

Risk Assessment
Of
Natural and Man Made Disasters
Of the
Signal Hill Fire Protection District
St. Clair County, Illinois

Executive Analysis of Fire Service Operations
In Emergency Management

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ABSTRACT

The purpose of this research project was to assess the type and nature of disasters – both natural and man-made - that have the potential to adversely effect the residents and businesses of the Signal Hill Fire Protection District. Descriptive and historical research methods were utilized to assist in answering three questions inherent in this assessment. Foremost among these was what kind of disaster has occurred or could occur within southwestern Illinois.

The second query asked what resources were available to the Signal Hill Fire Department in order to render emergency services in the aftermath of a disaster. In order to evaluate resources available at the time of such an incident, a capabilities-assessment instrument was used to perform a cursory review of current resources.

The final question attempted to determine whether “pre-incident” or “disaster preparedness” information should be gathered and distributed to the residents of the Fire Protection District - the hypothesis being that identifying and disseminating this type of information would have the potential to increase the personal survivability and/or lessen structural damage and destruction to buildings.

Not only were the types of disasters identified, but also the types of destructive consequences associated with each potential cataclysmic event. A community-risk-assessment matrix was used to rate the disaster risk of selected events.

Examination of the literature and historical research, along with geographic survey data were utilized to base conclusions drawn. In addition, interviews with public and private-sector individuals were conducted in order to seek and clarify specific

information regarding selected questions. However, several external factors were noted which either limited or restricted the research, though neither the limitations nor restrictions altered the final product.

The result of this project indicates that there does exist within the Fire Protection District a wide range of natural and man-made disasters and that the repercussions from such disasters could have serious consequences for the residents of the District. Furthermore, the internal and external resources available to the Signal Hill Fire Department to provide emergency assistance may or may not be adequate, depending on the enormity of a specific disaster scenario.

“Pre-incident” information of a general or incident specific nature is readily available from a variety of reputable public and private sector sources. If disaster-preparedness skills and precautions are heeded, the general public increases its probability of surviving the forces of a disaster and lessens personal property damage.

Several recommendations pertaining to aspects of this study were made based upon the research conducted. In summary, a disaster-planning effort should be conducted by the Signal Hill Fire Department to improve its capability to assist to the residents of the Fire Protection District in the aftermath of a disaster. Furthermore, disaster-preparedness information should be collected and distributed to its residents to enhance their awareness to potential disasters and the skills that they would require to survive a catastrophic scenario.

TABLE OF CONTENTS

ABSTRACT	ii
TABLE OF CONTENTS	iv
INTRODUCTION	1
BACKGROUND AND SIGNIFICANCE	2
LITERATURE REVIEW	5
PROCEDURES	15
RESULTS	23
DISCUSSION	26
RECOMMENDATIONS	32
REFERENCE LIST	35
APPENDICES	38

INTRODUCTION

The Signal Hill Fire Protection District located in St. Clair County which is in southwestern Illinois. Within this geographic area, there exists the possibility of a wide range of natural disasters. There also exists the possible occurrence of man-made disasters and either type could occur with or without warning to the District's residents.

The purpose of this research project was to gather information relating to a risk assessment of both natural and man-made disasters, either of which could adversely impact the residents of the fire protection district. The collected information was then analyzed in an attempt to determine whether the current resources are sufficient for their capabilities. In addition to the risk and resource assessments, is there information currently available to advise residents of actions that they may take "pre-incident," that could lessen the impact of either type of disaster? To facilitate the analysis, descriptive and historical research methods were utilized to answer the following questions:

1. What natural and man-made disasters could adversely impact the residents and quality of life within the Signal Hill Fire Protection District?
2. Should the Signal Hill Fire Department conduct a capability assessment in order to evaluate its resources or ability to effectively respond to any/all incident(s) caused by a natural or man-made disaster?
3. Should the Signal Hill Fire Department collect and distribute "pre-incident" information to the residents of the fire protection district that would lessen the personal impact in the event of a natural or man-made disaster and increase individual survival?

BACKGROUND AND SIGNIFICANCE

The Signal Hill Fire Protection District is located in southwestern Illinois. The Fire Protection District encompasses approximately 5.5 square miles. It has an estimated population of 8000 residents with approximately sixty non-residential occupancies and 2500 residential occupancies in the Fire Protection District. The District may be described best as a “bedroom” community since many of its residents commute to employment within the greater St. Louis metropolitan area. But other commuters pass through the Fire Protection District on a daily basis as well. Among them are residents, visitors and employees of the National Shrine of Our Lady of the Snows. The Shrine is the largest Catholic outdoor shrine in the United States and annually has over one million visitors for both secular and non-secular activities.

Two railroads that bisect the District, the Norfolk and Southern and the Illinois Gulf Central. Both use the western edge of the District as a staging area for their respective rail yards, located in East St. Louis, Illinois and transport a numerous variety of hazardous materials along their rail lines through or near residential areas of the District. Each railroad also has a highway grade crossing within the District.

The majority of the District is geographically located atop a bluff area that overlooks the American Bottoms to the west. The base of the bluff was formed by the Mississippi River thousands of years ago. A series of levees protects the American Bottoms area from flooding. Several canals drain rainwater run-off to the Mississippi River yet heavy rains have caused flash flooding on roadways adjacent to these canals. The canals originate from within the District.

Moreover, southwestern Illinois lies within the New Madrid earthquake fault zone.

According to the Governor's Earthquake Preparedness Task Force Report (1990), three of the earthquakes that occurred along the New Madrid Fault in the past have had their epicenters in St. Clair County, Illinois. The report period covered the history of New Madrid earthquake epicenters between 1795 and 1990. The adjoining counties of Madison and Monroe have had a total of 11 epicenters indicating that the region is prone to the effects of the fault line.

According to the Illinois Geological Survey reports, approximately one-third to one-half of the District is also subject to mine subsidence, caused by collapse of underground coalmines. The collapsed area or mine ceiling/roof is transferred to the surface causing sinkholes or depressions and frequently destabilizes buildings.

Two interstate pipelines traverse the District. Not only do the Phillips PipeLine Company's blue and gold lines transport highly volatile liquids, but in some areas, are actually located within the backyards of homes. The Mississippi River Transmission pipeline carries high-pressure natural gas. This is "raw" gas, meaning that no odor has been added to detect leaks.

Severe weather conditions have also threaten the District. Winter storms, thunderstorms, heavy rains, hail and straight-line winds have been known to cause significant damage, yet the most severe weather condition that would impact the Fire Protection District would be a tornado. Illinois has an average of 27 reported tornadoes each year with five fatalities. While peak tornadic activity in Illinois exists from April through June, tornadoes may occur throughout the year.

