7.1.6

Recovery Program

Goal 1
Provide for the complete recovery of all firefighters after emergencies

Objective 1:
Provide a comprehensive medical monitoring program for all firefighters.

Status: Future
General Plan: PS 7.1.6

Objective 2:
Establish and maintain an employee assistance program.

Status: Ongoing
General Plan: PS 7.1.6

Objective 3:
Establish and maintain a physical fitness program.

Status: Ongoing
General Plan: PS 7.1.6

Objective 4:
Develop and maintain good psychological fitness of all Fire District personnel through education, counseling, and critical incident stress debriefings.

Status: Ongoing
General Plan: PS 7.1.6

Objective 5:
Maintain a record of all firefighter possible exposures to toxic substances including infectious diseases.

Status: Ongoing
General Plan: PS 7.1.6

Goal 2
Take appropriate steps to assist citizens recover from fires, EMS, or other emergencies/disasters.

Objective 1:
Develop and maintain a Fire Chaplain's program to assist citizens in time of need.

Status: Ongoing
General Plan: PS 7.1

Objective 2:
Develop reciprocal support with other District and City Departments and related service agencies so as to maximize community services after an emergency or disaster.

Status: Ongoing
General Plan: PS 7.1.3

Goal 3
Critique all major emergency incidents or other incidents where benefit may be gained by actively discussing the incident by all agencies and personnel involved.

Objective 1:
Establish and maintain channels for citizen input concerning fire protection and EMS, and provide for community feedback.

Status: Ongoing
General Plan: PS 7.1

Objective 2:
Develop and implement a program where firefighters within 72 hours after a fire or major incident in a neighborhood, promote and conduct a meeting in a home in that neighborhood to explain the cause of the fire or incident and present a prevention program.

Status: Ongoing
General Plan: PS 7.2

Objective 3:
Mitigate any remaining hazards or risks after an emergency if possible to reduce or prevent the emergency from happening again.

Status: Ongoing
General Plan: PS 7.1

Goal 4
Investigate the cause of all fires and take steps necessary to correct all deficiencies and law violations.

Objective 1:
Maintain a vigorous arson prosecution and deterrent program, which includes preliminary and follow-up investigations of all fires.

Status: Ongoing
General Plan: PS 7.3.4

Objective 2:
Recover suppression costs on all criminally, negligently, or maliciously caused fire.

Status: Ongoing
General Plan: PS 7.1