

California Energy Commission

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Declaration of Deployment  
For  
Southern Inyo Fire Protection District



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## Introduction to Current Deployment:

The Declaration of Deployment Analysis process results in a document that local communities can use to assess the Level of Service presently being afforded to the Community, and the form of delivery of emergency fire and rescue services provided by the volunteer fire department. It also serves as a guide for making changes and improvements in the local fire protection delivery system.

The analysis process is not solely a fire department document but one where community participation fosters and improves with the stakeholders' understanding of community risks, emergency incident challenges, deployment, including the amount and type of resources needed to provide a minimum level of service to protect property and save lives. It also helps to define the rules of engagement for the department by setting parameters on the level of capability that can be provided when relying on recalled fire forces (volunteers).

Each community is different, and the application of fire protection for one jurisdiction may not be appropriate for another. One jurisdiction may be protected by an all career fire department. In that case the proper management tool should be to apply the principles of the standard of cover. Another department may be a combination career and volunteer, or an all volunteer fire department. That is where the Deployment Declaration fits in. This method of analysis still includes an assessment of risk, the community's expectations, the fire station locations, response time goals, and the agency's mission of providing an array of emergency services, but is not based entirely upon the same outcomes.

## Comparisons of Demand and Density

The following chart illustrates the relationship between demand and the density of human population. It creates several separations in the context of how much fire protection is needed based upon the relationship of these two factors.

- ✓ Low demand and low density is generally considered to be frontier type fire protection.
- ✓ Below average demand and below average population density is considered to be rural.
- ✓ Average demand and average population density is considered to be suburban.
- ✓ Above average demand and above average population density is considered to be urban.
- ✓ High demand and high density is considered to be metropolitan.

Considering the two population concentration areas of Tecopa/Shoshone and Charleston View those risks that are within eight miles should be classified as below average demand and below average population and therefore rural. Those areas beyond the eight mile radius are considered low demand and low density or remote protection.

Figure 1 - Comparison of Demand and Density

For purposes of creating a method for distinguishing how these categories apply to volunteer organizations we have broken down these considerations into more specific geographic and demographic differences. To further analyze these conditions we have provided 4 distinctions regarding the actual physical location of this department geographically. The distinctions help define the subtle differences of departments that are essentially rural, but different in their makeup.

These 4 Distinctions have been identified as:

- a. Isolated department – set in middle of nowhere
- b. Cross-roads department
- c. Freeway based
- d. Fringe department – set adjacent to rural community

### Isolated department

The definition of an isolated fire department is a community or designated place on a map in which a concentration of risks occurs but the organization is remotely located from any other community. Generally speaking, isolated fire agencies protect extremely large areas with extremely low population densities as per the demand density chart. Isolated agencies may still have large structural risks, such as barns and agricultural structures. But the risks are limited in number due to the fact that the population center is limited. The hallmark of an isolated agency is isolation and extremely limited resources. Typically they can also have wildland fire risks.

**The Southern Inyo Fire Protection District fits two categories. Portions of the study area are within 8 miles driving distance, other portions are in excess of 8 mile travel time resulting in two different demand zones, cross roads and isolated.**

### Cross Roads

A cross roads community is defined as a community or designated place in which two highways intersect; neither of which is a major highway or freeway. The intersection would be with two state highways or with a state highway and a county road system. The predominant characteristic of a crossroads community is that they usually evolve from local service provisions for more isolated area communities. A cross roads oriented community has a risk assessment profile that is limited with respect to structural risk with fire flows rarely exceeding 2,500 gpm. Generally crossroads oriented communities are either a very small population with a limited area to protect or a very small population with large areas to protect.

#### **The demand zones of Tecopa and Charleston View meet the intent of Crossroads Department**

### Freeway (Major Expressway)

Freeway oriented communities are those that are immediately adjacent to or are bisected by major freeway or national highway transportation system. These communities are characterized by having a high level of exposure to automobile oriented responses which can also lead to hazardous materials exposure. The risk assessment profile of a freeway oriented rural agency includes large commercial warehousing (example, big box distribution centers), significant agricultural impact as well as transient population due to hotels and motels. This category does not apply to SIFPD.

### Adjacent Department

An adjacent agency is a community or designated place that has a continuous border that links up with other fire agencies but is characterized by relatively low densities of its population. The distinction between an isolated department and an adjacent department is that an adjacent department has the possibility of mutual aid and probable linkage with a regional communication system. Adjacent area departments are often combination departments and are likely to be undergoing transition as population density increases. This category does not apply to SIFPD.

### Current Description of Community being protected by SIFPD

Throughout recent history, fire stations and associated equipment were originally located to achieve or perform to meet certain community expectations. Understanding the reasons for the historical location of fire stations, as well as their contributions to public safety, should be thoroughly understood. Documenting this history provides information as to the consequences of proposed or future changes. It is important to understand the nature under which the current level of service was established, the laws, ordinances and the funding mechanisms that created the current level of deployment.

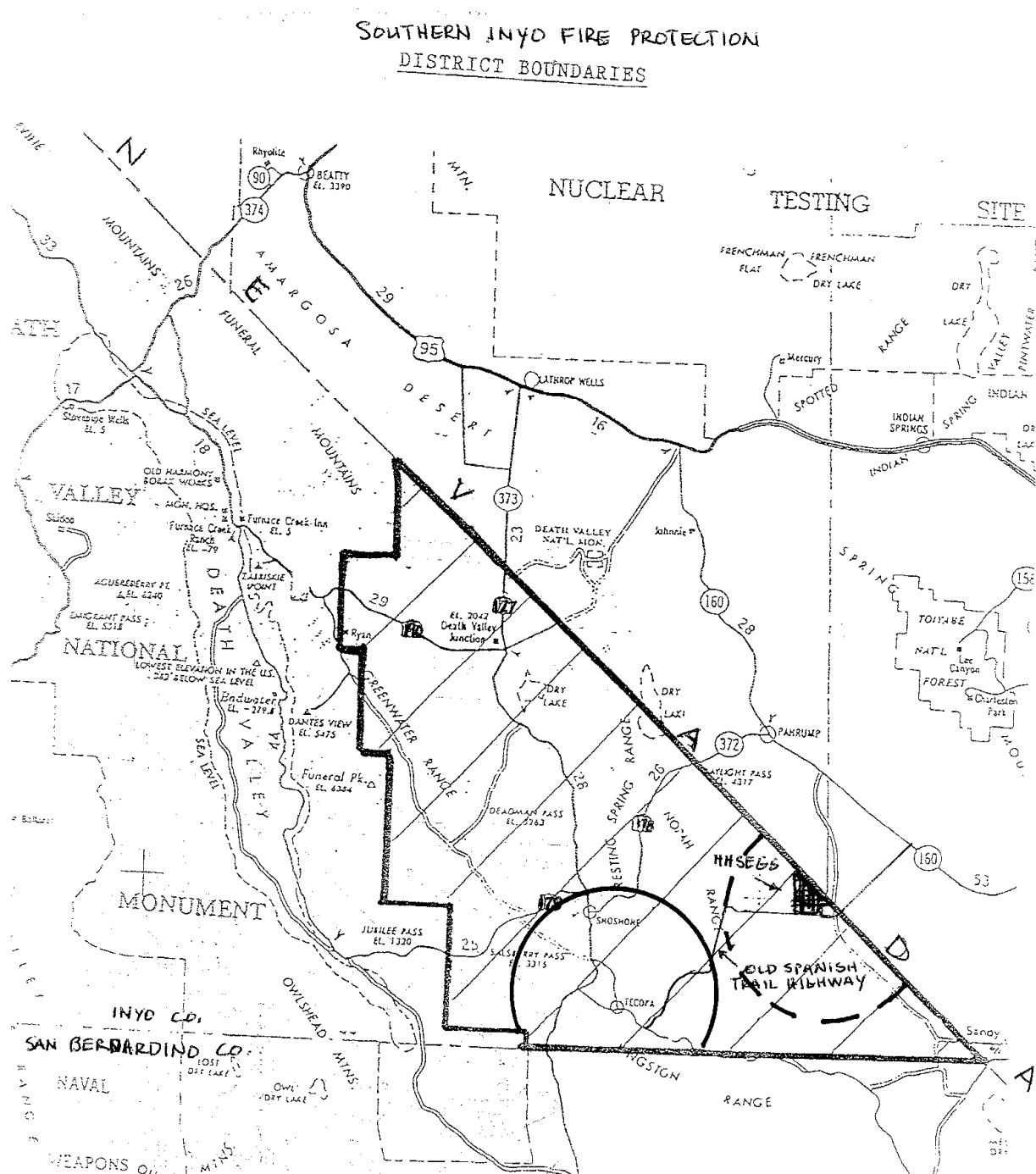
### Governance

The Southern Inyo Fire Protection District was created by an action of the Inyo County Local Agency Formation Commission (LAFCO) and the Inyo County Board of Supervisors on August 13th, 1993. It was organized under the provisions of Government Code Section 57200-57204.

### Geographic boundaries

The SIFPD is located in Inyo County and has the general geographic relationship as identified in the following map.

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Files\Content.Outlook\04H6LJYW\Ex 1100\_Declaration of Deployment (4).docx



In the map above, the solid line is existing boundary; the dotted line is for additional coverage in the future.

The main community in the area is named Tecopa (formerly Brownsville), which is a Census Designated Place (CDP) in the Mojave Desert. Tecopa is located 9 miles (914km) south-southeast of Shoshone. The entire district covers 1,350 square miles. The latest population figures indicate a population of between 400 and 500 people in the area covered by the District. This gives the area an overall population density

of 0.3 people per square mile. The density varies in the areas where limited development has occurred, such as in Tecopa, Charleston View and Shoshone. For purposes of this report we are defining these as "enclave areas" where groups of buildings have clustered, but they are not of urban density.

**This area is defined as a low density, low demand area.** This means that there is less than one call for service per day, or less than 365 calls in any annual period

The distinction in this area is that it is associated with a high level of traffic density in some areas. This is because of the traffic from the Pahrump area that comes through the district on the two lane highways that go from east to west (178 and Old Spanish Trail Highway).

## Community Demographics

In the case of the Volunteer fire service, the department is the community and the community is the department. It is not uncommon for volunteer firefighters to respond on calls with family, friends, co-workers and others that they have grown up around and know personally. Therefore, we are also proposing in this risk assessment that a study be performed on the demographics of the community.

The secondary reason for this recommendation is that a significant number of the calls for service, even in the rural areas of the country are for medical aids. This factor needs to be planned for every bit as much as the fire problem. Our methodology is rather simple for this portion of the exercise.

The US Census Bureau provides several opportunities for you to obtain detailed information on Zip Codes. One approach is to go to the website: <http://ZIPskinny.com/>

Enter your state and then your community's ZIP Code and the resulting information will assist you in determining the makeup of the community.

There is general information there about the community as well as specific demographic indicators.

They include such factors as:

- Social Indicators
- Race
- Gender
- Educational Achievement
- Marital Status
- Household Income
- Occupation

The following is an overview of the geographic, demographic and stakeholder information regarding those properties located within the jurisdiction of the SIFPD.

