The ASPEP Journal 1999

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, 2000 for papers to be included in the 2000 *Journal* which will be published in November, 2000. 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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The Journal of the American Society of Professional Emergency Planners

1999

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A NEW RISK: THE CRASH OF A BULLET-TRAIN
Experiences from the German ICE Accident, June 3, 1998

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On June 3rd 1998 a high-speed ICE[2] train derailed and collided with a highway overpass in Eschede, northern Germany. The catastrophe occurred at a speed of 120 mph and claimed the lives of 101 people. Another 108 people were injured, most critically, and only 5 survived unhurt. In the first hours, 1889 emergency workers with 400 vehicles and 39 helicopters responded to the accident site in the remote town of 6000 citizens. The salvage and body recovery operations took nearly a week. The media's presence and the coverage by national and international representatives was unexpected and overwhelming.

This paper describes impacts, challenges, and demands on the affected town (Eschede) and the county administration (Celle), as well as their communities. Their real life experience can be used as a blue print for emergency planning, especially in remote and rural areas.

INTRODUCTION

Since 1991, major cities in Germany have been connected by a system of high-speed trains, called ICE. ICE trains had transported more than 130 million passengers without serious accidents. Their top-speed can reach 175 miles per hour.

The train set consists of two electric-powered locomotives (one at the front, one at the rear) and 12 passenger cars with a total passenger capacity of 750 people. Each passenger car is 95 feet long and the length of the train is 410 meters (1300 feet). The complete train weighs approximately 800 tons.

SAFETY ASPECTS

ICE trains are inspected on a regular basis. According to a serious news-magazine (*Der Spiegel*), this specific train was audited by computer the night prior to the accident, as part of a regular maintenance schedule.

In a German high-speed train, every coach has two pivoting wheel assemblies or trucks, one on each end of the car. Every wheel assembly or truck has two fixed axles with one wheel on each end, that is four wheels per assembly. On top of each wheel is a metal sleeve. The sleeve is used for improving the passengers comfort.

In the Inspection Center, 48 sound-resonance sensors measure each wheel's outer diameter and the thickness of each sleeve. The diameter of every wheel is 93 cm (37 inches). The sleeve is only 6 cm (2.36 in) thick, giving an overall outer diameter of 99

cm (about 39 inches). The acceptable tolerance is +/- 0.6 mm (3/1000 inch). One wheel on the train that derailed showed a variance of 1.1 mm (1/200 inch). The safety engineers believed that this variance would cause some vibration, but would only affect the smoothness of ride. Even if it was clearly out of tolerance, it was not expected to be unsafe.

All procedures and performances associated with this accident are still under criminal investigation. There is no final report as of yet.

ACCIDENT SEQUENCE

The ICE train was travelling at approximately 120 mph through the rural and flat area of Lower Saxony. About 3 miles prior to the crash site, a rear wheel of the first passenger car failed. The wheel rim or metal sleeve began to break off from the wheel. The remainder of the rim struck the tracks. Some passengers in the first car could hear noises and felt vibrations beginning two minutes before the crash, however, there was no monitoring system to alert the engineer about the wheel failure.

The train traveled nearly 3 miles with the damaged wheel. Two hundred meters (200 yards) before a bridge, the train approached a track switch at a turnout. At this turnout the broken wheel rim, still hanging on the track brake, collided with a guide rail. As a result of the impact, the rear left wheels of passenger car no. 1 derailed.

One hundred and twenty yards later the derailed truck hit the next turnout switch. The derailed wheels caused the open switch point to close against the running rail lining. Passenger car no. 1 went straight through the switch, followed by car no. 2. The front wheels of car no. 3 followed as well, but the rear wheels diverted to the siding track and derailed. This occurred 80 meters prior to the highway overpass.

