The ASPEP Journal 2000

THE JOURNAL OF THE AMERICAN SOCIETY OF PROFESSIONAL EMERGENCY PLANNERS

ASPEP

The American Society of Professional Emergency Planners (ASPEP) is a professional organization of certified emergency managers dedicated to the advancement of knowledge about disasters and to the improvement of the practice of emergency management. ASPEP works toward these goals through continuing education, through professional development and exchange, and through the publication of an annual Journal.

THE ASPEP JOURNAL

The *ASPEP Journal* is published annually in the fall in time for release at the yearly conference of the International Association of Emergency Managers. The *Journal* is dedicated to the sharing of ideas, research, lessons, practice, and opinion and serves as a forum for all disciplines involved in emergency management. A formal call for papers is issued in early January of the year of publication. Articles or papers which will contribute to the goals of ASPEP are welcome.

A call for papers will be issued about January 1, 2001 for papers to be included in the 2001 *Journal* which will be published in November, 2001. The future may bring either electronic publication or more frequent print publication.

TYPES OF PAPERS

Articles or papers which will contribute to the advancement of knowledge and to improvement in the practice of emergency management are welcome. We encourage breadth of subject matter and depth of discussion.

Examples of subject matter which would be appropriate include:

> The state of the profession of emergency management: where it has been, where it is, and where it is going or should go.
>
> Research which will lead to a greater understanding of disasters, to their prevention or mitigation, to more effective response, or to better recovery practices. Research which will establish a base for further research.
>
> Discussions of particular emergency management problems, resources, or procedures which have not been well addressed in the past.
>
> New ideas which will lead to improved understanding and practice.

Studies of events or exercises and the lessons which may be drawn from them that would be valuable to practitioners in a similar situation.

Programs which may be used by other emergency managers.

Practices which have proven successful.

Since the *Journal* is published only once a year, we prefer papers of lasting interest. You should be sure that the paper you start in January will still be of interest in November.

The *Journal* cannot accept papers which are advertisements or infomercials for particular products.

The usual length of our papers is between 1500 and 4500 words. Shorter articles may be published in the monthly *Bulletin of the International Association of Emergency Managers*. We recommend that you look at the earlier issues of the *Journal*. If you are in doubt contact us.

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2000

American Society of Professional Emergency Planners

PLANNING FOR WMD TERRORISM RESPONSE: FACTORS TO CONSIDER

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Since 1996, numerous articles have been written concerning the threat of a terrorist attack involving weapons of mass destruction (WMD). In addition, the federal government and private industry have established several training programs to teach first responders how to prepare for and respond to a WMD attack. There appear to be few, if any, articles or specific training available for the emergency managers who typically write the emergency and contingency operations plans, however. This article focuses on the nuclear, biological, and chemical (NBC) aspects of WMD. It outlines some issues to generate discussion and provides some ideas that emergency managers can use to develop programs and operational plans.

In general, the All-Hazards Emergency Operations Planning process (FEMA, 1966) can be used to prepare for an NBC attack. In fact, for planning purposes a terrorist NBC event can be likened to an extremely dangerous hazardous material (hazmat) release.

The planning process begins, as always, with a hazard analysis. This process is basically the same for all hazards, including NBC materials. The following discussion outlines the unique character of NBC materials, hazard identification and profiling, and prioritization of the risk of terrorist incidents involving NBC materials.

CHARACTERISTICS OF NBC MATERIALS

Many NBC materials, particularly chemical and biological (CB) agents, were specifically selected for their ability to injure or kill people. To plan for NBC terrorist incidents, planners must become familiar with the unique character of NBC materials including the hazards, limitations, and threat.

NBC Hazards

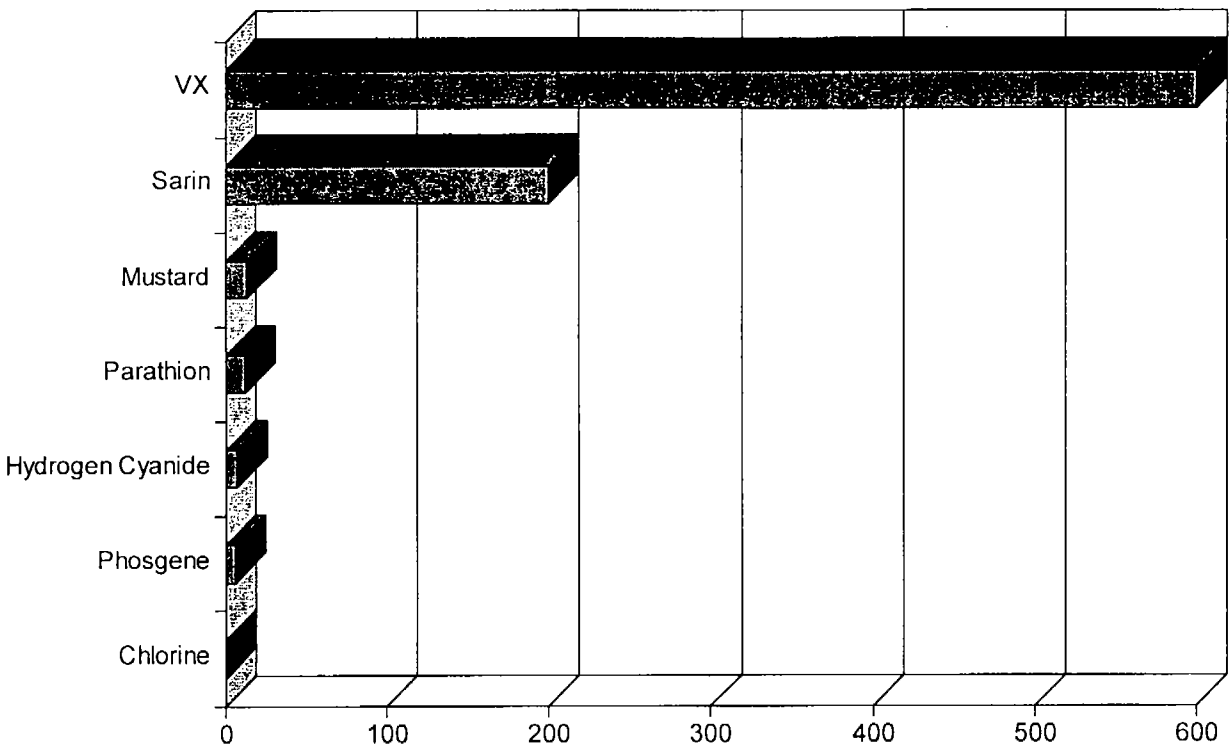
Nuclear fuel rods and large quantities of industrial chemicals are transported on the nation's roads and rails daily. A terrorist attack on the transportation system could result in a release that fulfills the terrorist's requirements without exposing the terrorist to the hazards associated with obtaining, manufacturing, and transporting the material. Some considerations of the hazards of NBC materials include:

Nuclear. Very few of the radiological materials used in industry, medicine, or research are suitable for making fission or fusion weapons. Any radioactive material can be combined with explosives to create a device that scatters radioactive material in small particles that can be inhaled or ingested.

Biological. Biological materials can be found in nature. For example, Anthrax is often found in populations of grazing animals and the toxin Ricin can be extracted from the Castor plant which grows wild throughout North America. Various other fatal diseases and toxins can be produced fairly easily. In fact, Botulinum toxin, one of the most lethal toxins on Earth, can be made by mistake during the canning process.

Chemical. Several common hazardous materials such as Chlorine and Phosgene are also considered chemical warfare agents. The majority of chemical warfare agents, however, such as blister and nerve agents, are significantly more toxic than these common industrial chemicals. Sarin, for example, the nerve agent used in the 1995 Tokyo subway attack, is 200 times more toxic than Chlorine (See Figure 1).

Figure 1. Relative Toxicity of Chemical Agents



NBC Limitations

Not all NBC materials are easy to make or obtain. Some manufacturing materials and equipment are subject to national or international regulation and purchase or theft can be tracked and reported. If terrorists successfully purchase or steal NBC material they must still transport it, work with it to create the weapon they want, and store it until they are ready to use it. This can pose serious hazards for the terrorists, themselves. For example, some of the manufacturing processes are very complex and an incautious or incorrect step may kill or injure the terrorist.

Disseminating NBC materials can also be difficult for several reasons. First, the

dissemination device must hold enough material to create the desired effect. This device can be relatively small if the agent is especially lethal, disseminated correctly, and released in an enclosed area. If the release is in the open or into a large water supply, the device may need to hold hundreds or thousands of tons of material. Second, the device must be able to disperse the material in an effective form (ie dust, vapor, or aerosol) and particle size (typically 1 - 5 microns). This is much harder to accomplish than it sounds. Offensive weapons programs in several countries worked on this problem for decades and spent millions, if not billions, of dollars trying to solve it. The terrorists do not need to be perfect but they still need to be at least marginally capable or the attack is likely to create very few casualties. Lastly, if the release is outside, then weather factors must be taken into account. For example, wind direction and speed, air stability, temperature, ultraviolet light, and precipitation will affect the persistency and spread of the material. If the release is indoors, weather factors are largely negated, but the terrorists must still account for the air circulation pattern, environmental controls, and traffic patterns of inhabitants.

Another alternative is for the terrorists to sabotage industrial safety systems and cause them to fail. Although this may be possible, some safety features have automatic back-up systems and alarms. Also, activities that violate secure areas or safety features may be noticed and reported by security personnel or workers in the area. Finally, this would be a very inefficient dissemination technique for many agents. An act of sabotage would probably have to release tons of material to have significant effects.

NBC Threats

Hazard Identification. Hazards can be defined in terms of materials and Locations. To identify hazards, the planners should determine which NBC materials or their components are in, near, or transiting their areas of responsibility. In general, this step may be fairly simple since the Local Emergency Planning Committee (LEPC) may have identified many hazardous materials and locations as part of the hazmat planning requirements under the Emergency Planning and Community Right-to-Know Act of 1986. For example, the LEPC should have identified transportation routes, chemical production and storage facilities, and nuclear power plants in the local area. There are many other facilities and materials, however, which the LEPC may not recognize as terrorism hazards or they may not comprehend the potential many sites pose for NBC terrorist incidents. Table 1 outlines some sources of NBC materials.

Hazard Profiling. Hazard profiling must analyze the risks in terms of the probability of a terrorist NBC attack, the materials the terrorists may use in the attack, and the probable targets in the area. The resulting profile can be addressed as basic planning assumptions.

Probability. The specific probability of a terrorist attack using any weapon, including NBC materials, can only be judged based on sound, current intelligence. Within the US, the Federal Bureau of Investigation (FBI) and other law enforcement agencies

Table 1. Sources of NBC Materials

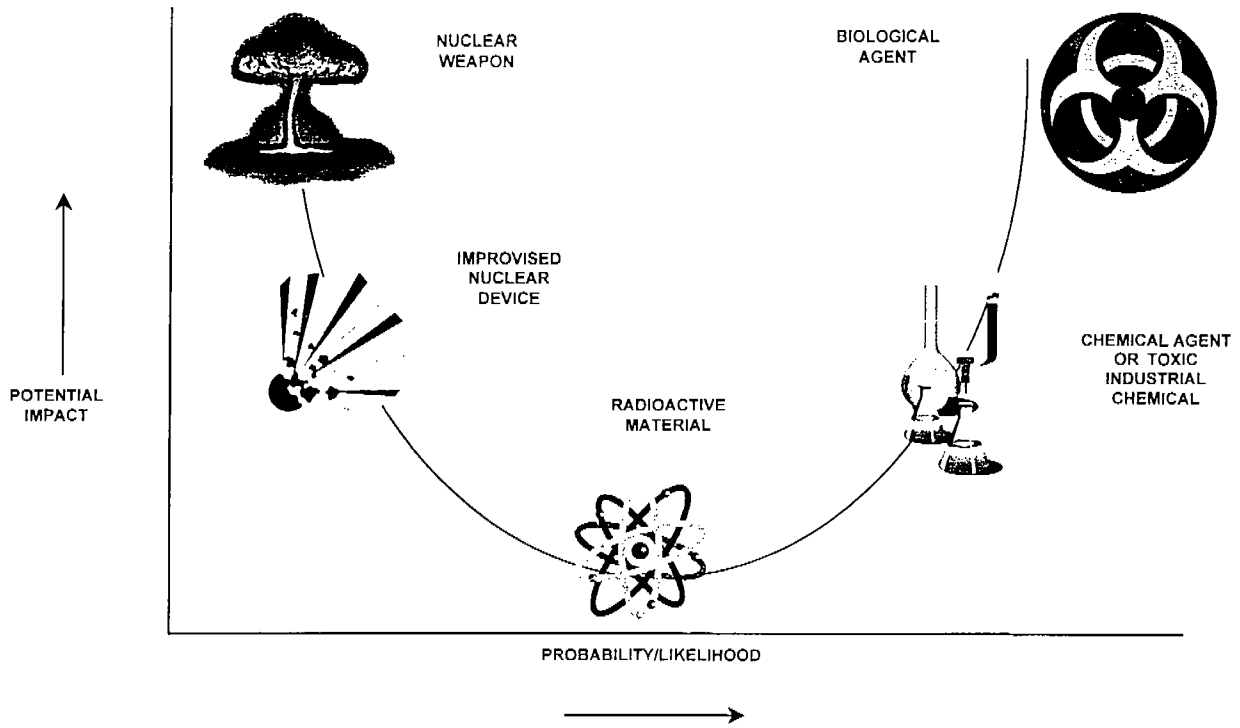
Nuclear Material	Military weapon systems. The most obvious military weapon is a fission or fusion device.[a] Some armor, ammunition, and wingtip counterweights contain depleted uranium, a material that is slightly radioactive. Also, several military chemical warfare agent detection systems contain various radioactive materials. Nuclear power stations use, store, and transport radioactive fuel rods. Industrial facilities use radiological material during some industrial processes and to manufacture objects such as smoke detectors. Radiological medicine and research facilities at universities or health care facilities also use and store various types and quantities of radioactive material.
Biological Material	Plant toxins such as Ricin. The source of Ricin grows anywhere in the continental United States and may be sold as an ornamental flower in local garden shops. Venom from animals such as snakes, scorpions, or spiders. Diseases endemic to the area. For example, Anthrax is often endemic to areas with large populations of hoofed animals. Specimens at research facilities, universities, and human or veterinary health care facilities. For example, Botulism Toxin is used in some medical procedures.
Chemical Materials	Industrial facilities manufacture, store, ship, and use chemicals that are exceptionally hazardous. In fact, four of these chemicals (Chlorine, Phosgene, Hydrogen Cyanide, and Cyanogen Chloride) are considered lethal chemical warfare agents. Universities, research, and medical facilities may also have small stockpiles of dangerous chemicals. Farms, ranches, swimming pools, and stores may hold relatively large stocks of dangerous chemicals such as chlorine and pesticides.

a. US Army DPP, Hazmat Technician, Module 2, FBI Threat Briefing Video and pg M2-5. According to the FBI, it is currently unlikely that a terrorist organization could obtain a military nuclear device.

constantly watch for terrorist activity. Indications of this activity are often passed within the law enforcement intelligence community. These communications can provide warning that a NBC terrorist attack is imminent.

Currently, the FBI indicates that the threat of an NBC terrorist attack in the United States is low (US Army DPP, 1999). The increasing number of hoaxes involving biological agents such as Anthrax, however, could indicate a trend towards actual use in the future. Figure 2 shows what the FBI considers to be the relative impact versus potential likelihood of WMD attacks. For example, the FBI considers an attack with a nuclear weapon extremely unlikely. If such an attack occurred, however, it would be devastating. Therefore, the probability of a terrorist nuclear attack is low, but the impact is high. Conversely, an attack with radiological material is more probable, but the affects would be very limited. Therefore, the probability is higher, but the impact is lower. Chemical or biological agent attacks have both a higher probability and great impact. Under certain conditions, a biological attack could be nearly as disastrous as a nuclear attack.

Figure 2. Impact vs Likelihood



Materials. Planners need to make some basic assumptions concerning the NBC material terrorists might use in an attack. These assumptions should consider factors such as the amount of material the terrorists can obtain, the nature of the material, and the most probable dissemination methods. These factors will affect target selection and the probable outcomes of an attack, including magnitude, intensity, and spatial extent of

an attack. In general, these assumptions can be outlined using the following questions:

How much NBC material can terrorists obtain without being noticed? This question can highlight terrorist activity using the same concept as the reportable quantity limits established under regulations for hazmat. Once planners have identified trigger amounts, they can key plans to activate if suspicious activities occur that include quantities at or above the predetermined limit (ie large purchases by previously unknown users, thefts, unexplained spills, etc). Because of their hazardous nature and problems with agent stability the terrorists would probably not store NBC materials for long periods. They would be more likely to obtain the materials based on their attack plan and use them as soon as possible. Although some NBC materials are easy to obtain, many are regulated and even small-scale purchases, usage, or losses are tracked and reported. For example, several radiological materials are reportable to the Nuclear Regulatory Commission, biological specimens and samples that require special handling, such as Smallpox, are controlled by the Center for Disease Control and Prevention, and many chemicals are reportable under the Chemical Weapons Convention.[2]

What is the nature of the material? This question helps to determine the potential impact if NBC material is used in an attack. For example, what is the rate of action, how long does it persist in the environment, which agents are easy to produce, and which more common materials can the terrorists use to obtain similar results? Consider the following:

Rate of Action: The rate of action basically measures the length of time between exposure to the material and the onset of symptoms. Short-term exposure to a very strong radiological source can be extremely harmful. Ingesting or inhaling radiological particles can also be deadly. If the exposure is severe, symptoms may develop in hours or days; however, it may also take years to achieve the full effects of radiation poisoning (US Army FM 8-9, pg 5-1). Many biological agents can induce illness, but the effects are delayed for hours, days, or weeks while the agent incubates and overcomes the immune system. Biological toxins are relatively fast acting and are some of the most toxic materials available. For example, Ricin is two to three times more toxic than VX, the most potent nerve agent. Botulism Toxin is 5000 to 10000 times more toxic than VX (US Army DPP, pg M7-5). Chemical agents are fast acting. For example, Mustard agent begins to damage the skin immediately, although it can take hours for the blisters to develop. Many victims can survive exposure to low concentrations of these agents, but even minor exposures can cause injuries. Figure 1 compares the lethality of some chemical agents.[3]

Persistency: All NBC materials will persist in the environment for some period of time. The persistency of nuclear materials is measured in terms of the material's "half-life." This term basically applies to the length of time required for half of the atoms of a given sample of radioisotope to decay. Half-lives range from fractions of a millionth of a second to billions of years (US Army DPP, pg 2-10). Biological agents are usually very susceptible to the weather conditions. Few last more than a few hours in ultraviolet radiation and dry weather. Anthrax, however, which creates a hard-shelled spore, can

last for decades. Toxins are actually chemical substances and they evaporate like any other liquid. Chemical agents can persist for a few minutes to months, depending on the physical and chemical properties of the agent and the weather. Sarin, for example, will evaporate quickly, usually within hours in hot, dry weather. In cold, wet weather VX can last for months. In general, the factors that accelerate the evaporation rate of chemical agents are high surface temperatures and low humidity.

Ease of Production: Assessing how easily materials can be manufactured may realistically limit the number of NBC materials the planner must consider. While relatively unskilled people in home laboratory conditions can manufacture some materials, others require sophisticated manufacturing techniques and equipment. Some government-sponsored terrorists, for example, may have access to materials produced in professional facilities; other groups may have to produce the material in relatively unsophisticated facilities. Terrorists can also buy or steal some NBC materials. They may be able to buy the materials to manufacture others. Again, some ingredients and equipment are tracked in accordance with national or international regulations. Table 2 outlines the potential of NBC materials.

Table 2. Good News and Bad News of NBC Materials

MATERIAL	GOOD NEWS	BAD NEWS
NUCLEAR	Even some nations have trouble building "The Bomb" because it is hard to produce enough weapons grade nuclear material.	Any radioactive material and explosives can make a Radiation Scattering Device.
BIOLOGICAL	Some biological agents, such as Smallpox, are not readily available and large quantities of weapons grade, freeze-dried agents are beyond the capability of most terrorist groups.	Some biological agents, such as Ricin, can be made in small, impure quantities, ie a few liters, and distributed as a liquid, paste, or aerosol.
CHEMICAL	The blister agents Lewisite and Phosgene Oxime and the nerve agents Soman and VX require equipment and manufacturing processes that are beyond the capabilities of most terrorist groups. In fact, some national programs were unable to make the necessary ingredients.	Nerve agents Tabun and Sarin and the blister agent Mustard can be produced in small, impure quantities, ie a few liters, and distributed as a liquid, paste, or aerosol with fairly simple equipment and ingredients.

Common Materials: Some commercial chemicals, such as chlorinating and cyanide compounds, are also classified as chemical warfare agents. Many pesticides also produce

nerve agent-like symptoms. They can pose inhalation, ingestion, and contact hazards. As indicated in *The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals*, however, they are several hundred times less toxic than G or V-series nerve agents. For example, Organophosphate-based liquid pesticides include Parathion (an agricultural insecticide), Malathion (common in several household insecticides), and Amiton (used in Metramac) which has a chemical configuration similar to V-type agents. Carbaryl (used in Sevin) is a carbamate-based powder that also produces nerve agent-like symptoms.

How can the agent be disseminated most effectively? If the planner presumes a terrorist's goal is to kill or injure large numbers of people, then dissemination devices must be very efficient. Dissemination devices can take many forms. These include direct deposit, breaking, bursting, spray, and vectors. Each form of device has its own characteristics, but all have actually been used to disseminate NBC material. Consider the following:

Direct Deposit: These devices are typically mechanical systems used to attack a specific individual. They are easily controlled and pose little hazard to people nearby or downwind. They can take many forms, but they are basically designed to inject the material directly into or onto the victim. An example of a direct deposit device is the modified umbrella two Bulgarians used in London in 1978 to inject a micro-ball containing Ricin into Georgi Markov's leg (Harris and Paxman, pp 197-198). He died as a result.

Breaking Devices: These are also mechanical systems that can be made from common items such as light bulbs, balloons, thermos bottles, glass jars, etc. They simply hold the material until they are broken. Since these devices do not usually hold much material, their affects are fairly controllable. Depending on the material and the point of release, however, even a small release can pose a hazard to people nearby or downwind. For example, breaking devices were used in the Sarin attack in the Tokyo subway. Also, in the 1960's US biological warfare researchers broke light bulbs filled with a harmless biological agent in the New York subway system to determine the effectiveness of this form of attack (Harris and Paxman, pp 197-198).

Bursting Devices: These are typical of the systems designed and used by the various military forces for decades. In essence they consist of a reservoir to hold the material, an explosive charge to break open the weapon casing and distribute the material, and a fuse system to initiate the explosion at the desired point, altitude, or time. Some military systems, such as Scud missiles, can contain several hundreds liters of agent (Cordesman, pg 58) and can pose a hazard to fairly large areas, especially if they are used in substantial numbers. The effects of bursting devices are generally predictable, but deviations due to changes in the weather have occurred. Although these weapons were principally designed and used to disseminate CB agents, Chechen separatists in Russia threatened to use an explosive device surrounded by radiological material in 1995 (US Army DPP, pg M10-20).

Spray Devices: Such devices are commonplace. They are used daily to disseminate everything from pesticides and fertilizer to hair spray and clothing starch. They basically

consist of a reservoir for the material, a pressure source, and a release valve. Every garden supply shop in the country contains examples in a variety of shapes, capacities, and sizes. For a small-scale release (ie a few ounces to a few gallons, a terrorist could either purchase a spray device or build one from the selection of pipes, nozzles, valves, and fittings available in any hardware store. For large-scale dissemination (ie several gallons to tons, a terrorist could use a commercial crop duster or improvised spray device mounted on a vehicle or aircraft. Since the material released in this manner is most susceptible to the weather, the results of an attack using sprays are harder to control than any of the other mechanical devices. Also, most spray devices can be turned on and off so the material can be disseminated from a single point, from a series of points, or in a continuous line. This means a spray device can pose a hazard to very large areas or a number of areas.

Vectors: A vector is usually used to disseminate live biological agents or toxins. Examples of vectors include bacteria infected animals and insects or contaminated clothing, food, or water. Once released, vectors are unpredictable and virtually uncontrollable. For example, in the Middle Ages fleas infected with plague traversed Europe spreading the Black Death. Recently, mosquitoes in New York City have spread a sometimes-fatal disease now identified as the West Nile Fever (*Daily News*, 1999a).

What are the potential consequences of an attack? The last step in hazard profiling is to identify the potential consequences of an attack. This includes assessing the probable extent of the affected area, identifying probable targets, and estimating the potential economic and political impacts. Factors that affect the potential consequences of a NBC terrorist attack include the characteristics of the target and the nature of the weapon. The characteristics of the target include the size of the probable incident area and the size of the target population.

Affected Area: Military planners estimate that NBC weapons can contaminate or adversely affect operations in hundreds or thousands of square miles. Military planners, however, anticipate thermonuclear detonations or weapons systems that can deliver tons of CB agents. Previous accidental hazmat releases, disease outbreaks, and terrorist attacks provide more realistic examples of what to expect from a terrorist NBC material release. Consider the following:

According to the Associated Press, the recent accidental release of radiation at a uranium processing plant in Tokaimura, Japan affected an area covering about a six-mile radius, about 113 square miles. As of this writing, reports indicate the incident involved 35 pounds of uranium. Three people were injured and the released radioactive gas may have contaminated 36 others. Another 310000 were ordered to remain indoors. One person died from this incident (*Daily News*, 1999b).

The recent outbreak of West Nile Virus in New York City killed five people, infected 31 people, affected hundreds or thousands of square miles, and crossed state and international boundaries (*Daily News*, 1999a).

In 1984, the Union Carbide plant in Bhopal, India accidentally released over 45 tons of Methyl Isocyanate. Estimates indicate the accident may have killed over 2500 people and affected over 200000. The incident also killed thousands of cattle, creating a severe impact on local agriculture (Smith, pp 75-76).

The subway attack in Tokyo, Japan involved the release of only 20 pounds of impure Sarin. It contaminated a fairly small area, however 13 people died and 5510 people were treated for symptoms, real or imagined (US Army DPP, pg M2-8).

Probable Targets: Identifying probable targets can be simplified if planners assume the terrorist's goal is to quickly kill or injure as many people as possible in one attack. Based on information from the previous discussions the planners should consider the following factors:

In order to hurt or kill large numbers of people, terrorists need to attack areas with large crowds. These could include political rallies, sporting events, cultural activities (ie concerts, festivals, or religious functions), or other places where people gather (ie airports, parks, theaters, shopping centers, etc).

To ensure the most efficient use of the available material terrorists need to attack areas where the weather conditions are most favorable and predictable. Enclosed areas fit this description.

Terrorists often want publicity. So any event that is heavily covered by the media is a possible target, although the terrorist act itself will generate its own publicity.

Another qualification for a possible target is something that is meaningful to the terrorist or the targeted community. Key examples from the past include government buildings, university research facilities, religious facilities, and medical facilities that perform controversial medical procedures such as abortions.

Economic factors such as utilities, crops, and food animals are also possible targets. The overall affects could be disastrous. It is very difficult to seriously contaminate a major water supply, but loss of vital electrical service due to NBC contamination of fuel or the power station or an attack on a nuclear power facility could cause significant disruption and possibly injury or death during periods of adverse weather. National recall or international embargoes of suspect produce, grain, or meat could also seriously affect various sectors of the national economy. NBC attacks against these targets would typically result in few direct human casualties, however.

Economic and Political Consequences: The economic and political consequences include response costs measured in terms of man-hours, material, and equipment; loss of income for private business and the resulting loss of revenue for the government, and loss of faith in the government's ability to protect the population and efficiently respond or recover from the incident.

PRIORITIZING RISK

Prioritizing risk requires planners to assess the vulnerability of the various potential targets to attack with NBC materials. Part of this assessment process requires the planners to think like a terrorist. In his book, The Anti-terrorism Handbook: A Practical Guide to Counteraction Planning and Operations for Individuals, Businesses, and Government, Karl A Seger suggests considering the target's criticality, accessibility, recuperability, and vulnerability, the affect on the terrorist group and the risk to the terrorists.

Criticality

The concept of criticality attempts to identify the impact an attack will have on a target or community. An attack affects not only the daily operations within the facility itself, but also that facility's overall role in providing economic, governmental, or cultural support to the community.

Accessibility

Accessibility determines how easily terrorists can approach the target and complete their mission (ie disseminate the NBC material). For example, a facility with unsecured, unmonitored external air handling systems may be more accessible than a facility with roof-mounted air handling systems inside a locked, fenced area.

Recuperability

Recuperability addresses how long the attack will disrupt the target. For example, a small bomb may disrupt operations for a few hours or days until repairs can be made. On the other hand, scattering even a small amount of radioactive material may render the target permanently unusable.

Vulnerability

Vulnerability assesses what would be required to disrupt or destroy the target or achieve some other short-term goal. In Tokyo a fairly small amount of Sarin severely disrupted the subway system.

Affect on the Terrorist

Every attack affects both the target and the terrorist. An attack involving WMD could adversely affect the perpetrators, costing them financial or political support. In some cases, the attack could result in sanctions or even military retaliation.

Risk to the Terrorist

Risk assesses the probability that terrorists will be noticed, intercepted, and apprehended during their operations. Also, as previously mentioned, mishandling WMD materials could kill or injure terrorists.

Additional Issues

Additional issues to consider include how different WMD materials will affect the target. This assesses the relative effects of radiological, biological, and chemical materials on

the target facilities, equipment, or populations. The answer must address both the physical and psychological aspects of an attack.

Facilities and Equipment. In most cases, contamination can be removed, neutralized, or covered. The process can be long, expensive, and difficult, however. This is particularly true of sensitive or complex equipment and facilities. In some cases decontamination is not practical or possible. For example, chemical agents cannot realistically be removed or neutralized on leather, wood, foam rubber, and some fabrics.

Population. Many physical affects of an attack with NBC material can be treated. For example, antibiotics and antidotes can help against many chemical or biological agents. Some effects can be permanent, however, and many NBC materials could have their most serious physical affects on the elderly, the very young, or people with immune deficiencies.

The psychological affects of a WMD attack may last longer and be more traumatic. For example, the population may lose faith in the government's ability to protect them and respond effectively to save lives and property. The psychological impact may also depend on the historic and ethnic background of the victims. For example, a chemical attack, with its Holocaust overtones, may be psychologically devastating to a Jewish community. An attack with radiological material, reminiscent of the atomic bombings of Japan, may have a similar effect on a Japanese community.

SUMMARY

In summary, the preceding discussion points to a number of assumptions planners can apply as they develop their WMD response plans. Specifically:

The FBI indicates that the current threat of an NBC terrorist attack in the United States is low; however NBC hoaxes seem to be proliferating. When the effectiveness of the hoaxes wears thin, the real thing may not be far behind. Planners should use this time to prepare.

Terrorists can theoretically obtain, manufacture, and use any quantity of any type of NBC material. In reality, most terrorists would only be able to obtain, manufacture, or use small quantities of impure material. Terrorists may, therefore, employ NBC materials that are exceptionally toxic so that a small amount will have a significant affect. This also simplifies some transportation problems and limits a terrorist's vulnerability to detection and interception during the planning, preparation, and movement to attack phases.

Terrorists may choose to attack industrial facilities and hazmat transportation systems. However, this means they would release common hazardous materials and the community may already be prepared to deal with incidents of that type and scale.

Terrorists may want timely publicity. This means they might choose materials that act

quickly. Chemical agents and biological toxins are best suited to this purpose.

Planners should not be overly concerned with nuclear weapons, large-scale attacks in the open, most biological agents that require a long incubation period, or chemical agents such as Lewisite, Soman, or VX. Planners might instead concentrate on fairly small-scale CB attacks in enclosed areas where large crowds commonly gather, especially if those targets are known to have a special meaning to terrorist organizations or to the populations that terrorists choose to target. Planners may also want to plan for Anthrax which is widely recognized as a biological agent and which could be used simply because of its name even though it takes several days for symptoms to appear. Lastly, planners should consider CB agents that are not difficult to produce, readily available commercial chemicals, and protection of shipments and facilities that contain radioactive materials and hazardous chemicals.

The typical Anthrax hoax uses mail as a vector to disseminate the agent. A more credible attack, however, would include devices that disseminate the NBC materials as dust, vapors, or aerosols. Of these, the most dangerous are the breaking, bursting, and spray devices.

Finally, because of the difficulties for a terrorist involved in obtaining, manufacturing, storing, moving, and effectively disseminating the NBC material, it may be reasonable to assume that the community will have to respond to only one major incident at any given time.

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NOTES

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2. Chemical Weapons Convention Homepage. The Chemical Weapons Convention (CWC) specifically identifies many hazardous chemicals in the three CWC Schedules. Specifically, CWC Schedule 1 lists chemical warfare agents, such as nerve and blister agents, and the materials needed to manufacture them, which are known as precursors. It also lists Ricin and Saxotoxin that are derived from plants. CWC Schedule 2 lists dual-use chemicals of limited use. These chemicals include some that are used only in very small quantities or that have few, if any commercial uses and many more chemical agent precursors. CWC Schedule 3 lists dual-use chemicals of extensive use. These include chemicals such as Phosgene and various cyanide compounds that are chemical agents or precursors, but also have legitimate industrial applications that require them to be manufactured, stored, shipped, and employed in large quantities.

3. US Army DPP, pg M4-46. The chart shows the relative inhalation toxicity of various chemicals. It establishes chlorine as one. Using this baseline phosgene is a six, hydrogen cyanide is a seven, parathion insecticides can reach 12, mustard agents are 13, the nerve agent Sarin rates 200, and VX is 600. Skin toxicity varies as well. Less than a pinhead of mustard can cause a blister, less than a pinhead of VX can be fatal.

EMERGENCY PREPAREDNESS AND THE YEAR 2000 CHALLENGE

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CHALLENGE AND RESPONSE

The Year 2000 (Y2K) transition created one of the greatest emergency preparedness challenges ever faced by the Federal Emergency Management Agency (FEMA) and State and local emergency management organizations in the United States. This event was unique in the annals of emergency management because it had the potential to affect many different geographical areas and systems simultaneously. FEMA's normal mission of reducing loss of life and property and protecting America's critical infrastructure from all types of disasters made it a key federal agency involved in Y2K preparations.

FEMA used an Executive Secretariat, including representatives from all major agency components, to lead the Y2K program and approached it from three perspectives: information technology; emergency preparedness; and response. This structured management approach was effective, providing coordinated decisions allowing for quick actions on the Agency's part. FEMA also supported the President's Council on Year 2000 Conversion, chairing the Emergency Services Sector Working Group, and leading the Catastrophic Disaster Response Group Federal Departments and Agencies in preparing for potential responses to Y2K consequences. The Y2K transition resulted in few disruptions and was successful in large part because of extensive preparedness, technical assistance, and outreach activities on the part of FEMA and many other organizations.