Figure 2 – Community Demographics

Characteristics	This Information was obtained from a combination of US Census Bureau, Fact Finder, ZipSkinny and Wikipedia websites.
Population?	The population of the entire County is only 18,546. Population of SIFPD is

	only 400
Land area in square miles?	The entire county area constitutes some 10,226.98 Square miles. This county is the second largest in California and tenth largest in the nation.
Water area in square?	The county has about 23.88 squares miles of water area. None of this is in the district.
The population density per square mile?	The SIFPD covers 1,250 square miles. This generates 0.3 persons per square mile. In Tecopa, the density is 8.0 people per square mile. Population density varies in areas where development has grouped together
<b>Social Characteristics</b>	
How many households are in your jurisdiction?	In Tecopa there are 92 households
The average household size in your jurisdiction?	In Tecopa the average household size was 1.63
The average family size in your jurisdiction?	In Tecopa the average family size is 2.60.
How many residents over the age of 65 years live alone?	28 households have a person over the age of 65 living alone.
<b>Economic Characteristics</b>	
The median family income in your jurisdiction?	The average annual income in the District is \$16,250
How many individuals live below the poverty level?	30.8% of the families and 38.6% of the population are living below the poverty level.
The median per capita income in the jurisdiction?	\$12,344.00. The median income for a family is \$16,250.
<b>Housing Characteristics</b>	
The total number of housing units in your jurisdiction?	159 units
Ownership?	57 are owner-occupied, 35 are occupied by renters.
How many vacant housing units are there in your jurisdiction?	The homeowner vacancy rate is 6.6 % The rental vacancy rate is 10.3%.
<b>Characteristics of Citizenry -</b>	
What is the break down between male and female in your jurisdiction?	For every 100 females there are 138.1 males
What is the largest age group in your	The population distribution is as follows.: There are only 19 people under the age of 18; 5 people aged 18 to 24; 17 people aged 25 to 44, 59 people aged

jurisdiction?	45 to 64; and, 50 people over the age of 65.
What is the median age of the population in your jurisdiction?	In Tecopa the median age is 57.5 years
<b>Business and Industry Characteristics</b>	
With the NAICS code for business establishments in your jurisdiction?	There are very limited numbers of commercial and industrial occupancies in this area. There are a few target hazards. They include: In Tecopa there are four RV Park Resorts. These are populated generally above the age of 55 and are transients. In the area of Amargosa; Opera House In Shoshone at the intersection of Hwy 127 and 178 gas station - High school, County and State Road facilities In Charleston View, an enclave area there are 2000 parcels, in the form of 2.5 acre sites Some are larger. There are 30 structures in Stewart Valley on border with Pahrump.
What types of businesses in your jurisdiction that employ the largest number of employees?	There is no specific business that employs large numbers of individuals. The development of the Solar Energy plant, as anticipated in the immediate future will be the single highest concentration of employees
What types of businesses generate the largest sales, shipments and revenue in your jurisdiction?	None have been identified

## Review of Current Service Provided

### Current SIFPD staffing:

**Currently the SIFPD has 2 paid staff: This consists of a Fire Chief/Mechanic and Administrative Officer. Both respond to emergencies as volunteers.**

**The department has 7 volunteers: 3 of which are trained as Emergency Medical Technicians (EMT) – Basic; two of them are soon to achieve AEMT. 2 Firefighter II, 1 Firefighter I, and 1 Entry Level Firefighter.**

### Current SIFPD Facilities

The SIFPD has a fire station in Tecopa with an administrative services building.

### Current SIFPD Equipment Inventory

The following is an inventory of the existing fire apparatus used by the SIFPD. The right hand column contains an assessment of the various vehicles utilization. An X means the unit is in service for the most part. If the column states "in reserve", the equipment may be in need of maintenance or repair before being placed in service.



Figure 3- Vehicle Inventory

UNIT#	YR-MAKE-MOD	TYPE	RATING	PUMP	TANK	ENGINE	MILES	IN SERVICE
Sierra 72	03 Ford F-350	AMB-BOX	BASIC			6.0 Diesel	239,762	X
Sierra 73	85 Ford E-350	AMB-BOX	BASIC			7.5 Gas	49,755	X
2731	80 Hahn-Superior	STRUCTURE	TYPE 1	1250 GPM	300 GAL	6-71 Diesel	104,120	X
2732	83 Hahn-Superior	STRUCTURE	TYPE 1	1250 GPM	300 GAL	6-71 Diesel	116,652	In Reserve
2733	80 Intl. 1824 4X4	BRUSH	TYPE 5	100 GPM	400 GAL	V-8 Gas	74,421	In Reserve
2734	75 Intl-Van Pelt	STRUCTURE	TYPE 2	1000 GPM	800 GAL	3208 Diesel	63,356	In Reserve
2752	05 Peterbilt	TENDER	TYPE 1	750 GPM	2000 GAL	8.3 Cummins	8,661	X
2781	78 Ford F-250	MINI	TYPE 4	100 GPM	250 GAL	V-8 Gas	129,659	In Reserve
2782	86 Chev C-30	MINI	TYPE 4	100 GPM	250 GAL	V-8 Gas	64,807	In Reserve
2783	89 Ford E-350 4X4	HAZ-MAT	BOX AMB			V-8 Diesel	136,868	In Reserve
2791	99 GMC S-10	COMMAND	Blazer 4X4			V-6 Gas	196,186	X
	Single Axle Trailer	Mass Casualty Supply	Non-rated	County Owned				X
	Tandem Axle Trailer	Disaster/Hazmat	Non-rated	County Owned				X

The basic service provided by a volunteer fire department is to fight fires. If the department engages in other types of services, this can have an effect on the organization's ability to perform. A component of fire department deployment relates to the type of services which are provided by a fire department through their discretionary commitment, which may include rescue, and medical, hazmat, wildland, USAR, and swift water rescue. **In many rural areas the fire department may be the ONLY public safety resource that is available. This is true for this department.**

The department's deployment commitment for the types of service provided relates to a multiple of factors, the geography of the area, the demographics of the population, the density of the population and most notably, the economic resources allocated to provide these services. Clarification of these services types amplifies the operational capability of the department.

To provide an example of this concept the Board is reminded of a recent fire in Charleston View - The department was paged out at 5.03 and was on the road at 5.15. The travel time to the incident was 35 minutes, arriving at 5.50.

Figure 4 - Current Deployment Policy

Current Fire Department Deployment to Typical Emergencies	
Type of Emergency	Responding Units and Personnel Responding
Structure Fire: Commercial	The SIFPD responds one engine, a water tender, and an ambulance and command vehicle on every event - Because of the limited staffing the organization has a limited ability to vary its responses.
Structure Fire: Residential	
Automatic Fire Alarm	
Outside Fire: Vehicle, Trash Dumpster	
Wildland	
HazMat	
Rescue, Medical Aid, Injury Accident	
Vehicle Extrication	

## Community Baseline

The Baseline forms a point of reference to gauge the delivery of current services. In essence, this A Community Baseline, for delivery of emergency services, is essential in establishing a starting point for the community to begin understanding the current performance that may be expected from existing resources.

## Data Analysis

The deployment analysis process provides a format which allows an effective appraisal of current trends in deployment of resources from receipt of a 911 call to the arrival of the first unit on scene to answer the previously stated questions.

Data from a 3 to 5 year period is usually sufficient to provide realistic response data used to measure expected response performance

Figure 5 - Fire Department Incident Activity

Fire Department Emergency Incident Activity							
Incident Type	Current Year	Previous Year 2012	Previous Year 2011	Previous Year 2010	Previous Year 2009	Total	%
Medical Aid (EMS)	3	32	34	27		96	48
Vehicle Accident	6	22	23	22		73	36.5
Air Plane Crash/Fire							
Vegetation Fire		3		1		4	2
Structure Fire	1	2	1			4	2
Flue/Chimney Fire							
Transform/Power Lines							
Vehicle Fire		2	2	1		5	2.5
Dumpster Fire							
Smoke Check							
False Alarm							

Haz Mat		3				3	1.5
Other	1	3	6	5		15	7.5
Total	11	67	66	56		200	100

Figure 6 - Current Trends

Current Measured Trends	
Response Trends	Time_ years 80th Percentile
A. Notification of call (Dispatch) to En-route	Last Year's Records
B. First Engine En-route to On Scene (Rural)	15 Minutes
B1. First Engine En-route to On Scene (Remote)	30 Minutes
C. Second Engine En-route to On Scene(Rural)	15 Minutes
C1. Second Engine En-route to On Scene (Remote)	30 Minutes
D. Water Tender En-route to On Scene (Rural)	15 Minutes
D1. Water Tender En-route to On Scene(Remote)	30 Minutes
E. First Chief Officer On Scene	Depending on who is available on any given day the Chief Office may be responding individually or may staff an engine or tender
F. BLS Ambulance Dispatch to On Scene (Rural)	15 Minutes
F1. BLS Ambulance Dispatch to On Scene (Remote)	30 Minutes
G. ALS Ambulance Unit/ Dispatch to On Scene (AEMT) (California Regulations)	Available only on Mutual Aid and still subject to discussion
H. Initial Attack Commences with 8 miles	15 Minutes
H1. Initial Attack Commences over 8 miles	30 Minutes
I. Incident Under Control/Mitigated	Within 1 hour

### Community Expectations

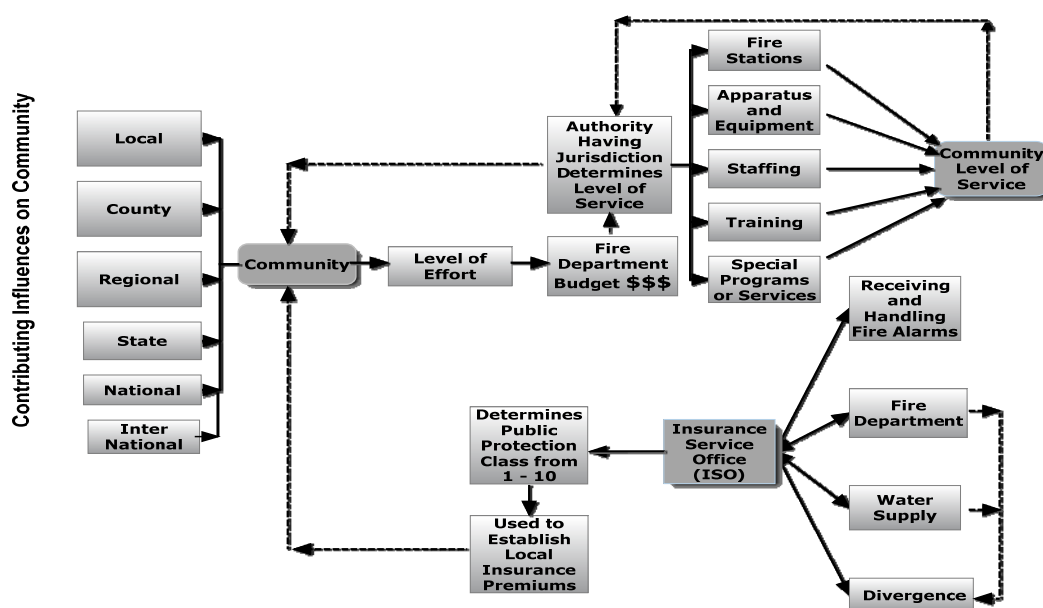
Community Expectations are the outcomes of how the existing fire and medical response system meets community needs. In many communities there is a difference between the expectations and the ability of the fire department to deliver what the community feels is an appropriate level of service. The location of a fire station may appear to have an effective emergency response capability, but an in-depth analysis may indicate that available equipment and staffing may not be able to mitigate the effects of a structural fire or respond in a timely fashion for a cardiac arrest patient.