Surface transportation corridors within the District consist of several urban principal arterial routes, urban minor arterial routes, urban collectors and local streets.

Hazardous-material transports travel these corridors, with the exception of local streets, on a regular basis. Thus along with the potential for a hazardous-materials-transportation accidents, there exists the potential for multiple casualty accidents or accidents involving entrapment.

Under the provision of the federal statues, the Superfund Amendment and Reauthorization Act (SARA), facilities that produce, use or store hazardous materials must report the presence of their inventories. Several facilities within the District have also reported the presence and utilization of hazardous materials to the St. Clair County Local Emergency Planning Committee (LEPC). In addition to reporting to the LEPC, they have also reported their hazardous materials quantities and types to the Signal Hill Fire Department.

Like its neighboring districts and municipalities, the District lies in the landing and take-off pattern of a general aviation airport that is located approximately three statute miles to the southwest. In addition to the general aviation airport, an international airport lies only twenty statute miles to the northwest and is used by commercial passenger and transport airlines on an uninterrupted basis. And while Signal Hill has escaped without an air crash disaster, general aviation and military aircraft accidents have occurred in adjoining fire protection districts that have resulted in death and injury.

Terrorism is a relatively new element for disaster-response personnel to consider. Public assembly occupancies, historical and/or symbolic locations may become targets of terrorist activities. However, "An act of terrorism can occur anywhere, at any minute, when you least expect it. No jurisdiction, urban, suburban, or rural, is totally immune." (Emergency Response to Terrorism -- 1997, page 7)

In addition to damage, destruction, injuries or fatalities resulting from a disaster, there exists the potential for the primary incident to trigger secondary events which have the ability to cause collateral damage to buildings, utilities infrastructure or human beings. Secondary events would certainly compound the scope of all emergency recovery operations.

The Fire Protection District also bears the responsibility for a number of public assembly occupancies or “target hazards” that warrant special notation. Among them are: an elementary school, a geriatric center, a fully enclosed apartment-community complex for retired seniors, several churches, a group home, and nightclubs as well as several other non-residential occupancies - each are distinctive in the type and nature of their operations and may require extraordinary services in the event of a large-scale emergency incident.

This research project falls within the scope of the National Fire Academy’s Executive Analysis of Fire Service Operations in Emergency Management curriculum. While the study’s relationship would be encompassed within the entire course work content, specific reference can be found within Module # 4, *Community Risk Assessment*.

LITERATURE REVIEW

Across the United States, in the aftermath of either a natural or man-made disaster, the first response customarily comes from a community's fire department. Firefighters rescue victims, control hazards, and engage in the assortment of life-threatening activities involved with recovery operations.

Hardly a day passes that a disaster endangering many lives and much property does not occur somewhere in our nation. Train wrecks, plane crashes, hazardous cargo spills involving dangerous chemicals, tank truck collisions, overturned buses, and similar transportation accidents are common, even in the heart of densely populated areas. Every year recurring conflagrations, floods, hurricanes, tornadoes, and other natural disasters cause great destruction, and occasionally one of the thousands of earthquakes that jar our countryside each year grows to devastating magnitude in a populated region, producing tragic results. (Kramer, Bahme – 1992 page 1)

Historically, the fire service has been much better prepared to respond to disaster scenarios than any other emergency service response agencies: in fact daily fire service operations and disaster control functions share many similarities.

- The immediate response of emergency service resources and equipment
- The tasks associated with disaster recovery functions are closely related to ongoing fire service duties.
- The number of trained personnel both committed volunteers and career staffs are often times readily available to respond.
- Most well trained fire departments have an incident-management system established that adapts well to disaster response operations.

- A recognition of the value and benefits of pre-incident planning that can carry over into catastrophic emergencies
- Cooperative relationships with other fire service organizations and other community services, police and emergency medical providers, which enhance the collective performance assistance may be required by a host department

“The onset of an emergency creates a need for time sensitive actions to save lives and property, as well as for action to begin to stabilizing the situation so the jurisdiction can regroup.” (Guide for All-Hazard Emergency Operations Planning –1996, page 1-4)

Even the best-planned efforts, if not performed to a high standard, and with all due speed, can have tragic consequences. A community expects far more of its fire service. “These are the ones whom the community will look to for leadership and guidance in the event of a disaster.” (Auf der Heide – 1998 page 2-3) Local fire service agencies must prepare themselves for those natural and man-made disasters that may impact their communities.

Crisis management need not exist in the emergency services, particularly if pre-planning is inherent in our position as fire officer to be prepared and not surprised.

This summary of the pre-planning process begins with in training...Just ask “what might happen if...?” (Jenaway – 1992, page 10).

The disaster-response planning process consists of two functions. The first is to identify the nature and frequency of those natural and man-made disasters that may effect a given area. But this initial step must be expanded to include hazard appraisal, to assess the impact a disaster may have upon a community.

A hazard identification and risk assessment should be conducted. This should identify potential hazards and their likelihood of causing an incident. The risk assessment should quantify and qualify the effects or consequences of an incident on the entity and the surrounding area. (Recommended Practice for Disaster Management – 1995, 3-1.2)

The second step in the pre-planning process calls for the determination of the Signal Hill Fire Department capabilities to requests for services prior to, during or after the occurrence of a disaster. “To evaluate resource use and availability, the following should be considered: quantity; response time; capability; limitations; cost; and liability connected with using involved resources.” (Recommended Practice for Disaster Management, -- 1995, page 4-2.4)

Using the information gathered during the hazard-identification process and equating it to the Disaster Rating score would then allow the Fire Department to analyze its capabilities for dealing successfully with a specific disaster. By recognizing its strengths and weaknesses, the Department would be better prepared in the event of any catastrophic occurrence.

After the potential hazards to a community have been identified and analyzed, and preparedness and response capabilities and response priorities have been established, the next step is to assess current capabilities of the local jurisdiction in handling a large-scale incident. (Kramer, Bahme – 1992, page 20)

The St. Clair County Emergency Operations Plan includes certain planning assumptions regarding fire service responsibilities during disaster operations: “That the Fire Service within the district where the disaster occurs will respond and in all likelihood

be the first personnel on the scene.” (St. Clair County Emergency Operations Plan (1997) – page FR-5) This assumption recognizes the critical role local fire services perform during disaster-response operations.

Operating at the scene of a disaster, the Incident Commander carries the responsibility to insure that search, rescue, and suppression operations are well supported.