The trailing end of passenger car no. 3 hit the concrete bridge and knocked out the support columns. This caused the 300-ton overpass to collapse. As the train was still running at 50 meters per second, cars nos. 3 and 4 were able to go through the falling bridge, but the middle of car no. 5 was crushed by the collapsing bridge and torn apart. The rear end was buried under the 300 tons of concrete debris. Passenger car no. 6 turned sideways across the track in front of the barrier. The following six passenger cars, nos. 7 through 12, and the rear end locomotive, hit the blockade with full force (at 120 miles per hour). The unbelievable power piled the train up in accordion fashion and pressed everything together. Passenger cars nos. 6 and 7 were partially buried and crushed by the bridge debris.

Sometime during the accident sequence, the front engine separated from the rest of the train. The locomotive had passed without any damage and came to a rest 2 miles ahead of the accident site. The stop was initiated by an automatic emergency braking system. Only then did the engineer realize the situation.

Cars nos. 1, 2, and 3 derailed and skidded along the tracks but didn t fall over. Car no. 4 slid from the railroad embankment into a wooded area and fell on its side. Car no. 5 was torn up in the middle; the first part passed the overpass, while the rear part was

buried under the debris.

This was the situation at 10:59am in the remote town of Eschede (6000 people, no industry, and no freeways).

RESPONSE AND RECOVERY OPERATIONS - OVERVIEW AND SUMMARY

The incident's response activities are divided into four phases:

Phase I - Wednesday, June 3 from 11:00am to 3:00pm:
Dispatch of emergency personnel and equipment, search and heavy rescue operations, extrication of trapped victims, triage-treatment-transport of the injured, and coordination of responding agencies (190 military personnel with heavy equipment and helicopters, 726 fire personnel with fire vehicles, 514 medical personnel with 19 EMS helicopters and 98 ambulances, at least 40 physicians).

Table 1
Response Personnel and Equipment
Initial Phase - Wednesday, June 3 from 11:00am to 3:00pm

Agency	Personnel	Vehicles	Helicopters
State and Local Police	85	20	1
Federal Police	113	37	8
Fire	726	108	-
EMS	91	22	13
Volunteer EMS Squads	423	102	-
Military	190	34	17
Federal Volunteer Rescue and Salvage Organization (THW)	123	16	-
Command Post (TEL)	25	5	-
Others (ie, cranes, railway company)	113	10	-
Total	1889	354	39

Phase II - Wednesday, June 3, from 3:00pm to Thursday 12:00pm:
Secondary search operations, logistics, body recovery, dealing with the media and first press-conference, replacement of first responders, registration of fatalities, injured, and uninjured train occupants, taking care of relatives and starting on-site stress debriefings.

Phase III and IV - Thursday, June 4, at 12:00pm to Saturday, June 6, 7:00am: Body recovery, accident investigation, public relations (more than 200 journalists have arrived), dealing with high profile politicians at the site, logistics, collection of private baggage, salvage of the wreckage, search for body-parts.

Friday, June 5: Four additional bodies found and recovered. In the end, 96 bodies were recovered, many needing to be identified by dental or DNA records. The investigation proved that these persons died on initial impact.

Saturday, June 6 at 7:00am: Command of the accident scene is passed over from fire to police.

EMERGENCY MEDICAL SERVICES ACTIVITIES

Emergency Medical Services (EMS) is organized by the county and provided by two private EMS companies. At that time, EMS had its own dispatching center, independent from the fire dispatch. The county of Celle has seven full-time ALS ambulances (one of them stationed in the town of Eschede), three day-time BLS ambulances, and one full-time emergency physician squad.

In Germany, France, Belgium, Austria, and some other countries, emergency physicians are part of the on-scene EMS. They are provided by the emergency departments of local hospitals and trauma centers. They go on-scene with an ALS ambulance or with a specially equipped medical-squad vehicle.

The initial dispatch at 11:03am consisted of five ALS and three BLS ambulances, one emergency physician squad, and two ambulance helicopters stationed in other counties.