"Continuing Influences" are issues emanating from societal factors or other impacts at the local through national level, and exist in everyday life. These influences may affect or impact a community's overall mood, with respect to local governance, either positively or negatively. The disposition of a community toward their fire department's ability to provide a Level of Service concurrent with associated risk could be prejudiced by these Continuing Influences. This, in turn, may reflect the stakeholders' commitment, or lack thereof, of financial resources (Level of Effort), to support their fire department. It is with this foundation of community support that a fire department's budget and Level of Service is influenced.

In addition, the vast majority of people external to a fire department have a difficult time explaining the present level of fire protection and medical responses and whether either is, or is not, effective. Much of their perception is largely based on seeing fire apparatus responding through streets of the community, where they may arrive at the conclusion that the fire department is providing an effective level of service and is adequately funded.

The chart below outlines the process in defining a Level of Service predicated on a community's disposition toward fire protection or for that matter government in general. The Level of Effort (financial resource) is paramount to the Level of Service and the fire department's effectiveness in mitigating the effects of fire or cardiac arrest. It is the Authority Having Jurisdiction's (AHJ) responsibility to determine an effective Level of Service, supported by a Level of Effort. It is the community's responsibility to validate the Level of Service or provide a financial investment that supports a community consensus on Level of Effort.

Figure 7 - Community Influence vs. Budgetary Process



## Risk Assessment and Risk Management

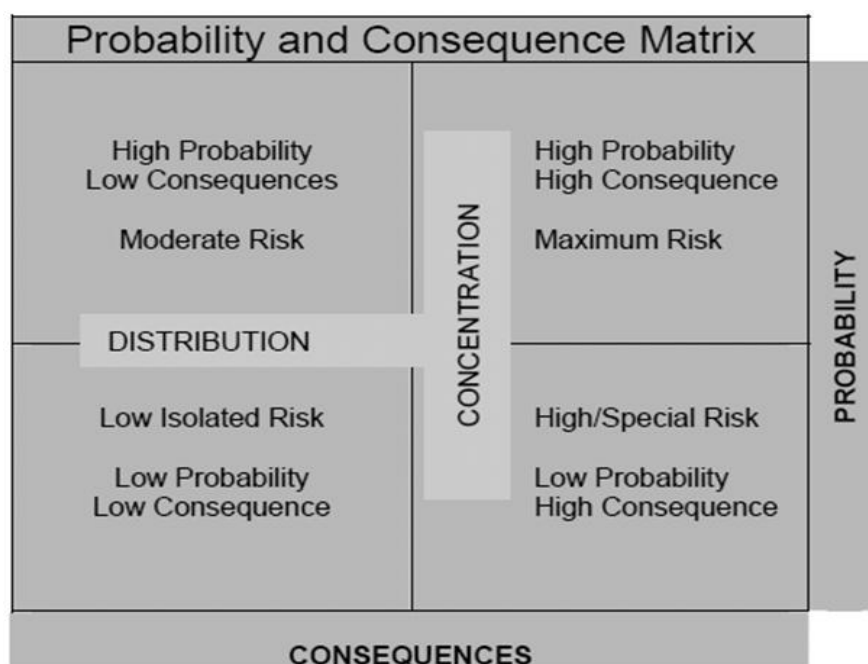
Risk Assessment is based on the potential frequency and probability of an incident occurring and the consequences, or potential damage, should an event occur. For example, an earthquake generally does not strike the same communities every year: but if it did, the damage could be great. Conversely, medical emergencies, in the community as a whole, are not nearly as significant as the impact from an earthquake or other natural disaster, although these individual incidents greatly affect those requiring

the service. Fire departments must be able to compare the potential frequency, with potential damage, attributed to events that may affect their community and service areas.

Risk management is the analysis of the probability of an event occurring and the resulting damage that could occur as result of the event. A structure fire is relatively infrequent compared to more frequently occurring medical incidents. However, the losses of subsequent dollars, irreplaceable items and of businesses or jobs make the consequence of such fires high. Comparatively, a dumpster fire may be of high probability but have little consequence outside of the fire response. With an understanding of the different levels of probability and consequence, proper strategic planning in respect to risk management and resource deployment, can take place.

For purposes of understanding risk assessment can be divided into four quadrants that create different scenarios. . Each area imposes a different requirement for commitment of resources, as seen below:

Figure 8 - Probability and Consequence Matrix



The ability to provide varied and adequate resources for an anticipated fire, medical emergency or other event(s) is a critical element in the assessment of an emergency service delivery system. Each emergency requires an adaptable amount of staffing and resources for effective resolution. Each event; i.e., fire, rescue operation or major medical emergency, will also require varying and unique levels of resources. For example, controlling a fire before it has reached its maximum intensity requires a rapid deployment of personnel and equipment within a given timeframe.

The objective is to have a distribution of resources, which are able to reach a majority of events in the time frame as stated in the department's service level goals. There are many factors that make up the

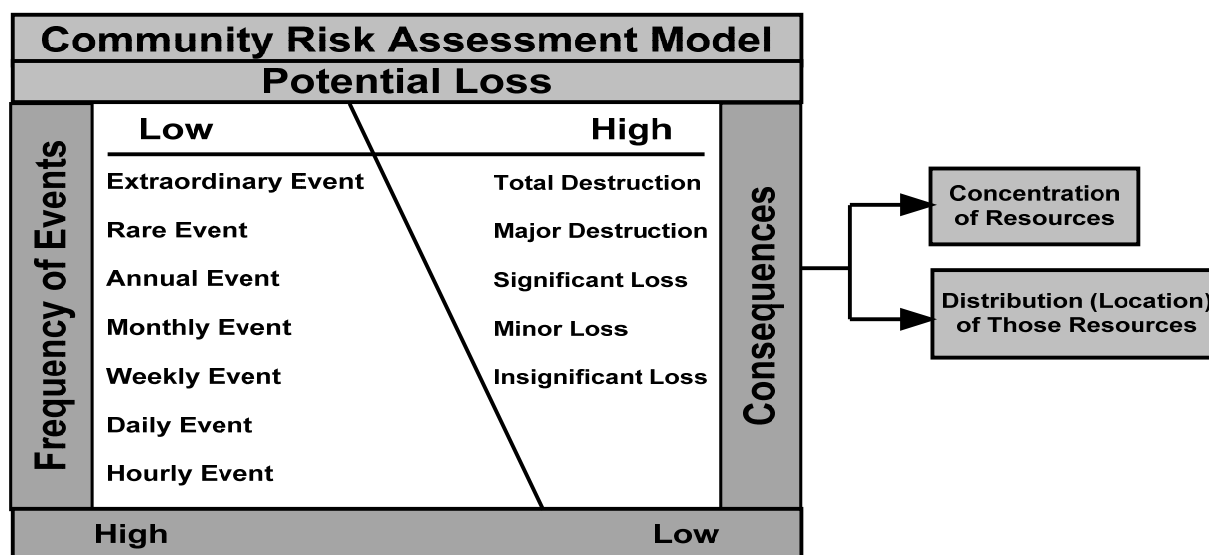
risk level, which would indicate the need for higher concentration of resources; i.e., the inability of occupants to take self-preserving actions. Other factors may include:

- Construction features
- Lack of built-in fire protection (sprinkler system or alarm system)
- Lack of needed fire flow
- Nature of the occupancy or its contents

The level of service provided by an agency should be based on the agency's ability to cope with various types and sizes of emergencies that can reasonably be expected in the community following a risk assessment. The Risk Assessment process starts with examining the most common community risks: the potential fire problems, the targeting of hazards, and includes the knowledge of critical infrastructure(s) and an analysis of historical call data.

Community Risk assessment incorporates the various elements of risk in relationship to the community as a whole: the number of events, and the severity of those events occurring, potential losses, and the geographic distribution of risks. The daily event is usually the routine that results in minimal losses, while the significant events are less frequent. If the risk management system is working in the community, a catastrophic loss should be an extraordinary event. The objective of risk assessment is to reduce the truly serious losses to a very unusual event. Toward the highest risk levels on the chart below, the events are less frequent

Figure 9 - Community Risk Assessment Model



Based upon this model the SIFPD faces a limited fire risk in that there are currently not many major buildings. Nonetheless, there is an expectation that the dwellings in this area should receive a response to limit damage whenever the department can.

## The Physics of Fire and the Cessation of Life

One point that both career and volunteer fire personnel agree on is that the enemy is not different when faced in the field by either volunteer or paid personnel. Fire does not burn differently in rural America. Loss of heart rhythm or loss of blood does not result in a different outcome if the event is in the suburbs or in the back country. The phenomena of flashover and the impact of medical emergencies follow the same exact rules in all areas. If a condition starts to deteriorate, it will continue get worse until someone intervenes. This is why these factors need to be considered in the context of setting deployment policy for a volunteer fire department just as they would for paid forces.

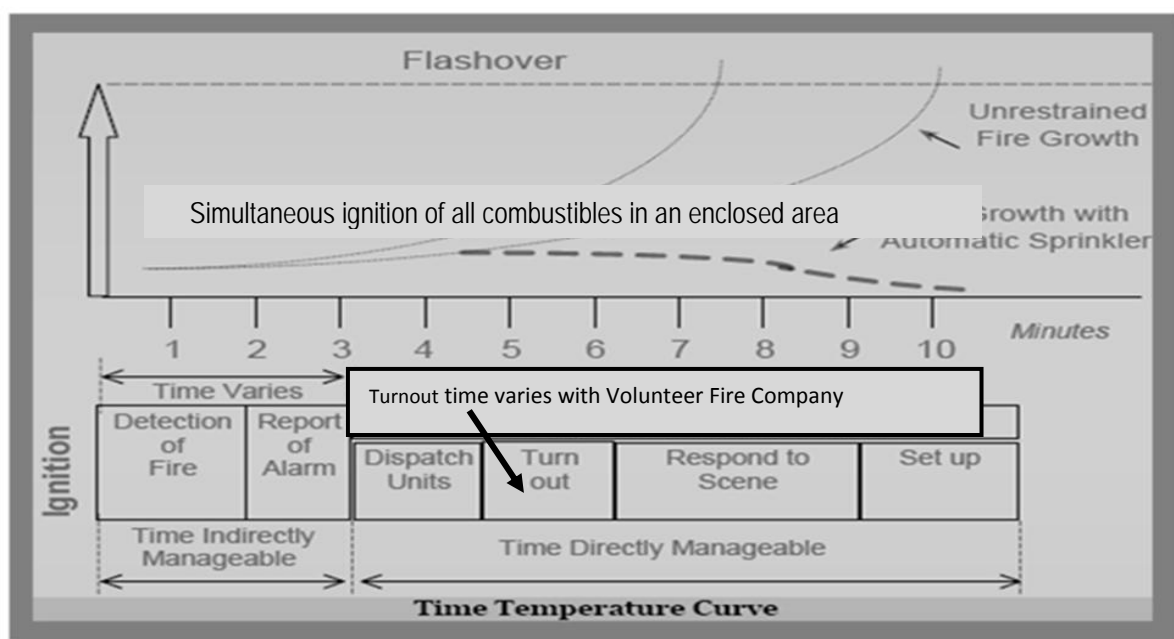
These principles have been well developed in the Standards of Cover concept, and in fire fighting tactics and strategy as well as emergency medical services protocols. They are reproduced here to emphasize this reality. The rules of engagement a local fire department adopts will depend upon recognizing them.