The disruption of computer-based systems as a result of the "millennium bug" posed a potentially serious risk to the continuity of operations of government agencies, public utilities, and businesses, as well as to the well being of individual citizens. While the actual mechanics of making sure that a single computer system could accurately process data into the Year 2000 was relatively straightforward, the entire process of identifying, fixing, and testing a myriad of systems and data exchange points consumed an extraordinary amount of time, energy, and money. Tackling the Y2K problem also presented one of the greatest management, leadership, and command and control challenges in emergency preparedness FEMA has ever faced. The importance of careful contingency and consequence management planning emerged as being critical to guarding against the possibility of disruptions and remaining prepared to deal with any consequences. At FEMA, Y2K was labeled the "un-natural hazard" and "hazard of the year." Notwithstanding this, there was a silver lining for FEMA and its emergency management partners because preparing for Y2K presented an unprecedented opportunity to heighten awareness across the nation and around the globe about the importance of being prepared not only for Y2K, but for all disasters and emergencies, no matter what the cause. FEMA's message was more widely heard than ever before.

PARTNERSHIPS IN EMERGENCY MANAGEMENT

FEMA's normal day-to-day mission is to reduce loss of life and property and protect America's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery. A large part of the success of emergency preparedness and disaster management programs in recent years lies in the many close partnerships established with public, private, volunteer, and non-profit organizations. This partnership approach was used very successfully in preparing for and responding to Y2K. Equally important, was the recognized leadership role in emergency preparedness and disaster management already firmly established for FEMA in the United States.

FEMA works daily to reduce risks and strengthen the support systems that help people and communities prepare for and cope with all types of disasters and, because of this, it was well understood that FEMA would be the appropriate agency to lead any needed federal response and manage any consequences of Y2K or other problems requiring federal assistance. This is why it was so critical to ensure that FEMA's own systems were compliant so that it could continue to respond to any and all disasters. Leading up to the century transition, FEMA reached out and provided extensive guidance and assistance to help lead and prepare the nation's emergency management community for dealing with the possible consequences of Y2K-related incidents.

THE YEAR 2000 ISSUE AND EMERGENCY MANAGEMENT

The Y2K hazard was unique in the annals of emergency management and correspondingly presented significant challenges to the emergency management community. Y2K-induced problems had the potential to affect many different systems and geographical areas simultaneously, a situation that FEMA has never before faced. FEMA can normally handle three or four major disasters at the same time, but the prospect of addressing problems in all 56 states and territories was daunting. The date was certain for its most likely impact, and techniques for solving Y2K problems were well known and used in the remediation process. During the entire preparatory and remediation phase, however, several factors undermined the potential to mitigate this threat: the inter-connectivity of computers and computer systems; the difficulty in locating and replacing embedded chips; the elusiveness of absolute assurances of compliance from vendors and suppliers; resource limitations; and the myriad, variable decisions and priorities of business and government leaders.

Y2K was mostly invisible to the public because it could not be seen or experienced like a tornado, flood, or earthquake. It was difficult to portray the extent to which technology supports daily lives. This added to the difficulty of increasing public awareness to a level sufficient to cause the average adult to take prudent preparedness measures, while at the same time not causing the concern to reach a level of panic that might result in hoarding of essential resources. We called this balancing act "the 4 Ps": undertaking prudent planning without causing public panic. Business, government, and citizen group leaders constantly struggled with this dilemma and through its public outreach FEMA

played a lead role in helping to educate the public.

ADDRESSING THE YEAR 2000 CHALLENGE

Establishing a formalized command and control structure within which to direct and manage Y2K preparations was key to the success of FEMA's efforts. Early on, a Y2K Executive Secretariat was appointed by the Director to direct and manage all of the Y2K activities in the Agency. Representatives were assigned from each Directorate and Office. Similarly, FEMA supported the President's Council on Year 2000 Conversion, a Council appointed by the President with representatives from federal departments and agencies and the private sector to guide the nation's preparations for Y2K. The President's Council on Year 2000 Conversion led the government's efforts and served as the command and control organization for the public, private, and international sectors.

FEMA supported the President's Council in three distinct areas: emergency services, responses to emergencies, and emergency preparedness and contingency planning. As at other federal agencies, a priority was to ensure that its own computer-based systems were compliant and to report its progress periodically to the President's Council. Another major responsibility was chairing and coordinating the activities of the Emergency Services Sector (ESS) Working Group of the President's Council. The ESS Working Group reached out to the organizations working with federal agencies in emergency response to increase their awareness of Y2K and assess their readiness to operate normally leading up to, during, and after January 1, 2000. These were the organizations that would be heavily involved in managing the consequences of Y2K-caused events and protecting the public.

In a second area of responsibility, FEMA led the Catastrophic Disaster Response Group, under the Federal Response Plan (FRP), in developing a special supplement to the Plan to deal with the consequences of potential Y2K failures. As such, FEMA ensured that all FRP signatory agencies maintained readiness to respond to all types of hazards and to conduct recovery operations according to their FRP responsibilities. As the lead agency for the FRP, FEMA has long-standing experience in providing leadership and command and control in responding to disasters and emergencies. During Y2K preparations, FEMA was responsible for ensuring that FRP agencies worked with their partners in the state and local emergency management and fire service communities to promote awareness and undertake contingency and continuity planning.

In the emergency preparedness and contingency planning area, FEMA mounted an aggressive outreach campaign to the state, local and Indian tribal emergency management and fire service communities to heighten awareness of and sensitivity to Y2K issues and to enhance their preparedness levels. To facilitate this outreach, close coordination was established early and maintained with key constituency groups. FEMA engaged in specific activities to help state, local, and Indian tribal emergency management organizations, as well as individuals and families, prepare for Y2K, including:

Publishing contingency and consequence management planning guidance.

Conducting Federal-State-local exercises, workshops, and seminars throughout the country.

Convening seminars focused on preparedness at commercial nuclear power plants.

Distributing Y2K training materials.

Conducting Emergency Education Network Y2K broadcasts.

Conducting a hazardous materials conference to examine Y2K implications for first responders and to emphasize the importance of preparedness and contingency planning for small and medium size chemical facilities.

Producing public awareness and consumer and personal preparedness information for FEMA employees and the public.

Providing grants to assist the States and territories with Y2K outreach, public awareness, planning, training, and exercises.

Coordinating Y2K emergency preparedness assessment surveys of state and local emergency management organizations.

Conducting briefings for delegations from more than 60 nations.

CONCLUSION

All of FEMA's Y2K efforts were carried out in concert with, and supported, the Agency's all-hazards emergency management approach and strong advocacy of community and family preparedness for all types of disasters. The long-established principles of all-hazard emergency management proved to be very helpful in every aspect of FEMA's extensive Y2K activities: outreach and awareness; training; contingency planning guidance; exercises, seminars, and workshops; response planning; and event management. Similarly to other organizations, FEMA benefitted from a 100% assessment of its own information technology assets. While ensuring Y2K compliance, obsolete technology was eliminated and overall awareness of programs, networks, and their components was increased.

The Y2K experience clearly demonstrated that all sectors of American society, indeed people around the globe, can mobilize to successfully address a common problem; but, it also clearly pointed out that it is very difficult to obtain timely, accurate information on the status of efforts in such a large-scale enterprise. Overall, as FEMA Director Witt said: "While the Y2K 'bug' has been costly and anxiety producing for the nation, there is a silver lining. Y2K - while one of the biggest technological challenges ever faced - also

gave us an opportunity to raise awareness about the need for general emergency preparedness across the country. These efforts will go a long way toward helping the American people to be prepared for the inevitable tornado, earthquake, flood, or hurricane of the future."

Often, significant numbers of people do not heed FEMA's ongoing emergency preparedness message that it pays to be prepared. With Y2K, a record number of people were paying attention. Y2K awareness activities meshed nicely with FEMA's ongoing efforts to promote risk reduction through Project Impact: Building Disaster Resistant Communities, the national initiative in which communities work with FEMA, state and Indian tribal officials, and private sector partners to assess their particular disaster risks and take pro-active steps to reduce potential damage in the future. The Y2K experience helped strengthen existing working relationships between FEMA and state and local governments; resulted in new working relationships being established; boosted the Agency's outreach to the private sector; and provided an opportunity to update emergency and contingency planning.

What started as a daunting task ended on a positive note as the new century dawned and very few problems were encountered. This success can be attributed to strong, pro-active leadership; a focused mission; and the concerted efforts of many individuals and organizations in both the private and public sectors.

NOTES

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AND THE WATER KEPT RISING
The Virginia Health And Medical (ESF-8) Response to Hurricane Floyd

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INTRODUCTION

Hurricane Floyd generated the most complex health and medical response for a declared State of Emergency ever recorded in Virginia. The event was prolonged, resource intensive, and complicated by differing operational requirements in four phases:

(1) Routine alerting and warning concerning a hurricane approach and impact. This involved a hurricane approaching Virginia overland from North Carolina.

(2) Water outage response to Portsmouth. Health and medical efforts during this phase concentrated on problem identification and characterization.

(3) Emergency medical and health response to flooding in Franklin. The largest and most complicated effort was the combined deployment of Emergency Medical Services Task Forces and the on and off-site efforts of public health resources to meet a variety of health issues in the impact area.

(4) Critical Incident Stress Management response to North Carolina. In this phase Virginia Critical Incident Stress Management resources mobilized and deployed to North Carolina under the Emergency Management Assistance Compact.

THE STORM

To Understand Hurricane Floyd You Have to Understand Hurricane Dennis

The impact of Hurricane Dennis in Virginia in early September 1999 created conditions that magnified the impact of Hurricane Floyd. Hurricane Dennis did not cause widespread destruction. The major event was a tornado that caused localized damage in Hampton (Commomwealth of Virginia Department of Emergency Services 1999a, VDES hereafter). Dennis, however, started 13 days of sustained rain - totaling 15 inches or more through southeastern Virginia. As Hurricane Floyd approached, the two major rivers in southeast Virginia, the Nottoway and Blackwater, were already at three-quarters bank, and the ground was saturated (Sammler 2000).

The flooding history of the region suggested this would be a cause for concern. The last major flood in the City of Franklin had occurred in 1940 as the result of four major rainfall events in a three week period. This had resulted in the region's historical flood as the Blackwater River crested at 21.9 feet, 10 feet above flood stage in Franklin (Sammler 2000).

The Meteorological Impact

The initial assessment of Hurricane Floyd early on September 16th was that it was a non-event. The main concern in Franklin was that the combination of rain and wind would result in falling of trees (government official 2000). At the state level, the emergency operations center staff breathed a sigh of relief as winds did not exceed 60 mph, although there was a realization that rainfall was substantial (Kline 2000).

Hurricane Floyd, however, deposited six or more inches of rain over the entire Blackwater watershed and much of that of the Nottoway River. On September 16th this resulted in a rapid rise in the amount of water in the rivers and their tributaries, an 8 foot rise in the Nottoway being typical. The Blackwater River crested at 26.4 feet in Franklin (4.5 feet above the previous historic flood of 1940) and the Nottoway at 27 feet. It took two weeks for the rivers to recede below flood level (Sammler 2000).

The Impact on Jurisdictions

Hurricane Floyd's effects were felt across the eastern one third of Virginia. For the first time in recent history, a hurricane isolated the Hampton Roads region (Foresman 2000). On the Peninsula, Interstate 64 and US Highway 60 were closed by flooding. On the south side of Hampton Roads, US Highway 460 and State Routes 10 and 35 were blocked by flooding. US Highway 58 remained open, but could not be easily accessed by response forces coming from the north because Interstate 95 south of Petersburg was also closed by flooding.

The first impact of the flooding on September 16th was the loss of potable water delivery to the City of Portsmouth and part of the city of Chesapeake. A dam failure in the Portsmouth City reservoir (actually located in the city of Suffolk) flooded the water plant and disrupted water supply to over 120000 persons. Initial estimates were that it would take seven to ten days to re-establish water service (VDES 1999b and 1999c).

On the morning of September 17th it became obvious that the city of Franklin was the most severely impacted Virginia jurisdiction. At approximately 4:00 am the city Emergency Operations Center on the second floor of the Public Safety Building was relocated to temporary facilities in a fire station on higher ground. City Hall was inundated with nine feet of water on the first floor, causing the loss of all City records. Telephone communications were lost; the only remaining circuits being amateur radio high frequency and tenuous cellular telephone service.

The economic impact of Hurricane Floyd on the city of Franklin was potentially catastrophic. The Union Camp paper plant (the largest employer) suffered millions of dollars of damage. Downtown, most local businesses were closed. Of 182 businesses

formerly located in the downtown business district, some 110 to 120 have indicated a desire to return, however estimates are that no more than half will actually make this move (Brown 2000). Given the accepted rules of thumb for the viability of businesses struck by catastrophes, as few as 50 will survive the next three years. The loss of tax revenue is potentially crippling for a city that suffered extensive damage to its government facilities (government official 2000).

THE RESPONSE

The Organizational Structure

Responsibility for managing health and medical emergency response in Virginia is delegated to the Department of Health (Commonwealth of Virginia 1997). The Commissioner of Health has assigned coordination of this role to the Office of Emergency Medical Services. During disasters the Office of Emergency Medical Services dispatches a Liaison Officer to the State Emergency Operations Center. All resource tasking and tracking functions are performed in an Emergency Support Center which functions as a medical emergency operations center in the office space of the Office of Emergency Medical Services. In addition, the Emergency Support Center coordinates with other offices within the Department of Health and other agencies for support in the full variety of public health functions.

The Water Emergency

The initial health and medical response to Hurricane Floyd was triggered by a call from the Department of Health's Liaison Officer at the State Emergency Operations Center (EOC), indicating the EOC had received a request for drinking water assistance from the city of Portsmouth but that the tasking had been completed. A routine check revealed the issue was not resolved and there was confusion as to who was responsible for managing water supply issues. The City staff felt that it was the responsibility of the Director of the Western Tidewater Health District; however, the Health District Director's position was that his Office did not have water supply specialists and had no normal water supply mission (government official 1999). While this was a reasonable disagreement over responsibilities, water supply needs were not being adequately addressed.

The water supply needs were solved by a combination of bottled water and the unexpectedly rapid return of the water plant to service, in part due to forethought on the part of the staff in shutting down power. This phase highlighted a deficiency in local planning, however. The Health District had not been involved in writing the City's Emergency Operations Plan. The Plan copied responsibilities assigned to the Department of Health in the Commonwealth of Virginia Emergency Operations Plan, even though the local Health District lacked staff expertise and resources to undertake many of the plan's roles.

Throughout the hurricane's aftermath, problems that would not go away plagued the Emergency Support Center staff. The Portsmouth water crisis generated one of these. In the City three clinics provided dialysis service to kidney failure patients, requiring

approximately 45,000 gallons of water each day. The Health District staff located dialysis sites for all patients in Norfolk, Chesapeake, and Virginia Beach and arranged their transportation to treatment. The issue was closed by the evening of September 16th or so it appeared. A local dentist and political figure, however, determined the deployment of a military desalinization plant to Portsmouth was critical to provide water for dialysis to prevent widespread mortality in the kidney patient population. Over the next three days this proposal was elevated to generate Congressional inquiries, repeated requests for information from Federal Emergency Management Agency and Public Health Service staffs, and approximately 40 telephone calls. There were no reported cases of delays in dialysis for patients and no increase in mortality (Commonwealth of Virginia, Department of Health 1999a, VDOH hereafter).

The Initial Emergency Medical Services Response

On the evening of September 16th, the Office of Emergency Medical Services (OEMS) placed two Emergency Medical Services Disaster Task Forces on a 12 hour state of alert for deployment based on reports that the Blackwater River was five feet out of its banks at its crossing of US Highway 460. The OEMS had eight volunteer Task Forces, each of which was committed to provide a standard package of one Basic Life Support Ambulance, one Advanced Life Support Ambulance, one Crash/Rescue Truck, and one Quick Response Vehicle. Task Forces are self-sufficient to as great a degree as possible for deployments of up to 72 hours. The mission of a Task Force is to provide the equivalent of a complete rescue or ambulance station to relieve local resources which have been exhausted by a prolonged event (VDOH 2000b).

Task Forces are deployed in conjunction with a Coordination Team, a two person team with the mission of coordinating Task Force actions, liaison with local government, and arranging logistics support. Coordination Teams have a secondary mission of providing augmentation to the emergency medical services function in a local emergency operations center (VDOH 2000a). As a result, Coordination Team members are chosen for a breadth of experience and the ability to make effective decisions under pressure.

The first request for assistance to Franklin was relayed to the Emergency Support Center at approximately 0930 on September 17th. Two Task Forces (Crater 6 and Metro 11) and Coordination Team One were on the road by 1100. Additional resources were dispatched shortly thereafter, including Lord Fairfax 1, South Central 5, and Northern Virginia 8. On Sunday, September 19th, Thomas Jefferson 2 and Northern Virginia 10 were added to relieve resources on site, with the high point of available resources including seven Task Forces with 70 personnel, 24 vehicles, two 2 support trailers, and two boats (VDOH 1999a).

Operations of the Task Forces in Franklin included the full range of normal emergency medical service requests for assistance. Because of the small size of the City and the large number of resources, the Task Forces were combined into a single large resource pool, a departure from their normal operating procedure of working as units. Two specific taskings, one procedural innovation, and one clear problem area offer potential lessons for future disaster operations:

The shelter in Franklin housed approximately 170 persons at any time, with over 700 being sheltered in the first week (St. Andre 2000). The District Health Director strongly insisted that the shelter needed regular coverage by an Advanced Life Support Ambulance, a level of service not normally available in the community and not justified by actual needs for emergency assistance. A decision was made to support this request in order to prevent a public disagreement among Health Department representatives.
Staffing shelters with emergency medical services providers is an inappropriate use of high value mobile resources. Emergency Medical Technicians and Paramedics are not trained in the types of medical interventions needed in shelters and may not be authorized by their protocols to provide certain types of needed care on a non-emergency response basis.

Task Forces South Central 5 and Metro 11 were assigned to perform a night evacuation and transport the residents to a new shelter in Isle of Wight County. When they arrived at the shelter they found one public health nurse, a stack of folding chairs, and a large empty room–no other preparations had been made to open or manage a special needs shelter. Due to the leadership of the Task Force Commanders, feeding, bedding, and other critical services were arranged, averting a potentially unsatisfactory outcome. Task Forces need to be prepared not only to be self-sufficient, but to also assist others in establishing disaster services, a role for which they are not normally trained.

In a jurisdiction where internal telephone service, including 9-1-1 access is no longer available, how do the emergency medical services find out about emergencies? In this case the solution was to dispatch ambulances to circulate on a regular patrol pattern through districts so that persons needing assistance could flag down a vehicle. This approach, although crude, appears to have worked well, and was quickly nicknamed by the crews "trolling for patients."

Communications were suboptimal. The Task Forces deployed with too few portable radios capable of using the statewide disaster mutual aid frequency (155.205 MHz FM). Long haul communications from Franklin to the Emergency Support Center depended on an overloaded cellular system. Although amateur radio operators have received extensive credit for solving the communications needs of this incident, they provided no support to this portion of the response. Staff were not allowed into the Emergency Operations Center thereby denying access for state resources to amateur radio to pass reports, logistics requests, etc. The clear lesson learned is that the Task Forces must be self-sufficient in their wide area communications assets and can not rely on already busy local systems (Vaughan 1999, York 1999).

Emerging Public Health Issues

Although the city of Franklin was the focus of attention, flooding occurred throughout the counties east of Interstate 95 and south of the James River. In Sussex County a

historic rural church graveyard flooded, with human remains being displaced. This did not become a high interest issue and was quickly resolved through the provision of technical advice from the Office of the Chief Medical Examiner to the local jurisdiction and its funeral directors.

A meat packing plant in Surry County did provide another prolonged problem, however. The owner of the plant had continued to pack meat during the flooding in order to be able to ship a large order on Monday, September 20th in spite of an order issued by the Health District that prohibited the use of well water in flooded areas due to concerns over possible contamination of the wells. Eventually, it was determined that the plant's well was a deep well and had not been infiltrated by surface water, with the result that the meat could be shipped. Again, this issue attracted the attention of a wide variety of participants resulting in an extensive amount of telephone coordination, and was briefed at the national level in at least one conference call (government official 1999).

Within Franklin a host of public health concerns emerged. The flood waters themselves were grossly contaminated with agricultural chemicals and fuel oil released when local businesses in the city's downtown flooded. This created a requirement to decontaminate everyone who entered the water, reportedly including a news media reporter who stood in the flood waters while she narrated a story warning people to stay on dry land (Vaughan 1999).

Mosquitoes became a significant problem throughout the area (landing counts reached 100 per minute) apparently as a result of large amounts of standing water remaining from Hurricane Dennis. Aerial spraying was coordinated to suppress the growing mosquito population but rapidly became the subject of public concern. To attempt to communicate when and where spraying operations would be conducted, a mosquito hotline was established, staffed by a single individual and operated from 8:00 am to 5:00 pm, Monday through Saturday (government official 1999). This solution was rapidly overwhelmed by call volume. On the first day 250 calls were logged, estimated to be two thirds of the calls actually received. After five days the call rate fell to 40 to 50 calls a day, with the total number logged reaching 1200. Public inquiries included:

When was spraying was being conducted?

What agent was being used?

What were the health effects for humans?

What were the health effects on pets?

Why was the agent being used chosen?

What would be the impact on the bee population?

The public information effort was complicated by the size of the problem with over a

million acres in Virginia being targeted for spraying. Because of weather and other factors, including the need to empty agent from the tanks to prevent crystalization, spraying actually happened on some days in areas that were not expected to be sprayed. As a result of these considerations, there were unexpected impacts, specifically on the bee population. One bee keeper was featured in television news reports with a bag of 40,000 dead bees (government official 1999).

Clean-up operations in Franklin also generated health concerns. Flood water in buildings created the potential for mold growth-the mold itself caused burns and respiratory tract infections. To address this problem, building owners were advised to remove everything that had been wet, including wall surfaces to above the water line and deposit it outside to dry and be disposed of. Basic clean-up supplies, consisting of bleach, gloves, and masks were made available by Health Department staff walking the streets and through mass care feeding stations (Winter 2000).

An unusual clean-up problem presented itself in three peanut warehouses. One warehouse housed 10.2 million pounds of peanuts. As a result of the flooding, these peanuts started to ferment, releasing methane gas in potentially explosive amounts (St. Andre 2000).

Integrating the Response

The capabilities of the Emergency Medical Services Coordination Team was stressed by a wide variety of demands for its skills. Individuals from the Team were immediately assigned to manage emergency medical services for the city (York 1999). Eventually every available Coordination Team member was drafted in order to provide as many as six staff members on site. The net result was to drain individuals from the Emergency Support Center and increase the workload in that facility.

A significant development in the flooding response was the deployment of a Virginia Department of Forestry Incident Command System overhead team. The large number of agencies and resources on scene suggested the need for a structure to manage day-to-day operations. The Incident Command team established a unified command structure for field operations and produced regular Incident Action Plans throughout the response phase (Vaughan 1999). This was the first such deployment and its success suggests that this resource will be used in future events.

Integration of public health response was less successful. The Health District Director and his staff coordinated their services with local officials and delivered services in the impact area. Health resources participated in a multi-agency team that determined the reentry plan and inspected each building for safety (St. Andre 2000, Winter 2000). Operations of the Department as a whole, however, were not coordinated through the ESF-8 Emergency Support Center and the state Emergency Operations Center. As a result much of the expenditure involved has proved to be non-reimbursable (government official 2000); and, at the state level, when the Office of Emergency Medical Services had exhausted its capability to staff the state Emergency Operations Center, there was no trained pool of backup personnel from other Department offices. Those individuals who

did serve in the Emergency Operations Center felt that they lacked the necessary experience and information which was needed in order to be effective (government official 2000)

The Prolonged Emergency Medical Services Response

On the fifth day of the emergency medical services response (September 21, 1999), the Office of Emergency Medical Services started withdrawal of its Task Forces. The decision to withdraw resources was based on several factors:

> First, the situation in Franklin had stabilized and recovery was starting. Task Forces are an emergency response resource designed to allow local resources to recover and reconstitute. They are not intended to sustain a jurisdiction indefinitely.
>
> Second, the potential existed for another hurricane to strike Virginia, either in the near term (there was a hurricane in the Gulf of Mexico which was forecast to cross Florida and enter the Atlantic) or later in the hurricane season. Task Forces needed time to recover and restock.
>
> Third, the Office's resources were exhausted, and no additional Task Forces were available for deployment to continue coverage (Vaughan 1999). Even Task Force Tidewater 12, a unit in training, had been committed to assist in the transition period as resources were withdrawn.

Based on this and previous deployments, two common experiences can be identified that deserve further investigation.

> Even though the Task Forces arrived with a specific mission of relieving exhausted local emergency medical services resources so that they could rest, the local resources never stopped operating. This reluctance to rest may result from a sense of pride and an unwillingness to be seen as not being able to support their community (Vaughan 1999).
>
> Paradoxically, local agencies were extremely reluctant to release Task Forces, citing a critical need for emergency medical services resources. A critical look at total workloads reveals that call volumes did not justify the large investment of resources (in five days Task Force ambulances responded to 40 calls for assistance). In addition, the presence of multiple Advanced Life Support vehicles provided a service level not previously available in the city or surrounding rural areas. The reluctance to release resources led to Medical Transport, a commercial service, providing additional coverage through November 2nd (Blow 2000).

The North Carolina Response

On September 30th the Virginia Office of Emergency Medical Services initiated response under the Emergency Management Assistance Compact to a North Carolina request for Critical Incident Stress Management assistance in the eastern part of that state (Green

1999). Virginia has a robust Critical Incident Stress Management system with regional teams in each of twelve Emergency Medical Services Regional Council areas. These teams respond to acute incidents in the council area, however, no structure was in place to respond to events in other regions or other states. As a result the Office of Emergency Medical Services Critical Incident Stress Management Program Manager and her staff were forced to recruit individuals willing to go to North Carolina and then assemble ad hoc strike teams. During October, three Virginia teams were sent to North Carolina for three to five day deployments.

There is a need for Critical Incident Stress Management Strike Teams that can deploy out-of-state. The problem is larger, however. There is an equal need for teams to deploy within the state in order to meet needs for mutual aid or to support the Emergency Medical Services Disaster Task Forces. Currently, one team, sponsored by the Western State Hospital of the Department of Mental Health, Mental Retardation, and Substances Abuse Services, is capable of deployment. The Office of Emergency Medical Services is organizing Critical Incident Stress Management Strike Teams on the same basis as the Emergency Medical Services Task Forces. Identical deployment and support structures will be used (VDOH 1999b).

The anecdotal experience of Teams in North Carolina suggests it may be prudent to reexamine our approach to Critical Incident Stress Management in prolonged disasters that are exhaustion events. The structured debriefing used in acute incidents was not well received by emergency services providers in the North Carolina impact area; informal conversational defusings were more successful (Morrow 1999). Research is needed to determine if this was an unusual outcome, perhaps resulting from personality factors, or if it is a common occurrence.

OTHER LESSONS LEARNED

The phenomena of problems that will not go away deserves attention. A shopping behavior was observed during which Federal officials would contact the Department of Health's Liaison Officer in the state Emergency Operations Center. If this revealed no ongoing problems, the same official would call the Emergency Support Center to elicit a problem statement (or vice versa). If neither source revealed a significant issue, a different official from the same functional area would make the same set of calls after a time delay. Some of these requests were justified as being needed for executive level briefings. This behavior extended for as much as three days after a specific incident was marked closed. This generated extra work for the health and medical staff and contributed to stress. It is uncertain whether this experience may be explained by personality or event related factors.

The organizational model of Task Forces, Coordination Teams, and supporting command and control structure clearly works well as a means to mobilize, deploy, coordinate, and account for resources. The same model is being adopted for Critical Incident Stress Management Strike Teams, and serves as a potential model for public health strike teams. The success of the existing Task Forces is based on their being permanent

organizations with standard training and procedures. This is clearly shown by the ability of personnel from rural and urban communities, commercial, governmental, and volunteer services, and different parts of the state, to work seamlessly together.

Insufficient resources were available for prolonged operations or to meet the impact of a second disaster, however. All components of the system need more personnel and resources, and specific problem areas such as communications need to be addressed. The current recruiting target of 24 Task Forces may not be adequate. Although large numbers such as these appear to be excessive (24 Task Forces represent 96 vehicles and 240 personnel), a force of 24 volunteer units with existing responsibilities in their home communities can reasonably be expected to generate 12 Task Forces in a crisis. Experience suggests that this is enough to respond to one small incident (and the Franklin response was for an event with minimal medical challenges) with a reserve for a second event.

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RESPONDING TO EMERGENCIES AND DISASTERS: PROMOTING RESILIENCE IN EMERGENCY MANAGERS

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INTRODUCTION

The number, diversity, intensity, and duration of the demands encountered when managing mass emergencies and disasters creates considerable stress for emergency managers. This stress has implications for both their well-being and response management effectiveness (Flin, 1996). Further, the demands encountered when dealing with hazards such as earthquakes and aftershocks, volcanic crises, and floods can persist over a period of days, weeks, and sometimes months. Stress management in this context must facilitate the capability of emergency managers to deal with response demands over extensive periods of time.

This paper describes an approach to managing emergency management stress based on questioning the assumption of an automatic relationship between disaster involvement and the development of negative stress reactions. Criticism of this assumption is based on the growing realization that disaster response work can constitute a growth experience for those who respond to disaster in a professional capacity. For example, opportunities to exercise professional skills at a high level, dealing effectively with adversity, and relaxation of bureaucratic constraints can increase the likelihood that exposure to emergency demands can stimulate personal and professional growth (Alexander and Wells, 1991; Andersen, Christensen, and Petersen, 1991; Calhoun and Tedeschi, 2000; Moran, 1999; Paton, 1989; Tedeschi and Calhoun, 1996; Violanti, Paton, and Dunning, 2000).

This is not to say, however, that negative stress reactions will not occur. Growth and distress outcomes need not be mutually exclusive (Aldwin, Levenson, and Spiro, 1994, Calhoun and Tedeschi, 2000; Moran, 1999). What is important is that the negative affect likely to accompany exposure to an emotionally intense disaster context is not confused with the resolution of this experience or the meaning subsequently imposed upon it by the emergency manager.

The recognition of a relationship between responding to adversity and positive and/or growth outcomes introduces a need within emergency management to seek ways in which such outcomes can be facilitated. The planning process must expand to include not only the development of response strategies and resources designed to protect primary victims, but also the means by which the well-being of those responsible for their implementation can be safe-guarded and their capability to perform under adverse circumstances facilitated. Risk management (Dake, 1992, Hood and Jones, 1996), in this context, involves planning to facilitate resilience and growth outcomes in training and

operational contexts. Utilising a risk management framework to promote resilience is a particularly salient objective given that emergency managers may have to operate effectively under high demand/stress circumstances for prolonged periods of time. As a starting point, it is appropriate to identify the hazard, resilience, and vulnerability factors which influence how individuals respond to adversity.

EMERGENCY RESPONSE: HAZARDS, VULNERABILITY AND RESILIENCE

Contemporary risk management models typically use the term hazard to denote chance phenomena capable of causing harm. In applying risk management models to the study of disaster stress, the hazard component of the equation will be represented by the situational characteristics and demands encountered by emergency managers when responding to disaster. These include, for example, threat nature and duration, performance expectations and opportunities, perceived control, resource adequacy, and management responsibility (Hartsough and Myers, 1985; Moran and Colless, 1995; Paton, 1996, 1997b). Training needs and organizational analyses can utilise these data to construct realistic simulations (Paton, 1996; Paton, Flin, and Violanti, 1999). These event characteristics interact with personal, group and organizational resilience and vulnerability characteristics to influence, rather than prescribe, the probability of experiencing growth or distress.

The next stage involves identifying resilience and vulnerability factors. Dunning (1999) described resilience as comprising dispositional, cognitive, and environmental components. Dispositional resilience reflects how personal characteristics (eg hardiness) affect adjustment to emergency demands. The cognitive component is concerned with the resources (eg training, information management) that assist managers to impose a sense of coherence and meaning on atypical, adverse, and extreme experiences. The final element, environmental resilience, highlights the role of organizational practices, procedures, and culture in mitigating adverse consequences and maximizing the potential for recovery and personal and professional growth.

DISPOSITIONAL VULNERABILITY AND RESILIENCE

The often pronounced differences in reactions documented within the disaster literature has focused attention on isolating those individual resilience and vulnerability factors responsible for this response diversity. Scotti, Beach, Northrop, Rode, and Forsyth (1995) described how biological (eg autonomic reactivity), historical (eg pre-existing psychopathology), and psychological (eg learned avoidance of threat situations, social skills deficits leading to problems obtaining and utilizing social support, hypervigilance of threat-relevant cues, and inadequate problem-solving behavior) factors influence stress vulnerability. Vulnerability is also heightened by risk addiction (Paton, Violanti, and Schmuckler, 1999). Transient factors such as health status (eg colds, flu), fatigue (eg if called to manage a disaster at the end of a days work), and psychological fitness (eg occupational stress, personal concerns), can increase stress vulnerability (Paton, Flin and Violanti, 1999). While such factors affect fitness for duty, in reality most emergency managers are unlikely to declare themselves unfit. They must, however, understand how

these limiting factors affect their performance and, accordingly, increase their utilization of emergency management team members to ensure that situational performance constraints exercise minimal influence on response management.

Individuals can also differ in regard to their resilience characteristics. Traits such as level of control over cognitive re-experience, perceived meaning, behavioral self-blame, attributional style, and hardiness can constitute resilience factors (Lyons, 1991; Bartone, 2000). Other factors such as emotional stability, decisiveness, controlled risk taking, self-awareness, tolerance for ambiguity, and self-efficacy may also facilitate resilience (Flin, 1996; Paton, 1989). Once identified, vulnerability and resilience data can be used to anticipate disaster worker support and training needs, select resilient individuals for disaster response and emergency management roles, or for prioritizing post-event support provision and monitoring (Paton, 1997a, 1999).

Resilience is also a function of the way demands are managed at a personal level. Exposure to disaster demands can have positive or negative effects. For trained managers, exposure to demands can result in performance enhancing effects, including greater alertness, faster reactions, increased energy and accelerated thinking and decision skills. If, however, the level of demand grows, or extends over a prolonged period of time, stress vulnerability can increase and exercise a detrimental impact on performance and decision making. Typical problems, under these circumstances, include: tunnel vision; failure to prioritize; freezing; and loss of concentration (Flin, 1996). Maintaining resilience requires that time spent actively managing demands is interspersed with adequate rest breaks. Emergency managers must understand their personal limits and learn to operate within them.