Minutes later, the first paramedic arriving on scene reported the extent of the catastrophe. The dispatcher then:

- Asked other dispatch centers of neighboring counties for additional resources,
- Alerted volunteer ambulance and EMT squads within the county,
- Requested additional emergency physicians from the county hospital to the scene (within one hour, 14 physicians from that hospital had arrived), and
- Informed the state headquarters of volunteer EMS organizations (ie Red Cross).

At 11:19, the medical director of the county EMS arrived on scene and assumed command as Medical Leader and organized all EMS activities.

EMS helicopters, volunteer organizations like the Red Cross, German and British military physicians and EMTs, and volunteer EMS squads were notified or heard about the catastrophe. They all rushed to the scene - sometimes with their own agenda.

"Freelancing" is a cultural attitude of EMS. Ambulance units are generally accustomed

to working independently on a day-to-day basis. Their focus is to care for individual patients exclusively; therefore, integrating EMS units within a larger incident command structure is always difficult and requires training.

Trauma teams (emergency/surgery physicians and skilled paramedics) came from the county hospital in Celle (15 miles away), the medical university in Hannover (40 miles away), and trauma centers in Hamburg (100 miles away).

At 12:05pm, helicopters began to evacuate the most critically injured.

At 1:45pm (less than 3 hours after the accident), all but one of the more than 100 injured people were en route to hospital treatment by 60 ground ambulance transports and 27 helicopter transports. The patients were transported to 23 hospitals within a 100-mile radius, thereby avoiding patient overflow of any individual emergency room. Emergency physicians escorted and treated critical patients en route.

Considerations and Lessons Learned

Points that emerged from the EMS experience with the ICE accident included:

- Physician teams from regional trauma centers with a high-level of training and with skills in triaging and treating mass casualties can be a beneficial factor.

- Work relations and a knowledge of specialists' capabilities from other jurisdictions should be established. Standard procedures regarding their notification and transportation to an accident location should be devised.

- Volunteer rescue and ambulance groups in rural and remote areas are an ideal resource in addition to the existing EMS.

FIRE ACTIVITIES

The county of Celle has volunteer fire departments in every town and every city. The nearest career fire department is located in the city of Hannover, about 50 miles to the south. Volunteer fire departments have the same training and equipment as their paid colleagues.

The volunteer fire department of Eschede responded initially, as well as the county fire chief. After hearing the first radio reports, he requested the assistance of all fire departments in the county with rescue and extrication equipment, as well as mutual aid companies from neighboring counties. In addition, the paid fire departments of Hannover and Hildesheim responded, as well as the state fire college.

Seven hundred twenty-six fire personnel with 108 vehicles arrived in Eschede on the very first day. During this first day, their main tasks were:

- Rescuing injured survivors (often in confined-space and heavy rescue environments).

- Searching for victims in the buried and crushed cars.

and in the following days:

- Recovering bodies and body parts.
- Supporting salvage and train recovery operations.
- Lighting the accident site.
- Escorting traffic and transporting incident personnel.
- Staffing and maintaining the fire command post.

Problems in Technical Rescue

Technical rescue operations were hampered due to the unidentifiable material/ construction of modern high-speed trains. Pressurized windows were virtually unbreakable even with sledgehammers. Extrication tools like saws and jaws-of-life slipped on the polished skin of passenger cars.

Even today, one year after the catastrophe, the German Railway Transportation provider (Deutsche Bundesbahn AG) does not provide any educational materials or training courses on technical rescue to fire and emergency services.

Heavy concrete sections of the collapsed bridge had buried at least two cars (nos. 5 and 6). Parts of this debris weighed over 150 tons. To gain access to search the cars, heavy cranes had to be requested from private companies.