### The Significance of Flashover:

Flashover is a critical stage of fire growth, as it creates a quantum jump in the rate of combustion and hence, a significantly greater amount of extinguishing agent is needed to reduce the burning. With flashover it is usually too late to save anyone in the room of origin, and a greater number of firefighters are required to handle the multiple or larger hose streams needed to extinguish the fire. A post-flashover fire burns hotter and moves faster, compounding the search-and-rescue problems in the remainder of the structure, while at the same time requiring more firefighters for fire attack.

The charts below illustrate the need for rapid response to fire and medical incidents in order to mitigate these emergencies:

Figure 10 - Flashover Time Temperature Curve

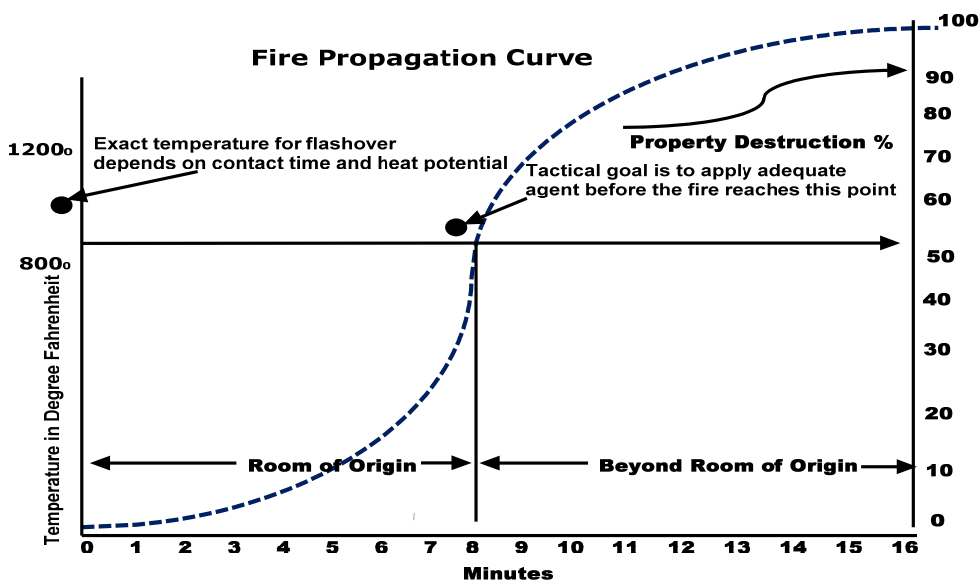


### Fire Propagation Curve

An alternative way to view the effects of a Flashover and its influence or outcome is through the Fire Propagation Curve. The arrival of suppression forces within an acceptable time frame and the application of an extinguishing agent (water) can considerably reduce the loss of life and property damage.

It is within the time period of 8-10 minutes that the extension of fire beyond the room of origin to other uninvolved sections of the structure occurs. The importance of smoke detectors, calling 911, turnout time and travel time become further evident of critical time issues which plays a significant role in saving of life and property loss. See graph below:

Figure 11 - Fire Propagation Curve



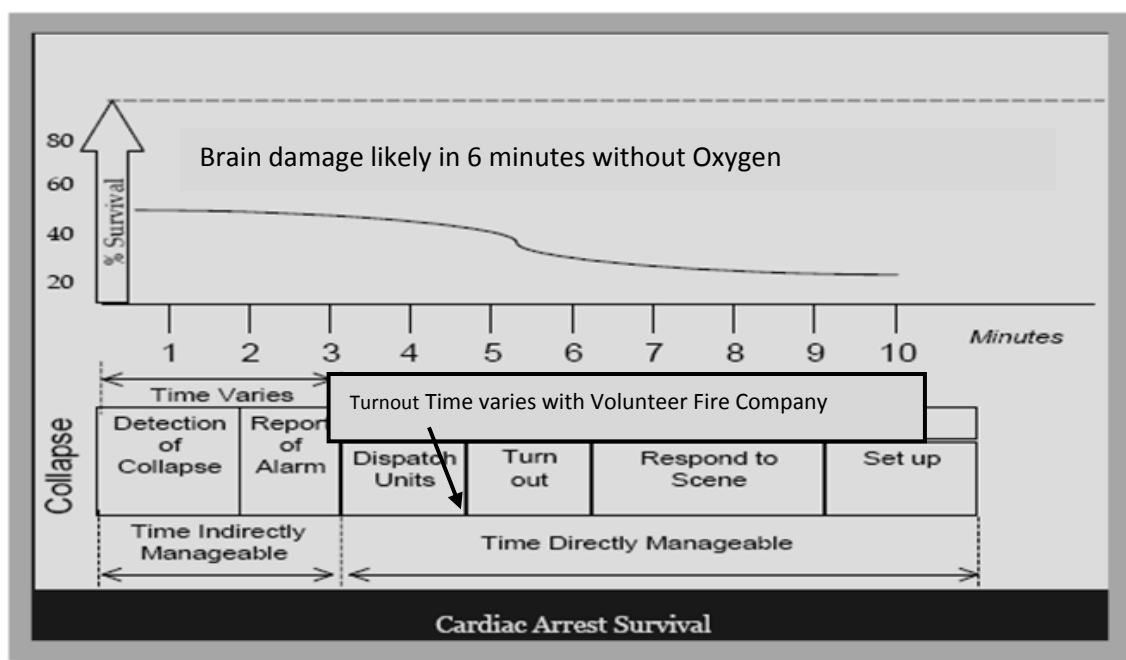
“The first unit responding to a fire emergency shall be staffed with a minimum of 2 first responders shall meet the minimum performance guidelines or certification as established by the SIFPD in its Rules of Engagement”.

### Evaluating EMS Capability

Additionally, survival of cardiac arrest, or preventing flashover, is time-driven.

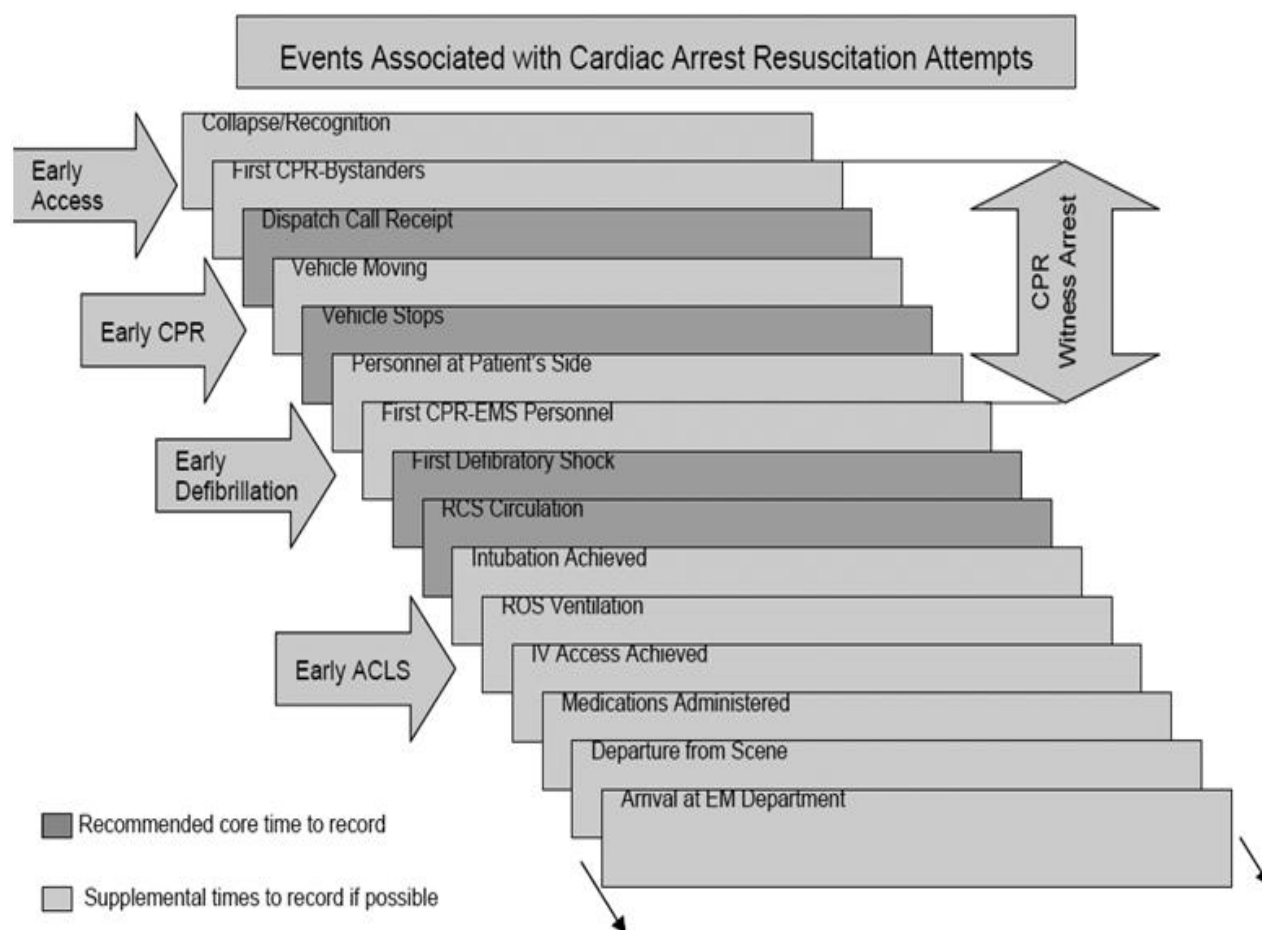
The brain can only be without oxygen for a short period of time, i.e., six minutes. Rapid intervention is necessary to prevent brain death from occurring. Generally speaking most people relate this to cardiac problem, but in actuality any injury can result in the same outcome. See graph below:

Figure 12 - Cardiac Arrest Brain Damage Survival



From an emergency medical perspective, the service-level objective typically is to perform medical interventions within a six-minute timeframe, as brain damage is to be expected at six minutes without oxygen. However, in a cardiac arrest situation, survivability dramatically decreases beyond four minutes without appropriate intervention. Intervention includes early recognition and bystander CPR. Research recommends using the Utstein reporting criteria for EMS outcomes, and capturing the following recorded time points in the Events Associated with Cardiac Arrest Resuscitation Attempts, as seen below:

Figure 13 - Events Associated with Cardiac Arrest Resuscitation Attempts



Early defibrillation is often the critical link in the chain of survival, especially because it is the only way to successfully treat most sudden cardiac arrest patients. When cardiac arrest occurs, the heart starts to beat chaotically (fibrillation) and cannot pump blood efficiently. Time is critical. If a normal heart rhythm is not restored in minutes, the person will die. In fact, for every minute without defibrillation, the odds of survival drop seven to ten percent. A sudden cardiac arrest victim who is not defibrillated within eight to ten minutes has virtually little or no chance of survival. The shortest possible response times creates the highest probabilities of resuscitation. An important evaluation point lost on most agencies is the required time for the crews to reach the patient's side. Often the clock stops when the vehicle arrives or stops at the address. The key to a successful outcome is the point at which the patient is actually physically contacted. Of note, is that in larger complexes or in having to use a long narrow pathway leading to a residence, contact time can be substantial and can most certainly affect the outcome due to delayed interventions.