PROMOTING A SENSE OF COHERENCE AND MEANING

Training

Training can enhance performance capability and reduce vulnerability to negative stress effects (Alexander and Wells, 1991; Driskell and Salas, 1996; Paton, 1996). Resilience can be enhanced by adopting an all-hazards approach to facilitate technical and psychological preparedness through the development of an adaptable response capability (Paton, 1996; Paton et al, 1999). In addition to knowledge and skill development, training should address how the disaster context influences performance and well-being (Paton, 1996). According to this model, training designed to facilitate resilience requires two inputs. One involves the detailed analysis of emergency response roles, tasks, and responsibilities to define the skills and knowledge required to protect well-being and promote effective performance. The second involves identifying how disaster demands render routine operational procedures and expectations inadequate or inappropriate to the needs of the situation.

The characteristics of the routine operating environment (eg clear role/task expectations, hierarchical reporting and command structures) are incorporated into the psychological frameworks (schemata) that guide response and become implicit, or taken for granted, facets of routine operations. Their importance as determinants of well-being and

performance effectiveness may go unrealized, however, until faced with atypical operational demands (eg scale of infrastructure disruption, multi-agency operating environments, rapid role change) which challenge these assumptions (Alexander and Wells, 1991; Flin, 1996; Moran, 1999; Paton, 1996). This signals a need to develop procedures, and expectations, that accurately reflect the disaster operating context in which expertise will be applied.

The relative infrequence of mass emergencies and disasters means that realising the full benefits of training, and facilitating its transfer to response contexts, requires the use of simulations and exercises. Simulations afford opportunities for individuals to review plans, develop technical and management skills, practice their use under realistic circumstances, receive feedback on their performance, increase awareness of stress reactions, and facilitate rehearsal of strategies to minimise stress reactions (Paton, Flin, and Violanti, 1999; Moran, 1999).

Information and Decision Making.
A key determinant of coherence and meaning in disaster contexts involves accessing information in a timely manner and using it to make decisions, often under considerable time and physical pressures. A lack of information management capability will introduce unnecessary response delays and constitute an additional source of stress for emergency managers. Promoting resilience requires that training and simulation facilitate the development of a capability to specify information needs, interpret it appropriately on receipt, and, if required, adapt it for different functions and end users over time (Paton et al, 1999). Sound information management is an important precursor of crisis decision making. Resilience, in this context, is concerned with the ability to adapt decision style to the demands of a dynamic situation.

The decision making of those experienced in managing crises is characterized by intuitive or recognition-primed decision making (Klein, 1997), where the manager recognizes the type of situation encountered and, from previous experience, knows what course of action is appropriate. This style is most adaptive when rapid decisions are required. Attention must be directed to understanding the naturalistic decision making of experts and how it can be modeled in simulations to develop this contingent capability in emergency managers. The alternative style, analytical decision making, requires the manager to consider several possible courses of action and then select the best option. This style should be used during operational planning, when making strategic response decisions, or where structural circumstances allow plans and action to be carefully evaluated and compared. During a disaster, these styles, and variations thereof, may be used to varying degrees depending on the situation (Paton, Flin, and Violanti, 1999).

While training can facilitate resilience, the comprehensive realisation of the ensuing benefits is a function of the extent to which it is sustained by the operating environment. Specifically, the group memberships, systems, and practices that comprise the organizational and operational environment represent resources capable of influencing both vulnerability and resilience.

THE OPERATING ENVIRONMENT

Group Cohesion

Emergency managers typically operate within highly cohesive groups. While membership of a cohesive group generally enhances resilience, this need not always be the case. Effective performance in the emergency management role serves to consolidate team identity and acts as a resilience resource. Exposure to events which limit opportunities to fulfil performance expectations (eg where rescue of victims is not possible) may heighten vulnerability, however. While the situational factors that create this state of affairs are generally beyond the control of the emergency manager, the high performance standards which underpin their role can result in perceptions of performance failure being internalized rather than being attributed to uncontrollable environmental circumstances (Moran, 1999; Paton and Stephens, 1996). Internalized attributions of professional inadequacy can undermine team cohesion and stimulate a breakdown of support networks, so increasing vulnerability. Consequently, a sound understanding of the dynamics of the emergency response environment is required, together with its implications for team relationships under conditions of extreme adversity. Once these group dynamics have been articulated, it will be possible to develop strategies to contain or reverse them, thereby minimizing disruptions to support and ensuring that team membership will act to sustain resilience (Paton, 1994).

Teamwork

Because the demands encountered when responding to a disaster transcend individual capabilities, effective emergency management involves considerable team work. The presence of a well trained, experienced team will enhance stress resilience and operational effectiveness because tasks can be delegated, information shared, second opinions sought, and tactics discussed and agreed by incorporating diverse perspectives. The promotion of resilience will require the analysis of team roles and training in team skills (Brannick, Salas, and Prince, 1997; Flin, 1996). In addition to their having a responsibility for co-ordinating the roles and tasks of their team, emergency managers may also find themselves responsible for co-ordinating the activities of several agencies or professionals.

The diversity of the demands created by a disaster means that the co-ordinated response of several agencies, some of whom may have little contact with one another under normal circumstances, is fundamental to comprehensive emergency management. Working in a context defined by, for example, inter-agency conflict or differences in terminology will constitute a significant source of stress for emergency managers. Response effectiveness relies heavily upon the activities of these agencies being integrated, liaison mechanisms established, and their respective roles accommodated in a planned and systematic manner (Johnston et al, 1999; Paton, Johnston, Houghton, and Smith, 1998). Whether this operating context increases vulnerability or resilience will be a function of the quality of these integrating mechanisms. From an operational perspective, effective team work and the management of the diversity in skill, professional background, and personalities inherent in multi-agency response contexts is crucial to promoting resilience. This requires negotiation, training involving all

prospective partners, sound inter-agency networking and communication, and the development of appropriate team management systems (Paton, et al, 1998).

One of the most stressful aspects of emergency response involves decision making within multi-disciplinary contexts, often involving decision makers who are geographically dispersed. Because problem definition and decision making under these circumstances requires the utilization of the collective expertise of different professionals, decision effectiveness and stress resilience is a function of the extent to which those involved possess a shared understanding of the response environment (including how events evolve over time) and their role in contributing different perspectives for problem definition and response planning (Paton, Flin, and Violanti, 1999).

At one level, this will reflect the degree of structural and procedural integration between responding agencies (Granot, 1999; Paton et al, 1998). It also requires that participants understand how their expertise contributes to different parts of the same plan while working towards common goals over time, including being able to anticipate the needs of those with whom they are collaborating (Paton, Flin, and Violanti, 1999). Facilitating effective inter-agency operational capability requires that the planning process anticipates and accommodates agency and professional diversity. This information can be used to design collaborative exercises and simulations capable of promoting operational integration and the development of information management systems necessary if collective team expertise is to be used effectively to define and manage complex, dynamic problems under conditions of adversity.

While having a shared mental model of the response environment and the role of others within it can facilitate effective performance, care in its use is warranted. For example, if an inaccurate or incomplete model is evoked, decision effectiveness will decline. For this reason, it is important that the planning process anticipates, as accurately as possible, the demands likely to be encountered and the degree of uncertainty inherent within the information at their disposal. This is assisted by using an all-hazards approach, ensuring that hazard causation and consequences are well understood, and designing simulations to facilitate this shared understanding based on a comprehensive review of possible scenarios and key agencies and following them by critical evaluation (Paton et al, 1998; Paton et al, 1999). Evaluation is essential to analyze whether, and to what extent, participants revert to pre-existing organizational frames of reference when operating collectively under high stress conditions and whether and how these frames restrict, filter or distort information flow and its utilisation (Smallman and Weir, 1999).

Organizational Factors

Vulnerability to emergency management stress is influenced by organizational characteristics (eg management style, reporting procedures) and bureaucratic flexibility (Alexander and Wells, 1991; Dunning, 1994; Eränen, et al, 1999; Paton, 1992; Paton and Purvis, 1995; Paton, Smith, Ramsay and Akande, 1999). To sustain staff and constitute a resilience resource management procedures designed specifically to manage response and recovery are essential (Alexander and Wells, 1991; Paton, 1997a; Paton et al, 1998; Paton and Purvis, 1995). Response management systems will be required to cover

several atypical demands including emergency resource acquisition and deployment, delegation, communication and information management, decision making, inter-agency co-ordination, and media and community liaison (Paton et al, 1998).

Managerial behavior and attitudes represents another environmental factor with both resilience and vulnerability potential (Alexander and Wells, 1991; Dunning, 1994; Paton, 1997a; Paton and Violanti 1996; Violanti and Paton, 1999). For example, a cultural predisposition to suppress emotional disclosure, contempt for those displaying emotions, or focusing on attributing blame for response problems on individuals can heighten stress vulnerability (Dunning, 1994). Developing managerial capability as a resilience resource involves training covering, for example, participative and supportive management style; identifying, accepting, and meeting staff needs; communication; planning and contingent plan implementation skills; delegation; managing uncertainty and ambiguity; and managing recovery and the return to routine performance (Alexander and Wells, 1991; Paton, 1997b; Paton et al, 1998).

During the post-event recovery period, resilience can also be sustained by managers acting as role models (eg acknowledging their own feelings), providing feedback to staff (eg regarding the emergency, future inquiries, etc) (Alexander and Wells, 1991; Duckworth, 1986; Dunning, 1994; Paton, 1997a,b), and establishing a framework for the positive resolution of their experience. The latter can be facilitated by assisting workers to identify the strengths that helped them manage disaster consequences or using the experience to discuss how future events could be dealt with more effectively. Managers can also sustain resilience by managing the transition back into routine work (Paton, 1997a). Where disaster experience has been positive, the return to routine work may be a more salient stressor than the disaster itself. Recognition of this possibility led Hartsough and Myers (1985) to define this as the 'letdown' phase of disaster work.

The letdown phase involves the transition from working in a disaster context back into the normal routine of work and family life. If the emergency response has enabled professionals to employ their skills in an intensely meaningful manner then, in general, the longer and more intense their involvement, the more likely they are to feel some ambivalence about terminating their disaster role. These feelings may be intensified as they return to 'business as usual' and to work within a context of the resource, reporting, autocratic, and bureaucratic constraints that had been suspended during the emergency response phase. Under these circumstances, systematic reintegration strategies would represent an appropriate approach to sustaining resilience and any benefits accruing from working in the emergency or disaster context. These must be developed when response and recovery plans are being developed.

CONCLUSION

It is no longer tenable to assume an automatic link between disaster exposure and the experience of negative stress reactions. Rather, the possibility of positive reactions and growth outcomes must be accommodated in research and in reduction, response, and recovery planning. Crucial issues here include the identification of resilience and

vulnerability variables, and defining the mechanisms by which they lead to growth and distress outcomes. A risk management framework was proposed to provide a means for conceptualising this relationship. While not representing an exhaustive list by any means, the material reviewed here indicates a basis for operationalizing the resilience paradigm. This paradigm focuses attention on mitigating disaster stress risk and facilitating recovery and growth in emergency managers for whom disaster work and its consequences is, or becomes, a professional reality.

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SPECIAL NEEDS REGISTRATION PROGRAM

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THE SPECIAL NEEDS POPULATION

As an Emergency Management official one of our first concerns upon learning of any emergency event is to be sure that the public is notified of the danger and of what, if any, protective actions they need to take. Many emergency management agencies use the local media as active partners in this effort while others use various mechanical warning devices or may use systems such as the Emergency Alert System (EAS) or National Weather Service's weather radio warning system. Most of these systems reach only 80% of the population, however. This 80% represents that portion of the public that does not need any special assistance in receiving emergency public information or in taking appropriate actions for their safety.

The remaining 20% are commonly identified as the Special Needs Population. This portion of the public needs some type of additional assistance in order to receive the necessary information and to take the appropriate protective actions. This Special Needs Population includes individuals who spend their time in schools, hospitals, child or adult day care facilities, and in residential congregate care facilities, and also includes individuals who live at home. Of this Special Needs Population, 75% have some type of supervisory leadership who coordinate emergency actions for the group. These coordinators include teachers and hospital and facility staffs. The Special Needs Populations in these various congregate facilities are also usually accounted for in local emergency plans and procedures. This leaves the remaining 25%, those at home, as a major concern for emergency management officials.

This last 5% of the total population includes the elderly, those with mobility problems, the blind or deaf, those with minor mental or behavioral challenges, and those who require some type of medical device such as an oxygen supply or medical assistance such as help with taking medicines. This group is generally self-reliant and able to live by themselves without assistance for routine events, but during an emergency, they may need some additional help in taking protective actions such as evacuation or sheltering. Because they are somewhat self-reliant and because they generally have no one who is directly responsible for their care, they are also the most likely to be overlooked during an emergency. They may be forgotten or left behind just because they are somewhat self-

reliant and do not have someone directly responsible for their care. Major concerns for emergency management officials, therefore, are how to identify and locate this portion of the Special Needs Population, how to notify them, how to determine what assistance they need in an emergency, and how to plan for any special transportation or sheltering that may be needed.

SPECIAL NEEDS REGISTRATION PROGRAM

All these situations can be planned for as part of a community's normal preparedness and mitigation strategies, but to make such plans a community must first identify where those needing assistance are located and the type of assistance they need. Linn County has developed a Special Needs Registration Program in order to collect this information. The program is a voluntary registration program that gives the special needs person, living at home, a way to let emergency management officials know about them and their requirements by using a Special Needs Registration Card. The card is printed and provided by the Duane Arnold Energy Center (DAEC), Iowa's only nuclear power plant, as a way to identify those persons requiring special assistance in the unlikely event that an emergency at the facility would require the public to evacuate. The card is distributed as an insert in the Cedar Rapids metropolitan area telephone books and is also mailed to rural residents of the area surrounding the DAEC facility. Residents can also get cards by contacting the Emergency Management Agency in Linn.

The card states that:

> Returning the card is completely voluntary
>
> The information is confidential and used for official emergency purposes only (no salesmen will call!)
>
> Registration is free and at no obligation to the resident
>
> Anyone can and is encouraged to register neighbors, friends, and family members who might need assistance in leaving their home if conditions warrant such actions.

The card itself has the following heading:

> If you or other members of your household would require special assistance in the event of an emergency evacuation, please complete and return this card now so special arrangements can be made to assist you in advance.
>
> Even if you have returned this card in previous years, please complete and return this year's card. This information will be forwarded to state and local emergency service agencies in your area.

The card also asks for the following information:

Name, address, and telephone of the resident needing assistance

Full or part time resident (if part-time which months are they at this address?)

Deaf or hearing impaired?

Blind or sight impaired?

Confined to a wheelchair?(Could walk/move with assistance? Could transfer to regular seat in bus or van?)

Confined to bed?

Difficulty walking or moving during an emergency?

Other _____ ?

Special notification due to hearing impairments (can't hear warning sirens)

Special notification due to sight impairments (can't read a TV crawl message)

Needs transportation if evacuation required

Other special accommodations needed_____

Name and phone number of person completing the card (for emergency contact purposes)

The completed cards are returned to DAEC's emergency planning staff and entered into a database sorted by emergency evacuation sub-areas. This information is then forwarded to the Emergency Management Coordinators in Linn and in Benton County. (In other jurisdictions agencies might prefer to have the cards returned to a local social service agency, the local Red Cross Chapter, or to the Emergency Management office.) Because much of Linn County's population is outside the Cedar Rapids metropolitan area, there is a concerted effort to make the cards available in other parts of the county. Once the database is received, the Emergency Management staff incorporate the information into a Geographic Information System (GIS) program that locates the special needs registrants on a computer generated map. Emergency management, medical, human resources, and transportation officials then use this information to coordinate assistance to the special needs groups.

Publicity is a key ingredient to the success of this program. Area media officials have cooperated in getting the word out that we have a program to assist our special needs groups. Our local public health agency workers and the various service groups who routinely deal with the special needs groups also help to advise people about the program. Also assisting in publicizing the program are the Visiting Nurses Association, who provide home health care services, and Meals on Wheels, who deliver meals to homebound residents. Members of these organizations are out in the community on a regular basis with the special needs population. There are several others that could assist in this program. Other groups such as church outreach groups, community service organizations, and friends and relatives could be requested to support this effort. We have done presentations for local special needs groups, like the Cedar Rapids Association for the Deaf, about this program and the importance of their participation.

While much of the focus is on those who have a specific medical need, this program is not limited to medical special needs. Our goal is to ensure that any person who may need assistance in leaving the area is accommodated. Any resident may register. No physician's statement is necessary. There are people in our current database who are in fairly good health, but who have no family nearby to assist them should they need to evacuate. There are also people who are totally reliant on public transportation and who would need assistance in ensuring access to the public transportation system during the emergency period. We consider this an investment in peace of mind for our residents, their families, and our emergency responders.

The Special Needs Registration Program outlined here is based on the requirements for the Emergency Planning Zone around our nuclear power plant. We have expanded the program to serve the remainder of the county. This program can be duplicated in any community. The cost of the program is minimal. The primary cost of the program is printing the postage-paid registration card. In Linn County, the cost of printing these cards for approximately 75000 households in a population base of 160000 is approximately $5000.

Postage costs are only incurred on returned cards. Some costs are saved because the telephone book publisher donates the distribution of most of the cards by including them in the annual delivery of telephone books. Most of the remaining cards are distributed by hand since mailing cards separately would add to the total cost. This method is just one way to carry out the distribution. Cards can be delivered by service agencies, put in the newspaper as a special notice, sent out in utility mailings, or distributed in numerous other ways. In lieu of postage paid cards, people can be encouraged to return their registration e-mail, fax, or telephone. Depending on their circumstances, some people may have difficulty filling out the form and may benefit by being able to provide their information over the telephone.

Getting the registration information is the most important part of this program. Other costs are incurred in maintaining the database and integrating the database into the GIS program. Regular office staff at the DAEC and the Emergency Management Agency do much of this work, however, volunteer staff members can perform the data entry tasks,

especially if the number of registrants is small. The strength of the program is in the quality of the database of the registrants. The better the database the better the quality of the information and the better the support for the special needs population during emergencies.

There are many benefits of the Special Needs Registration Program for the Emergency Management staff. The registration program gives the Emergency Management staff an idea of the size of the special needs population. By using the sort capability of the database management programs, the staff can determine the number of registrants in a sector or subarea of the community. They can also determine specific special needs categories such as registrants who need wheel chair assistance or who are on medical assistance devices. This is important when allocating wheel chair lift busses or locating persons who need immediate electrical power to operate life support systems during a power outage. The program also helps to improve communications among social services groups who support the special needs groups and the emergency management and emergency services groups who can help during emergencies.

By using GIS technology, the emergency management staff can do advanced planning for potential emergencies. In addition, by laying hazard models for chemical or other industrial facilities over the special needs data, the emergency planners can determine the number of special needs persons living in their homes in the hazard area. This pre-planning can speed up the initial response in an actual emergency because the data and maps are already available. The same information can be used to inform industrial facilities of the special needs persons in their hazard zones. Industries can then develop public information material for the residents that gives them more site-specific emergency information or protective action recommendations regarding evacuation or sheltering-in-place. The Emergency Operations Center staff can also use this data during drills and exercises to enhance realism and verify the reliability of current emergency plans. This can be particularly useful in evacuation scenarios which involve the need to coordinate the evacuation of congregate care facilities and those special needs groups living at home using the same limited transportation resources.

The Special Needs Registration Program is a vital tool for the local emergency management program in Linn County in coordinating the distribution of emergency information and the delivery of emergency services to a small, but unique, portion of our community. The cost of implementing this program is small in comparison to the benefit received for all concerned. The program can make a major impact on service delivery as well as providing peace of mind because their emergency management staff is better prepared to serve all of the community.

NOTES

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Preparedness Program for Linn County which includes the Special Needs Registration Program, Emergency Public Information, and training for over 2000 emergency workers each year. She has published several articles on emergency management and is a CEM candidate.

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MAJOR AVIATION DISASTERS: STRATEGIES TO SAVE LIVES AND CONTROL THE INCIDENT

Gunnar J Kuepper[1]
Emergency and Disaster Management Inc
Los Angeles, California

No 23 A substantial portion of the delayed emergency response was caused by preventable factors.

No 24 The delayed emergency response hampered the timely evacuation of injured persons, and at least one passenger who survived the initial impact and fire might not have died if emergency medical responders had reached the accident site sooner.

No 25 Improved formal coordination among . . .'s emergency response agencies has not been implemented, and off-airport drills to identify and correct deficiencies in disaster response planning before an accident occurs have still not been conducted in the more than 2 years since the flight . . . accident.

No 26 Actions taken by . . .'s emergency response agencies after the accident have been inadequate because they failed to ensure that emergency notifications and responses would be timely and coordinated.

Findings of the National Transportation Safety Board (NTSB) after the crash of a Boeing 747 on U.S. soil in August 1997 in which 228 people perished and 26 survived.

INTRODUCTION

Since the first powered airplane flight by the Wright brothers in 1903, the aviation industry has become a major sector of the world economy. Today, the aviation sector employs 127 million people and annually accounts for $3.5 trillion US worldwide.

With the growth of air traffic, however, and with thousands of commercial aircraft in service, and with millions of passengers every year, the risk of calamities has also increased.

PROGRAM OBJECTIVES

The objectives in managing an airplane crash, a passenger terminal fire, etc are the same as in any other disaster situation:

Saving lives

Preventing escalation and further damage

Relieving pain and suffering

Protecting property, the environment and the economy

Maintaining essential services

Informing the public

Supporting recovery

Facilitating investigation and inquiries

Evaluating activities and identifying lessons learned

Restoring normalcy

AVIATION ACCIDENTS

Location of Accidents

Most airplane accidents occur during the take-off or landing phase on the airport premises or in the surrounding communities, but experience has shown again and again that disaster can strike anywhere.

It can happen in densely populated areas:

November 3, 1957, Germany, Duesseldorf: A DC-4 crashed into a residential area, 9 people died, 7 were injured.

December 16, 1960, New York City: In a mid-air collision between an United Airlines Douglas DC-8 and a TWA Lockheed Super Constellation, 134 people died, including six on the ground.

September 25, 1978, San Diego: A mid-air collision between a Pacific Southwest Airlines Boeing 727 and a Cessna 172. Four blocks of a residential area were devastated; 137 people aboard the planes and seven residents on the ground died.

July 9, 1982, New Orleans: A Pan American Boeing 727 crashed into a residential neighborhood shortly after take-off. All 153 people on board and eight people on the ground were killed.

August 31, 1986, Cerritos, California (near Los Angeles): As a result of a mid-air collision between a Mexican DC-9 and a small plane all 64 people on board were killed, together with 15 people on the ground. At least ten houses were destroyed.

October 4, 1992, The Netherlands, Amsterdam: An El Al cargo Boeing 747 crashed into a major apartment building; the four crew members aboard and 47 people on the ground died.

It can happen in smaller cities, and in rural areas

December 28, 1978: A United DC-8 ran out of fuel and crash-landed in a suburb of Portland, Oregon, a few miles short of the airport. Ten people died; 179 survived, including 24 who suffered severe injuries. Despite the destruction of some homes, no one on the ground was hurt.

December 21, 1988: A Pan American Boeing 747 was destroyed by a bomb and crashed into the small village of Lockerbie, Scotland, killing 259 aboard and 11 on the ground.

It can happen in areas with limited access like jungle or swamp such as the Everglades National Park close to Miami International Airport:

February 12, 1963: A Northwest Boeing 720 broke up in flight over the Everglades shortly after takeoff from Miami Airport. All 43 people aboard died.

December 29, 1972: An Eastern Airlines Lockheed L-1011 with 176 occupants crashed while holding 14 miles west of the airport. Despite a tremendous impact, 77 people survived, 60 of them with severe injuries; 99 persons died.

May 11, 1996: A ValuJet DC-9 experienced an in-flight cargo fire and crashed into the Everglades, killing 110 aboard.

It can happen in mountainous terrain:

August 12, 1985: A Japan Airlines Boeing 747 crashed into Mount Osutaka, Japan at an altitude of about 4800 feet. It took rescue crews nearly 15 hours to reach the site and evacuate only four survivors. A total of 520 people died in the incident. Some people, though injured, had survived the initial crash, but, wearing only light summer clothing, were overcome by shock and exposure.

During the landing approach or take-off phase, planes can crash into rivers, lakes, or shallow ocean waters

November, 1996: An Ethiopian Boeing 767 crashed into the Indian Ocean off the Comoro Islands, and although 127 people perished, 48 survived.

March, 1992: A USAir Fokker F-28 ran off a runway at LaGuardia Airport in New York City and into Flushing Bay. Twenty-seven people died, 15 of them as a result of drowning; 24 survived, with 8 sustaining severe injuries.

Some planes plunge from as high as 30,000 feet into the sea.

June, 1985: An Air India Boeing 747 with 329 persons aboard was brought down by a bomb off the coast of Ireland.

July, 1996: A TWA 800 Boeing 747 exploded in mid-air and plummeted into the Atlantic off Long Island, New York, killing all 230 people aboard.

September, 1998: A Swissair MD 11 crashed off the coast of Nova Scotia, claiming 229 lives.

November, 1999: An Egypt Air Boeing 767 crashed off Long Island, New York, claiming 217 lives.

January 31, 2000: An Alaska Airline MD 83 crashed offshore of Southern California, killing 88 people.

On the very same Sunday as the Alaska Airlines crash, a Kenya Airways A-310 plunged into the Atlantic off the Ivory Coast. Ten people were rescued from the cold ocean water, but 169 died.

Types of Incidents

In general, we distinguish three major kinds of occurrences.

High Impact. The most serious type of incident is the high-impact crash. Examples are mid-air collisions or explosions in mid-air. There are almost never survivors. Even here, however, extensive search operations are sometimes worth the effort. In September, 1997, a Vietnam Airlines TU-134 crashed at Cambodia's Phnom Penh Airport. All of the 66 people aboard were killed with the exception of a 1-year-old child who survived with only minor injuries. To find even one survivor would give the dreadful task of searching through burnt and mutilated bodies meaning.

Middle Impact. In a middle-impact crash, such as a ground collision or skidding off the runway or running out of fuel, etc, we usually find some fatalities and many injured, but also some uninjured survivors.

On August 22, 1999, a China Airlines MD-11 crash-landed and burst into flames at the new Hong Kong International Airport. Aircraft Rescue Fire Fighting (ARFF) units were available within minutes. Of the 315 people aboard, three died, and 188 were injured.

On June 2, 1999, American Airlines Flight 1420 overran a runway at Little Rock, Arkansas. There was a delay in response because the location of the MD-82 jet was unknown. Of the 145 people aboard, nine persons died and 83 were injured.

Low Impact. Low-impact accidents are initially survivable, but can have a catastrophic

outcome:

On January 30, 1974, a Pan-American Boeing 707 en route from Auckland, New Zealand, to Los Angeles was due to make a scheduled stop at Pago-Pago International Airport. Due to stormy weather and human error, the plane crashed in the jungle at 11:40 pm 900 yards short of the runway. All 101 people aboard survived the impact without serious injuries, but in the subsequent fire and smoke 97 people died and only four severely injured persons were rescued.

On November 19, 1996, at 5:00 pm, a United Express commuter plane collided with a Beech King Air at Quincy Municipal Airport, Illinois. All passengers survived the initial accident, but the occupants were not able to evacuate. When the local fire department showed up 14 minutes later after a 10-mile approach, all 14 persons aboard both planes had perished. The airport was not required to have ARFF services and had none. Nevertheless, the National Transportation Safety Board (NTSB) stated that "contributing to the . . . loss of life were the lack of adequate aircraft rescue and fire fighting services. . ."

AIRPORT INDEXES AND ARFF REQUIREMENTS

The International Civil Aviation Organization (ICAO) is the worldwide regulatory body for airports and airport emergency services. In the US, the Federal Aviation Administration (FAA) establishes the rules for airports. Airports and mandatory levels of fire protection in the United States are defined in 14 CFR § 139. US airports are classified from Index A (the smallest) to Index E (the largest) in a manner similar to the ICAO classification which defines airports from 1 (the smallest) to 9 (the largest).

Airport / FAA Index / Requirement	A	B	C	D	E
Length of Aircraft (ft)	<90	90 < 126	126 < 159	159 < 200	>200
Example of Aircraft	Bae 146	Boeing 737	Airbus 310	L-1011	Boeing 747
Maximum Seating	86	170	280	400	592
Fire Fighting Vehicles	1	1 or 2	2 or 3	3	3
Fire Personnel	1	1	2	3	3

The FAA mandates that the first ARFF vehicle must be able to arrive at the midpoint of the farthest runway in 3 minutes or less and that all other required apparatus must arrive in 4 minutes or less.

Much stronger regulations are required by NFPA (National Fire Protection Association) Standard 403, ICAO recommendation 9.2.19-20, and Department of Defense Instruction DODI 6055.6. These regulations mandate that, within their jurisdictions, the first

airport fire apparatus has to arrive at any point on the operational runways in less than 2 minutes and that all other required apparatus have to be at any point on the operational runways in 3 minutes or less. ICAO, DOD, and NFPA standards have also higher requirements in regard to staffing levels, extinguishing agents, etc.

Interestingly, the obvious need for adequate EMS (emergency medical services) is not covered by FAA or any other US regulation. Because of this, the new Denver International Airport (DIA) is considered to warrant only one Paramedic on the airport premises, although there are more than 104000 passengers and 1300 commercial flights daily and the response time for the closest ambulance is estimated at 15 to 20 minutes in good weather conditions.

AIRPORT EMERGENCY RESPONSE

The benefit of having proper and trained ARFF units on-site in less than two minutes became obvious in an accident at Los Angeles International Airport (LAX). On March 1, 1978, a Continental Airlines DC-10 crashed while attempting to take-off due to blown tires and the subsequent collapse of the landing gear. The plane carried 198 people and 81000 gallons of Jet-A fuel. At least 10000 gallons of kerosene spilled and ignited instantly, engulfing the fuselage in flames and toxic smoke. Approaching airport fire units encountered people on fire outside the plane and many still trapped inside. The first ARFF crash truck was on-scene and in foam operation within 90 seconds of the initial alarm. Total extinguishment of the massive fire was accomplished only six (!) minutes after the crash. In the end, three people had perished, but 195 others survived, 43 with injuries.

Inside the airport fence is the principal jurisdiction of the airport and its fire and rescue services (ARFF), required by FAA regulations. They are expected to be trained, prepared, staffed, and equipped to deal properly with an accident situation during the very first minutes, but a recent study of the National Fire Protection Association (NFPA) proved otherwise. Fifty-four percent of category 9 airports (which are the larger airports like Chicago O'Hare, Los Angeles International, New York JFK, Dallas/Fort Worth, etc) did not meet NFPA standards in regards to response time (fire vehicles arriving in two minutes or less to any point of the operational runway).

The success or failure of ARFF in a major crash may depend on qualified assistance from outside resources. Support is needed from local fire, EMS, and other emergency departments for water supply, provision of personnel and equipment for rescue operations, triage, treatment and transportation of injured victims to appropriate hospitals, accounting for and securing survivors and human remains, control of the scene and access, etc. Responding emergency departments need to understand the characteristics of aviation accidents and their rules and responsibilities in an airplane crash.

In the initial response and chaos phase the goals are:

communicating all needs and assignments,

coordinating all resources,

commanding all activities,

through a single contact and control procedure called the Incident Command System (ICS).

On August 31, 1988, a Boeing 727 crashed at Dallas International Airport, very near the perimeter fencing. Responding airport fire and rescue crews set up a triage sector at the accident site. Local EMS units from neighboring counties and other jurisdictions approached the scene from outside the airfield. The Incident Commander, who was the ARFF chief, was not informed when a second triage area was set up. This "freelancing" created a serious breach of proper response activities, and in the accounting and identification of victims. Further, it endangered the safety of rescue personnel, who were searching for passengers already evacuated. Assisting departments should only fulfill assigned tasks and not work on their own. "Freelancing" will create chaos and confusion, and is always counter-productive.

Individual EMS and law enforcement agencies are often not familiar with the ICS concept. It is a common scenario, even during airport exercises, that ambulance crews rush to the scene without protective equipment, load victims on stretchers, and rush them to a hospital. It is dangerous for unassigned crews to rush to the accident scene without proper protective equipment. An aircraft accident scene is like a hazmat area. It is absolutely necessary that responders have adequate training and equipment.

Sometimes local responders are not even aware of the large size of ARFF apparatus. When a DC-8 cargo plane crashed on August 7, 1997 just outside the Miami International Airport on 72nd Avenue, police units hindered access by ARFF vehicles desperately needed on-site. The blockades set by patrol cars allowed access for conventional fire trucks but were not wide enough for the airport crash units.

Availability of Neighboring Emergency Services

Most major airports are close to the large cities they serve, and, therefore, surrounded by municipal fire-stations, EMS units, and hospitals. These facilities provide additional resources and assistance in a major aviation disaster. Due to environmental and noise protection concerns, new airports are often built far away from urban areas (ie Osaka, Denver, Munich). These airports have become self-contained and self-sufficient entities located on artificial islands or in the middle of what was once farmland. As a result, the response times for outside emergency resources has grown to at least 30 to 40 minutes in good weather conditions. Consequently, the airport's fire, rescue, and EMS departments are on their own for that period of time and, therefore, must develop the capability to handle any situation ranging from a failure of power and communication systems to a mass-casualty incident involving a collision of two passenger aircraft to an act of terrorism.

In reviewing response operations to aviation accidents on and off airports the following problems are encountered again and again:

Lack of training: Responders are not familiar with airport procedures and infrastructure, fuel firefighting, aircraft design and construction, or airplane rescue tactics.

Lack of planning: Staging areas and assistance operations are not designated.

Lack of communication: Responding agencies and personnel do not know to whom they have to report, and who reports to them. Different radio frequencies and systems do not allow the use of a common ground channel.

Lack of coordination: "Freelancing" crews begin fire, rescue, medical, salvage or recovery operations without being specifically assigned and without the knowledge of the Incident Commander.

Lack of proper resources.

LOCAL/COMMUNITY EMERGENCY RESPONSE

ARFF services are required and should be expected to deal with the specifics of a downed aircraft (ie fuel fires, fuselage, evacuation routes, and specific hazards). Emergency management agencies, fire, rescue, EMS, and law enforcement departments of local communities often have neither the experience nor the knowledge needed to handle these specifics.

The first on-scene priority is fire control at the fuselage to ensure an escape route for the people aboard. If an aircraft crashes away from an airport, local emergency services are the first to respond. They might not have the training or resources to successfully fight 50000 gallons of burning fuel and they are presented with an unfamiliar and overwhelming situation. An outside fuel fire goes through the metal skin of a passenger jet in approximately 90 seconds. Because responders will have only minutes or seconds to react, it is vital for local fire and rescue departments become thoroughly trained and well prepared and develop a knowledge of:

the basic principles and techniques of fuel fire fighting,

aircraft design, including the different compartments and materials,

location of fuel tanks, engines, and exits; and finally,

exterior openings for exits, evacuation slides, and forcible entry into the fuselage.

ACCESS

Staging and Traffic Direction

Access is often a tremendous challenge not only in rural but also in urban areas. An efficient traffic direction system must be established and communicated in the early phase of the incident. "One Way In - One Way Out" is the general rule to avoid traffic congestion for emergency vehicles.