Considerations and Lessons Learned

Points that emerged from the fire service experience with the ICE accident included:

- Make sure that your Emergency response teams are familiar with trains that run through your jurisdiction.
- Make sure that your Emergency response teams have adequate equipment to meet the hazards (ie, a modern Diesel locomotive contains 2500 gallons of Diesel fuel. In the case of a fire, an abundant amount of foam is necessary to extinguish this life threat.

MILITARY

The German armed forces responded from nearby bases with 190 soldiers; of these 56 were EMTs and 28 were physicians. They also provided 19 helicopters, 31 vehicles, and three salvage tanks.

One helicopter worked as a relay station/mobile control tower and coordinated all helicopter activities from civil EMS agencies, federal and state police, as well as the military. All helicopters worked on a common VHF channel but often had no

communications with the incident commander.

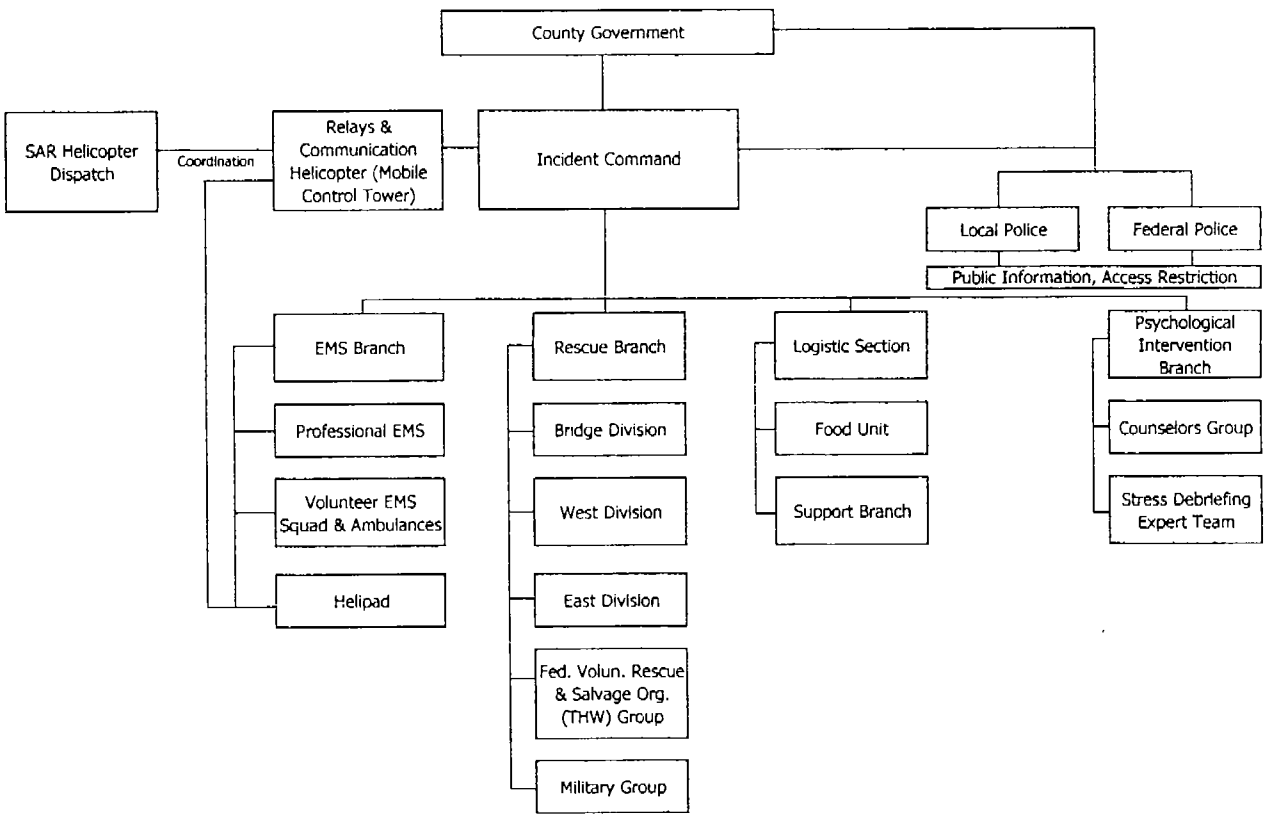
COORDINATION AND COMMAND

In the initial phase, coordination and command and control was mostly improvised. The Incident Command System (ICS), as used in the US, is unknown in continental Europe.