## Events Associate with other Medical Aids

Cardiac arrest is not the most common type of medical aid that a volunteer department responds to.

The following guide was established by the American Society of Testing and Materials (ASTM) as the minimum requirements for the Scope of Performance of First Responders, which includes volunteer fire departments that provide Emergency Medical Care. The guidelines do not purport to address all of the safety concerns that may exist at the scene of the emergency.

The guidelines, however, take into consideration an individual's acquired knowledge and the demographic differences that exist in rural areas. In addition, these guidelines establish first responder training criteria to minimize further patient complications until more highly trained emergency medical service personnel intervene. The guide does not include performances of emergency ambulance personnel, but only volunteer firefighters and other public safety personnel.

The following chart illustrates the scope of performance for first responders, but is not in an order that suggests a particular performance sequence. Based on the guidelines, and the historical data on the types of medical emergencies occurring in their jurisdiction, volunteer fire departments should establish a minimum staffing objective in response to medical emergencies. Inherent in the written objective below, is an understanding that this minimum is predicated on the availability of volunteer firefighters. It must be acknowledged that NFPA 450 Guide for Emergency Medical Services and Systems specifies that most experts agree that four responders, two at least trained in ACLS and two trained in BLS, are the minimum required to provide ACLS to cardiac arrest victims.<sup>1</sup>

It is recommended that the SIFPD adopt the following statement as its declaration of deployment for EMS:

**“The first unit responding to a medical emergency shall be staffed with a minimum of 2 first responders shall meet the minimum performance guidelines or certification as established by the SIFPD”.**

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<sup>1</sup> Standard Guide for Scope of Performance of First Responders who Provide Emergency Medical Care, ASTM Designation F1287 – 90 (Re Approved 2007)

The tasks the SIFPD expect to be able to accomplish with their response are as follows:

Figure 14 - EMS Performance Guidelines

Check	Performance Guidelines
Yes	Determine vital signs and identify normal ranges
Yes	Identify and report various forms of emergency medical identification found on the patient
Yes	Conduct a primary assessment for life threatening conditions
Yes	Provide BLS/CPR in accordance with America Heart Association/Red Cross standards
Yes	Control bleeding
Yes	Dress and bandage soft issue injuries
Yes	Care for a person in shock
Yes	Supplement respirations with available mechanical aids to breathing, including oxygen
Yes	Perform secondary assessment
Yes	Immobilize musculoskeletal injuries
Yes	Immobilize the spine
Yes	Move a sick or injured person from a hazardous environment in such a manner that the chance of aggravating injuries is minimized
Yes	Move a person in conjunction with patient care activities in such a manner that the chance of aggravating injuries is minimized
Yes	Care for a person who has non-traumatic chest pain
Yes	Care for a person who is experiencing respiratory distress
Yes	Care for a person who is experiencing a diabetic emergency
Yes	Care for a person who has ingested, injected, inhaled, or absorbed a poison
Yes	Care for a person who is experiencing an altered level of consciousness
Yes	Care for a person who has thermal, chemical, or electrical burns
Yes	Care of a person who is adversely affected by the environment
Yes	Provide initial care of a person with behavioral problems
Yes	Provide initial care for a person who is physically and/or sensory impaired
Yes	Recognize a multiple casualty incident and initiate an appropriate response
Yes	Triage injured persons found at a multiple casualty incident
Yes	Recognize potential dangers at an emergency scene and take appropriate actions to protect first responders and other persons
Yes	Use available equipment to gain access to trapped and injured persons in order to provide life saving care

### The Cascade of Events

In every emergency there is a sequence of events, which are critical elements in respect to time and evaluation of the response system, known as the Cascade of Events. It occurs on every emergency call. Part of the risk assessment includes the evaluation of the department's ability to respond to emergencies. The response performance continuum is composed of the following:

**Event Initiation Point** - The point at which factors occur that may ultimately result in activation of the emergency response system.

**Emergency Event Awareness** - The point at which human being or technologic sentinel (smoke alarm, heat detector) becomes aware that conditions exist requiring activation of the emergency response system.

**Alarm** - The point at which awareness triggers notification of the emergency response system.

**Notification** - The point at which an alarm is received by the Inyo County Sheriff Dispatch.

**911 Dispatch Processing Time** - The time between the first ring of the 9-1-1 telephone at the dispatch center and the time the operator activates the station or other volunteer alerting devices.

**Turnout Time** - The interval between the activation of the fire station, or firefighter's alerting devices, including the time when the responding crew is on the apparatus, and the apparatus is beginning to roll toward the call.

*This time varies with Volunteer Fire Companies. This element is also influenced by local practices that either prohibit or allow personally operated vehicles (POV) to be utilized.*

**Travel Time** - The point at which the responding apparatus notifies the dispatch center that they are responding to the alarm and ends when the responding unit notifies the dispatcher of its arrival on scene.

**On Scene Time** - The point at which the responding unit arrives on the scene of the emergency.

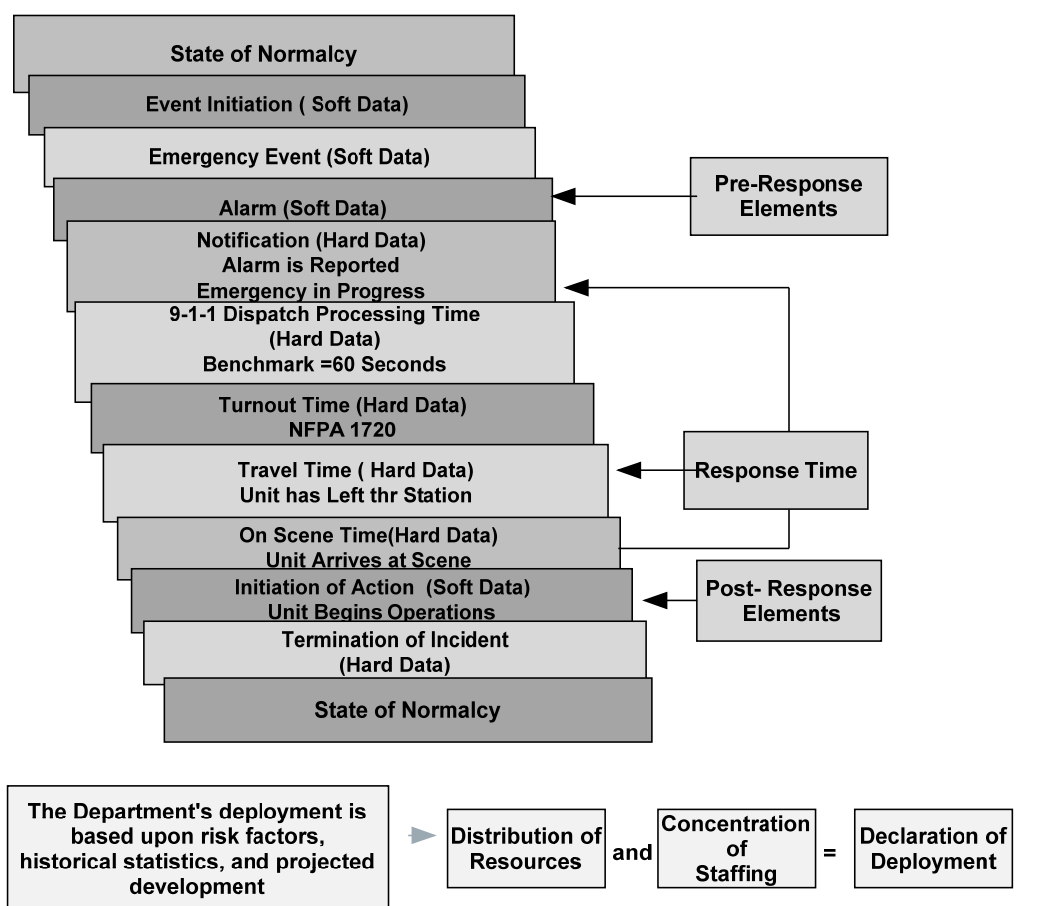
**Initiation of Action** - The point at which operations to mitigate the event begins.

**Termination of incident** - The point at which units have completed the assignment and are available to respond to another request for service.

**Total (Reflex) Response Time** - Alarm process time plus turnout time plus travel time.

Figure 15 - Cascade of Events Associated with Emergency Operations

## The Cascade of Events Associated with Emergency Operations



The Turnout Time event provides a reference to NFPA 1720 for Volunteer Fire Companies' turnout time. Again, turnout time is unique to each individual volunteer department. Members may need to respond from home, business or other locations to the fire station to don protective clothing, prior to responding to the emergency call. Or they may be allowed to go direct to the scene.

The following chart delineates the need for there to be an effort to identify the Fire Department's average baseline performance measure for Turnout Time. This is best determined by keeping accurate records for an extended period of time (Minimum of three years) of the recall time required to get apparatus on the road.

Our volunteer department is like many others as there is somewhat of a difference between day time and night time response records.

Figure 16 - Baseline Turnout

*\*\* See Glossary of Terms for definition of Baseline vs. Benchmark*

**“The first unit responding to any type of emergency shall be turned out within 12 minutes at a minimum during daylight hours and 12 minutes during evening hours. The equipment will be staffed with a minimum of 2 first responders and shall meet the minimum performance guidelines or certification as established by the SIFPD”.**

*Baseline Turn Out Time (0700-1859hrs) = 12 minutes*

*Baseline Turn Out Time (1900-0659hrs) = 12 minutes*

### **Insurance Service Office (ISO) GRADING SCHEDULE**

For a broad spectrum of commercial and personal lines of insurance, ISO provides statistical, actuarial, underwriting, and claims information and analyses, including consulting and technical information. In the battle against fire losses, one of the industry's more important tools is the Public Protection Classification (PPC™) program administered by ISO. The PPC program evaluates a community's public fire protection capability and assigns a protection-class rating from 1 to 10. Class 1 represents exemplary fire protection; Class 10 means that the area's fire-suppression program does not meet ISO's minimum criteria. According to the records reviewed in this study, the SIFPD does not have a current ISO grading file, and is therefore is classified as a Class 10 area.

It would be desirable for the the department to be able to achieve a Class 8B in the future, in the rural zone. This could result in some savings to the dwelling owners in the area. The following is a brief description of an 8B classification.

Class 8B - Class 8B is for communities providing superior fire-protection services and fire-alarm facilities but lacking the water supply required for a PPC of Class 8 or better. To be eligible for Class 8B, a community must meet the fundamental requirements for a classification better than Class 9. The community must have:

- An adequate number of well-organized and properly trained firefighters
- Reliable fire-alarm facilities
- Reliable fire apparatus with proper equipment
- Adequate fire station facilities
- Operational records

However, instead of providing a minimum fire flow of 250GPM for two hours as required by Class 8, the fire department must deliver an uninterrupted fire flow of 200GPM for 20 minutes, beginning within five minutes of the first-arriving engine company. The department must be able to provide the minimum fire flow to at least 85 percent of the built-upon areas of the community and score well in the "Receiving and Handling Fire Alarms" and the "Fire Department."

**Class 9**—Class 9 is for fire departments that lack a water supply for fire suppression meeting minimum criteria (250 GPM for two hours) and that have minimal fire suppression apparatus and equipment.