It is crucial to organize staging areas as soon as possible. These should be at designated locations or at well-known places of adequate size (ie major highway intersections, ARFF stations, parking lots). The staging area must be easily accessible and provide direct approach to the accident site. On airport premises or in off-road conditions, the use of escort vehicles is a prerequisite.

Accident Site

Airport gates can become a major challenge, particularly if local responders do not know how to open them. At the 1999 American Airlines Flight 1420 crash in Little Rock, EMS units and ambulances from neighboring communities arrived at a closed and unmanned gate. They didn't know the code-number for the keypad, so opening the gate caused unnecessary delay. With a comprehensive airport/community planning effort, the delay could have been avoided.

Access to the downed aircraft is often just the beginning of many obstacles. As described above, airplanes have ended up in the ocean, on the roofs of homes, in rivers and lakes, in swamps, jungles, icy water, and in mountainous and other inaccessible terrain.

Fuselage

After rescuers are able to get to the wreckage, they require access to and into the fuselage. Wide body jets (Boeing 747, etc) are as high as a three-story building. Ladders, elevated working platforms, or stairway vehicles will be necessary. Entry into the cabin is the next challenge. Conventional rescue tools like sledgehammers are often unsuccessful in breaking into a fuselage. The aircraft's aluminum skin and pressurized windows can be nearly unbreakable.

In a recent test executed by the ARFF department at Louisville Airport, rescue crews tried to cut or break the windshield of a Boeing 747. Nine different tools were used. Working with most of the equipment proved to be very time-consuming, and partially or totally unsuccessful - even in the case of window cutters and saws produced by high-tech rescue manufacturers. The only tool found to be effective was the Partner K-1200 8.0-horsepower saw with a 32-tooth carbide tip blade, 14 inches in diameter. This heavy-weight, 92 pound device threw sparks and glass particles in all directions, however.

Fast entry is a crucial factor in life-saving operations. Many people will survive the initial impact of the crash, but within a very short time will be overcome by heat and poisonous smoke. If the people aboard are not able to evacuate or are not rescued within the first three minutes after a fiery crash, they will have usually lost their chance for

survival.

In-flight Cabin Fires

The need for fast entry into the fuselage became obvious in some in-flight cabin fire incidents. Despite a safe emergency landing the outcome for many people aboard was often fatal. On August 19, 1980 the flight crew of a Saudi Arabian Airlines L-1011 received fire and smoke alerts shortly after takeoff from Riyadh International Airport. The plane returned safely to the airport and stopped on an taxiway. For still unexplained reasons, the engines were not shut down for some minutes, the cabin was probably not depressurized, no door was opened from the inside, no evacuation took place. The Airport Fire Service was obviously untrained and without proper equipment to deal with such a situation. It took them nearly 25 minutes to gain access into the fuselage. In the meantime, all 301 people aboard, passengers and crew, had perished due to smoke inhalation and heat exposure.

On June 2, 1983 an Air Canada DC-9 flying over Kentucky experienced an fire in the aft lavatory, which produced intensive smoke. Misjudgments by the pilots, lack of proper communication between the flight and cabin crew, as well as on the ground between the airport fire department and the local emergency services resulted in delays in proper procedures. In the end, 23 people including the crew were able to evacuate and survived, but 23 passengers died.

PLANNING AND PREPAREDNESS

Local emergency managers and rescue providers may believe there is little or no risk of an airplane crashing in their community. Recent tragedies have proven otherwise. It is impossible to predict the location of future airplane disasters and, therefore, it is essential to plan and prepare.

A comprehensive Aviation Emergency Plan should describe the agencies involved (FAA, NTSB, FBI, Fire/Rescue/EMS, Hospitals, ARFF, airline, aircraft manufacturer, Coast Guard, military, Coroner, law enforcement, etc) and their functions.

The plan must also cover aviation-specific resources and procedures for the Emergency Operations Center (EOC) and the Mobile Command Post, including unified Command, and clear lines of communication and coordination for all response and recovery activities. Specific considerations should be given to mass casualty management, on-site access control, mass fatality management, family assistance, and media handling.

The plan should allow for:

Maintaining a regular information exchange between airport and local emergency departments via fax or e-mail. All changes (construction areas, traffic detours, etc.) that could effect response or rescue efforts should be included.

Implementing mutual training and exercises on a regular basis, including airport

and aircraft familiarization.

Designating staging areas and the immediate installation of staging officers (staging is their exclusive resource).

Allowing site access only to units with specific assignments.

Establishing a recognizable command post, with clear communication and radio control.

Establishing a comprehensive Incident Command System (ICS). Making all command functions unambiguous and visible (vests).

Checklists

Emergency responders adjacent to an airport or its arrival and departure traffic patterns should have an Airplane Crash Checklist (ACC). This checklist should be laminated and fit into every glove compartment. It must follow the KISS principle (Keep It Simple, Stupid), and should contain the following information:

A grid-map of the airport and the designated staging areas,

Specifically assigned radio frequencies,

Priorities, DOs, and DON'Ts at an aircraft accident scene,

reminders that:

Rapid fire control at the fuselage from upwind is essential,

The site should never be approached without proper protective equipment,

There should be no freelancing - responders must always work within the established ICS.

and information on aviation specific safety hazards such as:

Kerosene fuel can always ignite,

Sharp metal debris can cut,

Engine force can blast objects and persons away,

Damaged aircraft structures can collapse and/or rollover.

There are often "unknowns" ie radioactive materials, explosive devices, chemicals, biological samples, and other hazmat.

RECOVERY / AFTERMATH

Investigation

After life-saving operations and affirmation of scene-safety, investigation becomes the next priority. In the US, the NTSB or the FBI will be in charge of the accident site, and their overall goal is to examine the cause of the accident. Similar agencies exist in most countries, ie in Braunschweig, Germany, it is the Bundesstelle fuer Flugunfallunter-suchung. State, local, or airport emergency management should be prepared to support the federal agencies with resources (ie with personnel, facilities, and equipment).

To illustrate the extent of an aircraft recovery operation, consider TWA flight 800 that crashed into the ocean close to Long Island on July 17, 1996. One million pieces of the Boeing 747 were salvaged, which equals 96% of the airplane. Another 40000 personal items belonging to the 230 persons who perished on board were also recovered.

Mass Fatality Management

Many bodies in high-impact crashes will be found nude, sometimes with no signs of injuries. Others bodies are discovered terribly disfigured with faces deeply gashed or with limbs torn off or decapitated. In the aftermath of the mid-air collision of a Boeing 727 and a small Cessna 172 above San Diego in 1985, fragments of 135 human bodies lay scattered in the streets, in trees, on rooftops, and in suburban backyards.

A mass fatality plan should be developed in advance, covering:

Capable personnel (ie Dmort Teams),

Equipment and facilities (ie body bags, hearses, refrigerated and secured mortuaries),

Health and safety considerations for recovery and investigative workers,

Procedures to ensure the dignified handling of bodies and human parts, with the incorporation of adequate religious rites (ie Christian, Jewish, Muslim, Hindu).

Media

An aviation disaster grabs the immediate attention of national and international news media. It is crucial to provide accurate and coordinated information in a timely manner to the media, the affected public, employees, etc. As in any crisis situation the media can become your best friend or your worst enemy. An experienced Public Information Officer (PIO) and a Press Information Center has to be assigned as soon as possible. Following the initial emergency operations the NTSB will usually be on-site and carry out press briefings and conferences.

A PIO must be prepared and trained in dealing with media representatives or camera crews who may be very confrontational. Local PIOs should never speculate about the cause of the accident. This is the exclusive authority of the NTSB or other designated

federal agencies.

A clear and agreed understanding by all entities involved (fire, local and state police, EMS, hospitals, air-carrier, airport, emergency management, etc) must be established as to who will make known which particular details during the different phases of the incident. Varying messages from different agencies and speakers will cause rumors and negative publicity. Press briefings should be given at one location under the leadership of the NTSB.

Family Assistance

The *Disaster Family Assistance Act of 1996* and the *Foreign Air Carrier Family Support Act of 1997* were prompted by complaints made by families of victims in three recent tragedies: the May 1996, ValuJet DC-9 crash into the Everglades; the July 1996, TWA 800 crash off the shore of Long Island; and the August 1997, Korean Airlines Boeing 747 crash in Guam. Air carriers are now required to submit a plan to the NTSB addressing the needs of families in an aircraft accident. The airline is instructed to establish a family support operations center and provide secured facilities for the grieving relatives and friends, as well as providing logistical support, proper notification and communication procedures, etc.

According to the *Family Assistance Act*, the American Red Cross (ARC) has to provide counseling services in coordination with the air carrier's disaster response team. The ARC will also address the needs of families in cooperation with governmental agencies and others.

Critical Incident Stress/Emotional Impact

The consequences of an aircraft catastrophe with many fatalities goes far beyond the emergency scene and reach deep into the hearts and minds of those affected. It strikes emergency responders and recovery workers, survivors, families and friends of victims, and last, but not least, the communities near the crash site.

Because of their nature aviation accidents have a high number of victims sometimes including children, often with bodies beyond recognition, and with mutilating injuries of survivors.

In the book, *In the Blink of an Eye - The FBI investigation of TWA Flight 800*, Pat Milton describes the feelings of private boat owners who went out into the night at the crash scene, and instead of finding survivors, recovered bodies.

> *"Patty S was exhausted and afraid of collapsing. When she had scrubbed down and got back in her clothes, someone handed her a slip of paper advising her that she might suffer nightmares in the coming weeks. The warning proved prescient. A few days later, on a television program about the crash, she would see a family video of the little girl in black sneakers. The girl was laughing. Patty recognized her as one of the bodies she had pulled up that night. Over the next few months, the image of the girl laughing was what she saw just before she woke up, sweat-*

drenched, in the dark. Or else she imagined what the passengers of Flight 800 experienced before the plane hit the water, alive on the way down. For months afterward, she would find comfort on the docks in the company of boaters who had also been out there that night. You could just stand there with them, looking out at the inlet and the ocean beyond; you didn't need to talk at all."

Training, Drills, and Full-scale Exercises

The FAA requires airports to have a full-scale exercise at least once every three years. It would be wise either to participate in such an event or to organize one in your community.

CONCLUSION

The initial impact of an airplane accident is often survivable. The final result of life or death for those on the aircraft may be determined by fast and skilled response.

The solutions to saving lives and reducing the pain and suffering of people we do not even know are joint planning and training and a comprehensive emergency program. We are in charge of making the difference and we should take that matter very seriously.

NOTES

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USE OF INTER-AGENCY AGREEMENTS TO ENHANCE EMERGENCY PREPAREDNESS

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INTRODUCTION

Since the days of fire-fighting by "bucket brigades," neighbors have pitched in to help with response to disasters. In current professional emergency management practice, such assistance is often performed according to an agreement that has been reduced to writing and signed by competent authorities. Most local emergency response organizations have mutual aid agreements with neighboring jurisdictions, and many also have arrangements with other levels of government, or with private organizations such as the American Red Cross (ARC) or Salvation Army to provide assistance. Such agreements can offer significant practical and legal advantages. Agreements that are poorly drafted or not properly authorized, however, can negate these advantages or cause unintended consequences in the wake of a response. This article examines the advantages of having emergency response agreements and suggests methods for avoiding pitfalls when negotiating and drafting them.

ADVANTAGES TO HAVING AGREEMENTS

Considerable effort is required to initiate, negotiate, and maintain emergency response agreements with other organizations. There are several advantages that derive from such agreements, however.

Promoting Essential Response

The primary reason for having agreements is to improve the quality of emergency preparedness and response. Effective emergency response often requires a coordinated effort among several local departments, and may involve state, federal, and private organizations as well. Agreements among these organizations can help to build bridges between their response plans and ensure that response efforts are coordinated and timely. For example, an agreement with a local chemical plant, spelling out emergency notification procedures, may help ensure that action is taken quickly to warn the public in the crucial first few minutes after a hazardous material release. Agreements can also serve as a basis for participation in training or exercises to fine-tune response capabilities and maintain proficiency.

Arranging for Specialized Resources

Certain types of events may require specialized resources that are needed only in an emergency. For example, emergencies involving hazardous chemicals, radioactive materials, or terrorism may require specially trained medical personnel, laboratory sample analysis, swat teams, or other resources that are not usually needed and are not

maintained in-house. But even a localized flood may trigger a sudden requirement for sandbags or earth moving equipment that is needed only in emergencies. Formal agreements are the surest way to ensure that such resources will be available when the need arises.

Institutionalizing Coordinated Planning

The process of negotiating agreements highlights the need for and advantages of coordinated planning. It also provides a mechanism to prevent erosion of coordination over time due to budget cuts, personnel changes, or loss of institutional knowledge.

Minimizing Litigation

By promoting a clear understanding of roles, responsibilities, and financial commitments ahead of time, an agreement can help prevent conflict and resulting litigation in the wake of an emergency. For example, parties to a mutual aid agreement typically waive all claims against each other for costs, damage, or injury resulting from joint response actions.

TYPES OF AGREEMENTS

Emergency management agreements go by many names; for example, Intergovernmental Agreement, Interagency Agreement, Memorandum of Agreement, Memorandum of Understanding, or Mutual Aid Agreement. The name for an agreement is not as important as its purpose and what it contains. Often an organization will have a standard form that they use for many agreements. For example, the ARC has a standard form agreement that they use with property owners to obtain use of a building as an emergency shelter. Below are descriptions of the most common types of agreements used for emergency management:

Intergovernmental or Interagency Agreement (IGA)

Intergovernmental agreements or interagency agreements are agreements between different levels of government or between different agencies within the same level (e.g. different state agencies or different federal agencies).

Memorandum of Understanding (MOU)

MOUs are memoranda that define general areas of understanding between two or more parties; they explain what each party plans to do. Generally, an MOU is used where the actions of one party do not depend on the actions of the other party, but rather both are pursuing independent paths to the same end.[2]

Memorandum of Agreement (MOA)

MOAs generally are used when what one party does depends on what the other party does; for example one party agrees to provide personnel if the other party provides the materials.

Mutual Aid Agreement (MAA)

In mutual-aid agreements, each signing agency agrees to provide mutual support in a specified area when requested (eg fire-fighting). In many states, a standard form for state or local MAAs is included in the emergency response statute or in the administrative regulations issued by the state's emergency management agency. In addition, states may form mutual aid compacts with one another and, indeed, some emergency management compacts are already in place[3]. For example, virtually all states are signatories to the *Interstate Civil Defense Compact of 1950*, which contains a broad range of mutual-aid emergency management provisions. The Compact also provides for side-agreements between participating states, such as the *Supplemental Agreement* entered into by the Southwestern Caucus States (essentially all of the states bordering Arizona). There is also the *Emergency Management Assistance Compact* (EMAC), which was initiated in the southeastern United States and now includes over half of the United States.

Cooperative Assistance Agreement, Standby Contract or Contingency Contract

These are agreements that involve a commitment for a response when certain agreed-upon conditions exist. Cost reimbursement may or may not be provided for.

THE DEVELOPMENT PROCESS

To create a useful agreement that will enhance preparedness, the process is sometimes as important as the product. At the beginning of the development process, the parties should be clear on what they hope to achieve by the agreement. These questions should be posed and answered: What is the problem that will be solved or prevented? What parties must be included in order for that to happen? This may seem obvious, but sometimes negotiations can drift away from the original purpose of the agreement. The points below should be considered during the development process in order to avoid unnecessary conflict or delay in getting the agreement finalized.

Legal Review and Document Search

Draft agreements should be reviewed by attorneys and by responsible officers or public officials to ensure that they are clear and within legal limits on authority. Legal review is particularly important because there may be legal restrictions that affect the content and execution of the agreement. For example, there may be a statutory prohibition against obligations in excess of appropriations (ie you can't promise to spend more than you have). This might pose a problem for an open-ended assistance contract.

As part of the drafting process, a search should be made for pre-existing agreements that may fill the need or be readily modified to do so. For example, the interstate compacts described above provide a readily accessible source of many of the needed emergency management resources, and in some cases further agreements may be unnecessary.

Strategies for Addressing Technical Considerations

Some agreements cover subjects that are complex, or that involve the use of unique equipment, or that require exact compliance with procedures for optimal results when

lives are at stake. In such cases, these technical considerations should be incorporated in the body of the agreement, in a technical annex to the agreement, in an attached sample format for exchanging information, in a section that defines technical terms used in the agreement, or in citations to specific technical publications.

The body of an agreement on mutual aid could address what supplies and equipment will be provided, shared, or exchanged among jurisdictions to decontaminate persons, places, and things; who will provide the supplies and equipment; what special storage or maintenance is required; who will store and maintain the supplies and equipment; who decides who will use the equipment; and what is the disposition of spent decontaminants and equipment that cannot be decontaminated.

An annex to an agreement could address what communications equipment and protocols will be installed, provided, shared, or exchanged to support the exchange of information among jurisdictions; who will provide and maintain this equipment; who will operate it; for what other purposes will the equipment be used; and what back-up communications equipment will be used if the primary system is not available.

A specific format identifying essential elements of information might be attached to an agreement to prescribe the exchange of alert and notification information among jurisdictions in the event of a fast-moving hazardous materials release, to collect hazardous materials monitoring and survey results for analysis, or to track the patient history or contamination status of injured persons across jurisdictional boundaries.

Negotiation

The negotiating process and the level of formality required is a matter of organizational policy. In some cases, there may be a long process of negotiation in which one side then the other proposes modifications. From a legal standpoint, the important thing to remember is that the written document should include the entire agreement. Any oral side agreements, understandings, clarifications, or interpretations are probably unenforceable and may be lost when personnel change.

Approval

Any agreement will ultimately have to be signed by an appropriate officer or public official of each party. This officer or official must have actual legal authority to bind the party. The agreement itself should specify the required approvals as well as procedures for renewal, modification, and termination. To expedite approval, it is best to keep the appropriate officers or public officials fully involved and informed during the negotiation process so that there are no surprises or questions at the end.

TYPICAL COMPONENTS OF AN AGREEMENT

In drafting an agreement, the following components should be considered for inclusion. Note that for particular types of agreements there may be other format requirements that apply as a result of state or local regulation.

Purpose and Scope

At the beginning, the agreement should have a simple, concise statement of its purpose. The purpose statement should answer the question: How will this agreement improve emergency response? A statement of purpose will aid in interpreting the rest of the text. The agreement also should state its scope. In what situations is it applicable? What types of emergencies trigger implementation? What personnel and resources are included?

Authorities and References

The agreement should reference relevant legal authority such as federal and state statutes and regulations. Each state has an emergency management statute and, generally speaking, it will contain language that specifically authorizes local governments to form agreements to cooperate on response. For example, under the Oregon statute, "The state, counties, and cities may, in collaboration with public and private agencies, enter into cooperative assistance agreements for reciprocal emergency aid and resources."[4]

In some cases, it may be appropriate to reference a separate planning document or procedure that contains details on implementing the agreement. For example, an emergency management agency might agree with an environmental agency to provide specific technical assistance upon request, such as monitoring for hazardous chemicals or radioactive contamination. Rather than spelling out all the details of how this will be done, the agreement might simply establish general responsibilities and principles for cooperation, and reference a separate procedure for details on how the monitoring will be carried out.

Definitions

Depending on the nature of the agreement, it may be essential to include definitions of key terms. For example, if one party will provide assistance to another party in event of an emergency, it may be appropriate to define what exactly is meant by "emergency."

Roles and Responsibilities

The agreement should summarize the roles and responsibilities of each party. This section should describe the services or resources to be provided in enough detail to ensure that the purpose of the agreement will be fulfilled.

Logistical and Administrative Considerations

Time is usually of the essence in emergency response. To ensure that agreed-upon actions will be quick and sure, it is often essential to plan out and agree upon specific logistics and support actions in advance. The following items should be considered during drafting and negotiation:

Conditions for activating agreement. Agreements may be limited to a particular type of emergency or may include all hazards. Most often, action under the agreement will be triggered by a request for assistance. The agreement may have limits on the types of circumstances under which such a request should be made, however; for example, only when a certain type of emergency occurs, or only when the requesting party's resources

have been exhausted.

Protocol and procedures for activating agreement. In many cases the agreement should spell out procedures for activation, such as points of contact, content of messages and so on. A special protocol such as a code word may be necessary to ensure that, for example, sirens are not activated based on a hoax. A provision as to the content of messages requesting assistance can serve as the basis for building staff procedures. For example, a mutual aid agreement can provide that any request for assistance will include at least the number and type of personnel or equipment needed; any special protective equipment needed; and specify a location or point of contact to report to. This in turn can be built into a procedure for the person who actually transmits such a request (such as a dispatcher) to ensure that they include all the required information.

Limitations of the agreement. Parties may place limits on the assistance provided under an agreement. For example, the agreement might provide that assistance will only be given if doing so will not jeopardize fire protection in the assisting district (ie they have units to spare), or only if there is a local or state-declared emergency.

Command and communications in the field. If the agreement covers field response such as law enforcement or fire fighting, it should make clear how lines of authority will run for each organization and who will be the incident commander. It may also be useful to specify communications systems and protocols to be used, including interoperability of communications between the various jurisdictions and agencies. Addressing this issue in an agreement will focus attention on whether the organizations have appropriate communications equipment to accomplish this goal.

Exercises and drills. Agreements regarding provision of assistance in an emergency also should include participation in exercises and drills. This is particularly true for organizations that supply specialized resources (eg laboratory services or wrecking equipment) that do not regularly engage in emergency response actions.

Training. Parties to an agreement should consider whether the contemplated actions will require any specialized training that their personnel are not already receiving; for example, training on use of specialized personal protective equipment. One party may agree to provide training for another, or the parties may agree to conduct joint training programs.

Consistent planning. Agreements should specify that the parties will incorporate appropriate elements into their emergency plans and procedures, to ensure planning is consistent with the agreement.

Legal and Financial Considerations

Legal and financial considerations are key to avoiding misunderstandings and possible litigation after the agreement has been signed. The particular considerations detailed below may or may not apply to a given situation; legal review by appropriate counsel is essential to determine the legal context of the agreement and what points must be

covered in the agreement itself.

Preparation costs. Implementing an agreement may involve expenditures to set up a facility, purchase equipment, or train personnel. In some cases it may be appropriate for the agreement to address allocation of such costs.

Response costs. In some cases, it may be appropriate to address cost issues such as compensation for equipment damage or injuries that may be sustained while carrying out the agreement. For example, mutual aid agreements often provide that each organization is responsible for its own personnel and equipment. In other cases, an organization may undertake responsibility for certain costs. For example, the American Red Cross (ARC) standard form agreement for using a building as an emergency shelter provides that the ARC will replace or reimburse the facility owner for any materials or supplies used in the conduct of relief activities. Note, however, that appropriations law at the federal level and in at least some states prohibits entering open-ended cost reimbursement agreements.

Liability. Situations may arise in which one party to an agreement is injured as a result of alleged negligence by another party; or in which a third person may allege injury as a result of negligence in emergency response efforts. An error in fire fighting judgement, for example, might cause injury to civilians or to other fire fighters. An agreement may be used to settle (or rather forestall) issues of liability between parties. Mutual aid agreements often contain a waiver of all claims, such as "Each party waives all claims against every other party for compensation of any loss, damage, injury, or death occurring as a consequence of the performance of this agreement . . . ."

Boilerplate. The agreement should specify what approvals are necessary to make it valid, the duration of the agreement (fixed term or indefinite), and procedures for changing, withdrawing from, or ending the agreement. The agreement also should include a periodic review process; for example, an annual review.[5]

If the negotiation of an agreement makes portions of a previous agreement obsolete, it is appropriate to include a section superseding those sections. That section should specifically supersede those portions that have been made obsolete while identifying those sections that are still in effect. If the entire document is made obsolete, it is appropriate to terminate the prior document.

Signature Blocks. An attorney should determine whether state law requires a notary seal or other attestation to make the document effective.

Attachments. One or more attachments may be needed to spell out technical details of assistance or resources to be provided, or protocols or procedures to be used. Such attachments should be expressly incorporated by reference into the final agreement and made a binding part thereof.

LEGAL CONTEXT: APPROPRIATIONS LAW AND IMMUNITY PROVISIONS

All agreements are set against the background of applicable federal, state and local statutes and ordinances. Sometimes this legal context will have a significant impact on how certain aspects of the agreement should be worded. Two areas of law that are particularly important are appropriations law and governmental immunity provisions.

Appropriations Law

Appropriations law restricts the types of financial obligations that can be undertaken by government officials. For example, US federal officials are bound by the federal *Anti-Deficiency Act*.[6] As stated in the U.S. General Accounting Office (GAO) guidebook:

> ". . . the fiscal principles inherent in the *Anti-deficiency Act* are really quite simple. The idea is to 'pay as you go.' Government officials are warned not to make payments - or to commit the United States to make payments at some future time - for goods or services unless there is enough money in the 'bank' to cover the cost in full. The 'bank,' of course, is the available appropriation." (USGAO 1991, pp 6-11).

This requirement means that open-ended agreements to indemnify or compensate another party for possible future response costs are generally prohibited. Any type of agreement that goes beyond the current fiscal year, or is not for a specific dollar amount will require special authorization. Multi-year obligations require special appropriations language from Congress. (USGAO 1991).

Similar provisions may be found in state law, binding the actions of state and municipal officials. For example, in Utah:

> "City officers shall not make or incur expenditures or encumbrances in excess of total appropriations for any department in the budget as adopted or as subsequently amended. Any obligation contracted by any such officer shall not be or become valid or enforceable against the city."[7]

However, in some cases the law may make an exception for emergency response expenses. For example, in Massachusetts:

> "No department financed by municipal revenue, or in whole or in part by taxation, of any city or town, except Boston, shall incur a liability in excess of the appropriation made for the use of such department . . . except in cases of major disaster, including, but not limited to, flood, drought, fire, hurricane, earthquake, storm, or other catastrophe . . . and then only by a vote in a city of two-thirds of the members of the city council, and in a town by a majority vote of all the selectmen.[8]

Governmental Immunity

The law provides certain protections from liability for emergency responders. This protection may affect how liability should be treated in an agreement. For example, one state statute provides immunity for emergency responders including the state, political subdivisions of the state, state and local government agencies, individuals, partnerships, corporations, and "emergency management workers" engaged in emergency response. The term "emergency management worker" is defined to include all full or part-time paid, volunteer, and auxiliary employees, including employees of other states who come in to assist at the state's request. Immunity also applies to those who voluntarily provide shelter for evacuees.[9] Such a statute may affect or even eliminate the need for indemnity or waiver clauses in an agreement.

CONCLUSION

The benefits of drafting and negotiating agreements prior to an emergency include loss reduction, ability to secure response resources, and cost savings. In order to be effective, the agreements must be comprehensive and coordinated, and legal review is essential. All of the affected parties must buy into the concept of an agreement to ensure that a useful document is created.

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NOTES

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Material for this paper was mainly derived from work performed by the authors for the Chemical Stockpile Emergency Preparedness Program, jointly sponsored by the US Army and FEMA. This work also was supported by the US Department of Energy under Contract W-31-109-Eng-38.

The authors wish to thank the following individuals who contributed to production of this paper: Don Brodersen, CSEPP Coordinator, Anniston Army Depot; Elaine Chan, Attorney, FEMA Office of General Counsel; Karen Cleveland, Public Health Advisor, Centers for Disease Control; Ruth Flanders, Attorney-Advisor, U.S. Army Soldier and Biological Chemical Command; Veronica Gross, General Engineer, U.S. Army Soldier and Biological Chemical Command; David Holm, Deputy Director and Legal Counsel, Colorado Office of Emergency Management; Leslie Mason, Chief Depot Counsel, Anniston Army Depot; and Mitchell Vogel, former Emergency Management Director of Parke County, Indiana.

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2. Definitions of some of these terms may be found in *US Department of Defense (DoD) Instruction #4000.19*, Enclosure 2, page 2-2, August 9, 1995 (available at http://web7.whs.osd.mil/dodiss/ instructions/ins2.html).

3. The *United States Constitution*, Article I, Section 10, provides for compacts between the states on matters of joint concern, reserving to Congress the right to approve or disapprove those pacts.

4. *Oregon Revised Statutes* (ORS), Sec. 401.480 (1999). Another section of the Oregon statute specifically authorizes cooperation on 911 calls: "Public or private safety agencies may enter into agreements which provide that an emergency unit dispatched by a 9-1-1 emergency reporting system established pursuant to ORS 401.720 shall render emergency services without regard to jurisdictional boundaries." [ORS Sec. 401.780 (1999).]

5. To facilitate regular annual review of agreements, it is recommended to keep a tabulation of agreements and their review dates for quick reference. This file may be in paper form, or as a spreadsheet or text file on a computer. Signatory authorities should ensure that responsibility for this has been assigned within their jurisdiction.

6. *The Anti-Deficiency Act*, while not an official short title for an act at all, is the term used when referring to a series of sections pertaining to the operation of the federal budgetary process; these sections date back as far as 1870 and include 31 USC Secs 1341, 1342, 1344, 1349, 1350, and 1511-17. As a general rule, any promise to pay must be limited to amounts that are available under current appropriations.

7. *Utah Code*, Sec 10-6-123 (2000).

8. *General Laws of Massachusetts*, Ch 44, Sec 31 (1998). The authors do not know why Boston is excepted or what the rule is for Boston.

9. *Code of Alabama*, Secs 31-9-16,17 (1998).

MODEL EMERGENCY ACTION PLANS
Will They Work in the Multi-Building Facility?

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The University of Louisville is a state institution of higher learning with three campuses in the Louisville metro area. It is the second largest university in Kentucky with approximately 21000 students, 5000 employees and 150 buildings. The University was founded in 1798, and in its two hundred year history has grown from a private seminary to a city university and finally to a state university.

From the late 1980s until 1999, the University's Department of Public Safety (DPS) was responsible for emergency planning at the University. While they were able to develop some standard operating practices and procedures for employees and students, DPS was unable to develop building-specific plans for each University building. DPS staff was taxed with its primary mission of delivering police services. Additionally, DPS did not have a sufficiently trained emergency manager, nor did they have the resources to support effective, building-specific planning across the University.

During 1998, the University of Louisville Department of Environmental Health and Safety (DEHS) conducted a gap analysis of emergency planning and fire safety programs on the University campuses. The gap analysis provided beneficial information as to the state of the University, including what was necessary to make the emergency planning effort both viable and effective. The gap analysis conclusions included the following:

> Emergency planning needs were not being effectively met.
>
> Multiple departments had portions of the overall responsibility and the coordination of their efforts was cumbersome and lacking.
>
> Occupational Safety and Health Administration (OSHA) regulations and the State Fire Codes were not being met.
>
> Emergency planning was a liability-limiting business strategy.
>
> Non-occupants developing an emergency plan for each building would be ineffective.
>
> The prudent path to follow to ensure the safety of students, staff and visitors would be to implement an emergency management program.

On completion of the gap analysis and discussion between DPS, DEHS, and the Vice-President for Finance and Administration, it was decided that DEHS would take over

the emergency management programs for the University while DPS would retain fire safety responsibilities. Despite DEHS being given this new role, it received no additional allocation of resources. Program funding included only what DEHS could re-allocate from its day-to-day operations. Before the transfer of responsibility was made official, DEHS had prepared its goals and objectives for emergency management. One of the primary goals was to ensure that each building or facility had an effective, building-specific emergency action plan.

DEHS had a strategy ready to reach its goal of 150 building-specific plans. The first step was to develop a model Emergency Action Plan (EAP) that could be sculpted into a building-specific plan. In writing the model plan, certain requirements had to be met:

The plan would be developed from the University's hazard/vulnerability analysis.

The plan had to be comprehensive, to react to each emergency identified.

The plan had to be easy to understand.

The document needed to be as concise as possible.

The plan would be updated annually, so it had to be easily revised.

Finally, it had to be simple, to allow easy training for a myriad of employees.

Once this model plan was developed, it was sent to peers and other Certified Emergency Managers and leaders in local emergency service agencies for their review. After the peer review, the Model EAP was revised to reflect the changes proposed. Finally, the plan was sent to the University's Administrators for their review, and after a few suggested changes, the plan was approved (see Annex A).

With a model plan ready, the next step was to evaluate its effectiveness in the University community. Five buildings were chosen to use the model to develop prototype building-specific plans. These buildings represented both academic and administrative units and two of the buildings housed multiple departments. The procedure to develop plans was fairly simple (see Annex B). A representative of DEHS met with the department chairs, introduced them to the model plan, and instructed them to use the model to write their own EAPs. During this process, DEHS found that the Unit Business Manager (UBM) would typically be assigned to the role of emergency coordinator. Between the UBM and the department chair, the first draft of the plan was developed.

During this phase, DEHS provided assistance upon request to identify evacuation routes, severe storm safe havens and congregation areas outside of the buildings. DEHS also provided technical assistance when the building had specific safety issues such as laboratories or other hazardous operations.

Once a department finished its draft plan, it was sent to DEHS via the campus e-mail

system. A Certified Emergency Manager at DEHS reviewed the plans and offered appropriate revisions. These revisions were added directly to the electronic copy that had been sent to DEHS. The plan was then sent back to the department electronically (using e-mail made the effort least burdensome on the department and DEHS). After all the revisions were agreed upon, the department printed out a hard copy of the plan and the Department Chair, as well as the Building Emergency Coordinator, signed the plan and sent it to DEHS.

On delivery to DEHS, the plan was reviewed and approved by the University Emergency Coordinator. A copy of the plan was placed in a fire-resistant filing cabinet at DEHS to serve as an official record. A letter (Annex C) was attached to the plan outlining the implementation procedures for the department and the plan was then returned to the Building Emergency Coordinator.

After completing the five prototype buildings, DEHS interviewed representatives to evaluate the process and identify areas for improvement. The suggestions that DEHS received were incorporated into the process.

Within one year, forty-five buildings completed their emergency plans. While this was a great start, several problems were encountered:

There was apathy in several buildings. The emergency planning effort was placed far down the priority list.

The University does not mandate one word processing software exclusively. Model plans were distributed in MS Word and WordPerfect, and occasionally requests came in for the plan in some other software format.

Departments had problems developing their evacuation routes.

There were insufficient resources in DEHS to meet the needs of the many different buildings, and the University as a whole.

Units complained of the employee time and resources needed to complete the plan.

Some even asked about reimbursement.

Even though there were some problems with the process, the overall experience provided many benefits:

It improved overall safety awareness in the individual buildings.

Department Directors, Chairs, Deans and Building Emergency Coordinators became more aware of their safety responsibilities.

It stimulated some departments to begin business continuity planning (which is a future goal of the emergency management program).

It encouraged department chairs to designate safety liaisons for their buildings.

It stimulated efforts to redesign procedures for handling mobility impaired faculty, students and visitors.

It improved the University's compliance with OSHA and State Fire Marshall regulations regarding emergency planning.

DEHS was allowed to hire a C.E.M. part time to assist in the effort.