The county fire chief and the county EMS director established a temporary command post at the scene. From there, they organized two sectors for search and rescue, extrication, triage, and treatment and transport. The first sector (West) consisted of cars nos. 1-3 (derailed, but not overturned), car no. 4 (derailed, overturned, and crashed off the embankment in a wooded area) and the front part of car no. 5 (mainly destroyed). The second sector (East) consisted of the collapsed bridge and crushed cars nos. 5-12.

A unified command structure was established at 3:00pm (Figure 1). A final command base with facilities from fire, federal and state police, and for media relations was set up about 500 yards away in a parking lot adjacent to public facilities.

Figure 1
Incident Command Structure beginning 3:00pm, June 3



Periodically, briefings occurred in a 1 or 2 hour term. All agencies involved in rescue and recovery operations participated. Decisions and assignments were handled as a team.

At 2:00pm, highly sophisticated communications vehicles and a mobile command post arrived from the disaster management agency of a neighboring county. They were completely staffed with experienced incident command technicians and had set up by 3:00pm. Until then, communication was weak due to the lack of adequate equipment. The county fire chief as incident commander, worked from smaller command vehicles without fax or copy machines. There was no direct radio communication to the military or to some of the other agencies. Fire and EMS radio channels were jammed and cellular phone nets broke down completely.

A Problem with Functional Identification

Coordination was also hampered by unclear identification. Many EMS physicians were wearing uniform jackets with the functional identification label "medical leader" because they had this role in their own jurisdiction. The same problem occurred with vehicles marked "Fire Chief" and "Commander", and it was therefore frequently difficult for arriving units to locate the Incident Commander or the EMS leader in order to receive assignments. Some units, especially EMS, never did report to the incident commander.

Considerations and Lessons Learned

Points that emerged from the coordination and command and control experience with the ICE accident included:

- Make sure command staff is easy recognizable and locatable. Colored vests with functional descriptions are the best way to make that happen. They can be worn over protective clothing and changed if necessary.

- The command post should be well marked (ie, through such items as a colored balloon; industry can even provide special balloons that are self-illuminated at night).

FATALITY MANAGEMENT

A total of 103 persons died in the crash, 98 on initial impact and five later in the hospitals. Many bodies were so mutilated that they needed to be identified by specialists. For this reason, the District Attorney requested an autopsy of every victim.

Bodies and body parts were recovered by volunteer fire and EMS personnel, put into body bags, and transported to the Medical University of Hannover. This institution was the only facility within that region capable of handling that number of victims.

It is still under discussion whether it was acceptable to let young volunteers carry out the gruesome task of body/parts recovery. Unfortunately, DMort teams are unknown in Germany. The author strongly believes that the number of casualties and their injuries will have a traumatic impact on every recovery worker, one that cannot be erased by

critical incident stress counseling. Such tasks should be fulfilled by experienced and prepared specialists.

Although Germany has no body recovery specialists, it does have a sophisticated federal expert team for body identification. It consists of specialists from the Bureau of Criminal Investigation (BKA) and was founded in 1972. Since then, they have responded to the aftermath of 18 airplane crashes, explosions, and terrorism incidents and have positively identified more than 1100 bodies.

All deceased persons from the ICE crash were finally identified on June 15, 1999 less than two weeks after the catastrophe.

Considerations and Lessons Learned

Points that emerged from the fatality management experience with the ICE accident included:

- A Mass Fatality program, including capable personnel and equipment, as well as refrigerated and secured facilities, should be part of the Disaster plan.