**Class 10**- Class 10 is where fire departments receive less credit than a Class 9

**It should be the goal of the SIFPD to achieve Class 8B within the 8 mile travel distance radius in the two rural zones.**

## Performance Measures for Response

The combination of property and life risk determines the fire ground tasks that must be accomplished in an emergency to minimize losses. These factors, although interrelated, can be separated into two basic types: fire flow and life safety. Fire-flow tasks are related to getting water on the fire; life safety tasks are related to finding injured or ill persons and providing definitive emergency medical care, or in the case of trapped victims, removing them from the building. The required fire-flow is based on a building's size, structural material, distance from other buildings, horizontal and vertical openness, contents, density, and potential energy release (BTUs per pound).

Life-safety tasks are based upon the number of patients in an emergency medical incident or occupants in a fire situation: their location (e.g., a low rise versus high rise), their status (awake versus asleep), and their ability to take self-preservation action. For example, ambulatory adults need less assistance than non-ambulatory. The elderly and small children always require more assistance. The key to any fire department's success at an emergency incident is coordinated teamwork, regardless of whether the tasks are all fire-flow related or a combination of fire-flow, rescue and life safety.

A fire in an occupied residential single or multi-family structure requires a minimum of eight tasks to be simultaneously conducted in order to stop the loss of civilian lives, stop further property loss, and minimize the risks to the firefighters. The number of types of tasks needing simultaneous action will dictate the minimum number of firefighters needed at different types of emergencies.

## Distribution

Distribution involves locating first due resources geographically, to provide rapid response to designated areas, to mitigate the emergency and save lives. A measurement of Distribution is to determine the percentage of the jurisdiction that is covered within the adopted performance measure (time) for the arrival of the first due unit.

## Demand Zone

The concept of a demand zone is simple. It is an area that has been mapped and has had an assessment of its risk factors used to determine what type of response should be provided. For purposes of this discussion volunteer fire departments have a need to create demand zones that are a reflection of two factors. The first is the location of your largest target hazards. Even rural fire agencies have large risks to contend with. Agricultural warehouses, silos, even local infrastructure services like bulk plants, utility buildings, etc create an inventory of target hazards. They need to be assessed as to whether they can be reached in reasonable time frames.

The second consideration is the residential housing stock. A volunteer fire department may have only one district – it may only cover a few square miles. Other departments may have hundreds of square miles and the demand zones need to be clarified as to which ones are within a reasonable response distance. For example, ISO recognizes a 5 mile limitation. Perhaps one distinction should be those buildings that are within a 5 mile road travel distance.

In either case, the volunteer department should create and define its “demand zones” based upon some logic that can be supported when an emergency occurs.

## Distribution Demand Zones

The distribution standard is based upon the recognition that all responses beyond 8 miles from the existing fire station and all future fire stations will still be done in accordance with the demands of a rural fire department protecting isolated structures. The department hereby adopts the following distribution standard:

**For 80% of all calls for service, within the populated Demand Zone(s) the first due unit shall arrive within 15 minutes Response Time. The first due unit shall be capable of advancing the initial hose line for fire control or initiating rescue operations, or emergency medical intervention.**

First unit arrival times are the best measure of distribution of fire resources. NFPA Standard 1720<sup>2</sup> identifies minimum Response Time and Staffing requirements to ensure that a sufficient number of

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<sup>2</sup> NFPA 1720, Organization and Deployment of Fire Suppression Operations by

members (Effective Response Force) are available to operate safely and effectively. See Figure 17 for a definition of these types of demand zones.

Figure 17 - NFPA 1720 Staffing and Response Time

Demand Zone	Demographics	Minimum Staff To Respond	Response Time Minutes	Objective (%)
Urban Area	>1000 people per sq mile	15	9	90
Suburban Area	500-1000 people per sq mile	10	10	80
Rural Area	<500 people per sq mile	6	14	80
Remote Area*	Travel Distance >8 miles	4	Dependent on distance	90
Special Risk	Determine AHJ	Determine by AHJ based on risk	Determine by AHJ	90

\*Upon assembling the necessary resources at the emergency scene, the fire department should have the capability to safely commence an initial attack within 2 minutes 90 percent of time

In conducting research of the volunteer fire service the authors have identified that many volunteer organizations have response times way beyond the “rural area” definition of 8 miles. It is recommended that when this phenomena occurs the local fire authority may wish to have a 10 mile and even a 20 mile limitation zone. **SIFPD has chosen to use the 8 mile limitation for definition of rural area.**

Figure 18 - Performance Measure Distribution

Complete the chart below, with the necessary information, based on the most available data available.

Performance Measure Distribution	
<b>Station # 1 Tecopa (Includes Shoshone)</b>	Rural
Area Covered by Station Sq Miles	200 sq miles
Approximate Population	200
Number of Dwelling Units	100
Percent of Total Calls for Service	60%
First Unit Arrives in 15 Minutes Travel Time	50%

<b>Station # 2 Charleston View (Planned)</b>	Rural
Area Covered by Station Sq Miles	200 sq miles
Approximate Population	100
Number of Dwelling Units	50
Percent of Total Calls for Service	10%

First Unit Arrives in 40 Minutes Travel Time (over 20 miles travel distance)	
Percent of Calls First Unit Arrives within 30 Minutes	0%

### Concentration

While Distribution is about the arrival of the First Due Unit, Concentration is the arrangement of multiple resources (fire stations) and their spacing or closeness to one another having the right type and amount of equipment, that can be assemble at the scene. For departments with a single station, Concentration is about having the correct amount and type of equipment in the station and its orderly arrival at the scene of the emergency. This would include staff and Officers in a time frame to allow an effective resolution of the emergency situation. Hence, as Distribution is speed, Concentration is weight.

### Total Response Force

A Total Response Force is defined as the minimum amount of staff, and equipment, which must reach a specific emergency within a targeted travel time. The Effective Response Force should be able to handle the typical fire that is reported shortly after it starts and is within the maximum prescribed travel time for the type of medical emergency or risk level of the structure. Considering the fire department cannot hold fire or other risks to zero or successfully resuscitate every patient, its response objective should find a balance among effectiveness, efficiency, and reliability, which will keep community risk at a reasonable level.

Figure 19 - Total Response Force

Total Response Force				
Demand Zone	Demographics	Minimum Equipment & Staff to Respond	Response Time Minutes	Objective (%)
Rural Area	<500 people per sq mile	Service Level D	15 minutes	75%
Frontier Area	Travel Distance >8 miles	Service Level E	30 minutes or distance driven	75%
Special Risk	Bright Source	Initial Response	15 minutes	80%

### Matrix for Setting Level of Service

It is important for us to consider the vast differences in the demographics of the departments that protect rural areas. Therefore, we must be cautious in creating standards too stringent for small

communities with limited personnel, but also hold to acceptable levels of service for the residents of such communities.

Depending upon how many personnel are available a fire department might be able to achieve any number of service levels. Based upon your department's equipment and average number of individuals that turnout on alarms your service level can be relatively predicted.

The following chart illustrates what each level of response can generate in terms of service level. The Service Level designation on the left hand column is to be used to describe the level that a department can achieve if its record keeping system contains data that will support that level of staffing being available on a regular basis.

**Figure 20 - Matrix of Setting a Standard of Service**

SERVICE LEVEL*	DESCRIPTION
Offensive Service Level A	a. Personnel available – 12 - 15 b. Equipment – 2 NFPA criteria engine (pumper), and one truck company (aerial or support truck) so fire crews can invoke 2 in – 2 out. c. Interior Firefighting capabilities of room or contents and small buildings under 10,000 square feet. Vehicle rescue capabilities with power or no power equipment and provide Operations level Hazardous Materials Response. NFPA PPE/SCBA for each person. d. Expectations – Ability to extinguish most any fire and save life and property. The ability to perform and extricate a person from a motor vehicle efficiently. The ability to identify and provide operations level hazardous materials response. Arrive on scene within 9 minutes of dispatch, 90% of the time.
Offensive Service Level B	a. Personnel available – 9 - 12 b. Equipment – 2 NFPA criteria engine (pumper) c. Interior Firefighting capabilities of room or contents and small buildings under 5000 square feet. Vehicle rescue capabilities with power or no power equipment and provide Operations level Hazardous Materials Response. NFPA PPE/SCBA. Can invoke 2 in – 2 out interior d. Expectations – Ability to extinguish a fire and save life and property. The ability to perform and extricate a person from a motor vehicle efficiently. The ability to identify and provide operations level hazardous materials response. Arrive on scene within 10 minutes of dispatch, 80% of the time.
Offensive Service Level C <b>This is the benchmark for the anticipated capacity for SIFPD in the future</b>	a. Personnel available – 6 - 9 b. Equipment – 1 NFPA criteria engine (pumper) c. Interior Firefighting capabilities of room or contents and small buildings under 1000 square feet. Vehicle rescue capabilities with power or no power equipment and provide Operations level Hazardous Materials Response. NFPA PPE/SCBA. Can invoke 2 in – 2 out interior d. Expectations – Ability to extinguish a fire and save life and property. The ability to perform and extricate a person from a motor vehicle efficiently. The ability to identify and provide operations level hazardous materials response. Arrive on scene within 14 minutes, 80% of the time.

<b>Defensive Service Level D</b> <b>This is the current level of capacity for SIFPD</b>	a. Personnel available – 5 b. Equipment – 1 NFPA criteria engine (pumper) c. Interior Firefighting capabilities only of room or contents and small buildings under 750 square feet. Also, vehicle extrication capabilities with little or no power equipment. NFPA PPE/SCBA exterior d. Expectations – Ability to extinguish a fire and save life and property. The ability to extricate a person from a motor vehicle efficiently. Respond within 9 minutes, plus travel time.
<b>Defensive Service Level E</b> <b>This is the service level for the areas designated as frontier.</b>	a. Personnel available – 4 b. Equipment – 1 NFPA criteria engine (pumper) c. Interior Firefighting capabilities only of room or contents and small buildings under 750 square feet, NFPA PPE/SCBA exterior d. Expectations – Ability to extinguish a fire and save life and property. Respond within 9 minutes, plus travel time
<b>Defense Service Level F</b>	a. Personnel available – 3 b. Equipment – 1 NFPA criteria engine (pumper) c. Exterior Defensive Firefighting capabilities only d. Expectations – Protect surrounding exposures, loss of involved property – NO TIME LIMITS

\*An ultimate (most basic) goal is to have a turnout time (time from dispatch to time first vehicle leaves the door) is 9 minutes 90% of the time, plus travel time to the incident. (Levels E and F)

\*Communities may have more than one service level

## Train to your Level of Service

Once a volunteer fire department has evaluated its staffing resources and determined what **level of service** it can achieve, an effort needs to be extended to relate that decision to the level of training required. The higher the level of service, the more robust the training requirements need to be. Regardless of whether or not a firefighter is paid or volunteer, the organization and its officers have a responsibility to see that operations are carried out safely.

If the department has set its service levels, and defined the expectations in the community that result in offensive firefighting operations training will need to be conducted so the personnel meet adequate training in interior operations. This includes use of self contained breathing apparatus, proper ventilation and nozzle operations and basic incident command systems (ICS).

While this level is not well defined on a national level, and varies from state to state, it is generally recognized that a minimum of 140 hours of basic practice is the absolute minimum to protect a novice firefighter from inappropriate activity.