It helped to identify departments that were lax in other safety areas.

It made DEHS more visible for units that did not have a traditional relationship with DEHS.

NOTES

1. Dennis K Sullivan, CHMM, CEM is the Environmental Manager for the University of Louisville. Vikki L Stempkowski, CEM is the Plans and Operations Coordinator for the Louisville/Jefferson County Emergency Management Agency, Louisville, Kentucky.

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ANNEX A

University of Louisville
(Department's or Building's Name)
Building Emergency Action Plan

(This model BEAP is for the use of departments that are the sole occupant of a building. This model BEAP is to be completed and submitted to DEHS for review and acceptance. DEHS' comments and suggestions shall be included and taken into consideration as necessary. If you need any assistance in the completion of this model BEAP please call DEHS at 852-6670)

1.0 Introduction

1.1 Each department at the University must have an Building Emergency Action Plan (**BEAP**) to provide for students, faculty, staff and visitors during an emergency. Each BEAP is developed by the individual department(Name of Department) plan was developed using a model plan prepared by the Department of Environmental Health and Safety (DEHS). DEHS has reviewed this plan and it was implemented on (date).

1.2 Each Emergency Action Plan is developed not only to provide for the safety of the University community, but also to comply with Occupational Safety and Health Administration (OSHA) regulation 29 CFR 1910.38. The (department name) **BEAP** is kept (location of plan and training records) and are on file at DEHS's office.

1.3 Each employee covered by this Building Emergency Action Plan must be provided with a copy of the plan and instructed as to their responsibilities and actions during an emergency. A record must be maintained including the names of everyone that has been trained and is kept (location of plan and training records).

1.4 The Building Emergency Action Plan will be tested annually during the month of (month).

Building Emergency Coordinator

Department (Chair or Director)

Reviewed by DEHS Emergency Management Coordinator

2.0 Emergency Action Responsibilities

2.1 (Name), Department Chairperson is responsible to ensure that the department uses the model DEHS Emergency Action Plan and develops a department specific plan.

2.2 (Name) is the Building Emergency Coordinator (**BEC**), (he/she) has been assigned by the Department Chairperson and is responsible for this plan and employee education regarding this plan. (Name) will also coordinate the testing of the plan annually. Testing will entail conducting an emergency exercise for one chosen section of the plan. During an emergency (he/she) would implement the Building Emergency Action Plan and coordinate emergency actions to ensure the safety of the people in this building . (His/Her) emergency duties include:

- Ensure that the notification to emergency agencies takes place. (DPS or 9-911).
- Assist in building evacuation.
- Report to the assembly area.
- Account for evacuated personnel.
- Collect essential information for emergency personnel (i.e., location of the incident, persons still in building, special hazards in the building, unique conditions).
- Develop specific procedures to assist persons with physical disabilities that are assigned to the department.
- Assist physically disabled employees, students or visitors.
- Implement the post emergency procedures

2.3 (Name) is the Assistant Building Emergency Coordinator (**ABEC**) will assist the **BEC** and will be responsible for the **BEC**'s duties if (he/she) is unavailable.

(Include 2.4.1- {as many as floors} if the building is multi-floored)

2.4.1 (Name) is the (floor number) Floor Leader (**FL**) and is responsible for coordinating the Emergency Action Plan for the (floor number) floor. The emergency duties of the **FL** include:

- Ensure all persons are evacuated.
- Designate volunteers to assist individuals with disabilities.
- Conduct a sweep of the floor and ensure that all doors are closed, elevators empty and critical operations stabilized.
- Assist physically disabled employees, students or visitors.

*as personal safety and time permits

2.4.1.2 (Name) is the Assistant Floor Leader (**AFL**) will assist the FL and will be responsible for the **FL**'s duties if (he/she) is unavailable.

2.4.2 (Name) is the (floor number) Floor Leader and is responsible for coordinating the Emergency Action Plan for the (floor number) floor.

2.4.2.2 (Name) is the Assistant Floor Leader is responsible for the Floor Leader's duties if (he/she) is unavailable

3.0 Contact List and Numbers

3.1 Departmental Contact Telephone Numbers:

Title	Name	Office Phone	Home Phone	Pager	Cell Phone
Chair					
BEC					
ABEC					
Floor Leader					
Floor Leader					
UBM					
Laboratory Supervisor					

(Other department staff may be added at the option of the department)

4.0 Emergency Action Plan - Fire

4.1 This section of the Building Emergency Action Plan will be implemented in the event of :

- A fire alarm activation.
  or
- A fire discovered by building occupant.

4.2 Any employee, student, or visitor that becomes aware of a fire shall immediately activate the building fire alarm system. The fire alarm system will in turn notify all building occupants that a fire emergency exists. This is accomplished through sounding an audible alarm and a visual flashing red light. All employees, students and visitors will regard any

activation of a fire alarm as a true fire emergency unless there has been previous notification of the alarm system being tested.

4.3 The **BEC** will contact Public Safety at 852-6111 and notify the dispatcher that a fire alarm in the building has been activated. If DPS does not answer, call the Fire Department at 9-911.

4.4 All occupants will immediately leave the building utilizing the escape routes outlined in **Appendix A**. Occupants may collect their valuables (purse, coat, etc.) and should close, but not lock, their door upon leaving. Any occupant who comes into contact with a student or visitor should direct them to evacuate the building. Any occupant that comes into contact with a visitor or student that is physically disabled should assist those individuals from the building. **DO NOT USE ELEVATORS.**

4.4.1 Building occupants should make no attempts to extinguish the fire.
(If a variation of section 4.4.1 is required, contact DEHS for approval)

4.4.2 Special procedures for physically disabled staff or faculty.

(The section should be developed if the department has physically disabled employees)

4.5 Once out of the building, all occupants should gather at (location) to be counted. Floor Leaders or Building Emergency Coordinator will conduct a roll call of employees to determine if everyone has vacated the building. No employee should leave the assembly area, either to re-enter the building or leave the campus, until advised to do so by the Building Emergency Coordinator.

4.6 The Building Emergency Coordinator will provide information to the DPS officer, the University Emergency Coordinator or the Fire Department Officer in Charge. This information may include, but is not limited to:

- Location of the fire,
- Status of the evacuation, personnel missing that may still be in the building, and
- Special hazards associated with the building.

5.0 Emergency Action Plan - Severe Weather

5.1 This section of the **BEAP** will be implemented in the event of a severe weather warning.

5.2 (Name) Department has a NOAA Weather radio in (location). This radio is dual powered working on both batteries and/or the buildings electrical service. This radio will be activated by the National Weather Service to announce any watches or warnings. (Name) will monitor this radio for any emergency announcements and notify the Building Emergency Coordinator of any warnings. Additionally, any employee that becomes

aware of a severe weather warning will immediately notify the Building Emergency Coordinator. The Building Emergency Coordinator will immediately notify employees by (either word of mouth, telephone or public address announcement). This notification will advise building occupants of the type of warning (thunderstorm or tornado) and to implement the Emergency Action Plan - Severe Weather.

5.3 Once occupants have been notified of a thunderstorm warning, they should take no other steps than to ensure that they are prepared if conditions deteriorate.

5.4 Once occupants have been notified of a tornado warning, they should gather their valuables and take cover. Any occupant who comes into contact with a student or visitor should direct them to take appropriate actions. Any occupant that comes into contact with a visitor or student that is physically disabled should assist those individuals. Office doors should be closed upon exiting. Building occupants should take cover in the areas outlined in **Appendix B**.

5.4.1 Special procedures for physically disabled staff or faculty.

(The section should be developed if the department has physically disabled employees)

5.5 The Floor Leaders and/or Building Emergency Coordinator will conduct roll calls to ensure that all employees are in the shelter areas. If an employee is missing, the Building Emergency Coordinator will make a determination whether it is safe to search for the missing employee(s) and assign someone to find them and have them move to the shelter areas.

5.6 If injuries or building damage occurs, notify DPS by calling 852-6111. If DPS does not answer, call 9-911 for local emergency services.

5.7 Once the all clear is given by the National Weather Service, the Building Emergency Coordinator will give the word for employees to return to their work stations or go home.

6.0 Emergency Action Plan - Earthquake

6.1 This section of the **BEAP** will be implemented when a sustained earthquake occurs.

6.2 Earthquakes occur without warning. Some earthquakes are instantaneous tremors and others are significant sustained events followed by aftershocks. Once an significant earthquake begins, building occupants must take immediate action. Individuals should take emergency action on their own and additional actions will be implemented after the quake stops.

6.3 An earthquake may cause noticeable shaking of the ground and building. This shaking will vary in intensity (i.e., mild tremors to shaking sufficient to destroy buildings.).

6.4 When an significant earthquake occurs, occupants should immediately take cover. Suggested locations inside buildings that provide cover include:

- Standing in a doorway and bracing your hands and feet against each side.
- Getting under a desk or heavy table.
- Standing flat against an interior wall.

NOTE: Do not seek cover under laboratory tables or benches, chemicals could spill and harm personnel.

6.4.1 Special procedures for physically disabled staff or faculty.

(The section should be developed if the department has physically disabled employees)

6.5 Once the shaking has stopped, gather valuables and quickly leave the building. **(DO NOT USE ELEVATORS.)** All employees should gather at (location). Any occupant who comes into contact with a student or visitor should direct them to take appropriate actions. Any occupant that comes into contact with a visitor or student that is physically disabled should assist those individuals. The Floor Leaders and/or Building Emergency Coordinator will conduct roll calls to ensure all employees are out of the building.

6.6 Be prepared for aftershocks. Although smaller than the main shock, aftershocks cause additional damage and may bring weakened structures down. Aftershocks can occur in the first hours, days, weeks, or even months after the quake. Follow the same procedures as for earthquakes.

6.7 If building occupants can not be accounted for, the Building Emergency Coordinator may direct personnel to search for the missing people. The Building Emergency Coordinator should contact DPS at 852-6111. If DPS does not answer, the BEC should call the local emergency services at 9-911.

6.8 The Building Emergency Coordinator will determine whether employees should return to their work stations or go home after consultation with the University's Emergency Coordinator and Department Chairperson.

7.0 Emergency Action Plan - Hazardous Materials

7.1 This section of the **BEAP** should be implemented in the event of a hazardous material incident that occurs outside of the building, but the chemical could impact the Department (i.e., train derailment, tractor trailer accident).

7.2 Hazardous material accidents can occur on campus or in the adjacent areas and could impact this building. Local media will broadcast warnings over radio and television to communicate that a hazardous materials incident has occurred. The National Weather Service will broadcast similar warnings over NOAA Weather Radios. Community sirens might sound, notifying people within hearing range to listen to the media. Information Technology may broadcast information over the University's intranet. Once building occupants become aware of a hazardous material incident that may impact the building, they should notify the Building Emergency Coordinator. The Building Emergency Coordinator will immediately notify employees by (either word of mouth, telephone or public address announcement). This notification will advise building occupants to implement the emergency actions.

7.3 The local community uses two strategies for protecting citizens during hazardous material emergencies, the Building Emergency Coordinator will notify the building occupants of which strategy has been implemented.

7.4.1 The first strategy that local government could use is "Shelter-in-Place". Everyone in the building would be required to stay in the building until the all clear is given. Employees will take the following actions:

- Close all windows and doors
- Turn heating/cooling systems (HVAC) off
- Everyone will move to the (location) shelter in place location
- Any occupant who comes into contact with a student or visitor should direct them to take appropriate actions
- Any occupant that comes into contact with a visitor or student that is physically disabled should assist those individuals

7.4.2 The Building Emergency Coordinator will ensure that the actions outlined in section 7.4.1 are completed. The Building Emergency Coordinator and/or Floor Leaders will also conduct a roll call to ensure that all personnel are protected.

7.4.3 The Building Emergency Coordinator will monitor the news media or the NOAA Weather Radio for further updates and will advise personnel on any changes in the situation. The Building Emergency Coordinator will also announce the all clear when declared by community officials.

7.4.4 If personnel become ill from the chemical release, the Building Emergency Coordinator or designate should contact DPS at 852-6111. If DPS does not answer, the Building Emergency Coordinator should call the local emergency services at 9-911.

7.4.5 The Building Emergency Coordinator will direct personnel to open doors and windows and allow the building to air out after the all clear is given. The Building Emergency Coordinator will also direct personnel to reactivate the heating/cooling system (HVAC).

7.4.6 Special procedures for physically disabled staff or faculty.

(The section should be developed if the department has physically disabled employees)

7.5.1 The second strategy that local government could use is "Evacuation". The Building Emergency Coordinator will direct personnel to take appropriate action. This action may include:

- Walk to an assembly area to be evacuated
- Walk or drive away from the area using travel directions determined by community officials
- Any occupant who comes into contact with a student or visitor should direct them to take appropriate actions
- Any occupant that comes into contact with a visitor or student that is physically disabled should assist those individuals

7.5.2 The Building Emergency Coordinator will ensure that the actions outlined in section 7.5.1 are completed as directed by community officials. The Building Emergency Coordinator and/or Floor Leaders will also conduct a roll call to ensure that all personnel have evacuated the building.

7.5.3 If personnel become ill from the chemical release, the Building Emergency Coordinator or designate should contact DPS at 852-6111. If DPS does not answer, the Building Emergency Coordinator should call the local emergency services at 9-911.

7.5.4 Special procedures for physically disabled staff or faculty.

(The section should be developed if the department has physically disabled employees)

7.6 If building occupants can not be accounted for, the Building Emergency Coordinator should contact DPS at 852-6111. If DPS does not answer, the Building Emergency Coordinator should call the local emergency services at 9-911.

7.7 The Building Emergency Coordinator will determine whether employees should return to their work stations or go home after consultation with the University's Emergency Coordinator and Department Chairperson.

8.0 Emergency Action Plan - Chemical Emergency

8.1 This section of the **BEAP** should implemented in the event of a hazardous material incident occurs inside of the building (laboratory, maintenance or physical plant operation).

8.2 Any person that becomes aware of a serious chemical accident in the building will immediately notify the co-workers around them and their supervisor. Either the person who discovered the chemical accident or the supervisor will immediately notify the BEC. The Building Emergency Coordinator will immediately notify employees by (either word of mouth, telephone or public address announcement). This notification will advise building occupants to implement the **BEAP** for Chemical emergencies.

8.3.1 Personnel that are involved with a laboratory experiment or process should take steps to stop the process or experiment to prevent additional accidents if it is left unattended. These steps are specific to each laboratory and are included in appendix C.

8.3.2 Personnel in the immediate area of the chemical accident will vacate the area and report to the (location). The should leave the area immediately, closing, but not locking, any doors as they leave. Any occupant who comes into contact with a student or visitor should direct them to take appropriate actions. Any occupant that comes into contact with a visitor or student that is physically disabled should assist those individuals.

8.4 The Building Emergency Coordinator will immediately notify DPS (852-6111) and/or DEHS (852-6670) and report the chemical emergency. The Building Emergency Coordinator will also ensure that the HVAC for the building is shut down (this may require a call to Physical Plant at 852-6241), to prevent the spread of chemical gasses through the cooling/heating system.

8.5 If personnel become ill from the chemical release, the Building Emergency Coordinator or designate should contact DPS at 852-6111. If DPS does not answer, the Building Emergency Coordinator should call the local emergency services at 9-911.

8.6 The Building Emergency Coordinator will determine if further evacuations are necessary.

8.6.1 Special procedures for physically disabled staff or faculty.

(The section should be developed if the department has physically disabled employees)

8.7 The Building Emergency Coordinator and/or Floor Leaders will conduct a roll call to ensure that all personnel have evacuated the building.

8.8 The Building Emergency Coordinator will provide information to the DPS officer, the University Emergency Coordinator or the Fire Department Officer in Charge. This information may include, but is not limited to:

- Location of the spill,
- Status of the evacuation, personnel missing that may still be in the building, and

- Special hazards associated with the building.

9.0 Emergency Action Plan - Utility Interruption

9.1 This section of the **BEAP** should implemented in the event of a utility interruption.

9.2 Employees will become aware of utility interruptions by the obvious absence of that particular utility:

- No Lights, Computers not working - Electric
- Toilets won't flush, drinking fountains not working - Water
- Inability to place outgoing telephone calls - Telephone
- Building won't warm up during winter - Steam or Gas
- Building won't cool in summer - Electric or chilled water

9.3 The Building Emergency Coordinator, Department Chairperson or other administrative staff should contact Physical Plant (852-6241) to report the problem and obtain any available information.

9.4 While a power interruption does not usually cause emergencies within a facility or injuries to it's employees, hazards may be created by outages. The Building Emergency Coordinator in conjunction with the Department Chairperson will determine the appropriate course of action. The Building Emergency Coordinator and Department Chairperson should consider the following issues:

- Dangers from tripping and injuries due to lights being out.
- Person(s) being trapped on elevators.
- Dangers of extreme heat and cold on employees.
- Inability to contact responders if an emergency occurs while telephones are out.
- Sanitation problems due to no water

9.5 Unless a decision has been made by the Provost, the Building Emergency Coordinator and Department Chairperson will make a decision regarding the continuance of work in the building during a utility interruption. Any occupant who comes into contact with a student or visitor should direct them to take appropriate actions. Any occupant that comes into contact with a visitor or student that is physically disabled should assist those individuals.

9.6 If laboratory research is underway during a utility interruption and the interruption will affect the research, the research should cease until the utility has been restored.

Experiments, chemical process and operating electric equipment should be stopped in a manner that would not cause additional problems.

9.7 If anyone is trapped on an elevators, immediately call the Department of Public Safety at 852-6111, if there is no answer call the local emergency services at 9-911.

10.0 Emergency Action Plan - Workplace Violence, Terrorism

10.1 This section of the **BEAP** should implemented in the event any type of workplace violence or act of terrorism.

10.2 Building occupants will become aware of a violent act by the sounds of an explosion, gunfire, scuffling, or by observation of events that could only be intentional acts of violence. The person(s) who observe these life-threatening acts should immediately call DPS at 852-6111, if there is no answer call the local police by calling 9-911.

10.3 The Building Emergency Coordinator should attempt to communicate to everyone in the building that a perpetrator of workplace violence is in the building. This may be done by (public address announcement, telephone and/or word of mouth).

10.4 Different types of workplace violence require different actions:

10.4.1 Explosion - If an explosion occurs, building occupants should leave the building using the same evacuation plan and procedures as they would for a fire.

10.4.2 Gunfire - If you become aware of gunfire occurring in the building, take refuge in a room that can be locked. The room should also provide limited visibility to anyone that is outside of it. Secure the door and hide under a desk, in a closet or in the corner.

10.4.3 Physical Threat - If someone's actions pose a physical threat to you, evacuate the area.

10.4.5 Toxic or Irritant Gas - Immediately evacuate the building using the same evacuation plan and procedures at the Fire EAP.

10.4.6 Hostage Situation - Immediately vacate the area, take no chances to endanger the life of the hostage. Contact DPS at 852-6111 immediately, if no answer, contact local police at 9-911.

10.5 In the event someone is hurt and/or a fire is caused by these events, contact DPS at 952-6111 and advise them of the particular information. If there is no answer at DPS call 9-911.

10.6 The Building Emergency Coordinator, Department Chair, UBM and DPS will coordinate the building's security once DPS releases the building. This group will also contact building occupants and advise them on when to return to work.

10.7 The Building Emergency Coordinator and/or the Department Chair will participate in any post-incident critique regarding the emergency.

10.8 Any occupant who comes into contact with a student or visitor should direct them to take appropriate actions. Any occupant that comes into contact with a visitor or student that is physically disabled should assist those individuals.

11.0 Emergency Action Plan - Bomb Threat

11.1 This section of the **BEAP** should implemented in the event of a Bomb Threat

11.2 A person would become aware of a bomb threat by either a telephone call, E-Mail or a letter. The person shall notify the University Police by calling 852-6111.

11.2.1 If the threat is made by telephone, ascertain as much information as possible about the bomb and its location, such as:

- Exact location of the bomb?
- When is the bomb going to explode?
- What kind of bomb is it?
- Why was it placed?
- Who is speaking?

(DPS has information cards on bomb threats and can be obtained by calling 852-6111)

11.3 The person should then notify his or her supervisor, the Building Emergency Coordinator and the Department Chairperson as quickly as possible.

11.4 A decision will be made by the Building Emergency Coordinator, Department Chairperson and DPS to determine if a building evacuation is warranted. If it is warranted, evacuation should take place as outlined in the fire emergencies section.

11.5 Occupants should not touch any suspicious or unfamiliar objects. Occupants should wait for police personnel to arrive on the scene before conducting any type of search.

11.6 The BEC, Department Chair, UBM and DPS will coordinate the building's security once DPS releases the building. This group will also contact building occupants and advise them on when to return to work.

11.7 The Building Emergency Coordinator and/or the Department Chair will participate in any post-incident critique regarding the emergency.

11.8 If an explosion does occur, building occupants should leave the building using the same evacuation plan and procedures as they would for a fire.

12.0 Emergency Action Plan - Medical Emergency

12.1 Implement the **BEAP** for Medical Emergencies for any injury or illness that requires more than simple first aid.

12.2 Immediately contact DPS at 852-6111 and report the emergency, if there is no answer call the local emergency medical services at 9-911.

12.3 When reporting the emergency provide the following information:

- Type of emergency
- Location of the victim
- Condition of the victim
- Any dangerous conditions

12.4 Comfort the victim and try not to move him or her until DPS arrives. DPS are first responders and will provide first aid care until EMS arrives.

12.5 Have someone standby outside the building to "flag down" EMS when they reach the vicinity of the building.

12.6 Once the victim has been cared for and is transported, normal worker injury reporting procedures should be followed.

13.0 Actions to take after the Emergency

13.1 Once the emergency is over and the building as been returned to the occupant, the Building Emergency Coordinator and Department Chair will determine if the building's occupants should return to work or be released. If they are released, employees will be advised when to return to work.

13.2 The Building Emergency Coordinator, Department Chair, UBM and DPS will coordinate the building's security once the Fire Department releases the building. This group will also contact building occupants and advise them on when to return to work. DEHS will coordinate the mitigation of the spill and notification to governmental agencies.

13.3 The Building Emergency Coordinator and/or the Department Chair will participate in any post-incident critique regarding the emergency.

13.4 The Building Emergency Coordinator will contact the University's Risk Coordinator (852-4654) regarding any property damage caused by the chemical spill. The Building Emergency Coordinator will also contact Physical Plant (852-6241) regarding any repairs needed from damage caused by the chemical release. In the event an employee is injured, normal worker injury reporting procedures should be followed.

13.5 The Department Chair will direct that a report be prepared after implementing this plan. This report shall review emergency actions, their effectiveness and needed revisions. This report will be shared with employees and forwarded to DEHS and DPS.

ANNEX B

Building Emergency Action Planning Procedure

Introduction

OSHA requires that all our buildings have an emergency action plan. DEHS has been charged to assist building occupants to develop a plan for their building. DEHS has prepared a model plan that will be used to develop an Emergency Action Plan for each University building. This document outlines the process that DEHS is using to develop these plans.

Pre-Planning Phase

1. Representative of DEHS will schedule a meeting with the individual that will be responsible for the Building's Emergency Action Plan (BEAP). In buildings with multiple units, DEHS will schedule the meeting with representatives of each unit.

2. The initial meeting will be held in the building to be planned, at a mutually agreed upon time.

3. During the initial meeting DEHS will explain the planning and implementation process to the attendees. Attendees will be provided a copy of the model BEAP (both hard copy and electronic) that has been developed by DEHS. Instructions will be provided to each unit's representative for preparing the BEAP. The representatives will determine a target date to complete their first draft of the plan.

Planning Phase

4. Building representatives will use the model plan to develop a specific plan for their building. Each section of the model plan must be reviewed and specific information must be outlined in the document for the building's staff to follow during an emergency.

5. Evacuation routes and shelter locations for severe weather must be determined by the planning person or committee. DEHS can be contacted to provide technical assistance. DEHS will make an additional site visit to assist the building staff, if requested. UPDC can provide building floor plans for each building.

6. The individual coordinating the planning effort will forward the completed draft BEAP to the emergency planning staff (electronic document to dksull01 and vlstem01 is preferred) at DEHS.

Review Phase

7. Emergency planning staff at DEHS will review the BEAP and suggest appropriate revisions, if necessary. DEHS will revise the document with the revisions highlighted, if the document was received electronically. DEHS will return the document to the individual coordinating the planning effort along with a NOAA Weather Radio.

8. The draft plan will be reviewed by the individual(s) developing the plan for the building. Any points that the building planners have questions or concerns about will be discussed with DEHS.

9. Once the plan is finalized, a hard copy will be printed and signed by the responsible parties for the building. The original hard copy and an electronic copy will be sent to the emergency planners at DEHS.

Implementation

10. DEHS will conduct a final review of the plan. If acceptable, DEHS will sign the plan and return it to the coordinator. DEHS will also send a copy of the emergency contact list for the building to DPS.

11. DEHS will store both an electronic and hard copy of the plan in a dedicated fire resistant file cabinet at DEHS.

12. The Building Coordinator will ensure that all current employees and future employees are trained to follow the plan. This training may take one of two forms:
    - The plan is sent to each employee for their review and at the next staff meeting a discussion will be held to discuss the plan and answer any questions regarding the individual's responsibilities.
    - The Coordinator will conduct a class to instruct the building occupants on their responsibilities under the plan.

    Records must be kept to document that each individual has been provided the plan (electronically or hard copy) and understands his/hers responsibilities.

13. DEHS will be available to attend any meetings to answer employee's questions regarding the plan.

14. Annually, DEHS will notify the Building Coordinator that the plan is due for review. Building Coordinators will send a copy of the reviewed plan to DEHS if it is changed.

15. Building Coordinators will test the plan on an annual basis (i.e., tornado drill) as outlined in their plan.

Contact Information

Primary Contact:	Dennis K. Sullivan Office 852-2948 Fax 852-0880 Email Dksull01
Secondary Contact:	Vikki Stempkowski Office 852-2959 Fax 852-0880 Email Vlstem01

ANNEX C

UofL

Department of Environmental
Health and Safety

Interdepartmental Communication

TO: Don Carson
School of Education

FROM: Dennis K. Sullivan, EOHM Manager
Department of Environmental Health and Safety

DATE: February 21, 2000

RE: Building Emergency Action Plan – School of Education

Attached please find the executed copy of the Building Emergency Action Plan (BEAP) for the School of Education.

I appreciate the work that you and your staff have put into this plan. The following steps should be undertaken to implement your building plan:

- Copies (either electronic or hard) should be provided to all employees (faculty, staff and graduate assistants) and they should be instructed to review the plan.
- At your next staff meeting, you should provide time for your staff to discuss any portion of the plan and ask any questions regarding their role in the plan.
- You should review the plan with any new employee as they are hired.
- You should review and test the plan according to the schedule listed in the plan.
- An electronic copy of the plan should be forwarded to me.

I have provided three NOAA Weather Radios for your building (one for each floor).

DEHS is available assist in your emergency plan training. If you would like our assistance, please contact me via E-Mail or at extension 2948. Lastly, DEHS and the National Weather Service is sponsoring a free class on February 29, 2000 at 1:30 regarding severe storm awareness. Please contact me if you or someone on your staff wishes to attend.

Again, I would like to thank all of you for your efforts and remind you all that I am available to answer any emergency planning or management questions that might come up.

TERRORISM AND SCHOOL VIOLENCE

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INTRODUCTION

How well are schools prepared for potential acts of terrorism and school violence? School administrators are responsible for the safety of their students and staff in any disaster, whether it be a fire, an earthquake, an act of terrorism, or a school violence incident. Emergency managers should help schools take prudent measures to prepare for all possible disasters. Schools should develop emergency plans, train staff in emergency response procedures, and conduct exercises to practice using their plan. In any disaster, local police, fire, and emergency medical units rescue the injured, put out fires, and do whatever is necessary to save lives and protect property. In the event of an act of terrorism or a school violence incident, these local authorities are initially in charge of rescuing the injured and performing their usual life and property-saving functions, but when Federal Bureau of Investigation agents arrive on scene, the FBI takes over management of crime scene aspects. Information on various types of school violence and possible acts of terrorism should be of value to first responders and to schools in strengthening their disaster planning, disaster preparedness, and increasing security and response measures.

WEAPONS OF MASS DESTRUCTION

The FBI considers terrorists to be criminals, and defines terrorism as "the unlawful use of force or violence against persons or property to intimidate or coerce a Government, the civilian population, or any segment thereof, in furtherance of political or social objectives."

The FBI is the lead Federal Agency in the crisis response involving a Weapon of Mass Destruction. The definition of Weapon of Mass Destruction is "any weapon designed or intended to:

1. Cause death or serious bodily injury through the release, dissemination, or impact of toxic/poisonous chemicals or their precursors.

2. Release radiation or radioactivity at a level dangerous to human life.

3. Involve a disease organism.

4. Use an explosive (greater than 4 ounces), incendiary, poison gas, bomb, grenade, or rocket.

STATISTICS [2]

Bomb Incidents

The Bureau of Alcohol, Tobacco, and Firearms of the Treasury Department compiles national statistics on criminal use of explosives. The record show that in 1966, for example, there were 1457 bombings, 504 attempted bombings, 427 incendiary bombings, and 185 attempted incendiary bombings for a total of 2,573 bomb incidents. Data for the years 1992 through 1996 shows that, during that 5-year period, there was a grand total of 14282 bombings, with 322 people killed and 3060 injured. About 5 % (661) of the total bombings for the 5-year period targeted educational facilities.

Motives which determined for 8348 of the bombings. Of these, vandalism was the most frequent motive, occurring in 5461 bomb incidents. Revenge was the next most frequent motive with 2325 bombings.

Juveniles carried out 4631 of the bombing incidents. Eighteen people were killed and 446 injured by juvenile bombings.

Data for 1997 for the various states shows that California had more bombings than any other state with a total of 771 explosive incidents in that year. Illinois had 304 and Florida had 301 explosive incidents.[3]

During the year of 1997, there was a national total of 2217 bombing incidents. Of these, 5% (107) were carried out against educational facilities, including 12 colleges or universities and 95 schools. Statistics on that year show no fatalities but one injury in college bombings and 17 injured in school bombings. Data on motives indicates that vandalism was the principal motive for incidents using explosives, with revenge again next.

Arson

The Arson Statistics Report published by the Bureau of Alcohol, Tobacco and Firearms shows that the ATF conducted arson investigations for 3,336 fires in the 5-year period from 1993-1997. There were 383 people killed in these fires and 921 injured.

Church Arson

A special report on church arson, the third report of the federal government's National Church Arson Task Force, stated that there have been 827 investigations of arson, bombing, or attempted bombing that have occurred at houses of worship between January 1995 and October 1999. Investigations resulted in the arrest of 364 suspects in connection with 294 of the investigations - an arrest rate of 35% - more than double the arrest rate of 16 % of arson in general. Trials have been held in 206 of the 294 investigations and 287 arsonists have been convicted by federal, state, and local courts.

Abortion Clinic Violence

Since 1982, there have been 169 arson and bombing incidents involving abortion clinics. Seventy-seven of these incidents have been solved, resulting either in arrests,

convictions, indictments, or incarceration in prisons or State mental institutions. Until the passage of the *Freedom of Access to Clinic Entrances Act of 1994*, these types of crimes were not under the jurisdiction of Federal agencies. Now, the Attorney General has designated a task force comprised of the ATF, FBI, US Marshalls Service, and the Department of Justice to target any person or group who would jeopardize the lives and property of others or violate Federal arson and explosives laws.

Increasing Activity in Biological Terrorism

Some extremists discovered that biological agents were the poor man's weapon of choice. There have been a number of incidents using these agents such as:

1984 - The Rajneesh used salmonella to poison people in a restaurant in rural Oregon in an effort to make some voters sick so that the Rajneesh could win a local election.

1991 - The Minnesota Patriots Council were making ricin, a potent toxin, for use against rural law enforcement officers.

1995 - An extremist named Thomas Lavy was arrested in rural Arkansas for brewing up a significant amount of ricin.

1996 - Thomas Leahy in Janesville, Wisconsin produced ricin and was attempting to produce botulinum.

April, 1997 - A petri dish marked "anthracis" was delivered to a B'nai B'rith office in Washington, DC. The dish was actually a harmless bacteria closely related to anthrax. The response involved closing off two blocks of the downtown area and decontamination of dozens of people.

July 1998 - Three men were arrested in rural Texas for conspiring to use several biological agents in a bizarre scheme against IRS and law enforcement personnel.

February, 1998 - Larry Wayne Harris, a former member of the Aryan Nation, a white supremacist organization, was arrested in Las Vegas, Nevada with several bags of a substance marked "anthrax". He was released when the substance was determined to be a harmless form of anthrax.

June, 1998 - Three men were arrested in Olmito, Texas for threatening to kill federal agents and state officials with biological agents. They claimed to represent the Republic of Texas, a militant organization which claims sovereignty over Texas.

August, 1998 - A white powder was spread through several floors of the Finney State Office Building in Wichita, Kansas. A letter at the scene falsely claimed the powder was anthrax. A letter sent to a local television station by a white supremacist group calling itself the Brothers of Freedom of Americans claimed

responsibility.

1999 - Numerous letters containing a white powder labeled "anthrax" were sent to abortion clinics and various other organizations. Initially, the response included securing the building and decontaminating all people who had come in contact with the letter while the powder was sent by air courier to the FBI Terrorism Lab in Quantico, Virginia. After analysis, these were all determined to be hoaxes.

School Violence

Californians probably remember the bizarre kidnaping of a group of school children on July 15, 1976. A school bus was taking 26 children home from the Dairyland Union School in Chowchilla, California when three men wearing masks and waving guns made the driver stop the bus. The driver and children were herded into two vans while the gunmen hid the bus in a thicket in a dry gulch. The gunmen then drove for eleven hours to an abandoned quarry where they forced the children and the bus driver into an old moving van buried six feet underground. The bus driver with help from the seven oldest boys managed to get the children out to safety after sixteen hours of effort. The three young gunmen had drafted a ransom note demanding $5 million for return of the children.

More recently, the nation was stunned when two students killed a teacher and 12 students and wounded 23 other students at Columbine High School in Littleton, Colorado on April 20, 1999. Two boys, one 18 and the other 17 years old had apparently plotted for a year to kill at least 500 students and blow up the high school. They killed themselves at the scene. There have been 15 other school shooting incidents which received publicity between 1996 and 2000. Some of these were:

February 2, 1996, Moses Lake, Washington - Two students and one teacher killed, one other wounded when 14 year old Barry Loukaitis opened fire on his algebra class.

February 19, 1997, Bethel, Alaska - Principal and one student killed, two others wounded by Evan Ramsey, 16, at his high school.

October 1, 1997, Pearl, Mississippi - Two students killed and seven wounded by a 16 year old who was also accused of killing his mother.

December 1, 1997, West Paducah, Kentucky - Three students killed, five wounded by a 14 year old boy as they participated in a prayer circle at Heath High School.