This premise assigns the resource management role to one individual who must be able to fully comprehend the situation at hand. Important to better preparation for the incident command responsibility is intra-department planning for any scenarios it may face.

“Those fire departments that cope best in emergency disaster situations are those that have anticipated them in advance.” (Kramer, Bahme – 1992, page 20)

The third query involved in this research sought evaluation of an attempt to provide Fire Protection District residents with disaster preparedness information. Would the dissemination of such information actually lessen the impact a disaster’s consequences or would such literature simply be discarded or simply be forgotten or ignored? “Public awareness of disasters is generally poor. Even in communities where disasters have occurred relatively frequently, the public has often failed to demand the most rudimentary protection.” (Auf der Heide –1989, page 14)

Earlier studies suggest several reasons the general public does not prepare itself for a disaster. According to Auf der Heide (1989) these include:

- Public apathy to disaster preparedness or readiness.
- Underestimation of the public to the risk of a disaster.
- Reliance on technology that provides to complacency of underestimating the actual disaster risk and its consequences

- Fatalism or denial that the effects preparedness can significantly alter outcome of the results of a disaster.
- Social pressures that facing a disaster indicates might or fearlessness.

In addition to the public's apathy and complacency toward disaster preparedness, there is also the failure of local government to either adequately prepare itself or encourage readiness by its citizens. Special interest groups that oppose governmental restrictions and assign a low priority to public disaster awareness and education may have also contributed to the public's attitude regarding disaster planning.

Literature Review of Disaster Scenarios

For years, Southern Illinois has been recognized by seismologists as an active earthquake region. The most likely scenario would be an earthquake originating in the New Madrid or Wabash River Valley Faults.

New Madrid, Missouri, about 80 miles from Carbondale, was the epicenter for a series of quakes occurring in 1811 and 1812. Some of those quakes would have measured 8 to 8.6 on the Richter Scale and are believed to be the most severe in the nation's history. In 1895, a milder quake (6.2 on the Richter Scale) shook Cairo. Seismologists believe such quakes have a probability of occurring about once every 100 years. That is why experts and seismologists believe the probability of a significant quake in Southern Illinois region is not a question of "if" but "when and how big." (Governor's Earthquake Preparedness Task Force Report (1990) – page 2)

In addition to the devastation caused directly by an earthquake's power, collateral damage is also a likely occurrence. Breaches of natural gas and water mains, electric

power grid interruption and other secondary events have the potential to cause further harm and destruction. Such events will also place additional burden upon emergency-response personnel. “Numerous and widespread individual or small-group structural fires are likely, however, due to a variety of damage-related factors, (i.e. gas leaks, flammable liquids spills, electric shorts, etc.), and loss of fire suppression capabilities.” (Estimated Future Earthquake Losses for St. Louis City and County Missouri (1990) -- Executive Summary)

Ever-increasing knowledge of the earth’s composition contributes to even greater concern about earthquake damage in the Central United States.

“The St. Louis University Earth and Atmospheric Department advises that an earthquake in the Midwest would cause more damage than one on the West Coast because of the nature of the earth’s crust. In this part of the country, the crustal rock is older, colder and less fractured, which could only serve to increase the amount of energy and damages.” (A Personal Guide to Earthquake Safety (1989) – page 1)

Heretofore less devastating, yet still destructive, mine subsidence has caused significant sinking or settling of homes in portions of the Fire Protection District. In addition to damaging structures, this subsidence may cause damage to the infrastructures of public utilities.

Subsidence responsible for damaging foundations may also be responsible for broken water mains, water lines, gas lines, sewer lines, telephone lines and electrical wires. If utility poles tilt or sink, power and other lines may sag or pull from the poles. In turn, this may expose electrical wires and create another hazard. Gas leaks are the greatest hazard because an explosion can occur, but leaks from

water mains are often the first noticeable evidence of major subsidence. (Bauer, Trent -- (1993) page 11)

Mines may also contain hazardous gases that can migrate into the basements of homes. "...some contain methane gas, carbon dioxide, and little or no oxygen. In places, the air may be explosive." (Bauer, Trent -- (1993) page 7)

As previously noted, railroads are a major transportation agent for the shipment of large quantities of chemical commodities, that travel through the Fire Protection District on a daily basis.

Railroads are a key part of the distribution system for hazardous materials and, thus, much hazardous material passes through rail yards en route to intermediate or final consumers. While the vast majority of these materials are shipped without incident, both the number of shipments and the nature of the materials themselves dictate that rail yards and surrounding communities be prepared to respond quickly and effectively to emergencies. (Preparedness for Hazardous Materials in Rail Yards (1991) – page 1)

The Illinois Commerce Commission (1997) documented seven accidents/incidents involving hazardous materials involving railroads in St. Clair County during 1997.

Although they (the incidents) did occur in rail yards west of the District, none of the accidents/incidents investigated by the Commerce Commission involved either of the two railroads that pass through the Fire Protection District.

In fact, roll-by inspections reports conducted by the Commerce Commission indicate hazardous materials continue to be transported by both the Illinois Central Railroad Company and the Norfolk Southern Railway Company. For instance, the Illinois Central

Railroad averaged 38.37% hazardous material cars per train in a four-year inspection period (1993 – 1997). These cars contained a variety of hazardous materials, including flammable gas, flammable, poison, and corrosive substances. While the Norfolk Southern Railway averaged only 11.13% hazardous materials cars per train in the same four-year inspection period. Unlike the Illinois Central cargo, the Norfolk Southern transported a greater variety of hazardous substances. In addition to those similar to the Illinois Central, the Norfolk Southern also transported explosives, blasting agents, chlorine, flammable solids, combustibles, organic peroxide, and other regulated materials.

Railroads are not the only conduits for hazardous materials that make the Fire Protection District vulnerable. The Phillips Pipe Line Company has two eight-inch high pressure pipe lines that run from the Texas panhandle to Chicago, Illinois. These pipelines operate at 900 pounds per square inch of pressure as they cross through the District, transporting highly volatile liquids (HVLs). “Comprised of either a mixture of “raw” product such as methane, ethane, butane and propane: or mixtures of the individual components after processing. The vapors are heavier than air. HVLs burn readily, and are dangerous and flammable.” (Phillips Pipe Line Company (1997) – page 4)

In contrast to the dangers presented by the “routine” incidents, and even greater threat are sources of future “planned-disasters” man-made to achieve an extremist’s political or social agenda. Incidents of domestic terrorism incidents have increased in the United States in the past several years. Most notably are the Oklahoma City bombing, the World Trade Center bombing and the 1996 bombing during the Olympic Games in Atlanta all devastating to emergency response teams as well as victims. Other such incidents – though on a smaller scale – have occurred at or near abortion clinics and social clubs. Not

content with the destruction and injury caused by the initial incident, terrorists have placed secondary devices specifically intended to harm members of those emergency teams responding to the initial event.