For each level of service, there needs to be a minimum amount of training involved. That includes both offensive and defensive types of environments. This assessment should include basic rules of

engagement. These rules of engagement must be reinforced by all officers supervising emergency conditions.

Rules of engagement must be set for each level A through F.

At the highest level A, (Offensive Level) which authorizes interior operations, officer accountability is absolutely essential.

Exposure (Defensive Level) protection means absolutely no interior operations.

**Figure 21 – Training Requirements**

<b>SERVICE LEVEL</b>	<b>TRAINING REQUIREMENTS</b>
Offensive Service Level A	<b>Firefighter</b> – Firefighter I Certification, Advanced vehicle rescue course, Haz Mat Operations Course, RIT Course, Truck Company Operations Course, NIMS <b>Pump Operator</b> – Basic Pump course, Firefighter I Certification, Advanced vehicle rescue course, Haz Mat Operations Course, Truck Company Operations Course, NIMS <b>Company Officer</b> – Fire Officer 1 <b>Chief Officer</b>
Offensive Service Level B	<b>Firefighter</b> – Basic firefighting course, Advanced vehicle rescue course, Haz Mat Operations, RIT Course, Truck Company Operations Course, NIMS <b>Pump Operator</b> – Basic Pump course, Basic firefighting course, Advanced vehicle rescue course, Haz Mat Operations Course, Truck Company Operations Course, NIMS <b>Company Officer</b> – Fire Officer 1 <b>Chief Officer</b>
Offensive Service Level C Benchmark is this level	<b>Firefighter</b> – Basic firefighting course, Basic vehicle rescue course, Haz Mat Operations Course, NIMS <b>Pump Operator</b> – Basic Pump course, Basic firefighting course, Basic vehicle rescue course, Haz Mat Operations Course, NIMS <b>Company Officer</b> – Fire Officer 1
Defensive Service Level D Baseline is this level less than 8 miles	<b>Firefighter</b> – Basic firefighting course, Basic vehicle rescue course, Haz Mat R&I, NIMS <b>Pump Operator</b> – Basic Pump course, Basic firefighting course, Basic vehicle rescue course, Haz Mat R&I, NIMS
Defensive Service Level E Baseline is this level more than 8 miles	<b>Firefighter</b> – Basic firefighting course, Haz Mat R & I, NIMS <b>Pump Operator</b> – Basic Pump course, Basic firefighting course

Defense Service Level F	<b>Firefighter</b> – Basic firefighting course <b>Pump Operator</b> – Basic Pump course
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Figure 22 - EMS Service Level

Service Level	Qualifications
EMS Service Level A	Advanced Life Support – 1 EMT and 1 Paramedic
<b>EMS Service Level A1</b>	<b>AEMT Program currently under development by Inyo County – 1 EMT and 1 First Responder</b>
EMS Service Level B	Basic Life Support – 1 EMT and 1 First Responder
EMS Service Level C	Quick Response Unit with 1 EMT and 1 First Responder
EMS Service Level D	First Aid Response by 2 First Responders

## Critical Tasks

It is known that fire growth, along with property or life risk, combine to determine the fire ground tasks that must be accomplished to stop fire loss or save lives. These tasks relate to getting water on the fire and to tasks relating to rescue operations. As with any fire, these tasks are dictated by the size of the structure, its construction type, density and vertical and horizontal openings. There are critical tasks that must be coordinated in a timely manner by on-scene personnel in order to control the dynamics of fire growth. In essence, it is the action required to control the escalation of the fire prior to flash over. Since the establishment of OSHA 29 CFR 1910 (2 in 2 out), **all** agencies must have a Rapid Intervention procedure in place to rescue the total number of personnel operating within the structure. A volunteer agency is not exempt from recognizing this rule. It is the arrival of a Total Response Force that is most critical in controlling the event from escalating.

Figure 23 - Critical Tasking Chart

Low Risk Minimum Tasks Necessary at a 2000 Square foot Residential Structure Fire		
Tasks	Firefighters	Company Assigned
Attack Line	2	Tecopa Engine – (Charleston View)
Rapid Intervention Team		Unable to provide
Search and Rescue		Situational only
Ventilation		Situational only
Back Up Line		Unable to provide
Safety Officer		Unable to provide
Pump Operator	1	
Water Supply	1	
Command Officer	1	
<b>Total Personnel</b>	<b>5</b>	

## Performance Measure Objectives

To minimize risk, the department strives to extinguish small fires quickly before they reach flashover potential and to mitigate medical emergencies quickly to reduce cardiac death. As flashover is such a significant fire event, preventing this stage of fire behavior is imperative. Time is a key factor in this effort. Once flash over is reached, an exponential increase occurs not only in the rate of combustion, but in the amount of resources necessary to mitigate the fire emergency.

### Structural Fire Objective

To maintain a service level capability(objective) to ensure the arrival of sufficient equipment and personnel, to stop the escalation of the fire and keep the fire to the area of involvement, upon the arrival of the first engine, while proving the safety of the first responders.

- The first engine to the Tecopa and Charleston View area shall be staffed with a minimum of 2 personnel and shall arrive within 15 minutes total reflex time for 90 percent of all requests for service.
- All other responding units to the remote areas shall arrive within 30 minutes total reflex time, sufficiently staffed with a minimum of 2 personnel for 80 percent of all requests for emergency service.

## Adoption of Performance Measures

- Performance Measures are how fire departments measure the quality of service they provide their community. Developing performance measures is a process by which the fire department establishes the criteria for determining the quality of service they provide. Performance measures are interrelated with Level of Effort as discussed earlier.
- Developing a system of performance measures begins with defining the important objectives in mitigating the effects of fire and other related emergencies, which culminates in the arrival of adequate resources in a timely manner. After setting minimum requirements the fire department and community can begin measuring the actual performance. By comparing the actual performance against service level objectives the department can identify areas of needed improvement. It is the responsibility of agency decision makers to adopt Performance Measures. In so doing, they establish a standard by which the fire department's performance can be deliberated. See chart below.

Figure 24 - Performance Measures

Actual Performance Measures			
Incident Type	Actual Minimum	Time	%
<b>Structural Fire</b>			
Rural	Less than 8 miles	15 min	80%
Remote	More than 8 miles	30 min	70%
<b>Wildland Fire</b>			
Rural	Less than 8 miles	15 min	80%
Remote	More than 8 miles	30 min	70%
<b>Medical (EMS)</b>			
Rural	Less than 8 miles	15 min	80%
Remote	More than 8 miles	30 min	70%
<b>Rescue</b>			
Rural	Less than 8 miles	15 min	80%
Remote	More than 8 miles	30 min	70%
<b>Special</b>			
Rural	Less than 8 miles	15 min	80%
Remote	More than 8 miles	30 min	70%

### New Facilities

The land owner has offered to SIFPD a 2.5 acre parcel directly across Old Spanish Trail Hwy from the Hidden Hills Solar Electric Generating Station (HHSEGS) project site, contingent on licensing. In order to adequately serve the project in both construction and operational phases, SIFPD intends to construct a fire station on this property. Facilities will include a garage structure to house fire and ambulance response vehicles, an office/ training/ dorm building, water supply (well and tank), and a heli-pad.

SIFPD also has a 2.5 acre site in Tecopa projected to expand headquarter facilities. **SIFPD has the fire apparatus for the Charleston View station and will need to acquire an additional water tender and ambulance to serve the project.**

### Adoption of Rules of Engagement

Every time that an alarm is called in to a volunteer fire department it results in the recall of individuals that may be responding from a wide variety of circumstances. Some might be at work, others at leisure; others may be at home or attending school. Regardless of what they were doing a few minutes before, they are now required to conduct themselves in a very specific manner if they are to protect the community from whatever caused the alarm. This phenomenon places a very high level of responsibility upon the members of the volunteer fire service to be prepared to act correctly and safely.

It is also a fact that many volunteer firefighters are killed or injured in the line of duty. Some become casualties when responding to the fire stations, some during an emergency event, and some are even struck down when returning to the station. This places a great deal of emphasis upon having policies that promote safe operations.

In July of 2010, the Safety, Health and Survival Section of the International Association of Fire Chiefs developed and distributed a document entitled: Rules of Engagement Project: Increasing Fire Fighter Survival. In that document the authors presented two sets of "Rules of Engagement". The first is for the firefighter. The second was for the incident commander. Both are applicable to this discussion of deployment policy. For a further explanation of this concept please turn to the Appendix labeled "Rules of Engagement".

### Future Considerations for Deployment Declaration

One of the conditions that has generated the need for this deployment declaration, is the future project involving Hidden Hills Solar Energy Project. Once construction is initiated at that location, the daily population for construction increases the potential for emergency operations on the SIFPD by up to four times. (500 citizens versus 2,300 workers at peak) The deployment that has been established for Tecopa/Shoshone and the other enclaves cannot be achieved in the vicinity of the Hidden Hills Project without additional facilities and staffing. In other documents, pursuant to defining the impact upon SIFPD, it has clearly defined a need to build a fire station in closer proximity in order to meet even rural level of service. This has been declared in the impact documents. In order to comply with 1720 Declaration of Deployment, the department will need to staff an additional station in the near vicinity. Charleston View should be staffed with a minimum of 1 person on a 24/7 basis (this is 3 FTE), supported by volunteers from the Charleston View area to provide initial response both on and off site for the energy plant. In adhering to the baseline that currently applies to the other population enclaves, additional volunteer personnel will need to be recruited from the Charleston View area.

### Summary

Declaration of Deployment – The department hereby declares the following:

Based upon the analysis and review of the body of this report, the SIFPD hereby declares its deployment as being characterized by the following factors. It is the intent of this declaration to meet the requirements of NFPA 1720, Section 1.2.1 "the purpose of this standard is to specify the minimum criteria addressing the effectiveness and efficiency of the volunteer and combination public fire suppression operations, emergency medical service, and special operations delivery in protecting the citizens of the jurisdiction."<sup>3</sup> In accordance with Section 1.3.1 the Authority Having Jurisdiction has determined this standard is applicable to its fire department. It is the intent of the department, in accordance with Section 4.4.2.1 to evaluate its level of service deployment delivery and response time objectives on an annual basis. Lastly, this report is deemed to comply with Annex A, Section A.1.3.1.

1. The Southern Inyo Fire Protection District fits two categories. Portions of the study area are within 8 miles driving distance, other portions are in excess of 8 mile travel time resulting in two different demand zones, cross roads and isolated.

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<sup>3</sup> NFPA 1720 Standard for the Organization and Deployment of Fire Suppression Operations Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments.