March 24, 1998, Jonesboro, Arkansas - Four students and one teacher killed, ten others wounded outside as Westside Middle School emptied during a false fire alarm. Mitchell Johnson, 13, and Andrew Golden, 11, shot at their classmates and teachers from the woods.

April 28, 1999, Taber, Alberta, Canada - One student was killed and one student

was wounded at W R Myers High School in the first fatal high school shooting in Canada in 20 years.

December 6, 1999, Fort Gibson, Oklahoma - Four students wounded and one severely bruised in the chaos as a 13 year old boy opened fire with a 9mm semiautomatic handgun at Fort Gibson Middle School.

February 29, 2000, Mount Morris Township, Michigan. A six year old girl was shot and killed at Buell Elementary School. The assailant was identified as a six year old boy with a .32 caliber handgun.

Terrorist Bombing Incidents at Universities

There were seven terrorist bombing attacks at universities in the United States between 1978 and 1993 in the 17 year bombing spree of the "Unabomber". He had other targets as well and his explosive devices killed a total of three people and injured 23. University attacks occurred at Northwestern University, University of Utah, Vanderbilt, University of California (Berkeley), and Yale.

Arson Incidents at Universities

There have been many arson incidents at universities. The US Department of Justice's report *Crime in the United States 1996* had a tabulation of UCR Part 1 Crimes which included arson. A comparative examination of these statistics by the University of Colorado's Police Department indicated that some universities had as many as eight or 13 arson cases in 1996.

Domestic Terrorism

The bombing of the Alfred P Murrah Federal Building in Oklahoma City on April 19, 1995 was a shock to most people living in the United States. Earlier attacks such as the bombing of the World Trade Center in New York City on February 26, 1993 had led many to believe that terrorists were from other lands. Oklahoma City changed all that. We began to realize that there were many different types of "home-grown" domestic terrorists and extremists. We found that there were anti-abortion groups, animal rights groups, militia groups, white supremacist groups, neo-nazi groups, tax protesters, arsonists, patriots, environmental groups, anti-world trade groups, the Klu Klux Klan, etc.

COUNTER-TERRORISM

Since there is always the possibility of acts of terrorism against schools and universities as indicated by these statistics, what should be done to prepare for these incidents? The Federal Government is taking a number of actions in various agencies to prepare these agencies to assist state and local governments. Congress approved a National Domestic Preparedness Office in November 1999. The Defense Department has been conducting training programs in 120 metropolitan areas to prepare the local police, fire, and emergency medical agencies to operate in incidents involving terrorist use of Weapons of Mass Destruction. There are national programs to establish Metropolitan Medical Assistance Systems which can help local hospitals and ambulance units cope with

decontaminating large numbers of casualties. Some local police, fire departments, and hazardous materials organizations are obtaining special equipment and training to prepare for Weapons of Mass Destruction.

Schools should decide what prudent and cost-effective actions they might take to prepare for terrorism as they now prepare for other disasters which are likely to occur in their geographic location such as hurricanes, floods, tornadoes, earthquakes, or ice storms.

Disaster Preparedness

The Katz Act of the California Education Code, reference (19) requires that schools plan for earthquakes and other emergencies. The law requires schools to do the following:

1. Develop a disaster plan which includes emergency roles, responsibilities, and procedures for students and staff (both certificated and classified).

2. Conduct periodic drills, evacuation exercises, and other emergency response activities.

3. Provide appropriate training for staff and students.

4. Prepare to have school buildings used as Red Cross shelters by the local community after disasters.

5. Take mitigation measures now to ensure the safety of students and staff in future disasters.

The State of Georgia passed *Senate Bill 74* effective July 1999, which required all schools to prepare school safety plans. The major features of this bill were:

(a) Every public school shall prepare a school safety plan to help curb the growing incidence of violence in schools, to respond effectively to such incidents, and to provide a safe learning environment for Georgia's children, teachers, and other school personnel. Such plan shall also address preparedness for natural disasters, hazardous materials or radiological accidents, acts of violence, and acts of terrorism. School safety plans of public schools shall be prepared with input from students enrolled in that school, parents or legal guardians of such students, teachers in that school, community leaders, other school employees and school district employees, and local law enforcement, fire service, public safety, and emergency management agencies. Such plans shall be reviewed, and if necessary updated annually. Such plans of public schools shall be submitted to the local emergency management agency.

(b) A public school may request funding assistance from the state for the installation of safety equipment including, but not limited to video surveillance cameras, metal detectors, and other similar security devices. Funding may be provided to a public school in accordance with a school safety plan prepared by the

school and approved by the local board of education, the Department of Education, and the Georgia Emergency Management Agency.

(c) School safety plans prepared by public schools shall address security issues in school safety zones as defined in paragraph (1) of subsection (a) of Code Section 16-11-127.1. School safety plans should also address security issues involving the transportation of pupils to and from school and school functions when such transportation is furnished by the school or school system and school functions are held during non-instructional hours.

(d) The Georgia Emergency Management Agency shall provide training and technical assistance to public school systems, and may provide this same training and technical assistance to private school systems, and independent private schools throughout this state in the area of emergency management and safe school operations. This training and technical assistance shall include, but not be limited to, crisis response team development, site surveys and safety audits, crisis management planning, exercise design, safe school planning, emergency operations planning, search and seizure, bomb threat management, and model school safety plans.[4]

Emergency Response of Schools in California

The Petris Bill of the *California Government Code* requires that all school districts responding to emergencies use the Standardized Emergency Management System (SEMS). This means that all plans must now incorporate SEMS procedures, all school personnel must be trained in how SEMS works, and exercises must be conducted to ensure that everyone knows how to use SEMS. This standardized emergency management system was developed after a disastrous fire in Oakland and Berkeley in 1991 when more than 3000 homes burned. The new system was introduced in 1996 after all state employees were trained. The standardized training means that all law enforcement personnel, including California Highway Patrol officers, county deputy sheriffs, State fish and game wardens, and city police receive the same training as firefighters and public works personnel.

SEMS requires that each organization understands and uses the following:

1. The Incident Command System - a method of organizing emergency response effort into five functions: command, operations, planning/intelligence, logistics, and finance/administration.

2. An Emergency Operations Center (or Incident Command Post in the field) with staff organized according to the same five Incident Command System functions.

3. Coordination of the school district's Emergency Operations Center with other Emergency Operations Centers of the operational area (county), city, and county's Office of Education, as appropriate.

4. Incorporation of the Standardized Emergency Management System into all school plans, training, exercises, and response during actual disasters.

5. Documentation of the use of SEMS in planning, training, exercising, and during actual disasters.

CONCLUSIONS

Schools and universities should include terrorist attacks in their emergency planning so that all of the personnel who have emergency responsibilities in a disaster are aware of their roles in this type of event. All administrators should review their disaster planning to insure that they have a plan which is appropriate both for their location and local conditions and also includes terrorist incidents.

While the local natural hazards may include hurricanes, floods, or earthquakes, weapons of mass destruction, cyber-terrorism, arson, and bombs should also be considered. Cost-effective actions should be taken now to reduce potential damage in the future from both natural hazards and terrorism. Planning for terrorism incidents should also address other complicating issues such as protection for responders.
School and university security administrators should talk to the local fire, police, emergency management agency, and, if necessary, the FBI about their requirements and suggestions. They should have them inspect their facilities to ensure a common approach against this new threat.

REFERENCES

California Governor's Office of Emergency Services. *School Emergency Response: Using SEMS at Districts and Sites*. Sacramento, California: June 3, 1998

Carus, W Seth. *Bioterrorism and Biocrimes*. National Defense University, Center for Counterproliferation Research, working paper, 1998. Also see <http://www.bens.org/pubs/srbioterr.html>

The Katz Act of the California Education Code (Sections 35295-35297)

National Defense Preparedness Office < http://www.ndpo.gov>

The Petris Bill of the California Government Code (Section 8607)

Time, "Escape from an Earthen Cell" 26 July 1976

US Federal Bureau of Investigation. *FBI Policy and Guidelines* <http://www.fbi.gov/contact/fo/jackson/cntrterr.htm>

NOTES

1. Russell C Coile, PhD, CEM has been the Disaster Coordinator at the Pacific Grove Fire Department since January 1990 and is responsible for disaster preparedness for the City of Pacific Grove. He received SB, SM, and EE degrees in electrical engineering from MIT and a PhD in information science from The City University, London, England. He is an Adjunct Professor in the Institute for Joint Warfare Analysis at the Naval Postgraduate School, Monterey, California. Russell Coile was an invited evaluator for a simulated terrorist attack incident in an exercise conducted at the NASA Ames Research Center, Moffett Field, California on December 4, 1998. The scenario included a simulated nerve gas attack and a bomb to injure first responders. He has also been an evaluator or observer in WMD exercises with biological or chemical scenarios in San Francisco, San Jose, Oakland, and Alameda. He operates amateur radio station K6FVH.

The Pacific Grove Fire Department has received national recognition from FEMA for its program, "Pacific Grove - A Model for Small City Disaster Preparedness". It was selected for inclusion in FEMA's *Partnerships in Preparedness Volume II: A Compendium of Exemplary Practices in Emergency Management, 1997* and for "Partnership for Preparedness Against Terrorism" in *Partnerships in Preparedness Volume III, 1998*. The Department has provided assistance to research projects by the Naval Postgraduate School in Monterey into models of response by local authorities to terrorism incidents.

2. Sources for statistics used in this paper are:

AFT Type of Incident	<http://www.aft.treas.gov/pib/fire-explo_pub/eir/type.htm>
ATF Targets	<http://www.atf.treas.gov/pub/fire-explo_pub/eir/targets.htm>
ATF Motives	<http://www.atf.treas.gov/pub/fire-explo_pub/eir/motive.htm>
ATF Juvenile Bombing Incidents 1992-96	<http://www.atf.treas.gov/pub/fire-explo_pub/eir/juvenile.htm>
ATF Explosive Incidents by State 1997	<http://www.atf.treas.gov/aexis2/qbystate.html>
AFT Bombing Incidents by Target 1997	<http://www.atf.treas.gov/aexis2/qbytarget1.html>
ATF Bombing Fatalities by Target 1997	<http://www.atf.treas.gov/aexis2/qbyfatals1.html>
ATF Bombing Incidents by Motive 1997	<http://www.atf.treas.gov/aexis2/qbynotive.html>
ATF Bombing Incidents by Motive 1997	<http://www.atf.treas.gov/aexis2/qbynotive.html>
AFT Investigated Fires 1993 to 1997	<http://www.atf.treas.gov/aexis2/qbyarson.html>
Church Arson	<http://www.atf.treas.gov/press/fy00press/021000ncatf3rd.htm>
Abortion Clinics	<http://www.atf.treas.gov/explarson/abort_clinc.htm>
School Shootings	<http://www.abcnews.go.com/sections/us/DailyNews/schoolshootings990420.html>
Terrorism Incidents at Universities	<http:www.unabombertrial.com/timeline/index.html>
Arson Incidents at Universities	<http://pongo.colorado.edu/police/compare.html>

3. This data is derived from current National Repository data provided by the Bureau of Alcohol, Tobacco and Firearms' AEXIS 2000 and the Federal Bureau of Investigation's Bomb Data Center systems.

4. Article 27 of Chapter 2 of Title 20 as amended by Code Section 20-2-1185, Official Code of Georgia. See also <http://www2.state.ga.us/Legis/1999_00/leg/fulltext/sb74.htm>

EMERGENCY PLANNING: INTEGRATING COMMUNITY DEVELOPMENT, COMMUNITY RESILIENCE, AND HAZARD MITIGATION

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INTRODUCTION

Central to contemporary emergency planning is the use of risk management principles to promote community resilience to a range of potential hazards. These principles underpin the development of strategies for mitigating or reducing physical, social, psychological, and economic hazard consequences (Kaniasty and Norris, 1999; Johnston et al, 1999; Lindell and Prater, 1999; Paton, Millar, and Johnston, in press; Paton and Bishop, 1996). The success of these strategies, particularly with respect to community hazard adjustment adoption has, in general, fallen below expectations (Lindell and Prater, 1999).

Several reasons can be proposed to account for this limited success. For example, the success of public policy approaches to information dissemination has been limited by their assuming a direct link between risk perception and the adoption of risk reduction behavior (Ballantyne, Paton, Johnston, Kozuch, and Daly, 2000; Johnston, Bebbington, Lai, Houghton, and Paton, 1999; Lindell and Prater, 1999; Tonnes and Tilford, 1994). Although direct experience of hazard consequences can increase hazard awareness and more accurate perceptions of the risks they pose, this does not necessarily translate into better preparedness (Johnston et al, 1999; Lindell and Whitney, 2000; Lindell and Prater, 1999). Indeed, Johnston et al (1999) found that low-level exposure to hazard consequences resulted in a normalization effect (Mileti and O'Brien, 1993) that reduced future preparedness. Since most mitigation planning and intervention is carried out during periods of hazard quiescence, the chances of adoption and maintenance of adjustments are likely to be significantly reduced. Johnston et al, (1999) also found that while direct experience of ash fall following a volcanic eruption enhanced community perceptions of volcanic threat, there was a concomitant decrease in perceptions of earthquake threat (a more salient hazard in the area surveyed). This compensatory mechanism could detrimentally affect the uptake of information designed to increase all-hazards awareness.

During quiescent periods, when most mitigation work is undertaken, other problems can emerge. Under these circumstance, community members can overestimate their hazard knowledge and preparedness, lessening the likelihood of their attending to new information or adopting any recommendations made (Ballantyne et al, 2000). The latter authors also observed that some 40% of their sample (n=405) attributed sole responsibility for hazard mitigation to those agencies providing them with information, reducing the perceived need for them to take responsibility for their own safety. The planning process is further complicated by the diversity of groups, needs, and

perceptions within a community that renders the risk communication process highly complex. Inadequate communication can detrimentally influence the perceived credibility of emergency management, administrative, and scientific agencies (Paton et al, 2000; Johnston and Paton, 1998), indirectly increasing vulnerability.

These problems are compounded by the fact that mitigation initiatives typically focus on attempting to motivate people to deal with destructive or disruptive hazards (eg earthquakes, volcanic ashfall, landslides) whose nature and intensity do not lend themselves readily to mitigation by individual action. Effects perceived as insurmountable and emotionally threatening are more likely to trigger the denial or suppression of the existence of a problem, reducing the likelihood that risk reduction measures will be adopted. Focusing on loss and vulnerability may thus not represent the most appropriate paradigm for planning and encouraging adoption of adjustment. An alternative is a planning model based on community empowerment and mobilizing natural community competencies and coping strategies. This process is consistent with an all-hazards management framework and involves developing community resilience.

RESILIENCE

An important issue here concerns the paradigm which underpins the conceptualization of the problems to be understood and the management initiatives implemented to contain or resolve them. The orientation of work in this area has progressively moved from a deficit paradigm to one emphasizing community resilience (Omer and Alon, 1994; Tobin, 1999; van den Eyde and Veno, 1999; Violanti, Paton and Dunning, 2000). This alternative paradigm has been described using terms such as salutogenic/resilience (Antonovsky1993; Dunning, 1999; Tobin, 1999), competency (Brickman et al, 1982), strengths (Bravo et al, 1990), and empowerment (Rappaport, 1984).

A common denominator between these conceptualizations of community response to adversity is an acceptance of communities as being capable of drawing upon internal resources and competencies to manage the demands, challenges, and changes encountered. The salutogenic paradigm goes further and emphasizes how disaster and adversity can facilitate personal, community, and professional growth and development (Bravo et al, 1990; Holman and Silver, 1998; Schwarzer et al, 1994). While this shift, and the growing empirical evidence for positive outcomes, should not be used to infer the elimination of community loss and disruption from disaster (Kaniasty and Norris, 1999), it is important to plan, as far as possible, to intervene in ways which facilitate resilience and growth.

This approach is consistent with the risk management philosophy. The concept of risk describes the assessment of the frequency of occurrence and magnitude of consequences associated with hazard activity and encompasses the probability of loss and beneficial consequences and resilience (Dake, 1992; Hood and Jones, 1996). Hence, the risk concept does not automatically imply the occurrence of loss outcomes per se and can readily accommodate paradigms focusing on resilience and development.

Community resilience can be described at several interdependent levels. For example, resilience involves safeguarding the physical integrity of the built environment and lifelines (eg building codes, retrofitting buildings and infrastructure) and promoting economic, business, and administrative continuity. It also involves ensuring that community members have the capacities and capabilities necessary to utilize these physical and economic resources in a manner that minimizes disruption and facilitates recovery and growth. With respect to the latter, promoting resilience involves strategies that utilise personal and environmental resources, with social-psychological factors playing a central role (Tobin, 1999; Violanti et al, 2000). The first step is to identify variables that have demonstrated some utility in relation to predicting community resilience to hazard effects. Variables that have been modeled in this context to assess community resilience to hazard consequences are 'self-efficacy', 'sense of community', and 'coping style'.

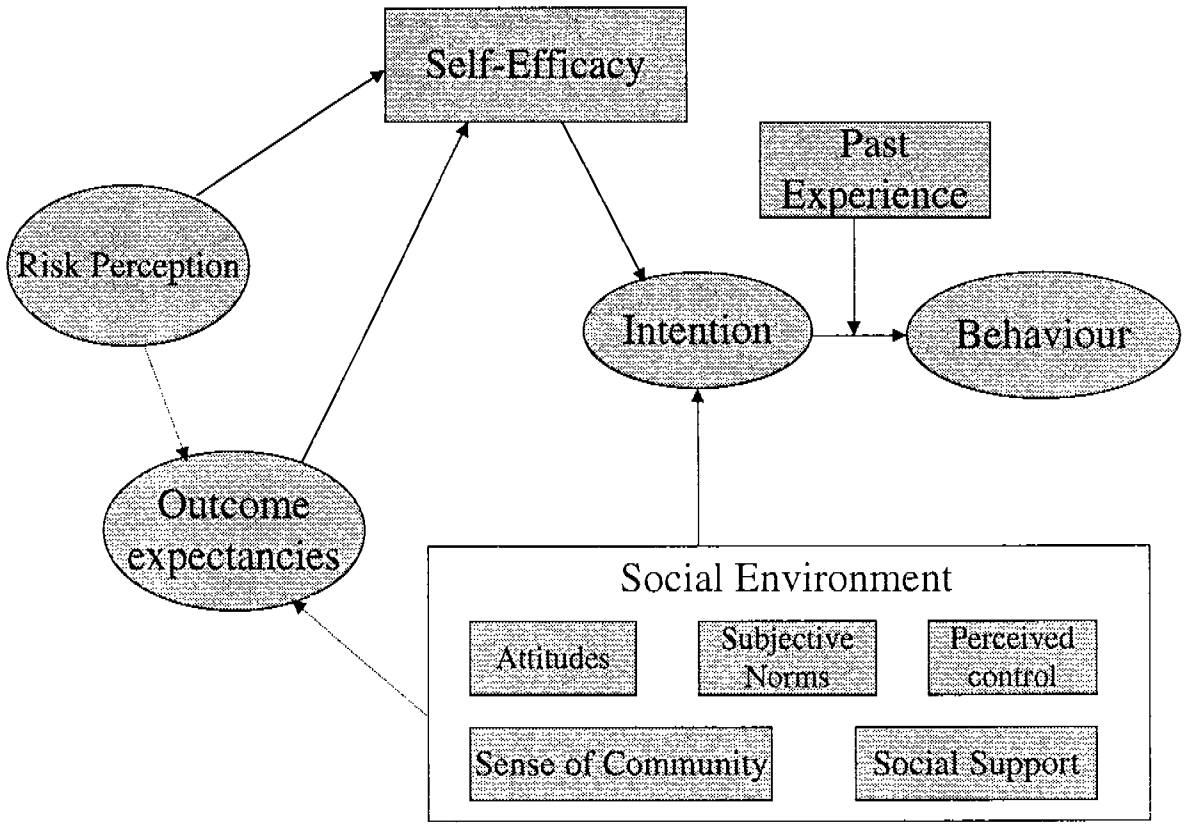
Self-efficacy describes individuals' appraisal of their performance capability and it influences their receptivity to information and the likelihood of their adopting risk reduction behaviors (Bachrach and Zautra, 1985, Bandura, 1997; Bennett and Murphy, 1997; Lindell and Whitney, 2000; Schwarzer, 1992; Yates, Axom, and Tiedeman, 1999). Sense of community (feelings of belonging and attachment for people and places) encourages involvement in community response following disaster and increases access to, and utilization of, social support networks (Kaniasty and Norris, 1995; van den Eyde and Veno, 1999). Individuals who perceive themselves as having no investment in their community may develop a level of detachment which, following a disaster, may trigger feelings of isolation and encourage learned helplessness and heighten social vulnerability. Sense of community also provides insights into the prevailing degree of community fragmentation and, consequently, the level of support for mitigation strategies involving collective community action. Coping style influences how people respond to hazard effects. Problem-focused coping (confronting the problem) represents a mechanism for facilitating resilience (Bachrach and Zautra, 1985; Bishop et al, in press; Paton et al, in press; Yates et al, 1999).

RESILIENCE AND NATURAL HAZARD REDUCTION

The utility of a model is a function of its ability to account for differences in resilience when assessed against a range of hazards. The above variables have demonstrated an ability to predict resilience in community members exposed to three very different hazards: toxic waste, salinity, and volcanic hazard effects (Bachrach and Zautra, 1985; Bishop et al, in press; Paton et al, in press). By verifying the utility of these components against several hazards the predictive capability of the model is enhanced and its utility within an all hazards management approach is strengthened. Confidence in the ability of a model to operate within an all-hazards framework has other benefits. The predictive capability of these variables, and their amenability to measurement, allows this model to be used to provide key performance indicators of resilience and provide a basis for assessing the effectiveness of reduction/ mitigation strategies, irrespective of the hazardscape prevailing within a specific community.

In addition to facilitating resilience, these variables have been implicated as determinants of the adoption of risk reduction behaviors. Using a model developed from the Theory of Planned Behavior (Ajzen, 1991; Bennett and Murphy, 1997; Schwarzer, 1992), a more searching analysis of the relationship between risk perception and adjustment adoption is possible (Figure 1).

Figure 1. A Model of the Risk Perception - Risk Reduction Behavior Process



In this model, motivation to act is triggered by the perception of a threat, but the key elements are action-outcome expectancies, self-efficacy judgements, past experience, and social norms. Outcome expectancies and self-efficacy judgements are concerned with considering whether risk may be reduced and whether the required actions are within the capabilities of the individual or group. In this model, action-outcome expectancies precede efficacy judgements. People make assumptions about the possible consequences of action before considering engaging in that behavior. The outcome of these deliberations may be, for example, an intention to adopt a preparatory measure or to change risk behavior. Once an intention is determined, the individual moves to the action phase, a phase strongly influenced by self-efficacy expectations. The number and quality of action plans is strongly dependent on one's perceived competence and experience. Self-efficacy also determines the amount of effort and perseverance invested in risk reduction behaviors (Bennett and Murphy, 1997). Adjustment adoption is also

influenced by past experience and is more likely to be maintained if supported by the social and structural environment (Tobin, 1999).

This model illustrates the complexity of the social response to risk and helps explain why strategies based on assuming a direct link between awareness and adjustment have enjoyed limited success. For example, irrespective of their level of risk awareness, people are unlikely to act if they perceive hazards effects as insurmountable (low outcome expectancy) or if they do not perceive themselves as having the competence, resources, or experience to act (low efficacy). Alternatively, the process could be disrupted if a normative bias elicited by prior experience has lessened the threat attributed to a hazard or to its consequences. According to this model, for risk reduction behavior to occur, strategies must aim to develop the outcome expectancies, efficacy, experience, and social context necessary for its realization. One way of harnessing the potential of this model involves its application within a community empowerment process.

RESILIENCE AND COMMUNITY DEVELOPMENT

Studies of response to hazard effects by Bishop et al (in press) and Paton et al (in press) observed a correlation between resilience factors and involvement in community activities and functions (eg membership of community clubs, social action groups). It can be inferred from these observations that the more people are involved in community activities that engender a sense of community, efficacy, and problem solving, the greater will be their resilience to adversity. In other words, by increasing the capacity to respond effectively to day-to-day adversity, community risk can be reduced even if community members are not engaged in risk reduction activities per se.

Accordingly, resilience can be developed using a community empowerment process involving community participation in identifying problems and the development and selection of strategies to solve or contain problems in ways consistent with their needs, systems, and values (Paton and Bishop, 1996). Participation in identifying shared problems and developing and implementing solutions to them facilitates the development of problem-focused coping, a sense of community, and commitment to action. A focus on actively dealing with salient issues helps foster a sense of individual and collective efficacy. Hence, the community empowerment process can be assessed using the efficacy, coping, and sense of community constructs outlined above.

Since valid and reliable measures of these constructs are available, a parsimonious and cost-effective basis for assessing salient community characteristics exists. Using this model to support planning and mitigation initiatives also requires an ability to assess the contribution of past experience to adjustment adoption. Lindell and Prater's (1999) measure of hazard intrusiveness (thinking and talking about, and getting information on, hazards) provides a means of assessing whether past experience will support the intention to adopt risk reduction behavior. There remains the problem of creating outcome expectancies that support the adoption of risk reduction behaviors. In particular, a means of surmounting the de-motivating effects of attempting to encourage people to adopt actions designed to minimize loss from 'insurmountable' hazard effects is

required. One way of tackling this issue involves developing strategies based on safeguarding or developing valued personal and community assets and practices.

Individuals are more likely to engage in behaviors when the outcome or objective is valued and perceived as achievable. Realizing the benefits of the above model requires a shift from a deficit or loss paradigm to one advocating beneficial effects. For example, a deficit or loss paradigm leads to strategies where community members are urged to spend money on strengthening or altering their houses or buildings to reduce the loss from earthquake hazards. From a development or beneficial perspective, attention would focus on encouraging investment in structural alterations to increase the capital or re-sale value of a property or reduce insurance costs (ie the focus is on the benefits that accrue from engaging in certain risk reducing activities).

This approach could also utilize strategies that advocate focusing on the value of local amenities, the need to safeguard them, and the maintenance of perceived quality of life. For example, in Paton et al's (in press) study of resilience to volcanic hazard consequences, the focus of community activity was the development of economic and employment activities to substitute for those lost as a consequence of disruptions to winter sports from volcanic ash fall. Thus they did not focus on dealing with the ash fall problem (insurmountable) per se, but on alternative, more achievable, ways of compensating for economic losses. This included volcano tourism, arts and crafts relating to the region and volcanic activity, and even selling ash as a souvenir of the eruption. Similarly, Becker et al (2000) noted that 38% of their sample of 208 individuals stated that they had enjoyed some benefits from their experience of volcanic hazard activity. These included environmental improvement (eg improved plant growth), increased business and tourism opportunities, and enhanced sense of community. Focusing on positive, tangible activities (eg enhancing property values, safeguarding local amenities, developing additional economic and employment resources) which can confer day-to-day benefits on individuals, rather than on uncontrollable and insurmountable threats such as earthquakes or ash fall, will provide for outcome expectancies that are more likely to stimulate adjustment adoption and resilience.

It is difficult to assess the extent to which beneficial consequences are typical. The predominant use of the vulnerability paradigm has focused attention on assessing loss. These and other data suggest a need to expand the disaster evaluation process to include perceived benefits. Pursuing the latter will require that the social evaluation process extends over an appropriate, longer term, time frame. Once articulated, information on beneficial consequences can inform the planning, hazard education, and mitigation development processes and contribute to the development of programs designed to promote community development and resilience. It is still important, however, to engage in strategies that increase community hazard awareness and the adoption and practice of risk reduction behaviors.

Efficacy beliefs operate at different levels. The relationship between community involvement and resilience described earlier reflected the operation of generalized efficacy beliefs which facilitate peoples' ability to respond more effectively to unexpected

adversity (Bennett and Murphy, 1997; Paton et al, in press). Because specific efficacy beliefs are more powerful determinants of behavior, however, risk reduction will be more effective if community members adopt mitigation and preparatory adjustments. One way of promoting this is to develop specific efficacy beliefs by building on existing capabilities or those developed to deal with day-to-day issues.

The rarity of hazard phenomena suggests that the process should focus on integrating hazard education with community development and problem solving to deal with existing or contemporary problems. In relation to hazards education, the community development process can be supplemented by providing community members with hazard scenarios. These can be used by them to define the meaning that specific hazards have for them, identify the resources and information they need to define the problems posed by hazard consequences, and to formulate strategies to deal with them that are consistent with community perceptions, beliefs, attitudes, and needs. The emergency planning role can be expanded to include assimilating and co-ordinating the perspectives/needs within a strategic context, and seeking, as far as possible, to provide the information and resources necessary to sustain empowerment, self-help, and resilience. This process can also be used to identify and rectify misconceptions regarding hazards, their effects, and the locus of responsibility for minimizing their effects and dealing with their consequences (Ballantyne, et al 2000).

Maintaining empowerment and, consequently, the competencies that underpin resilience to adversity involves consolidating collective efficacy, coping capabilities, sense of community, and social support into a sense of identity and belonging. This can be more readily accomplished through projects and activities that sustain community participation in problem solving. Achieving this can be incorporated in future community development and emergency management agendas.

CONCLUSION

Evidence from empirical studies of communities exposed to toxic waste, salinity, and volcanic hazards suggest that efficacy, problem-focused coping, and sense of community enhance resilience to direct and indirect hazard effects. The studies discussed here suggest that a model of community resilience comprising these factors has explanatory power that transcends the specific characteristics of the hazard per se. Consequently, this model can be used to predict resilience and monitor intervention effectiveness and community change (towards greater resilience) within an all-hazards management framework. A second model, which includes outcome expectancy, efficacy, experience, and social norm factors, can provide a framework for hazard education and the encouragement of adjustment adoption. Since the presence and magnitude of these factors is, to some extent, a function of the level of personal involvement in community activities, the effectiveness of hazard education programs can be promoted by integrating them with community development initiatives. It was also argued here that the effectiveness of mitigation programs can be enhanced by providing outcome expectancies based on direct and indirect benefits for communities and community members. By ensuring that these strategies are developed and delivered within a resilience/growth

framework, community disruption can be minimized and the potential for recovery and growth optimized.

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NOTES

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"PROJECTIZING" THE DEVELOPMENT AND MAINTENANCE PROCESS FOR EMERGENCY RESPONSE AND CONTINGENCY PLANS

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INTRODUCTION

The attainment of established goals and objects is essential for all successful projects in business and industry, including the development and maintenance of emergency response and contingency plans. The need for effective project management is an ongoing requirement and, as with any aspect of business, better ways of managing projects have been and are being developed. Those organizations that take the lead in implementing these management capabilities consistently carry out their projects better and, in the case of emergency management, provide better protection to employees, property, and the environment.

The Plans Review Subcommittee of the local Chemical Manufacturer's Association Community Awareness Emergency Response (CAER) Group in Las Vegas has reviewed a number of Emergency Response/Contingency Plans (ER/CPs) prepared by local industry. Many of these plans have been complete and effective, but others have appeared to be less than adequate when they were submitted for initial review.

A summary of the deficiencies identified in these plans indicates that the problems may have been the result of:

Changing scope,

A lack of understanding of requirements,

Changing expectations of the approving authorities and local oversight groups, or

Delivery of a final product without early involvement of the approving authority.

For many years the business/industrial community has recognized that a quality product is synonymous with excellence in project management. The same concept is applicable to the development and maintenance of ER/CPs. A "projectized" process based on a generally recognized construction project model will treat the development and maintenance of an ER/CP as a project. As a structured project, the process will utilize sound management principals and be defined by its scope, quality, schedule, and cost.

ESTABLISHING THE PROCESS

Managing the ER/CP effort like a project promotes completion in a reasonable period of

time. Experience has shown that ER/CP development and the required reviews tend to drag out over extended periods of time unless the efforts are disciplined. Activities must be scheduled, milestones must be established, resources must be identified and provided, and the schedules must be adhered to in order to effectively and efficiently manage the work. Although interaction is necessary, the review team must maintain a certain degree of independence from the development tea, and the review team must not interject itself into the development process. A common approach is to conduct a small number of interim reviews of portions of the ER/CP before submitting a review of the entire document and to use a standards-based approach. This should be a key goal.

One factor that may make managing an ER/CP effort challenging in a multi-facility complex is the lack of a single project manager with authority over all of the facilities involved. In the process described herein, the organization responsible for developing the ER/CP is assigned the responsibility for overall project coordination, but the success of the effort depends on each part of the organization assuming responsibility for its assigned tasks and managing its own efforts to comply with the project requirements and schedules.

The process outlined here involves several sets of deliverable packages and several reviews for each ER/CP. To be accomplished efficiently, the entire process including the specific reviews and the scope of each review should be defined and scheduled at the beginning. Typically this is done in an ER/CP Project Review Plan, which should be an integral part of the ER/CP development plan. Interim milestones and reviews should be scheduled. Advance planning is important to identify the resources necessary to carry out the project and to allow review organizations an opportunity to obtain the needed resources.

PROCESS

The steps outlined in this process are intended as a general guideline. The process should be tailored, as necessary, for each specific ER/CP. The order shown here is typical, but the steps are not always carried out consecutively and some of the following activities must be conducted in parallel.

Develop a Project Plan and Schedule

The ER/CP Project Manager will develop a project plan and schedule for ER/CP development, review, and approval. The project plan may be a simple scope statement or a comprehensive document establishing detailed activities relating to ER/CP development. At a minimum, the Project Plan should establish the scope of the ER/CP, applicable standards, requirements, expectations, schedules, and required resources.

Appoint a Review Team Leader

When an ER/CP development effort has been initiated, a Review Team Leader should be appointed.

Present the Project Plan and Schedule to the ER/CP Approval Authority
The ER/CP Project Manager and Review Team Leader will refine the ER/CP Project Plan to accommodate the review and will present the Project Plan and schedule to the approval authority and obtain concurrence.

Assemble the ER/CP Development Team
The ER/CP Project Manager will obtain resources for the ER/CP development effort. Assembling an appropriate project team in a timely fashion is imperative to the success of the project.

Assemble the Review Team
The Review Team Leader will identify the necessary Subject Matter Experts to serve on the review team. The review team will be assembled, as required, over the course of the review to perform necessary team functions.

Conduct the Kick-off Meeting
The ER/CP Project Manager will schedule a kick-off meeting at the appropriate time. Table 1 depicts sample milestones for consideration at the kick-off meeting to ensure that all participants are working the same data set.

Prepare the Review Plan
Before the start of the review, the review team will prepare the specific ER/CP Review Plan. The scope of the plan may vary depending on the scope and complexity of the review effort and may include the following elements:

Review Objectives and Expectations

Review Milestones and Schedules

Team roles and responsibilities.

Protocols and work methods.

Quality control, security, and records management considerations.

Interfaces with other review groups (eg Local Emergency Planning Committees, CAER Group, etc).

Review documentation (interim and final).

Review criteria.