Today, emergency responders and others in the emergency services who support them face new challenges that seriously imperil not only the public but also those very persons whose job it is to protect and help the public. The risks faced in today's world pose threats for which the average emergency responder may not be prepared. These threats go far beyond the usual ones associated with residential fires, vehicular accidents, or even, hazardous materials incidents. It is critical that emergency responders understand the implications of these modern threats and the proper response procedures and the limits of safe and prudent response. This knowledge will help prevent further fatalities. (Emergency Response to Terrorism (1997) – page 16)

Far beyond “the usual” are the threats that severe weather conditions can also present to firefighters. No area of the country is safe from the destructive forces of tornadoes, and no state in the country has been fortunate enough to escape one. Tornadoes are almost always associated with severe thunderstorms.

No region of the world suffers so many tornadoes as the continental United States, which averages 800 per year. The areas of the highest vulnerability are those states that lie in the eastern plains and the Mississippi and Ohio River Valleys. Even though some areas of the country may be relatively free from the tornado threat, tornadoes occur in all fifty states. (Kramer, Bahme (1992) – page 261)

“Most often they happen in the afternoon and the direction of travel is from the

southwest to the northeast.” (Kramer, Bahme (1992) – page 261) While the “typical” tornado may move southwest to northeast, this is not always the case. “For the next three hours the storm moved southeast creating numerous tornadoes as it moved across northern Illinois.” (Urban Search and Rescue in Will County, Illinois (1992) – page 1)

Whatever the source or size of the calamity, the St. Clair County Local Emergency Planning Committee is charged with developing a hazardous-materials incident emergency-response contingency plan to deal with it: this planning function is mandated by the Federal Government under the provisions of the Superfund Amendment and Reauthorization Act. The strategy makes certain assumptions as part of the process, including designation of the local fire department as a lead agency in the event of a hazardous-materials incident. “Fire Department – Assumes the role of Incident Command on scene. Determines the hazard level of the incident and directs response operations as directed by.” (St. Clair County L.E.P.C. Emergency Operations Plan (1998) – page 18)

State regulating agencies also contribute input to contingency strategies. To confront the complexities of a major medical disaster, the Illinois Department of Public Health mandates area hospitals and pre-hospital care providers (emergency medical technicians, paramedics and triage teams) develop and implement an Areawide Disaster Plan. Thus the State of Illinois Region IV Southwestern Illinois Emergency Medical Services Medical Disaster Plan prescribes how mass-casualty incidents are to be managed. Within the scope of this plan, again the local fire agency is recognized as “lead” agency for on-scene command and control of the specific incident. “Generally, the fire chief from the municipality is the Incident Commander of the Incident Command Center.” (Region IV Southwestern Illinois Emergency Medical Services Medical Disaster Plan (1998) -- Page

18) This designation reiterates the responsibility of the fire service as coordinator of the medical-control plan.

PROCEDURES

The primary goal of this project assesses natural and man-made disasters that could seriously impact the Fire Protection District. “The first step is research. This consists of reviewing the jurisdiction’s planning framework, analyzing the hazards faced by the jurisdiction, determining the resource base, and noting the characteristics of the jurisdiction that could affect emergency operations.” (Guide for All-Hazard Emergency Operations Planning, 1996, page 2-4)

To initiate the research process, a Risk Assessment Matrix was utilized to identify those catastrophic disasters to which the District is most susceptible. (Appendix “A”) Several of the literature review sources suggested matrices that could serve as a model-planning tool. While each matrix had its own distinct descriptors, collectively, they were very similar in form and substance. Thus, for the purposes of this project, the “Community Risk Assessment” model from the National Fire Academy’s “Executive Analysis of Fire Services Operations in Emergency Management” (1997) student manual was used.

This assessment model disclosed those natural disasters with the highest probability of occurring in the mid-western states; conversely, it also identified those with a very low probability of occurrence. “Where mountains do not exist, volcanic eruption is not likely.” (Guide for All-Hazard Emergency Operations Planning, 1996, page 2-6)

Completing the Risk Assessment Matrix was accomplished by reviewing descriptive and

historical information specifically for the central portion of the United States.

The initial step in compiling the Risk Assessment Matrix determined the probability of occurrence of a specific scenario. Disasters that to which the District is susceptible were identified, then each assigned a numerical rating which corresponded to the probability of its occurrence as follows: 1 -- “unlikely,” 2 – “possible,” or 3 – “likely.” The next step in the process determined the vulnerability of the District to the consequences of a given disaster’s occurrence taking into account five factors:

- Danger/Destruction -- injuries, fatalities, structures, etc.
- Economic – incident-related costs, recovery costs, other economic measures.
- Environmental impacts – water supply compromised, public health, scenic and historical values
- Social aspects – safety of emergency-service providers, sheltering considerations, or social-fabric issues.
- Political considerations – level of planning, political fallout, and other politically sensitive issues.

Each of the vulnerability aspects was also assigned a numerical value. The hazard factor and the vulnerability factors were then multiplied to reach a disaster rating. The higher the disaster rating, the greater the risk of a selected disaster scenario having a negative impact upon the resident’s safety and their quality of life.

Using a potential aircraft disaster as its focus, the following account demonstrates how the Risk Assessment Matrix methodology was completed

A telephone interview was conducted on May 7, 1998, with Mr. Bill Keller, Manager of Inter-Modal Transportation Planning for the East-West Gateway Coordinating

Council, during which he advised that St. Louis Downtown Parks Airport averaged 161,588 operations per year during a ten-year period beginning in 1987. (An operation is defined as a single take-off or landing.) A study by the Federal Aviation Agency of “general aviation” accidents reports that the accident rate per 100,000 flight hours has declined steadily from 1982 through 1997. “General aviation” is defined as smaller privately owned aircraft used for either personal or light commercial use.

Another interview was conducted with Mr. Mike Cullivillan, Program Executive for St. Louis Lambert International Airport, via telephone on May 7, 1998. Mr. Cullivillan advised that Lambert International had 516,889 operations during 1997 alone. He further stated that 75-80% of all commercial aircraft incidents occur on airport property or within the runway protection zone - the runway protection zone extending, in a triangular shape for a half-mile from the end of the runway. He further stated that the remaining 20-25% commercial aircraft accidents happen at widely unrelated locations. He suggested that the ability to predict an accident or incident locations would be statistically improbable, furthermore, the probability of a mid-air collision to occur 20 statute miles southwest of Lambert International, within the air traffic control pattern, is negligible.