2. "The area is defined as a low density and low demand area. In many rural areas the SIFPD may be the only public safety resource that is available to respond to an emergency on any basis".
3. "Currently the SIFPD has 2 paid staff: This consists of a Fire Chief/Mechanic and Administrative Officer. Both respond to emergencies as volunteers. The department has 7 volunteers: 3 of which are trained as Emergency Medical Technicians (EMT) –Basic; two of them are soon to achieve AEMT. 2 Firefighter II, 1 Firefighter I, and 1 Entry Level Firefighter".
4. "The SIFPD responds one engine, a water tender, and an ambulance and command vehicle on every event - Because of the limited staffing the organization has a limited ability to vary its responses".
5. "Based upon this model the SIFPD faces a limited fire risk in that there are currently not many major buildings. Nonetheless, there is an expectation that the dwellings in this area should receive a response to limit damage whenever the department can".
6. "The first unit responding to a fire emergency shall be staffed with a minimum of 2 first responders shall meet the minimum performance guidelines or certification as established by the SIFPD in its Rules of Engagement".
- 6a. "The first unit responding to a medical emergency shall be staffed with a minimum of 2 first responders shall meet the minimum performance guidelines or certification as established by the SIFPD".
- 6b. "The first unit responding to any type of emergency shall be turned out within 12 minutes at a minimum during daylight hours and 12 minutes during evening hours. The equipment will be staffed with a minimum of 2 first responders and shall meet the minimum performance guidelines or certification as established by the SIFPD".
7. The department's deployment declaration is described in the following chart:

Total Response Force				
Demand Zone	Demographics	Minimum Equipment & Staff to Respond	Response Time Minutes	Objective (%)
Rural Area	<500 people per sq mile	Service Level D	15 minutes	75%
Frontier Area	Travel Distance >8 miles	Service Level E	30 minutes or distance driven	75%
Special Risk	Bright Source	Initial Response	15 minutes	80%

- 8a. Based upon assessment of organizational capacity and risk levels, the department hereby adopts the following service levels for fire and other emergencies:  
Offensive Service Level C

This is the benchmark for the anticipated capacity for SIFPD in the future

Defensive Service Level D

This is the current level of capacity for SIFPD

Defensive Service Level E

This is the service level for the areas designated as remote

- 8b. Based upon assessment of organizational capacity and risk levels, the department hereby adopts the following training levels for fire and other emergencies

Offensive Training Level C

This is the benchmark for the anticipated capacity for SIFPD in the future

Defensive Training Level D

This is the current level of capacity for SIFPD

Defensive Training Level E

This is the training level for the areas designated as remote

9. EMS Service Level A1 – AEMT Program currently under development by SIFPD – 1 EMT and 1 First Responder

10. The following table represents the performance expectations of this department at the current time.<sup>4</sup>

Actual Performance Measures			
Incident Type	Actual Minimum	Time	%
<b>Structural Fire</b>			
Rural	Less than 8 miles	15 min	80%
Remote	More than 8 miles	30 min	70%
<b>Wildland Fire</b>			
Rural	Less than 8 miles	15 min	80%
Remote	More than 8 miles	30 min	70%
<b>Medical (EMS)</b>			
Rural	Less than 8 miles	15 min	80%
Remote	More than 8 miles	30 min	70%
<b>Rescue</b>			
Rural	Less than 8 miles	15 min	80%

<sup>4</sup> SIFPD has chosen to use the 8 mile limitation for definition of rural area.

Remote	More than 8 miles	30 min	70%
<b>Special</b>			
Rural	Less than 8 miles	15 min	80%
Remote	More than 8 miles	30 min	70%

11.

It should be the goal of the SIFPD to achieve Class 8B ISO rating within the 8 mile travel distance radius.

12.

For 80% of all calls for service, within the populated Rural Zone(s) the first due unit shall arrive within 15 minutes Response Time. The first due unit shall be capable of advancing the initial hose line for fire control or initiating rescue operations, or emergency medical intervention.

#### Specific Recommendations for Improvement -

The Table provides a listing of recommendations that assist the organization in improving its Deployment.

Figure 25 – Summary of Recommendations

Recommendations	Time Frame in Month of Year	Impact/Cost Anticipated
1. Develop Fire Station in Charleston View	Initiated January 2014	\$500,000
2. Staff Station in Charleston View	Consistent with Construction on the ground at Bright Source	Under Development
3a. Acquire Water Tender	Consistent with Construction on the ground at Bright Source	\$40,000 - \$50,000 Used Equipment
3b. Acquire Additional Ambulance	Consistent with Construction on the ground at Bright Source	\$40,000 - \$50,000 Used Equipment
4. Build Fire Station and Maintenance Building in Tecopa	Initiated January 2015	\$200,000

## Appendix Apparatus Inventory

1983 Hahn Superior	
1978 Ford Mini Pumper	
1983 Chevrolet Mini Pumper 250 gallon tank, 100 gpm portable pump 64,000 miles	

<p>1980 Hahn Superior Primary Engine Company</p>	
<p>Left - 1980 International Brush – (in service) Right – 1975 International Van Pelt</p>	
<p>2005 Peterbuilt Water Tender, 2000 gallon, 750 gpm pump</p>	
<p>2003 Ford Ambulance 250,000 miles (old Pahrump vehicle makes multiple round trips to Las Vegas)</p>	

<p>1985 Ford Ambulance 50,000 miles</p>	 A photograph of a white 1985 Ford ambulance with red stripes and the word 'AMBULANCE' in red letters. The ambulance is parked on a gravel lot. Another ambulance is partially visible to the left. The background shows a clear blue sky and some distant hills.
<p>HazMat</p>	

## Appendix: Glossary of Terms

**Advanced Life Support (ALS):** Medical care by paramedics. This would include administration of medication, defibrillation, and airway management.

**Alarm:** Notification of a signal from a device or person indicating the existence of an emergency.

**Alarm Processing Time:** The elapsed time from receipt of an alarm in a dispatch center to notification of the fire companies that are to initiate response.

**Arrival:** The point at which the fire companies dispatched to the scene are stopped at the scene of the emergency.

**Authority Having Jurisdiction (AHJ):** An agency having jurisdiction for enforcing the regulations pertaining to the jurisdiction.

**Baseline:** A point of departure, a starting point, your present status, a point of comparison which can be measured aligned with a benchmark.

**Benchmark:** What you would like to obtain, a point that can be measured, a standard of achievement, a point of reference. The difference the starting point and what you desire to achieve.

**CAD:** Computer Aided or Assisted Dispatching.

**Call:** A request for assistance of equipment and personnel.

**Call Processing Interval:** The time between the first ring of a 911 call at a dispatch center and the time the dispatch operator activates the station or other alerting devices.

**Community:** Refers to those living in a particular location.

**Defibrillator:** The delivery of an electric shock to a patient whose heart is fibrillating to restore the heart to normal rhythmic activity.

**Deployment:** The process by which resources are distributed throughout the service area.

**Dispatch:** The procedure to dispatch emergency resources to an address or location for a specific purpose.

**Distribution:** A measurement of the jurisdiction covered by the first due units within a response time standard.

**Effective Response Force:** The number of personnel that is assembled at the scene of an emergency to conduct the critical tasks in order to control the emergency situation.

**Emergency Demand Zone:** The geographic area designated by the fire department to determine an emergency response pattern.

**Engine Company:** A company, usually an engine, deployed with hose and water for fire attack.

**ESO: Acronym for Emergency Services Organization (Used in VCOS Summit)**

**Fire Demand Zone:** An area for fire hazard analysis.

**Fire Apparatus Engineer:** The operator or driver of a fire engine, whose primary function is to pump water.

**Fire Captain:** The supervisor of a fire crew, either engine, truck or other apparatus.

**First Alarm Assignment:** The number of companies and staffing that respond to a specific type of emergency.

**Flashover:** A designated temperature at which a fire causes complete destruction of all materials in the fire area.

**Hazardous Material:** A substance that presents a danger to person(s) due to toxicity, chemical reaction, etc.

**High Risk Hazard:** An area with a high concentration of property risk, or possible loss of life or financial impact on the community.

**Initial Attack:** The beginning phase of initial fire suppression.

**Incident Command System (ICS):** The on-scene incident chain of command system, which identifies the key roles and those tasks to manage an incident.

**Incident Commander:** The officer at the top of the incident management team in overall charge of the incident.

**Level of Service:** A standard of service used by governmental agencies to measure the effectiveness of service being provided.

**Multiple Casualties:** A medical incident that involves more than a specific number of patients with injuries.

**Mutual Aid:** Reciprocal assistance by other emergency service providers, usually through a prearranged plan.

**NFIRS:** National Fire Incident Reporting System.

**On Scene Time:** The point at which a responding unit arrives on scene.

**Public Safety Answering Point (PSAP):** A facility in which 9-1-1 or other emergency calls are answered.

**Rescue Unit:** A specific and specialized unit for the delivery of emergency medical care.

**Rapid Intervention Team (RIT):** A crew for the specific and intended purpose only of rescuing emergency personnel during emergency operations.

**Response Time:** The elapsed time from the point of notification (Dispatch) to a responding company and their arrival at the scene.

**Ventilation:** The systematic removal and replacement of heated smoke, air and gases from a structure with cooler air.

## Appendix - Rules of Engagement

The following rules of engagement are applicable to the discussion of deployment expectations. These policies should be adopted as general guidelines for anyone responding as part of a crew.

### Rules of Engagement for Firefighter Survival

- Size-up Your Tactical Area of Operation
- Determine the Occupants Survival Profile
- **DO NOT** Risk Your Life for Lives or Property That Can Not Be Saved
- Extend **Limited** Risk to Protect **SAVABLE** Property
- Extend **Vigilant** and **Measured** Risk to Protect and Rescue **SAVABLE** lives
- Go in Together, *Stay Together*, Come Out Together
- Maintain Continuous Awareness of Your Air Supply, Situation, Location, and Fire Conditions
- Constantly Monitor Fireground Communications for Critical Radio Reports
- You Are Required to Report Unsafe Practices or Conditions That Can Harm You. Stop, Evaluate and Decide
- You Are Required to Abandon Your Position and Retreat Before Deteriorating Conditions Can Harm You
- Declare a May Day As Soon As You **THINK** You Are in Danger

### The Incident Commanders Rules of Engagement for Firefighter Safety

- Rapidly Conduct, or Obtain, a 360 Degree Size-Up of the Incident
- Determine the Occupant Survival Profile
- Conduct an Initial Risk Assessment and Implement a **SAFE ACTION PLAN**
- If You Do Not Have the Resources to Safely Support and Protect Firefighters – Seriously Consider a Defensive Strategy
- **DO NOT** Risk Firefighter Lives for Lives or Property That Can Not Be Saved – Seriously Consider a Defensive Strategy
- Extend **LIMITED** Risk to Protect **SAVABLE** Property
- Extend **Vigilant** and **Measured** Risk to Protect and Rescue **SAVABLE** Lives
- Act Upon Reported Unsafe Practices and Conditions That Can Harm Firefighters. Stop, Evaluate and Decide
- Maintain Frequent Two-Way Communications and Keep Interior Crews Informed of Changing Conditions.
- Obtain Frequent Progress Reports and Revise the Action Plan
- Ensure Accurate Accountability of All Firefighter Location and Status
- If, After Completing the Primary Search, Little or No Progress Towards Fire Control Has Been Achieved – Seriously Consider a Defensive Strategy
- Always Have a Rapid Intervention Team in Place at All Working Fires
- Always Have Firefighter Rehab Services in Place at All Working Fires

### Crew Resource Management

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This document also suggests that volunteer fire organizations subscribe to the concept of crew resources management.<sup>5</sup> The foundation of CRM is that people are more effective when they function as a “team” and the system to recall fire fighters for a volunteer response is a classic example of having a different team every time you go into the game. Volunteer fire departments can significantly improve the potential for safe operations by subscribing to and implementing the concept of CRM.

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<sup>5</sup> LeSage, Dyar, Evans, Crew Resource Management, Jones and Bartlett Publishers, Boston, 2011