Perform Reviews.
Reviews are normally performed at several stages in the development process. Table 1 shows typical examples of the material that could be included in 30 percent, 70 percent, and 90 percent reviews. These points are recommendations; the number of reviews and

Table 1. Sample ER/CP Milestones

Review Kick-off Meeting	30% Review	70% Review	90% Review
Team Orientation. - Tour Facility. - Define review goals and expectations. - Specification of team roles and responsibilities. - Identification of external reviews and observers. - Review schedule and milestones. - Outline of ER/CP Review Plan and assignments. - Records management considerations. - Security considerations	Facility description, including facility processes and major activities, are defined. Hazard and accident analysis methodologies. Hazard identification, characterization, and evaluation. Risk ranking of postulated accident scenarios. Identification of candidate accidents to be analyzed.	Content is updated and comments incorporated. Preliminary accident analysis. Any safety function and safety systems described. Refined performance requirements identified through safety system identification and evaluation. Hazardous material protection programs described.	Finalization of: - Accident analysis. - Identification of safety systems, performance requirements, and evaluations. - Institutional controls.
Team Leader will have primary responsibility for developing ER/CP review plan with team members providing input. - Develop protocols for interfacing with facility personnel and ER/CP development team.	Arrange facility presentations and conduct facility walkthroughs	Defense-in-depth strategies identified and evaluated. - Verification of accident analysis computational code applicability and use.	All comments and issues have been completely resolved and vulnerabilities have been identified, compensated, and action items have been committed to resolution with a detailed schedule agreed upon by the Review Team Leader.

the material included in each review should be tailored to the specific ER/CP. Milestones should be established in the initial planning, but the ER/CP Project Leader, in consultation with the Review Team Leader, should negotiate the detailed contents of each review package. The Review Team Leader ensures that comments are prepared rigorously according to a set of established rules on comments in order to avoid open-ended comments and to assist the Subject Matter Experts in resolving the review comments.

Resolve Comments

The ER/CP Project Leader and the ER/CP development team will resolve, in writing, all review comments designated as critical.

Resolve Conflicts

Every attempt should be made to resolve review comments. Resolution is referred to successively higher management levels, as needed, to resolve critical comments.

Determine If Changes to Scope Are Necessary

If changes to the scope of the ER/CP are necessary, both the approval authority and the ER/CP project team will present their recommendations for change. An example of a necessary change in scope might include an additional hazard assessment.

Review Team Concurrence

After all comments from the 100 percent review phase have been resolved, the review team will document satisfactory completion of the review with a memorandum to the approving authority. Any dissenting team member opinions will be submitted with this memorandum.

EXPECTATIONS

A project management approach should result in a number of favorable expectations including the following:

A formal recognition of the scope, schedule, and cost for development and maintenance of an ER/CP;

A formal method of controlling changes; and

A method for ensuring product quality.

In addition, Subject Matter Experts will be able to develop more rigorous reviews using standards-based checklists and comment guidelines.

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This work was supported by the U.S. Department of Energy, Nevada Operations Office, under Contract No. DE-AC08-96NV11718.

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THE HISTORICAL ORIGINS OF EMERGENCY MANAGEMENT PROFESSIONALIZATION IN THE UNITED STATES

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Wherever humans live in the world, they have established their social environments within the natural environments of their residence. Because the earth is a volatile cosmological phenomenon, certain combinations of the earth's elements-fire, water, air, and soil-sometimes produce natural turbulence on the earth's surface (ie hurricanes, earthquakes, floods, etc) that can cause calamity for the human populations residing there. In addition, humans' own manipulations of the earth's elements can cause other forms of disaster (ie chemical explosions, radiological releases, etc). Thus, on one hand, although the capacity of nature has provided for human development since the beginning of mankind, it has also provided for great losses and suffering. On the other hand, technologies aimed to channelize the earth's power to societal benefits have also created new risks to human survivability.

For these two reasons, throughout time, societies have dealt with natural and man-made disastrous events and calamities. For example, the Greco-Roman cities of Pompeii, Herculaneum, and Stabiae were covered with and instantly preserved by up to 65 feet of volcanic ash that resulted from the eruption of Mount Vesuvius in AD 79 (Maiuri 1970; Parslow 1995). The great fire of London in 1666 destroyed a large part of the city over a period of four days including most of the civic buildings, a cathedral, 87 parish churches and about 13000 homes (Bell 1971). The Indonesian volcanic island of Krakatoa erupted and exploded in 1883 to completely destroy the island, cover 300000 square miles with ash and pumice, and cause great tsunamis, which took 36000 lives (Thornton 1996). Events like this have caused natural disruption as well as social and human losses. Doubtlessly, few would argue that these disruptions are disasters. In fact, so powerful is the force of nature over civilization that the rise and fall of nations may be at the mercy of catastrophic events. Hence, social evolution is intimately united with taming nature and adverting risks while reducing relative vulnerabilities to disasters.

Even after all the adaptations that our society has developed, disasters affect and will continue to affect whole communities in many significant ways. Natural hazards killed over 6000 people and injured at least four times that many in the United States and its territories between 1975 and 1994 (Mileti 1999, pg 66). During the same two decades, dollar losses to property and crops from natural hazards and disasters were between $230 billion and $1 trillion (in 1994 standardized dollars) so that a conservative estimate of the actual average dollar losses from natural hazards and disasters in the nation from 1975 to 1994 is $500 billion, or about $0.5 billion each week (Mileti 1999, pg 66). In view of the social calamity that past disasters have produced and in order to reduce the impacts of catastrophic events, societies in the modern era have established structures to

attempt to manage natural and technological hazards and their impacts on life and property. The whole process of emergency management professionalization is one of development and social change in order to adapt to the ever-changing social and natural environment.

Delineation of Emergency Management

The delineation of emergency management as a separate and specific body of knowledge is a fairly recent innovation (Marshall 1987). Emergency management is the discipline of applying science, technology, planning, and management to deal with extreme events that can injure or kill large numbers of people, do extensive damage to property, and disrupt community life (Hoetmer 1991, pg xvii).

In the United States, emergency management generally has been conceptualized as a problem for and legal responsibility of government - local, state, and federal (Lindell and Perry 1992). Indeed, elected officials have an inherent or a statutory duty to protect lives and property as well as to ensure societal well being so that the civilian population is spared from natural and technological calamities to be free to pursue happiness (Daines 1991). Historically, emergency management was considered only a function of law enforcement and fire departments, and was restricted to a quick-fix type of action with small budgets and partially committed workforces (Petak 1985). Today, the function of emergency management requires a permanent, full-time program to coordinate a variety of resources, techniques, and skills to reduce the probability and impact of extreme events; and, should a disaster occur, to bring about a quick restoration of routine. Furthermore, emergency management attempts to preempt any harm to civil society by minimizing the risks and vulnerabilities of the population.

Incipient Disaster Legislation

The essence of emergency management remains constant, in that its mission is to ensure the safety and well being of the population. Yet, there has been a constant change in the conceptualization and actions taken in order to accomplish this essential duty. Thus, there is a long history of development and social change involving emergency management functions since the colonial period.

Disasters were a part of the United States experience even before the nation was formed. In 1755, a major earthquake struck the Boston area and, at the end of the Revolutionary War, a hurricane prevented the reinforcing and resupplying of General Cornwallis's British troops at Yorktown, thus hastening the surrender that gave final victory to the American colonists. The federal role in disaster response began as early as 1803 when Congress enacted the first disaster legislation of the new republic, making federal resources available to Portsmouth, New Hampshire, after a devastating fire (Bourgin 1983, Drabek 1991, May 1985, National Academy of Public Administration 1993). When the army (or, beginning in the 1880s, Red Cross representatives) arrived on the scene of a disaster, they generally found ad hoc local or regional relief committees collecting funds and relief supplies, and performing recovery efforts (Popkin 1990). It was not until almost a century after that first 1803 relief act that Congress chartered the American Red Cross as the nation's first formally recognized disaster relief agency

(Popkin 1990). The U S Congress chartered the American Red Cross in 1905 as the coordinating agent for a national response to disasters. Originally founded as the United States unit in an international effort to provide service to civilian and battlefield victims of war, the American Red Cross became the first national Red Cross society to concern itself with disaster relief. This new responsibility was severely tested in the San Francisco Earthquake of 1906, which is estimated as 8.3 on the Richter scale, killing 478 people and leaving more than 250000 homeless. President Theodore Roosevelt announced that all federal aid was to be channeled through the Red Cross, and he sent federal troops into the city with instructions to shoot looters (National Academy of Public Administration 1993).

Between 1803 and 1947, Congress enacted 128 pieces of special disaster-specific legislation (Bourgin 1983, May 1985), and federal resources were used in response or recovery in the wake of more than 100 disasters: floods, tornadoes, earthquakes, and fires (Drabek 1991, pg 6; National Academy of Public Administration 1993, pg10). In many ways, the first major departure from piecemeal disaster legislation was the incorporation of the American Red Cross although this was probably not viewed as disaster legislation (Popkin 1990).

Over the years, disasters such as the Chicago fire, the San Francisco earthquake, the Johnstown flood, the Galveston hurricane, the 1936 floods along the Mississippi and Ohio rivers, Hurricane Camille, Hurricane Agnes, Three Mile Island, and Love Canal have marked milestones in the nation's disaster legislation development. Paralleling the many catastrophic events in U S history has been the evolution of hazard response and relief activities by government and private agencies, beginning with locally-based relief and recovery efforts and disaster-specific federal legislation, expanding with the founding of the congressionally chartered American Red Cross in the latter part of the nineteenth century, and eventually developing in the mid-twentieth century into the complex of insurance providers, government and voluntary agencies, and their various programs involving preparedness and recovery (Popkin 1990, pg 101).

At the federal level, permanent government agencies concerned with national emergencies existed since Franklin D Roosevelt's first administration. The Great Depression resulted in a more pro-active role by the federal government in many aspects of citizens' lives, and coping with disasters was among them. The National Emergency Council (NEC) operated within the White House between 1933 and 1939 primarily to cope with the Great Depression, but also to oversee natural disaster relief. Many New Deal social programs provided services and various types of aid to natural disaster victims. For example, Congress gave continuous authority to provide grants for the repair of federal highways and bridges damaged by natural disasters to the Bureau of Public Roads (Drabek 1991, pg 6; Lindell and Perry 1992, pg 3; National Academy of Public Administration 1993, pg 11). The Flood Control Act of 1936 provided for a wide variety of projects, many of which were completed under authority granted to the U S Army Corps of Engineers. Reflecting the pro-active approach advocated by engineers, hundreds of dams, dikes, and levees were erected to reduce vulnerability to floods (Drabek 1991).

In 1939, when the economic crisis had begun to subside, the National Emergency Council was moved to the Executive Office of the President and renamed the Office for Emergency Management (OEM). Natural disaster relief continued to be centered in the OEM, and the agency functioned as a crisis management team for various national scale threats (Lindell and Perry 1992).

Parallel Lines of Emergency Management Development

Previous to World War I, disaster legislation had pertained to natural disasters within United States territory, and emergency management followed a single line of development. That is to say, disaster legislation enacted by the federal government was piecemeal and directed toward ameliorating specific disaster events such as fires, floods, and earthquakes. As a direct result of this type of structure, disaster response was ad hoc.

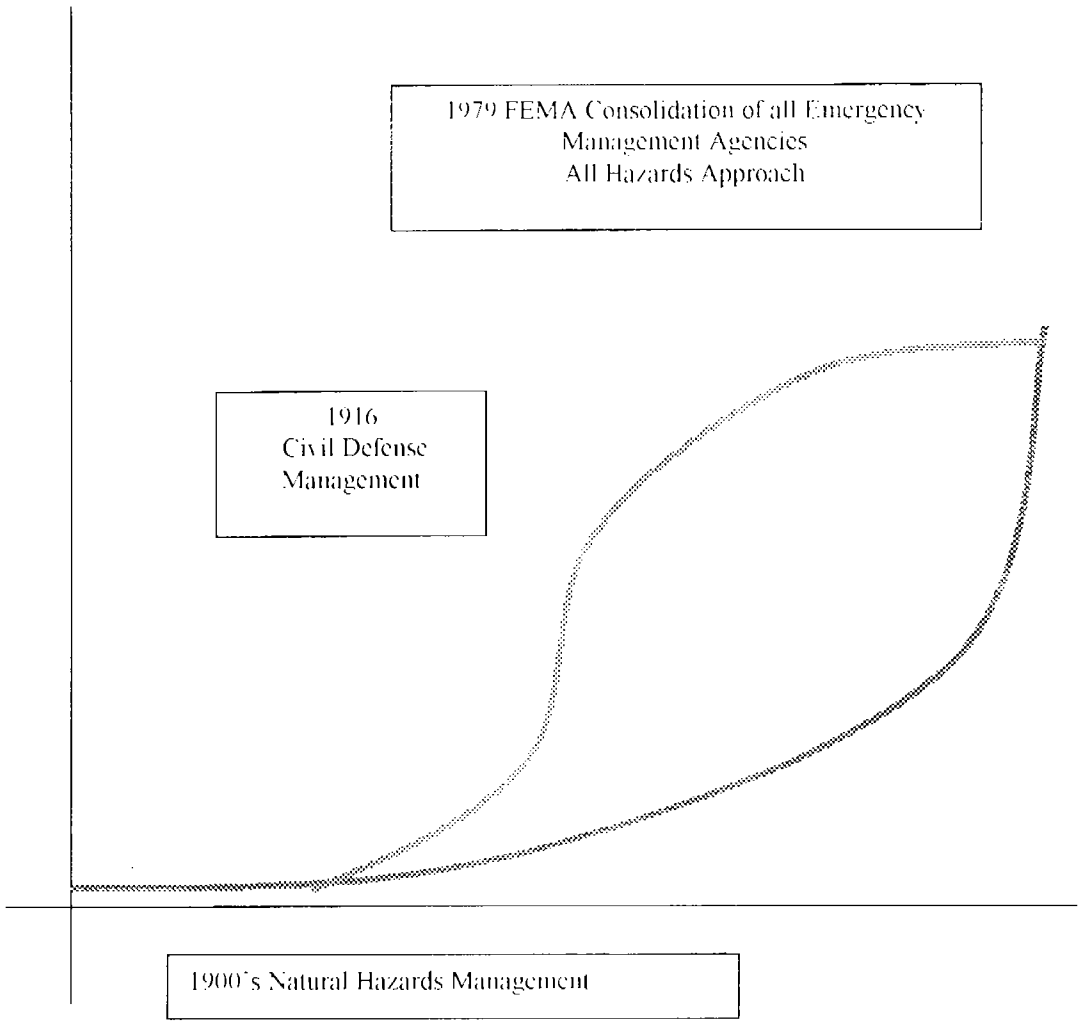
Once the nature of warfare had changed to include the means to reach civil populations without engaging directly in battle, nations had to counteract these threats by creating mechanisms to protect the nation's industry, food and natural resources, and citizenry (Buckley 1999). Although somewhat dissimilar in nature from the preparation for natural disasters, civil defense had the same basic motives as natural disaster management - protecting the population and assuring the nation's survival. The difference in actions required depended on the nature of the threat, one of which is natural and the other man-made. Civil defense needed to plan and counter-plan and organize and reorganize, evolving as the enemy threats changed. Thus the development of civil defense corresponded to the development of warfare. This meant that growth of civil defense in the twentieth century increased rapidly with the development of modern warfare technology. Its counterpart in natural disaster management developed at a slower pace due to the fact that natural hazards remained a somewhat constant threat during the same time period (although this started to change as the nations' population grew and a greater number of people migrated to hazard prone areas). Furthermore, while civil defense's origin was more pro-active because response to all possible contingencies of attack had to be planned beforehand and preparations had to be made, natural disaster management since its origin was envisioned as post-impact action or relief oriented.

Because of the nature of the differences between natural disaster management and civil defense, therefore, two parallel paths of emergency management development materialized; and, although they were similar in essence, the differences in manifestations of natural disaster management and civil defense management caused this separation.

Because the equivalencies in their fundamental natures were not recognized as such, civil defense and natural disaster management were envisioned as separate lines of work. Civil defense was considered to be directly related to the military domain under the auspices of the armed forces. Natural disaster relief was considered to be within the social services domain under the auspices of the American Red Cross and other relief agencies. Once the work for civil defense and natural disaster relief became exclusive to

each domain it took a change of structure in order to bring them together. These parallel lines of development did not merge until the equivalent fundamental nature of natural disaster management and civil defense management was recognized and integrated into a comprehensive emergency management system in 1979 with the formation of the Federal Emergency Management Agency.

Figure: Two Lines of Emergency Management Development



Early Stages of Civil Defense

The history of federal involvement in civil preparation for a war of defense is not as lengthy as in natural disasters. Nonetheless, as early as 1916, Congress passed the first legislation pertaining to a federal role in civil defense. The *U S Army Appropriations Act of 1916* established the Council of National Defense, which in turn established the War Industries Board and encouraged the formation of state councils of defense (Drabek 1991, National Academy of Public Administration 1993).

The capability of nations to bypass military forces in the field and to initiate direct attacks upon civilian populations was achieved for the first time during World War I. Prior to that time, the first and last line of defense of a nation was its army or navy. As long as the military forces held the line, they served as a barrier between the attackers and the non-combatant population. With the development of aircraft, all of that changed. It became possible for an enemy to attack targets far distant from the scene of the battle among the armed troops (Kerr 1983). In other words, warfare became total warfare. Nations were now at war rather than just the armed forces being at war. Strategies evolved to attack the war machine of the enemy nation rather than to fight just the armed forces. Thus, legitimate targets of war became factories, government buildings, and major transportation facilities such as bridges and communications infrastructure among others.

During the course of World War II the range of bombers capable of delivering large payloads had increased to such a degree that few significant targets on the earth's surface could be considered completely safe from attack (Kerr 1983). For instance, the firebombing in Dresden, Germany on February 13, 1945 caused a firestorm that obliterated the city killing 135000 residents and injuring thousands more (Davis 1993). A state councils pattern of organization for civil defense lasted until the early years of World War II, when general war emergency planning and coordination was placed under the OEM and more specific activities associated with civil defense were placed in the Office of Civil Defense. When the war came to an end, bringing hopes of a lasting peace, President Truman abolished the Office of Civil Defense (Drabek 1991, National Academy of Public Administration 1993).

The dawn of the nuclear age dramatically altered the nature of the civil defense problem, however. With the development of the atomic bomb, the problem of protecting the civilian population had become enormously complex in comparison to the preceding period. Not only had the power of the weapons of destruction increased dramatically as a result of technological developments, but the means of delivering these weapons had also increased in efficiency. By 1947, the pressures of the Cold War were beginning to mount and civil defense became a relevant, if not vital, issue of concern which was much higher on the political agenda (Kerr 1983). The rising threat of nuclear war led to a reinstatement of the Office of Civil Defense (National Academy of Public Administration 1993). In 1948, President Truman accepted a recommendation to immediately reestablish civil defense planning and establish a unit for this purpose in the Office of the Secretary of Defense called the Office of Civil Defense Planning (OCDP). Debates, about the structural placement of such a program continued until 1949, however, when

the president temporarily resolved them by assigning civil defense responsibility to the National Security Resources Board (Drabek 1991, Kerr 1983, Kreps 1990). Legislation proposing the creation of an independent federal civil defense organization coincided with the heightening of Cold War tensions. The announcement in 1949 that the Soviet Union had successfully tested a nuclear weapon represented a new threat and brought forth demands from local government officials that the federal government make clear to cities and counties what was expected of them. This pressure continued to increase with the onset of the Korean War in 1950 (Drabek 1991, Kerr 1983). Fueled by fear that the Korean conflict could precipitate nuclear war between the superpowers, Truman's *Civil Defense Act* soared through Congress in six weeks despite fierce debates.

Federal Civil Defense Act of 1950

Undoubtedly, society was substantially different after World War II. The political arena associated with national security took a new course in relation to United States vulnerability to nuclear attack from the Soviet bloc. This new threat ultimately led to the *Federal Civil Defense Act of 1950*, which created new or restructured agencies in order to face the new challenges. Emergency managers of this era adapted to the nuclear-age risks by adopting new skills and practices. Thus, a new set of professionals arose from these conditions.

The *Federal Civil Defense Act of 1950* defines civil defense in more explicit terms than those which had previously been used. The term civil defense is applied to all activities that are designed and utilized: 1) to minimize the effects of an attack, 2) to cope with the immediate emergency conditions resulting from an attack, and 3) to effectuate emergency repairs and restoration (Kerr 1983, pg 27). According to this definition, civil defense activities formally assumed a protective character, and the non-protective activities of civilians were assumed by other organizations (Kerr 1983, Yoshpe 1981). Civil defense was viewed as a civilian function, the province of local volunteers, with a central authority located in each state (Yoshpe 1981).

The act also outlined a more generalized approach by the federal government to disaster relief (Popkin 1990). This legislation provided the federal government with authority to initiate planning and to provide state and local governments with guidance, coordination, assistance, training, and matching grants. The grants were provided on a fifty-fifty basis for the procurement of supplies and equipment (Blanchard 1984). Few states at the time had emergency funds of any kind for local government public facilities repair (Bourgin 1983). The act provided states as well as local communities with aid for restoring damaged public facilities (Popkin 1990). Moreover, the act set a pattern for the future by supplementing state and local capabilities and resources and calling for the governor of a state involved in a disaster to certify a need for assistance to the President.

The new Federal Civil Defense Administration (FCDA) established by the *Federal Civil Defense Act* was to undertake an evacuation and sheltering program (Drabek 1991). Since the 1950 Act declared that the responsibility for civil defense should be vested primarily in the states and their political subdivisions (Kreps 1990), the FCDA's approach to these population protection plans was to work closely with state and local

civil defense officials.

The *Federal Civil Defense Act of 1950* was the first general legislation concerning disasters. With this act, the indirect institutionalization of the occupation of emergency management solidified to include not only the variables associated with traditional first response and disaster relief (ie Red Cross, social workers, fire fighters, etc), but also to explicitly address the risks and vulnerabilities associated with warfare threats. Now, a new array of professionals from a variety of diverse fields including planners, political scientists, military strategists, and nuclear scientists were incorporated to carry out the tasks mandated by Congress to ameliorate both natural hazard and war related threats. With this act, civil defense management and natural disaster management became somewhat integrated for the first time. Thus, the nation was able to progress from a reactive approach to natural and technological disasters to a more pro-active approach (Oyola-Yemaiel 1999). In other words, the *Federal Civil Defense Act of 1950* was the first step toward comprehensive emergency management.

Following the *Federal Civil Defense Act of 1950*, which contained few provisions for victims, Congress passed legislation providing various forms of individual assistance such as temporary housing and emergency shelter for the disaster homeless, drought relief for farmers, and surplus federal equipment and supplies for use by states in disaster response. The federal government also extended these programs to include U S Pacific territories (Popkin 1990).

In the mid-1950s, the federal government, for the first time, began providing some Small Business Administration loan assistance to disaster victims, particularly those who had lost stores or other businesses during floods in New England. Since then, as government programs have expanded, the Red Cross role in individual family assistance has diminished, particularly in larger disasters receiving a presidential declaration and federal funds. Federal programs have limitations regarding dollar amount and eligibility, however, so the Red Cross still provides a considerable amount of supplemental assistance (Popkin 1990).

Incipient Disaster Research

During the 1950s, the National Opinion Research Center conducted a series of federally sponsored research projects on human behavior in natural disasters (Fritz and Marks 1954). The field teams interviewed victims and emergency officials in the aftermath of more than seventy disasters, including tornadoes, explosions, earthquakes, airplane crashes, and industrial fires. The purpose of these exploratory (qualitative) studies was to try to determine how the civilian population would react to the "extreme stresses to be anticipated in war-time." Disasters and hazards seemed to be the best alternative to a warlike atmosphere since war is impossible to achieve in a controlled laboratory experiment. As topics such as responses to warnings, panic behavior, evacuation, and convergence were systematically analyzed according to social science methods, it became clear that much of what the public-including emergency officials-believed about behavior in disasters reflected myth rather than fact (Drabek 1991). These studies became a benchmark for the creation of comprehensive emergency management because they

demonstrated to decision makers that human needs and responses to emergencies and disasters were similar regardless of the hazard.

Civil Defense Following the Federal Civil Defense Act of 1950

Throughout the 1950s and into the late 1960s, as the presence of intercontinental missiles and thermonuclear warheads escalated the threat to civil populations, increasing attention continued to be given to civil defense. Concerns for the continuity of government and civil defense were the driving forces behind emergency management efforts at the national, state, and local levels. During the Eisenhower administration, no fewer than three major reports (Gaither, Rockefeller, and Rand) were issued calling for civilian shelter programs as part of the nation's overall defense strategy (Drabek 1991, National Academy of Public Administration 1993). Among changes that occurred during this period, the new Office of Civil Defense Mobilization (OCDM) was located within the executive office of the president. The need for quick decision-making in the event of a disaster was achieved by locating this group of advisors in direct contact with the White House. At the same time, Eisenhower's administration stressed the peacetime utility of civil defense for disaster planning, rescue, and relief work (Blanchard 1984). In this case the indirect institutionalization of the occupation of emergency management developed by incorporating such professionals as civil engineers who designed and constructed fallout shelters to withstand nuclear attack, planners who strategized ways to evacuate entire communities, supplies experts who organized materials for stockpiling, and others.

Civil defense in the United States become a matter of public debate during 1961 and 1962, championed by President John F Kennedy. The confrontation that resulted in the Cuban Missile Crisis of 1960 placed mid-range ballistic missiles pointing toward United States soil for the first time. This led President Kennedy to emphasize the need for civil defense, and a major fallout shelter program was initiated in 1962 (Kreps 1990). This is the only time when presidential and congressional support merged to approve enough funding to indicate a substantial civil defense commitment. However, after the Berlin crisis and the Cuban Missile Crisis were peacefully defused, events surrounding the Civil Rights Movement, the Vietnam War, and urban riots soon eclipsed concern for civil defense. U S civil defense receded from public and governmental consciousness; for 15 years it received only nominal funding. Yet, several matters of lasting importance emerged from evolving efforts in both disaster response and civil defense (Drabek 1991, National Academy of Public Administration 1993, Vale 1987).

In the 1960s and 1970s the predominant theory of superpower relations was characterized by the condition of Mutually Assured Destruction, which implied that mutual vulnerability of civilian populations was both necessary and good. Thus, many saw little reason to support civil defense efforts and this perspective was the primary cause for the sharp decline of civil defense budgets in the late 1960s (FEMA 1983a, pg 4). Civil defense received little attention until the mid-1970s, when certain U S officials began to fear that the extensive Soviet civil defense program could have a destabilizing effect on superpower relations. Increasing weapons stockpiles spurred the development of Crisis Relocation Planning, an alternative to the home-based fallout shelters of the

1960s. The goal of Crisis Relocation Planning was to disperse populations in high-risk areas during periods of heightened international tension. This strategy seemed appropriate to current weapons technologies and was a logical extension of the successful hurricane evacuation programs many coastal states had adopted (Drabek 1991). Thus, when civil defense re-emerged, it was rationalized as humanitarian insurance as well as a necessary component of deterrence (Vale 1987).

Civil defense had receded because political support and civil concerns were transferred to other social themes such as civil rights and because the increasing perception of the impossibility of defense against thermonuclear war due to mutually assured destruction. However, the degree of the indirect institutionalization of the occupation of emergency management attained did not diminish but remained. The indirect institutionalization of the occupation of emergency management developed in order to maintain a minimum level of understanding of the threat and to adapt to the risks related to increasing weaponry sophistication and methods of delivery. As war technologies escalated so did the tensions and correspondingly the preparations for civil defense.

Inability of Federal Government to Respond to Natural Disasters

The civil rights movement and the Cold War raised consciousness in the civilian population that civil defense planning and preparation focused upon very improbable events with a high degree of uncertainty and was not the answer to technological and natural disasters. Yet almost all emergency management funding was poured into this type of planning and preparedness which was not perceived to be directly beneficial to the population. Meanwhile, natural and technological disasters were impacting the general population to an increasing degree and the government was not perceived as being able to respond properly.

Although disaster relief has traditionally been considered a local responsibility, the late 1960s and early 1970s brought massive disasters requiring major federal response and recovery operations. Hurricane Carla struck the Texas coast in 1961, resulting in 46 deaths and causing nearly $1 billion of property damage. The Great Alaskan earthquake of 1964, at 8.4 to 8.6 on the Richter scale the largest earthquake in North America, devastated 50000 square miles of land and cost 115 lives, mostly from tsunamis (Sokolowski 1991). The tsunamis caused extensive damage ($400 million) to towns along the Gulf of Alaska and left serious damage along the west coasts of Canada and the United States and in Hawaii (U S Department of Commerce 1964). Hurricane Betsy in 1965 resulted in 76 deaths and caused $1.3 billion in damages, making Betsy by far the most expensive hurricane in U S history up to that time (Barnes 1998). Hurricane Camille (1969) - one of only two Category 5 hurricanes ever to hit the United States (National Hurricane Center 1999) - caused 259 deaths and about $1.5 billion in damage when it struck the Mississippi coastline (DeAngelis and Nelson 1969). The San Fernando earthquake in 1971, with a magnitude 6.7 on the Richter scale, took 65 lives, injured more than 2000, and caused property damage estimated at $505 million (Stover and Coffman 1993). This earthquake caused freeway overpasses to collapse and caused major damage to two dams that secured reservoirs over the densely populated San Fernando Valley. Finally, Hurricane Agnes in 1972, a hurricane that never strengthened beyond a

category one storm, resulted in torrential rains and extreme flooding throughout the entire eastern seaboard that caused 122 deaths and two billion dollars worth of damage (Barnes 1998).

These disasters of the late 1960s and early 1970s, as well as some easing of Cold War tensions, served to turn attention back to the issue of natural disasters. Persons in this emerging field, and some outside it, became increasingly concerned about the inadequacies of programs to protect citizens against both the age-old threat of natural disasters and the 20th-century threat of nuclear war. Social scientists began to give more attention to the subject of disasters in the wake of these devastating events. In addition, the nomenclature of emergency management began to appear as a field of study, a body of knowledge, a set of skills, and a nascent profession encompassing both civil defense management and natural disaster management. As this process began, practitioners and academics struggled with developing a definition of emergency management (National Academy of Public Administration 1993).

The inadequacies of government at all levels in responding to these disasters were made painfully clear. There was no coordinated federal or intergovernmental response system in place and people experienced greater suffering and losses due to this inadequate emergency planning and response. Such suffering awakened demands for disaster assistance with greater performance capability and a higher degree of professionalism. Such pressures on the political system were reflected in increased legislation (FEMA 1998). Consequently, new structural mechanisms were added and new experts became involved, producing a proliferation of programs.

This advance in the improvement of natural disaster management occurred in incremental stages - each a response to a particular disaster. Increased response capabilities were directly related to organizations being created, moved, divided, and reorganized within the federal government (Drabek 1991, National Academy of Public Administration 1993). Yet this resulted in differentiation, compartmentalization, and fragmentation of tasks. The Federal Disaster Assistance Administration was established within the Department of Housing and Urban Development in 1973. The Office of Preparedness and the Federal Preparedness Agency were formed respectively in 1973 and 1975 under the General Services Administration. The National Weather Service Community Preparedness Program (1973) and the National Fire Prevention and Control Administration (1974) were created within the Department of Commerce. In addition, rather than allocating large budgets to civil defense, which was politically unpopular due to the Mutually Assured Destruction paradigm as well as the internal social tensions of the period, the solution was to first establish improved mechanisms of natural and technological disaster response through which civil defense needs could be secondarily satisfied. At this point, the field of emergency management was reaching a high degree of complexity, not only because of the two parallel streams of civil defense management and natural disaster management, but due to the increased internal differentiation of each stream.

Disaster Relief Act of 1974

Ad hoc legislative decrees that created or expanded programs in response to specific disasters compounded the fragmentation of federal disaster relief, leading to criticism from many local and state government officials (Drabek 1991). It was not until the *Disaster Relief Act of 1974* that the full spectrum of current federal disaster assistance programs was included in a comprehensive piece of legislation.

The detailed federal definition of disaster was first contained in this law, which is the basis for today's federal disaster programs (Bourgin 1983). In addition, it introduced into the disaster discourse the alleviation of "hardship or suffering," adding new complexities to the management of disasters beyond damage assessment. It is evident that Congress viewed disasters as having complex social impacts with lasting implications for the citizenry; and that the government's role should not be limited to the safeguarding of life and restoration of property, but should provide multi-layered, multifaceted relief by playing a central role in all phases of disaster - a precursor to comprehensive emergency management.

The Disaster Relief Act of 1974 authorized federal assistance for both federal and state disaster preparedness and warning programs (Drabek 1991). The act firmly established the process of Presidential disaster declarations (FEMA 1998). It authorized individual family grants, disaster food coupons, temporary housing, and disaster unemployment assistance, and also referred to emergency loans, restoration of public facilities, mental health counseling, and other forms of individual public assistance (Popkin 1990). All of these provisions contributed to the professionalization of emergency management.

Establishment of the Federal Emergency Management Agency

By the 1970s, concerns about natural disasters led to calls for dual use of infrastructure and resources originally intended for civil defense. In 1970, a still-classified National Science Council study determined that a single federal civil defense agency could direct a dual program designed to mitigate both peacetime and attack-related emergencies. In 1972, when the Defense Civil Preparedness Agency replaced the Office of Civil Defense, the notion of dual-use found its first home (Vale 1987).

The justification for dual use was two-fold. First, the participation of civil defense organizations in natural disasters would increase their ability to cope following a nuclear attack. Second, the linkages that the federal government had already established with state and local governments for civil defense purposes, combined with the human and material resources it could mobilize, would be very useful for responding to peacetime disasters (Kreps 1990). These trends, reflecting the professionalization of emergency management, created a pattern of simultaneous convergence of concerns and frustration with the fragmented way in which the federal government dealt with emergency management. Emergency management practitioners throughout the nation and at all levels of the intergovernmental system wanted more control, consolidation, and coordination over their programs. Reflecting this, the National Governors' Association took up the subject of emergency management in 1977 (Drabek 1991, National Academy of Public Administration 1993).

The National Governor's Association (1978, pg ii) report described "the governors' increasing concern about the lack of a comprehensive national emergency policy, as well as the dispersion of federal responsibilities among numerous federal agencies, which has hampered states' ability to manage disaster situations." The report called for an equal partnership of federal, state, and local governments, for a comprehensive approach to emergency management, creation of a federal agency consolidating the comprehensive emergency management functions (mitigation, preparedness, response, and recovery), and the development of corresponding state agencies (National Academy of Public Administration 1993). In short, the National Governors' Association asked President Jimmy Carter to centralize federal emergency management functions (FEMA 1998).