It would thus appear that the probability of a major aircraft disaster occurring within the Fire Protection District is unlikely – though not implausible – and that the extent of vulnerability resulting from an aircraft incident would depend on whether the incident took place in an open field or in a residential neighborhood.

Following the risk assessment came a cursory review of the resources of the Signal Hill Fire Department for their capability to respond to disaster-related incidents. Again, the course curriculum for Executive Analysis of Fire Service Operations in Emergency

Management served as a model for conducting a cursory capability assessment.

(Appendix “C”) “Capability assessment is the key to preparedness. A response plan cannot be prepared during a disaster.” (Executive Analysis of Fire Service Operations in Emergency Management Student Manual – page 6-3)

The Academy’s planning model recommends three phases of disaster management. These phases are: mobilization, production and demobilization. Mobilization is summarized as gathering the necessary resources to respond to an incident. Production equates to functions such as search, rescue, and fire suppression that assist the community after the occurrence of a disaster. Demobilization may be best defined as returning to a condition of normal after completion of the first two phases.

The third question posed for of this project whether “pre-incident” actions could lessen the impact of a disaster’s aftermath. In addition to preparing a neighborhood with preparedness activities also assist in actually managing community risk.

Key activities that support risk-management principles and practice include, fire prevention, code enforcement, public education, and other efforts that make citizens more aware of how to:

- Recognize potentially dangerous situations
- Prevent emergencies
- Respond effectively to an emergency

(Risk Management Practices in the Fire Service (1996) – page 9)

The general public may discount or disregard valuable information regarding disaster preparedness because they (disasters) are not an everyday occurrence. Despite the public’s complacency towards disasters, emergency service providers should pursue it its

attempts to provide timely information in order to lessen the personal impact caused by the occurrence of a disaster.

Disasters are “low probability” events. As such, they are associated with a high degree of apathy. It is important to understand the limitations posed by this fact.

The existence of apathy should not be taken as an excuse to neglect or discount the need for preparedness, but, especially in this time of shrinking resources and expanding responsibilities, we must be selective in deciding which aspects of disaster preparedness to emphasize. (Aur der Heide – 1989, page 31)

Limitations and Restrictions

There were no limitations placed upon this project by the Fire Protection District. Financial, administrative and project-support functions were well sustained. Several limitations and restrictions were identified during the progress of this project; however, these limitations and restrictions were outside the control and influence of the Fire Protection District.

One such limitation arose when attempting to identify the frequency of specific incidents in a given geographical area. When fruitful contact was made with several agencies while requesting data specifically related to the Signal Hill Fire Protection District, located in west-central St. Clair County, attempts were then made to identify smaller geographical areas, employing census tracts, townships and/or township sections. However, while very general information was readily available for larger regional areas, obtaining or even locating data for the relatively smaller township sections or census tracts, was so time consuming that the attempt became highly impractical, if not impossible. One example of this futile effort was the attempt to isolate the number of

tornado warnings issued by the National Weather Service to an area as small as the township. These warnings are issued on a county-wide basis. So a tornado cell sighted or indicated via radar thirty miles south of the Fire Protection District will automatically trigger a warning for the *entire* county. Thus, it became highly impractical, if not impossible, to determine how many warnings issued to include St. Clair County would have directly impacted the Fire Protection District in the event a tornado actually did touch down.

Telephone contact with Mr. Edmund Murphy of the Illinois Mine Subsidence Fund provides another example of a limitation outside of this study's control. Inquiry was made regarding the effects an earthquake might have upon those structures sitting atop areas where underground-mining operations have taken place in the past. When asked whether the presence of underground mining operations would intensify or lessen damage to structures during an earthquake, he could give no definitive answer. Mr. Murphy agreed to forward additional information regarding this topic. At the date of submission, however, the materials had not arrived.

Still further limitations were confronted when Mr. Bill Keller, Manager Inter-Modal Transportation Planning for the East-West Gateway Coordinating Council, suggested accessing the National Transportation Safety Board's World Wide Web site to obtain data regarding general aviation accidents. The National Transportation Safety Board it turns out only investigates injury related or fatal accidents; therefore, only limited data regarding general aviation aircraft accidents was readily available.

Such limitations prove, therefore, that a completion of the vulnerability section of a Risk Assessment can be necessarily subjective. And, completion of the section relies

upon “best guess estimates” of the factors involved. An aircraft crashing into a school or church in the middle of the night will have a lesser impact than the same scenario’s occurrence on a weekday or Sunday morning.

Furthermore, since most statistical data often only references the numbers of fatalities or injuries sustained as a result of a disaster, there appears to be insufficient data relating to the impact that public disaster preparedness has upon a community. An illustration of this may be the totality of the deaths or injuries prevented when tornado-warning sirens alert residents to an imminent destructive force - those that heed the warning simply do not become a statistic.

A lack of follow-up information also presented limitations. A portion of this research project attempted to identify sources of disaster-preparedness information that could be both readily obtained and distributed to the occupants of the Fire Protection District. It is widely acknowledged that those who take disaster preparedness-precautions seriously will develop the skills necessary to survive a disaster incident. No attempt was made to suggest that simply distributing this type of information, if the residents would read, comprehend and take the recommendations suggested earnestly enough to enhance their family’s disaster preparedness skills.

The information obtained from the Illinois Commerce Commission regarding the Hazardous Materials Flow Study contained finite data. The Flow Studies are conducted by a “roll-by ” inspection process and present only a representative sampling of the type and quantity of hazardous materials transported by a specific railroad company. The companies were unresponsive to requests to for information related to this project.

Some self-imposed restrictions should be noted as well. Flooding in the lower

elevations of the Fire Protection District is plausible. In 1993 had the levee system paralleling the Mississippi been breached, three-to-five feet of floodwater would have been realized in the extreme western sections of the Fire Protection District. (Bill Polka, St. Clair County, 1993) The impact would not have focused on flood response, as much as it would have on becoming a “host community” for those displaced by floodwaters. And that responsibility would encompass more disaster-relief efforts than it would disaster-response operations. No effort was made within the scope of this project to address disaster relief operations or planning for “outside” communities.

The broad scope of this project also restricted the amount of information acquired during the literature review phase that could be practically included in this paper. Each natural or man-made disaster, while similar, encompasses a range of issues, problems, and operational functions that may be specific in nature or scope. An entire applied research project could be built upon one or two disaster scenarios.

RESULTS

Answers to Research Questions

Research Question 1. What natural and man-made disasters could adversely impact the residents and quality of life within the Signal Hill Fire Protection District? A variety of natural and man-made disasters harbor the power to adversely affect the residents of the Fire Protection District (Appendix “A”).

In addition to the damage and destruction caused by the primary disaster, there are “secondary” events, triggered by the initial event, (Appendix “B”) that can also bring about devastation, significantly reducing the quality of life.

The forces of nature carry a velocity and magnitude, although there is no means known to man that can prevent the occurrence of a natural disaster. Today's scientific technology often allows a significant degree of warning. However, while adequate public warning may prevent injury or death, the populace must be alert to such warnings and prepared to take those actions that will insure survival.

Conversely, man-made disasters can be prevented. Pipelines are regularly tested and examined for corrosion and other physical damage. Railroad tracks are x-rayed for defects and rail beds inspected for erosion. Hazardous materials at fixed facilities can be mixed, contained or stored in structures specifically designed to handle dangerous chemicals

But, despite these precautions, accidents do occur and external forces can be responsible. NorAm Gas Transmission pipeline (parent company of Mississippi River Transmission pipeline) reported that nearly 66% of all damage to their pipelines is caused by third parties.

Research Question 2. Should the Signal Hill Fire Department conduct a capability assessment in order to evaluate its resources' ability to effectively respond to natural or man-made disasters? Yes, any incident with a Disaster Rating greater than "five" would quickly overwhelm the current resources of the Signal Hill Fire Department. (Appendix "C") Additional outside resources can only provide assistance assuming that their services are not needed in within their host communities.

Moreover, the primary component of a fire department's capabilities to respond effectively to a disaster is planning.

Disaster-preparedness planning has the potential to offset local resources, which

are often times limited in type and quantity “Further, most jurisdictions do not have a sufficient quantity of specialized equipment or enough trained teams available to accomplish the large-scale search and rescue operations needed to respond to a catastrophic earthquake.” (Guide For All-Hazard Emergency Operations Planning (1996) – page 6-A-3)

An internal disaster-response plan can be a stand-alone document or serve as an appendix to a larger local or regional plan. The fire service is recognized as the primary response in several existing disaster-planning processes. More specifically, the State of Illinois Southwestern Illinois Emergency Medical Services Medical Disaster Plan, the St. Clair County Local Emergency Planning Committee and others assume that *local* fire departments, including Signal Hill, will be the first to respond.

Fire Departments are also presumed to take the lead role of incident command. Both the Local Emergency Planning Committee and the Emergency Medical Services Disaster Plan specifically identify the “Fire Department” as the Incident Commander on scene. And, the general public also expects the fire departments to take command and control – to respond, to rescue, secure hazards, and lead in all recovery operations.

Research Question 3. Should the Signal Hill Fire Department collect and distribute “disaster-preparedness” information to the residents of the fire protection district – would it lessen the personal impact of a natural or man-made disaster?

The American Red Cross, the Federal Emergency Management Agency, the National Weather Service, and private industry already produce, publish and distribute information pertaining to specific disaster-readiness survival skills and other actions that may lessen the impact of a disaster. The Emergency Broadcast System, community warning sirens,

tone activated alert radios, loudspeakers and other devices can be utilized to forewarn Fire Protection District residents of an impending disaster. Yet, “Each year, many people are killed or seriously injured by tornadoes despite advanced warning. Some did not hear the warning while others received the warning but did not believe a tornado would actually affect them.” (Tornadoes...Natures Most Violent Storms – 1995, page 7)

Despite apathy or inattention, the tremendous amount of energy released, natural disasters – including earthquakes, they are survival events. Indeed, homes, businesses and other facilities can take preemptive actions to lessen damage and reduce injuries.

- 1 Deaths, injuries and property damage can be significantly reduced if the people of Illinois increase their awareness and preparedness for the risks of earthquakes.
- 2 “Earthquakes don’t kill, buildings do.” Deaths, injuries and property damage can be prevented by adopting building codes which enable homes, schools, hospitals, shopping malls, office complexes and other structures to withstand the shock of an earthquake. (Governor’s Task Force on Earthquake Preparedness Task Force Report (1990) – page 1)

Experience and technology lead emergency-management officials to believe that ‘pre-incident’ or “disaster-preparedness” information can reduce the impact either a natural or a man-made disaster may have upon a community.

DISCUSSION

By virtue of its operational functions, the fire service has assumed the role of disaster-response and recovery leader within its communities. It is also perhaps the most versatile of all emergency service agencies in terms of the types of services it provides. In assuming this leading role the fire service has made a commitment to its communities.

Emergency management services protect the community from the effects of natural disasters. Rescue teams safely remove citizens from dangerous predicaments, avoiding the risk of injury or death that untrained; unprepared citizens might face if they tried to perform that mission. Hazardous materials response teams protect the population and environment from the effects of uncontrolled releases of hazardous materials. The common thread among the missions of all those teams is the community's need for protection from potentially harmful or undesirable events.

(Risk Management Practices in the Fire Service (1996) – page 9)

While there is little, if any hesitancy to believe that the fire service is in the best position to render post-disaster emergency services to a community, what is the price? How should the fire service allocate already limited resources to disaster planning and then transforming those plans into emergency operations? As financial and other resources become more scarce, where to place or establish priorities becomes a quandary for a fire officer.

Public apathy, as well as economic restraints, are reflected in a lack of political support for disaster preparedness. Programs have been difficult to initiate or maintain unless they have been demanded by the citizens or mandated by law and paid for by the state or federal government. Without federal funding, many

government officials have felt that they could only justify the most basic preparedness programs. (Aur der Heide – 1989, page 17)

In 1995, the Signal Hill Fire Department proposed the installation of severe-weather (tornado) warning sirens. A subsequent study by a private contractor indicated that three sirens would provide warning to 90% of the Fire Protection District. However, the price for such sirens in 1995 exceeded \$15,000 per unit. With limited local financial revenues, the cost of purchasing, installing and maintaining these sirens was simply beyond the grasp of the Fire Department. Still, warning sirens have been proven to save lives, particularly when tornadoes flex their destructive energy.

Over the years, the Signal Hill Fire Department has responded to disaster incidents - ice storms, straight-line winds, severe winter snows that paralyzed the entire area, chemical releases, and a major fire that resulted in a loss in excess of 1.5 million-dollars. Several of these events brought multiple calls for assistance, with wires down and arcing, structural fires related to lightning strikes, and similar dangers to public welfare.