The same year, 1978, the President's Reorganization Project (PRP) of the Carter administration was committed to carrying out the President's promise to examine governmental operations and organization and make them more effective, efficient, and economical. Thus, the PRP responded to the complaints of state and local government officials and, over the objections of several federal agencies, asked Congress to approve a reorganization plan that brought together several disparate programs related to emergency management. The reorganization was designed, according to a 1978 White House press release, to achieve the following:

> make a single agency, and a single official, accountable for all federal emergency, preparedness, mitigation, and response activities (consolidation);
>
> create a single point of contact for state and local governments (coordination);
>
> enhance the dual use of emergency preparedness and response resources at all levels of government (comprehensive);
>
> provide an improved basis for determining the relative benefits - and cost effectiveness - of spending for hazard mitigation, preparedness planning, relief operations, and recovery assistance;
>
> provide significant economies through combining duplicate regional structures and redundant data processing and policy analysis systems; and
>
> provide greater visibility and coherence for preparedness functions
>
> (*White House Fact Sheet 6/19/78* as cited in National Academy of Public Administration 1993, pg 15).

In addition to the important rationale of one agency/one official/one point of contact, an important justification for reorganization was the idea of comprehensive emergency management with its interrelated functions. For example, lessons learned in response and recovery (eg homes in hurricane-prone areas not built to sufficient standards of wind resistance were heavily damaged leaving people homeless) could be used in mitigation efforts (eg model building codes) (National Academy of Public Administration 1993).

Responding to administrative and structural difficulties, as well as to concern that the scope of the functions performed as part of emergency management was too narrow and that too many resources were devoted to after-the-fact disaster response and too few to the issues of prevention and control, the Carter administration created the Federal Emergency Management Agency (FEMA) in 1979. Although by far the most comprehensive effort, the establishment of FEMA represents the third time that all federal disaster efforts and functions were combined; the first being the National Emergency Council (1933-1939) followed by the Office of Civil Defense Mobilization (1958-1961) (Lindell and Perry 1992).

From Fragmentation to Consolidation

A decisive factor in the professionalization of emergency management is the instability of the federal emergency management structure. This instability is related to the incremental changes in the development of emergency management to cope with the fast changing world. This development of emergency management in incremental steps resulted from immediate responses to crisis situations. This is why the evolution of emergency management took place in a decentralized and uncoordinated manner. For example, civil defense has been managed, consecutively or concurrently, by 13 agencies since World War II, each with a different emphasis. It has been classified under 11 different executive departments and, moreover, each changes of presidential administrations usually brought in a new chief administrator. Until the establishment of FEMA in 1979, as a nominally independent agency overseen by the Secretary of Defense and the National Security Council, U S civil defense often had many administrators simultaneously.

When hazards associated with nuclear power plants and with the transportation of hazardous substances were added to civil defense management and natural disaster management, more than 100 federal agencies were involved in some aspect of disasters, hazards, and emergencies. Many parallel programs and policies existed at the state and local level, compounding the complexity of federal emergency management efforts (FEMA 1998).

FEMA's creation gave the federal government, for the first time, an integrated approach to emergency management. The conceptual leap taken in creating FEMA was something like that which gave birth to the Federal Bureau of Investigation as the nation's federal law enforcement agency in the 1920s (Kreps 1990). War-related and natural disasters were the major types of hazards considered during the several reorganizations prior to the establishment of FEMA. Increasing concentrations of populations and physical structures and expanded use of new technologies such as nuclear power, however, had resulted in growing vulnerabilities to a wide range of possible emergencies such as peacetime nuclear accidents, terrorism, and disruption of essential resources and services. Concern over these types of emergencies was growing and this was reflected in the broad emergency mission of FEMA (Kreps 1990). By the 1970s, the time had come for the federal government to have a highly reliable organization charged with developing a comprehensive approach to protecting citizens from the ravages of emergencies of all kinds: military attack, natural disasters, man-made disasters, civil disorder, or fire

(National Academy of Public Administration 1993).

The mission of FEMA as the new lead agency was more diverse than that of its predecessors. That mission now included among other things disaster relief, earthquake hazard reduction, flood insurance, crime insurance, fire protection and control, civil defense programs, programs for continuity of government, guidance for stockpiling strategic materials, off-site emergency planning for nuclear facilities, oversight of dam safety, risk assessment for terrorist incidents, and selected emergency response activities related to toxic spills (Kreps 1990:287). Thus, the field was becoming increasingly complex requiring advanced skills related to physical, natural, and social sciences to manage a diverse array of emergencies.

FEMA was a consolidation of the major federal disaster agencies and programs. Most of the new organization's administrative apparatus came from combining the three largest disaster agencies: the Federal Preparedness Agency, the Defense Civil Preparedness Agency, and the Federal Disaster Assistance Administration. The creation of FEMA brought a variety of program elements together under one agency umbrella. Offices were transferred from the U S Department of Defense, the Department of Housing and Urban Development, and the General Services Administration. Additional responsibilities were transferred from the Executive Office of the President, from the U S Department of Housing and Urban Development, and from the U S Department of Commerce for the National Fire Academy, the National Weather Service's Community Preparedness Program, the National Fire Prevention and Control Administration, as well as the Federal Insurance Administration (McLoughlin 1985). Civil defense responsibilities were also transferred to the new agency from the Defense Department's Defense Civil Preparedness Agency (FEMA 1998). Some emergency planning functions of the Nuclear Regulatory Commission were ultimately moved to FEMA (Popkin 1990).

A total of 13 separate hazard-related programs were then moved to FEMA, including most of the programs and offices created in the 1970s. These moves gave FEMA responsibility for nearly all federal emergency programs of any size, including civil defense, warning dissemination for severe weather threats, hazard insurance, fire prevention and control, dam safety coordination, emergency broadcast and warning systems, earthquake hazard reduction, terrorism, and technological hazards planning and response. Where FEMA did not absorb a program in its entirety, interagency agreements were developed giving FEMA coordinating responsibility. FEMA's director reports directly to the President of the United States (Lindell and Perry 1992). This is the first time in history that federal agencies playing a disaster-related role were comprehensively coordinated.

Political Struggle in the Early Years of FEMA

In some measure, FEMA came to be dominated by the civil defense and preparedness activities and was made less effective in natural and technological disaster activities by jurisdictional and resource conflicts between the two emphases. The major reorientation of FEMA's mission, de-emphasizing civil defense and national security programs, recommended by National Academy of Public Administration (1993) and US General

Accounting Office (1993) studies and by the *Federal Disaster Preparedness and Response Act of 1993*, are in response to these conflicts within FEMA, as well as to the end of the Cold War (Waugh 1994).

Similarly, the recommended reduction in the number of political appointees was in response to FEMA's internal problems (National Academy of Public Administration 1993; U S Congress 1993, pg 31-32). During the early 1980s in particular, FEMA suffered from leadership problems that resulted in very high turnover in personnel, legal charges against some political appointees and contractors, and a fluctuating set of programmatic emphases. State and local officials often found themselves at odds with FEMA over resources and responsibilities and confused by the rapidly changing priorities (Clary 1985, May and Williams 1986, Mushkatel and Weschler 1985, Waugh 1990).

The resolution of the internal political struggles during the first years of FEMA was important to the professionalization of emergency management because it corroborated or ratified the all-hazards approach and the civilian nature of FEMA's mandate. In resolving these conflicts by reducing the political strength of civil defense, FEMA was not limited to the professional field of civil defense, but was able to take a comprehensive approach to all hazards.

Integrated Emergency Management / All-Hazards Approach

By the 1980s, emergency management had moved from a generalized field that was limited and compartmentalized, to a comprehensive (all-hazards) field that was coordinated. This shift was manifest in the consolidation of all departmentalized federal agencies into the single agency of FEMA.

In 1980, Congress strengthened the federal mitigation role established in the *Disaster Relief Act of 1974* by adding multihazard planning to the agency's responsibilities. In this context, FEMA began development of the Integrated Emergency Management System, an idea that represented the logical culmination of years of work toward consolidation of emergency management functions to better serve the public. The Federal Emergency Management Agency, taking an all-hazards, full spectrum approach, moved increasingly to focus on state and local needs unrelated or at least only tangentially related to nuclear attack (FEMA 1983a, pg 5). Amendments passed in 1980 and 1981 added to the 1950 *Civil Defense Act* full authorization for peacetime disaster planning and legalized what had long been a matter of practice. The 1981 amendment stated that Federal funds could be used to prepare for peacetime disasters "to the extent that the use of such funds for such purposes is consistent with, contributes to, and does not detract from the attack-related civil defense preparedness" (FEMA 1983a, pg 8). This amendment made possible the development of the Integrated Emergency Management System (Vale 1987), and FEMA (1998, pg 5) began practicing an all-hazards approach that included "direction, control and warning systems which are common to the full range of emergencies from small isolated events to the ultimate emergency - war." The agency promoted integrated emergency management for all hazards including enemy attack by emphasizing the similarities between natural hazards preparedness and civil defense activities (Popkin 1990).

The concept of an integrated emergency management system is based on the belief that the efforts of many disciplines are necessary in order to reduce the consequences of natural and man-made disasters. No one professional field need necessarily do it all, nor does any one professional field necessarily possess expertise in handling all of the professional areas. Indeed, a highly diverse and professionalized workforce involving all fields of science would be necessary to properly address an all-hazards disaster prevention approach. According to Petak (1985, pg 6), however, emergency managers must have the conceptual skill to understand: 1) the total system, 2) the uses to which the products of the efforts of various professionals will be put, 3) the potential linkages between the activities of various professional specialists, and 4) the specifications for output formats and language which are compatible with the needs and understandings of others within the total system.

The Integrated Emergency Management System is an attempt to define the lowest common denominator of disasters; this base provides a substantial possibility for integrated planning. As a FEMA spokesman explains:

> "If you look across the range of threats we face, from fire, through hurricanes, to tornados, to earthquake, to war, you will find there are common preparedness measures that we deal with in trying to prepare for those threats. It is the establishment of common preparedness measures that then become a foundation for all threats, with the development in addition of the unique preparedness aspects relevant to each individual threat (Thomas 1982, pg 8 as cited in Vale 1987, pg 84)."

According to FEMA, these common preparedness elements include evacuation, shelter, communications, direction and control, continuity of government, resource management, and law and order (FEMA 1983b, pg 2). The goal of Integrated Emergency Management System is to enable each participating jurisdiction to develop a readiness to face a broad range of emergencies, while concentrating on its most likely emergency needs:

> Individual states and communities may choose to use their hurricane, radiological response, nuclear attack protection, or other plans as a starting point for developing an integrated emergency plan specific to their needs. The IEMS approach will thus build upon current emergency plans and systems, turning existing hazard-specific plans into integrated, all-hazards plans (FEMA 1983b, pg 3).

FEMA assumes that all hazards, from hurricanes to nuclear war, can profitably be mitigated by an integrated plan. The point was stressed that, with an evacuation plan, "the precipitating cause becomes almost secondary" (Giuffrida 1983, pg 91). This conclusion remains a telling statement about the intellectual drift of the civil defense argument away from talk about nuclear attack (Vale 1987).

In practice, the emergency manager's task is to use a variety of resources, techniques, and skills to reduce the probability and impact of extreme events - and, should a disaster

occur, to bring about a quick restoration of routine. The two emergency management concepts of Comprehensive Emergency Management and the Integrated Emergency Management System have great pro-active implications that help define roles and responsibilities. Comprehensive Emergency Management calls for an integrated approach to the management of emergency programs and activities - each element of Comprehensive Emergency Management relates to every other element (Hoetmer 1991). Integrated Emergency Management System helps a community define these relationships in both strategic and operational terms. In other words, Comprehensive Emergency Management provides emergency management with a conceptual framework, and the Integrated Emergency Management System shows how the framework can be translated into action.

More specifically, according to Hoetmer (1991), Comprehensive Emergency Management is a way of fitting together the many elements of emergency management into an inclusive framework that encompasses all hazards and all levels of government as well as the private sector. One depiction of Comprehensive Emergency Management shows it as a circle, which indicates the continuity of the four phases of emergency management (Neal 1997). Current thinking in the field is that communities should prepare for recovery before disaster strikes so that difficult decisions about reconstruction and mitigation are less subject to the extreme pressures that characterize the immediate aftermath of disaster.

The Integrated Emergency Management System is a way of spelling out Comprehensive Emergency Management (Hoetmer 1991). On the strategic side, the Integrated Emergency Management System requires that a community undertake a hazard and risk analysis, assess its current capabilities in the areas of mitigation, preparedness, response, and recovery and devise steps to close the gap between existing and required levels of capability. Operationally, the Integrated Emergency Management System provides the framework to support the development of emergency management capabilities based on functions (ie warning, shelter, public safety, evacuation, etc) that are required for all hazards (Hoetmer 1991).

Increasing Disaster Risks, Vulnerability, and Costs

Undoubtedly, FEMA, as a conglomerate of federal agencies with disaster-related missions. benefitted the population with its greater capacity for emergency management preparedness, response, and recovery. Vulnerabilities continued to expand, however, and posed increasing losses and costs to the nation. Coping with vulnerabilities and reducing the risks associated with them ultimately led to the formulation of stronger mitigation strategies, which, in turn, prompted the need for greater emergency management skills.

Most communities in the United States, large or small, are at risk from some type of natural hazard; many are exposed to multiple risks. Even communities not visibly at risk from natural hazards are subject to technological hazards. Technological hazards such as chemical emergencies and nuclear accidents have grown with the spread of advanced technology (Godschalk 1991). As illustrated by events at Three Mile Island, Bhopal, and Chernobyl, the benefits of modern technology are accompanied by major hazards.

Furthermore, potentially hazardous technologies have been rapidly adopted throughout the world and there is often an acute lack of information upon which to base risk management decisions (Mitchell 1990). This has led to emergency management agencies having to exercise professional skills in the early stages of poorly understood hazards. For example, FEMA funds were used to buy out families at Love Canal even before Title III of the 1986 *Superfund Amendments and Reauthorization Act* and, in the past, local emergency management agencies have had to supply drinking water when underground sources were polluted (Popkin 1990).

The risk from natural and technological hazards is compounded by demographic trends that increase vulnerability: increasing population density, increasing migration to hazard-prone areas, and the growth of those segments of the population that are especially vulnerable to losses from disaster (Anderson and Mattingly 1991). As the population continues to concentrate in urban areas, more and more people are exposed to the risks that those areas face. For example, some of the most violent earthquakes ever recorded in the United States were those centered on New Madrid, Missouri in 1811 and 1812. At the time, the area was sparsely populated; if earthquakes of a similar magnitude were to occur today - and that region is still at risk - a major disaster would result. The Northridge earthquake in 1994 was a relatively mild seismic (6.7) event when compared to the earthquake at New Madrid, but because it occurred in the now densely populated and developed Los Angeles region, it caused $20 billion dollars worth of damage making it the most costly earthquake in United States history (U S Department of the Interior 1996).

The second significant demographic trend is the movement of population and capital into hazard-prone areas of the country. For example, the rate of population growth along the Pacific, Atlantic, and Gulf coasts is high compared with that in most of the rest of the United States. Referring to the hurricane hazard, Godschalk et al (1989, pg 4) defined the problem as "continuing urban growth in high-risk coastal areas without a corresponding growth in our ability to protect developed property or to evacuate expanded populations in threatened areas."

A third factor contributing to increased risk is rapid growth among some of the most vulnerable groups in society-elderly people, disabled people, minorities, and poor people. Physical, social, and cultural barriers put members of these groups at greater risk from hazards. Elderly and physically disabled people, for example, generally have more difficulty evacuating threatened areas; non-English-speaking minority groups may have problems taking proper protective actions because of language difficulties or a distrust of authority; and poor people often live in the most vulnerable structures (Aguirre 1988, Blaikie et al 1994, Bolin and Bolton 1986, Morrow 1999, Perry and Mushkatel 1986, Phillips 1993, Tobin and Ollenburger 1992,).

The potential for highly destructive events has increased as the nation's population has increased, as populations have become more concentrated in urban areas, and as certain potentially dangerous technologies have become more widespread (Hoetmer 1991).

Furthermore, we are recognizing the interdependence of technological and natural hazards. Environmental laws that relate location of waste treatment facilities to 100-year flood levels have been enacted, and there are additional concerns about the location of nuclear power plants near earthquake faults, in coastal areas, and in flood plains. For example, the Three Mile Island nuclear power plant sits on an island in the Susquehanna River making it vulnerable to flooding. The Trojan nuclear power plant is close to Mount St. Helens, which erupted in 1980 and is still an active volcano. The Great Midwest floods in 1993 affected nine states and caused numerous industrial accidents such as the inundation of water treatment plants and landfills, the dislodging of tanks of propane and other chemicals, and the release of household hazardous wastes throughout hundreds of counties (Fields 2000). Hurricane Floyd caused massive flooding in North Carolina releasing numerous toxic substances. Clearly, we are becoming aware of a whole new set of disasters - technological disasters triggered by natural events (Fields 2000, Popkin 1990).

Due to the ever-increasing disaster risks to the population, disaster relief became a large and increasing public expenditure. From 1982 to 1987 formal federal public-assistance aid to communities exceeded $1 billion, spent on 115 declared disasters (Kirby 1990). The implications of this funding were twofold. In the first case, the large disaster machinery overseen by the Federal Emergency Management Agency (FEMA) served to excuse a lack of preparedness within communities; if marginal or even regularly at-risk localities were affected, FEMA would often step in to help under a Presidential declaration. Some communities received funds following successive hazard events and used them to replace infrastructure in the same location. Of the $1.1 billion spent between 1982 and 1987, 40% was channeled to only three territories - California, Virginia, and Puerto Rico (Kirby 1990). In other words, this type of practice was not mitigative and created a cycle of hazard recurrence from which the community always remained at risk. Conversely, FEMA would not pay local communities for their efforts to permanently evacuate residents or to take preventive measures designed to minimize hazard impacts (Kirby 1990).

Due to the non-mitigative emergency management practices and demographic trends, Petak and Atkisson (1982) estimated nearly 20 years ago that the real value of losses from nine common natural hazards in the United States (including hurricanes, tornadoes, riverine floods, earthquakes, landslides, severe winds, and tsunamis) would increase sharply by a factor of 69 percent between 1980 and 2000. Thanks to advances in warning systems, deaths and injuries in the United States from recurring natural hazards such as hurricanes and floods dropped significantly since 1900, when 6000 died in a hurricane in Galveston, Texas. But advances in warning capability leveled off, while people continued to settle in areas at risk from natural hazards (Godschalk 1991). Thus, Petak and Atkisson (1982) also predicted that by the year 2000, the US death toll from hurricanes would rise again because of the increase of population in vulnerable coastal areas.

Although this has not occurred, these authors were correct in their assertion that population growth in high-risk areas would continue placing larger and larger numbers

of people at risk. For instance, the tri-county region of southeastern Florida now has in excess of 5.5 million inhabitants and is expected to grow to over 15 million inhabitants by the year 2050 (South Florida Regional Planning Council 1996). Petak and Atkisson's (1982) prediction did not materialize because the field of emergency management matured through incorporation of mitigative practices to reduce disaster impacts. In 1988, the Stafford Act came about as part of the continuing process of the professionalization of the occupation of emergency management.

The Robert T Stafford Disaster Relief and Emergency Assistance Act of 1988

The Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 was an important overhaul of the nation's disaster relief system (Godschalk, et al. 1999). The Stafford Act streamlined the declaration process so as to make federal aid to state and local governments more timely. The Act is now the primary legislation governing the provision of federal disaster assistance and determining the nature of the federal-state disaster assistance framework.

More importantly, however, the Stafford Act specifically introduced mitigation efforts as a strategy to reduce disaster losses and costs prior to the occurrence of disaster events. Section 404 of the Act creates the Hazard Mitigation Grant Program (HMGP), which provides federal matching funds for state and local mitigation projects. These grants are tied to presidential declarations and are limited to a percentage of the federal disaster assistance monies made available. According to Godschalk et al (1999, pg 14), between 1988 and 1995, FEMA approved 876 applications for hazard mitigation grant projects, obligating $219 million.

Disaster Losses Continue to Increase

Although the Stafford Act, in placing greater attention on mitigation efforts in order to reduce disaster losses and costs, was a step in the right direction, it was not enough to curb the upward trend of such costs. According to Godschalk et al (1999, pg 6-7), between the Stafford Act's passage in 1988 and May 1996, a total of 295 disaster declarations were made by the President, resulting in expenditures of more than $12.6 billion for FEMA public and individual assistance and hazard mitigation grants. Expenditures for Hurricane Hugo (1989) were $1.27 billion, and expenditures for Hurricane Andrew (1992) were $1.64 billion. Expenditures for the 1994 Northridge earthquake alone were $3.32 billion, and expenditures for the 1993 Midwest floods approached $900 million (Godschalk, pp 7,10).

Total insured losses caused by major natural disasters between 1989 and 1995 reached $45 billion (FEMA 1997a). Led by Hurricane Andrew's insured losses of $15.5 billion in 1992 and the Northridge earthquake's losses of $12.5 billion in 1994, these damages put serious strains on the nation's private insurance system. A number of small insurance companies went out of business, and several companies in particularly hazard-prone states discontinued hazard insurance (Godschalk et al 1999).

Disaster relief costs continue to increase. Between 1995 and 2010, costs of natural disasters have been projected to be in the range of 5000 lives and $90 billion (Engi 1995).

Between 1990 and 1999, 460 major disasters were declared, nearly double the number of Presidential declarations issued for the previous 10-year period and more than any other decade on record: and FEMA spent more than $25.4 billion for declared disasters and emergencies during the decade compared to $3.9 billion (current dollars) in disaster aid for the 1980 to 1989 period (FEMA 2000). Eighty-two percent of this relief funding has gone to disasters involving hurricanes, typhoons, and coastal storms ($4.1 billion), flooding ($2.1 billion), and earthquakes ($4.1 billion) (Mileti 1999).

Thus, the nation's vulnerability increased despite hazard-specific legislation and federal preventative programs, eg the National Flood Insurance Program and the National Earthquake Hazards Reduction Program. While the benefit of the Stafford Act had been an improved FEMA structure, more effective individual and public assistance delivery, and hazard mitigation grants to counteract rising disaster risks, the continuation of rising disaster losses and costs led FEMA to build upon the base provided by the Stafford Act to create an alternative mitigative approach.

FEMA established mitigation as the cornerstone of the nation's system of emergency management through a fundamental shift in disaster policy away from purely reactive response toward pro-active pre- and post-event mitigation. The agency recognized that it would need to lead and support the nation in a comprehensive, risk-based emergency management program. Thus, FEMA's mission as stated in its Strategic Plan (FEMA 1997b) is "to change the emergency management culture from one that reactively responds to disasters, to one that pro-actively helps communities and citizens avoid becoming disaster victims." The concept of disaster-resistant communities has become a focus for delivering FEMA programs resulting in the National Mitigation Strategy and the subsequent Project Impact Program. FEMA's revised focus upon mitigation strategies for disaster resistance through intergovernmental and public-private partnerships has improved the effectiveness and efficiency of the emergency management system in the United States. Furthermore, a wide array of other convergent events has helped propel the U S toward risk reduction by formulating new ways to reduce vulnerability.

Development of New Strategies for Reducing Disaster Losses

Indeed, a general movement toward vulnerability reduction has arisen especially since the beginning of the United Nations International Decade for Natural Disaster Reduction (IDNDR) in 1990, a theme that has prompted a wide range of projects around the world. Furthermore, academicians and practitioners alike have taken up the challenge of the IDNDR by incorporating new tools and techniques in research and in the field, thus increasing the degree of emergency management proficiency. There is progress in the coordinated effort to create integrated knowledge by sharing information and expertise across disciplines and between practitioners and researchers. For example, the Natural Hazards Research and Information Application Center has undertaken a broad discourse of vulnerability reduction and sustainability in its annual Natural Hazards Workshop and in the newly released Second Assessment of Hazards in the United States project (Mileti 1999). Each year at the workshop approximately 45 percent of the participants are academicians, 37 percent are government employees from the

federal, state, county, and city levels, 18 percent are representatives of private companies such as insurance firms, and 2 percent are representatives of non-profit organizations such as the American Red Cross.

These new trends in vulnerability reduction respond to increasing human development pressures on the natural environment which are occurring despite the fact that governments are adopting comprehensive development management plans (Murley 1999). The case of South Florida is similar to many locations throughout the US where environmental constraints (ie water shortages combined with population pressures in a hurricane prone area) continue to place larger numbers of people at risk. Such a development pattern is occurring because there are few limits on growth (Sitarz 1991). It is therefore imperative for civil society to create the means for vulnerability reduction. In all cases there must be reliable prediction, response, and recovery mechanisms, and, above all, competent development and mitigation strategies to reduce risks of disaster losses.

As a part of the recent efforts to reduce vulnerability in order to curb disaster losses, the emergency management field has been actively pursuing greater professionalism in several significant ways. In order to reduce vulnerability there must be experts who can assess local vulnerability, plan alternative ways to reduce it, and, if a disaster occurs, manage it proficiently. There is a direct correlation between mitigation strategies such as vulnerability assessments and the presence of a professionalized emergency management workforce. Thus, professionalization of emergency management is a necessary component of risk reduction.

CONCLUSION

It is notable that, throughout the last two centuries, disasters and disaster legislation have gone hand-in-hand with social development. Indirect institutionalization of the occupation of emergency management developed in incremental steps as a consequence of new societal complexities. Shifts in human settlement patterns that placed more people at risk from natural hazards and from the widespread adoption of new technologies, military and civil, which placed larger segments of the population at risk increased the complexity of hazards and, therefore, resulted in greater complexity of the emergency management discipline. As government attempted to curtail risks associated with these societal changes, personnel qualified to counteract the vulnerabilities associated with development took leadership positions, creating the current field of emergency management. Moreover, political pressures to reduce the cost of disaster response and recovery, tighter budgets, and political accountability combined to prompt emergency management professionalization (Drabek 1987, Gillespie 1991, Moore 1997, Perry 1991, Petak 1984).

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NOTES

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THE VIRTUAL EMERGENCY OPERATIONS CENTER

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QUESTIONS BY WAY OF INTRODUCTION

"Virtual emergency operations center" is gaining currency as an emerging term in emergency management. Current software is now being promoted as being able to allow the operation of a virtual emergency operations center (EOC). This is but the latest in an increasing number of uses of the word "virtual" in conjunction with the primary coordination point for business, local, and state disaster response.

Given the increasing use of the term it becomes important to ask what a virtual EOC is. How it is organized (a question that has not been fully or uniformly resolved for physical EOCs), and how work gets done within one?

CHARACTERIZING THE EMERGENCY OPERATIONS CENTER

The Physical EOC

The familiar emergency operations center is a physical facility, for many years a facility designed to confer some measure of protection against fallout (FEMA 1993), and thus often underground. The well-designed EOC achieved the ability to survive the impact of a disaster and to sustain operations through hardening, back-up systems, and the capability to feed and billet its personnel for an extended period of time (FEMA 1984).

Emergency operations centers are more than facilities, however. As an empty room they have no functionality. The ability to actually do emergency management comes from the staffing of the EOC with trained personnel who are organized to work, using standard operating procedures that ensure some level of uniformity of performance. That performance is guided by the policy direction provided by elected officials, by the jurisdiction's emergency operations plan, and by the standard operating procedures.

Perry (1991) lists a number of functions performed by emergency operations centers, as does the Federal Emergency Management Agency's EOC's Management and Operations Course (1995). When we consider the potential of virtual EOCs, four of these possible functions become of significant interest, specifically information gathering and assessment, warning, coordination, and reporting.

Defining the Virtual EOC

The problem with the term "virtual EOC" is that it can mean many things, depending upon the time of the use of the term and the person using it. In the late 1980s and early 1990s simply having computers assisting in emergency operations, and later

communicating by electronic mail, may have been sufficiently on the cutting edge to have an EOC thought of as "virtual". Considering that many EOCs today are not computerized, this may still be a possible benchmark of virtual status.

Today virtual may be interpreted as meaning that the EOC has a public presence on the Internet. The Internet may be used to provide information to the general public, and remote access to agency systems is possible for individuals working at home or other locations away from a physical EOC. It is therefore a small step for an initiative at Simon Fraser University that seeks to ". . . establish an experimental virtual emergency operations center, where wireless information networks, interconnected to other fixed and mobile networks, allow managers to remain in the information loop, either until they can reach their EOC destinations, or as a substitute for physical presence at the EOC" (Anderson, nd). A model of the future provided new software from Essential Technologies is that work can be done on a completely distributed basis without the requirement for a physical facility. (Essential Technologies 2000)

THE VIRTUAL EOC - A VOLUNTEER ORGANIZATION

In July 1999, a group of individuals organized in Virginia as a volunteer organization to establish and operate The Virtual Emergency Operations Center. This facility has developed and demonstrated a capability to provide information services to emergency management and disaster response organizations. The Virtual Emergency Operations Center uses a distributed architecture with a widely dispersed staff. Members have performed their duties during actual responses while being located in Colorado, various locations in Virginia, and London in the United Kingdom. Management of this dispersed workforce is achieved through use of the standard Incident Command System modified to suit virtual operations.

Strengths, Weaknesses, and Value Added

The strength of this system is that it is tailored to the needs of its users. For example, The Virtual Emergency Operations Center has expanded its site to meet requests for additional capabilities to provide information for Virginia Emergency Medical Services Task Forces during the development of a disaster (Kahn 2000). The current list of capabilities includes state ESF-8 situation reports, the alerting status of all volunteer teams, mission orders, a Standard Emergency Briefing, and reports from units in the field. The flow of information reduces calls to the ESF-8 staff, keeps teams that are on advanced state of readiness informed on the overall progress of the disaster, and provides the stay at home liaison officer with current information to provide to families and agencies.

This site is designed only for use by emergency management organizations; it is not widely linked and is not listed with any of the popular search engines. While this is hardly complete security, it does provide a reasonable level of assurance that the site will not become a source of misinformation or confusion for the general public and plans are in place to provide password protection to the entire site if needed. Some features, such as the incident log, are already password protected.

The architecture of the Internet provides the site some degree of inherent survivability. Not only is the primary site hosted on a commercial hosting service located outside the organization's primary Virginia service area, but a backup site is also located on a dedicated server in Colorado. There are, however, limitations to such facilities; if local telephone and wireless data services are disrupted, site access or Internet access may be denied(Wybo 2000). This suggests that the primary value of the virtual emergency operations center concept may be at the state or national organizational level.

The weaknesses of this approach are primarily related to personnel issues. A virtual emergency operations center requires individuals who are both adept at the use of the Internet and the use of other forms of electronic communications and also fully qualified as emergency managers. Because communication is entirely electronic, a higher degree of proficiency is required than is common in most emergency operations center staffs. This creates a requirement for continual exercises to ensure currency of skills (In the first year of its existence, The Virtual Emergency Operations Center conducted or participated in 10 exercises).

The primary value that The Virtual Emergency Operations Center adds to its clients' operations is the ability to widely and rapidly disseminate information to people who are not located in a physical emergency operations center, but who require access to its information. This reduces the telephone traffic in the emergency operations center, and allows units on standby to have a complete and current situation picture. The next step in this process is the development of evaluated and fused information (fusing is a process of consolidating information from all available sources) to support both field units and the support emergency operations center.

The Technological Solution

The emphasis in phase one of the development of The Virtual Emergency Operations Center has been on the use of simple technology and commercially available software in a building block approach. The primary Internet site is hosted at Tripod, a commercial site hosting operation. Chat capability, used for on-line staff meetings by the staff; bulletin board software, used for an on-line incident log; and a listserv, available for users to provide archived automated electronic mail distribution were all selected from commercial sources available on the Internet. This approach reduces costs to a minimum, reduces risks by distributing functions among a variety of vendors, and uses services that have incentives to have relatively robust operations. In developing this architecture, the basic approach has been to find products that emulate processes for communications and information handling used in typical emergency operations centers.

Personnel

The Virtual Emergency Operations Centers staff is all volunteer. Individuals are recruited without regard to geographical location. Although most members are located in Virginia, one resides in Colorado. All have prior experience in emergency response - in emergency management, search and rescue, firefighting, or the emergency medical services. A formal training program is used to initially qualify individuals, including standard National Wildfire Coordinating Group Incident Command System training, and

half the members hold state emergency management certifications in Virginia's Emergency Management Professional Certification program. All are familiar with the electronic office environment. Most important is that all have an interest in experimenting with better ways of performing emergency management functions.

Processes

The staff is organized in a standard Incident Command System structure with the size of the staff on a particular incident expanding or contracting as needed to meet the workload. All products are prepared for clients in much the same way that documents are produced in the Incident Command System. Each staff member writes his or her portion of the document based on a standard list of areas of responsibility (see Table 1 for an example), and the lead staff member produces a finished copy for posting on the site or for transmission by e-mail to a distribution list. The source of information depends on the product needed and may include information provided by the client or information gathered from outside sources.

Table 1. Situation Report Preparation Responsibilities

Report Section:	Staff Member Responsible:
1. Status	Operations Section Chief
2. Mission	Operations Section Chief
3. Level of Effort	Resources unit Leader Supply Unit Leader Facilities Unit Leader
4. Current Internet Sites	Operations Section Chief
5. Incident Situation	Situation Unit Leader
6. Served Organization Status	Situation Unit Leader

Source: The Virtual Emergency Operations Center, Virtual Incident Command System Field Operations Guide, Glen Allen, VA, The Virtual Emergency Operations Center, 1999c.

Documentation

Procedures in use in the Virtual Emergency Operations Center are documented in a Virtual Incident Command System Field Operations Guide (1999c) that mirrors the standard Field Operations Guides produced for the wildfire community (California Department of Forestry 1983, FIRESCOPE California 1996). Skill performance standards books are being developed to serve as the basis for formal qualification in duty positions. Documents used during operations, including a warning order, mission order, incident action plan, and situation report, are available as word processing templates (The Virtual Emergency Operations Center 2000b). The use of templates speeds up the exchange of information and helps to ensure a uniform product for each document.

Clients

The Virtual Emergency Operations Center currently supports the Coordination Teams, Emergency Medical Services Disaster Task Forces, and the Critical Incident Stress Management Strike Teams of the Virginia Office of Emergency Medical Services. It provides similar support to the Virginia Voluntary Organizations Active in Disaster, including the preparation of their situation report. To date, this support has included operations during three disaster events, Hurricanes Dennis and Floyd and the Y2K Rollover (The Virtual Emergency Operations Center 1999a, 1999b, and 2000a).

CONCLUSION

The Virtual Emergency Operations Center as an organization offers one small and successful example of how to operate an emergency operations center in a virtual environment. The degree to which virtual operations are desirable or practical depends on the organization, its service area, and its mission. Although this example is a stand-alone facility, in other cases a virtual interface is allowing a state emergency operations center to explore ways to improve the receipt of reports from field locations (Fugate 2000). The critical factor is not the technology, but rather how we find ways to organize people and processes to better perform emergency operations center functions using the capabilities facilitated by the virtual environment.

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NOTES

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This 2022 reprint is compiled
by: DisasterCom World Press
P.O. Box 336364
Greeley CO 80634
www.disasters.org

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