Probably the most memorable of these types of incidents involved occurred on October 16, 1989. Severe thunderstorms with high winds ripped through portions of the Fire Protection District. The Fire Department responded to dozens of requests for assistance in a two-hour time period during and after the storm. Employment of the Incident Command System prioritized those requests and allowed them to be effectively handled. However, the Department has never really been tested by a catastrophic disaster related event such as the tornado faced by departments in another Illinois County. "In a very short period of time, hundreds of homes were flattened or blown apart. Many people lost their lives and scores were injured, some who had to be extricated from autos and buildings. (Urban

Search and Rescue in Will County, Illinois (1992) – page 6)

Notwithstanding the success of previous “potential-disaster” incidents, it should be noted that cataclysmic events are not simply an extension of day-to-day activities. Caution should be brought to bear not to exaggerate the limited capabilities of the smaller Fire Department.

Another reason for complacency toward disaster preparedness is the mistaken belief that the disaster problems can be managed merely by an extension of routine emergency measure. . . .disasters often pose unique problems for which routine emergency procedures are not well adapted. (Aur der Heide (1989), page 22)

How would an incident similar to that which occurred in Will County play out in southern Illinois? The type and number of emergency-response forces and equipment are not as readily available in southern Illinois. The 1990 tornado that struck Will County occurred in a region where the sheer number of fire departments available to respond would far exceed the current resources available to St. Clair County.

Due to the magnitude of this disaster and the large number of instantaneous emergency calls, the Fire Chief did not hesitate in calling for fire and ambulance mutual aid. Fire and rescue departments who were not even part of standing mutual aid agreements also responded to the request. In total, 160 fire departments sent 215 engines, ambulances, rescue squads and other apparatus. They came from rural areas, municipalities, and even the City of Chicago, which sent five units under the command of a Deputy Fire Commissioner. (Urban Search and Rescue in Will County, Illinois (1992) – page 6)

It was clearly illustrated through the completion of a cursory Community Risk

Assessment matrix show how quickly emergency-response resources could become depleted in the event of a major disaster. In addition to the limited resources and the instantaneous requests for assistance would place a severe strain on the Fire Department's ability to effectively respond to those specific locations requiring immediate services.

While the establishment of mutual-aid departments may compensate for expanded services in those "routine" responses, their usefulness may not be readily available for the "big one!"

Consideration was not given for the possibility of the tornado striking other areas when the Chief of Plainfield Fire Protection District requested mutual aid. The other areas hit were Oswego Fire Protection District, the Joliet Fire District, and the Lockport Fire District. The Plainfield Fire Chief was not aware of this as his district was struck before the others. Due to the devastation in Plainfield and the immediate need for many rescues, he quickly requested a full mutual aid response. This left the Lockport Fire Department, requesting the same mutual aid units later, with no outside assistance. (Urban Search and Rescue in Will County, Illinois (1992) – page 21)

It is clear that disaster-planning efforts, both internal and external, should seriously consider the finite availability of local resources, which may be imperative to emergency operations.

The experience of Will County illustrates the obligation for emergency-service providers to inform and educate the public about its responsibility in family disaster preparedness. "Emergency measures to protect life and health during the first 12 to 24 hours after a disaster in all likelihood will be exclusively dependent upon local and area

resources.” (Guide for All-Hazard Emergency Operations Planning (1996), page 5-G-3)

In fact, the one impediment that must be overcome in order to achieve successful disaster-preparedness education is the public’s indifference. Reducing this insensitivity may prove to be a task more difficult than any for emergency-service professionals. The literature review selections for this project contain several suggestions that warrant special examination.

Public education about the nature of disaster hazards and the practical counter-measures available can help to offset apathy. Education is the most effective at times when people are motivated to learn about disasters. For example, the public is more anxious to learn about disasters at the beginning of seasonal threats (e.g., tornado or hurricane season) or after disasters, even non-local ones, that have received attention in the news (e.g., the Mexico City earthquake) At these times, they may be more interested than usual in how vulnerable their community is to disaster threats, how well their emergency services are able to respond, and what practical measures citizens can take to protect themselves. (Auf der Heide (1989) – page 30)

Use of the media and school programs to educate and inform the public should also be considered. The Fire Department’s community newsletter may also be an excellent means through which to convey to the Fire Protection District residents the significance of personal disaster preparedness.

Although no emergency can be called merely “routine,” responses will become even less so if incidents of domestic terrorism continue to increase. Then, the fire service’s responsibilities go well beyond the scope of responding to a disaster incident. “Any

response to an incident other than a natural disaster may be a response to a crime scene.” (Emergency Response to Terrorism – 1997, page 21) Not knowing the when, where, how, or why makes the development of contingency planning for this specific man-made -disaster arena very difficult to comprehend. And, this is perhaps especially true for a relatively small fire protection district in southwestern Illinois.

While there is obviously nothing that can prevent the occurrence of a natural disaster, and while most man-made disasters can be prevented through preemptive measures, the fact remains that, even with preventive maintenance or other general precautions, total elimination of man-made disasters caused by third party involvement is impractical at best.

If experience of others is the best teacher, the Signal Hill Fire Department has the opportunity to increase its own preparedness by revisiting the past through literature that examines previous disaster-related emergency responses. Those incidents should serve as a foundation on which to develop an intra-department disaster-contingency plan.

The Signal Hill Fire Department has the capability to provide “pre-incident” education to the residents it serves. Getting it to the residents is easy - persuading them to heed the warnings and the advice is the hard part. But the old adage holds true: If we don’t do it, who will?

RECOMMENDATIONS

It is recommended that the Signal Hill Fire Department should develop an internal disaster-preparedness plan. This plan should incorporate elements of existing disaster plans, (i.e Local Emergency Planning Committee, Region IV Medical Disaster Plan, St. Clair County Contingency Plan, etc.), to insure for congruent planning assumptions. Furthermore, the focal point of the internal plan should capitalize upon those current Department resources available to respond to a disaster scenario. This section would be completed after a comprehensive Capabilities Assessment, with an emphasis on identifying external resources that could be made readily accessible in the event they are needed. The development of an internal plan should also take into consideration those obstacles that may hinder emergency operations.

With the wide scattering of debris across many streets and roadways, many emergency units were limited in response times because of flat tires. The Plainfield Fire Protection District had not planned for this problem, but three local dealers made tire repair trucks available around-the-clock. These services for 10 days amounted to over \$125,000.” (Urban Search and Rescue in Will County, Illinois (1992) – page 8)

It is recommended that after the development of an internal disaster-preparedness plan, the principal components of the plan be exercised on a regular basis.

Just saying you are developing a disaster plan or have one in place doesn't mean it is going to be effective. Much thought and inter-action must go into the plan.

While there has been considerable guidance given here, the real purpose and success of any disaster plan depends on two critical fundamental items:

- needs assessment
- practice of deployment

(Jenaway, (1992) – page 119)

Continually testing an internal plan can insure that any defects within the planning and exercise process will be recognized, allowing for effective remedial actions to be taken. It is recommended that the Signal Hill Fire Department should retain a structural engineering consultant to evaluate its own facilities for structural stability during and after an earthquake. “These situations will be almost impossible to combat if needed fire equipment is buried in a collapsed fire station...” Governor’s Earthquake Preparedness Task Force Report (1990) – page 1) “Vehicles assigned to fire and ambulance stations are often stored indoors. These may be unavailable in the event that the storage structure is damaged.” (Estimated Future Earthquake Losses for St. Louis City and County Missouri (1990) – page 36) Remedial fortification of the facility should be considered to insure for the integrity of mobile firefighting and rescue equipment. The fire station could then serve as a “safe-haven” for the families of volunteer firefighting personnel during crisis periods. “As soon as possible, the safety of the families of the personnel at the Command Center should be determined...People work much better when they are confident of their family’s safety.” (Urban Search and Rescue in Will County, Illinois (1992) – page 20)

It is recommended that the Signal Hill Fire Protection District revisit the installation placement of warning sirens within the Fire Protection District. Investigation of the availability of federal or state matching funds or grants should be examined to fund the

installation of these warning devices. Annual maintenance costs should not be overlooked when preparing long-term financial plans.

Finally, it is recommended that the Signal Hill Fire Department increase its efforts within the community to inform and educate the public of the potential of disasters. Emphasis should be placed upon obtaining family disaster-preparedness planning information from reputable sources such as the American Red Cross, Federal Emergency Management Agency, etc., and making these materials readily available to the Fire Protection District residents. (Appendix “D”) Additionally, consideration should be given to conducting public forums with a focus on disaster preparedness. Efforts should be made to inform the public that, in the event of a catastrophic event, survivability is still feasible, but only if it is prepared to anticipate a 72-hour delay before the arrival of outside emergency-response forces.

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Appendix "A"

Community Risk Assessment

	Hazard			Vulnerability			Risk
	Probability of Occurrence				Danger Factor		Disaster Rating
	Likely (3)	Possible (2)	Unlikely (1)	High (3)	Average (2)	Low (1)	
Air Disaster			1		2		2
Communications			1			1	1
Dam			1			1	1
Drought		2				1	2
Earthquake	3			3			9
Earthquake Zone	3			3			9
Flood		2				1	2
Group Homes		2				1	2
HAZ MAT Stationary		2				1	2
HAZ MAT Transport		2			2		4
High Wind	3				2		6
Highways							
County Roads		2			2		4
State Highways	3				2		6
Hospitals/Nursing		2			2		4
Landshift/earthslide		2				1	2
Pipelines		2			2		4
Power Failure	3				2		6
Rail Disaster		2			2		4
Railroads (Freight)		2			2		4
Schools		2				1	2
Severe Weather	3			3			9
Subsidence	3				2		6
Terrorism			1		2		2
Tornado	3			3			9
Transportation Accident		2				1	2
Winter storm (severe)		2			2		4

Appendix “B”
Secondary Events
(Typical)

Primary Disaster (Trigger)	Landslide	Flash Flood	Slow Raise Flood	Fire	Levee/Dam Failure	Transportation Accident	Train or Rapid Transit	Aircraft	Power Failure	Fuel Shortage	Water Supply Failure	Hazardous Materials	Other
Air Disaster				X					X				X
Communications				X					X				X
Dam	X	X											
Drought													
Earthquake	X	X		X	X	X	X		X	X	X	X	X
Earthquake Zone	X	X		X	X	X	X		X	X	X	X	X
Flood		X	X	X					X			X	X
Group Homes				X									X
HAZ MAT Stationary				X		X	X		X			X	
HAZ MAT Transport				X		X	X		X			X	
High Wind				X		X		X	X			X	
Highways													
County Roads				X	X							X	X
State Highways				X	X							X	X
Hospitals/Nursing				X									X
Landshift/earthslide		X	X		X	X	X		X		X	X	X
Pipelines									X			X	
Power Failure										X	X	X	X
Rail Disaster				X				X				X	X
Railroads (Freight)				X				X				X	X
Schools				X									X
Severe Weather	X	X	X	X	X	X	X	X	X			X	X
Subsidence	X			X	X		X		X		X	X	X
Tornado				X		X		X	X			X	X
Transportation				X					X			X	X

Accident													
Winter storm (severe)			X	X				X				X	X

msexcell/disaster1

Secondary events that could be of a major consequences for a selected area presented in this listing.

Source: Command and Control of Fire Department Operations at Earthquakes and other Catastrophic Disasters. National Fire Academy, February 1987.

Appendix “C”
Resource Capabilities Matrix

Signal Hill	Engines	Rescue*	Utility/Special	Aerial	Chief's Car	Firefighters
Average Daily Response	2	1	0	0	0	12
Current Resources	3	1	1	0	1	26
St. Clair County Availability**	102	18	16	16	N/A	N/A

** May Include Reserve
Units not Staffed

*Rescue = Fire Rescue does
not include Medical Rescue
or Emergency Medical
Services

Source: St. Clair County Fire
Chiefs Resource Manual -
July 1997

St. Clair County		ALS	BLS
Medical Resources Availability*			
		16	22

* May Include Reserve Units
not Staffed

Source: Southwestern
Illinois Emergency Medical
Plan - 1998

Appendix “D”

Sources of Pre-Incident Information and Titles

It’s The Law – Call Before You Dig, NorAM Pipeline Operations – Pipe line safety information.

Tornadoes...Natures Most Violent Storms, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service

Your Family Disaster Plan, Federal Emergency Management Agency, American Red Cross -- Hurricane, Flash Flood, Hazardous Materials Spills

Emergency Preparedness Checklist, Federal Emergency Management Agency, American Red Cross – Tornado, Flash Flood, Earthquake, Winter Storm

Thunderstorm, Federal Emergency Management Agency and American Red Cross, National Oceanic and Atmospheric Administration

Your Family Disaster Supplies Kit, Federal Emergency Management Agency, American Red Cross -- Hurricane, Flash Flood, Hazardous Materials Spills

Earthquake, Federal Emergency Management Agency, American Red Cross, United States Department of Interior – Us. Geological Survey

Mine Subsidence in Illinois, Illinois State Geological Survey, Champaign, Illinois

Safe Steps for Winter Weather, American Red Cross