- Procedures should ensure a dignified handling of bodies and body parts, and should involve ministers of religion to give the last blessings.

LOGISTICS

Some of the logistics needs of the 1889 emergency responders who responded on the first day and the many others who were involved on following days were:

- Food, water and beverages, rehab areas.

- Restrooms and sanitation areas.

- Ground transportation and fuel.

- Meeting space and equipment.

- Means of communication.

Traffic Directions

An efficient traffic direction system was organized from the early beginning. Police, local firefighters, and public works awaited incoming fire and emergency vehicles from other cities and counties at a major highway intersection. The mutual aid services were then escorted to staging areas or the two established scene sectors.

Considerations and Lessons Learned

Points that emerged from the logistics experience with the ICE accident included:

- Access will often be a challenge even within city limits. To avoid congestion, it is essential to implement a traffic direction system as soon as possible (one way in,

one way out).

DOCUMENTATION

Documentation was initially neglected. EMS focused on treatment and distribution of patients to hospitals/trauma centers appropriate to their injuries. Unfortunately, nobody kept track of patients' names nor their destinations.

It took time to identify all fatalities due to the mutilations. Because nobody kept track of the survivors, many relatives could not receive information as to whether their loved one was injured and in a hospital or dead. The hospital location of surviving patients, especially the unconscious ones, could often not be determined.

Considerations and Lessons Learned

Points that emerged from the casualty documentation experience with the ICE accident included:

- To avoid pain and confusion and to ensure safety (especially in criminal/ terrorism events) names and hospital/shelter destinations must be documented from the very beginning. This task can be delegated to police or administrative personnel if Fire and EMS workers are tied up with emergency operations. An EMS transportation officer/supervisor should be in charge of comprehensive documentation and should be designated as soon as possible.

- A program should be implemented that documents patients received by hospitals. Unconscious patients can be photographed and the pictures sent to the information facility of the command post.

POLICE ACTIVITY

State and local police, as well as federal police (BGS) responded. State/local police were in charge of public safety, while federal police were in charge of the railroad track system, which is federal property. The railway provider, Deutsche Bundesbahn AG, is a private railway transportation provider using federal railroads.

In addition to standard police tasks (traffic control, restricting on-site access, documentation, criminal investigation, etc), the police were also in charge of dealing with the media on-site. Media were initially ordered to gather at the Eschede train station, about one mile away from the crash site. At this location, up to seven police PIOs gave interviews and provided information for up to 250 media representatives. Later, this police division moved to a trailer at the command base, equipped with phone lines, faxes, PCs, etc, and continued the press work there.

MEDIA/PRESS RELATIONS

The county government was in overall charge of handling the media. Nearly 250 media representatives and camera teams showed up immediately after the news broke.

Considerations and Lessons Learned

Points that emerged from the media/press realtions experience with the ICE accident included:

- A public information officer (PIO) has to be assigned as soon as possible.
- A PIO in charge of a catastrophic event needs to be trained in dealing with large numbers of media representatives.
- There needs to be a clear agreement between all parties as to who will be disclosing which particular details during the different phases of the incident. Varying messages from different speakers (police, fire, government, railway provider, etc) can cause negative publicity. In the initial press conference every agency should be involved with their PIO.
- Languages: a PIO with specific language skills must be available. An incident involving people with Latin American heritage will attract Spanish-speaking media; the crash of an French aircraft will need French language skills, etc.

CRITICAL INCIDENT STRESS DEBRIEFING

An organized Critical Incident Stress Debriefing (CISD) policy is not existent in Germany. Some local organizations have implemented individual projects in order to assist emergency responders as well as victims and relatives.

At Eschede, it was obvious that counseling was needed due to the:

- High number of victims (injured and dead),
- Totally destroyed and mutilated bodies,
- Trauma and mutilation injuries of survivors,
- Injured and deceased children,
- Accident location (remote areas with no multi-casualty experience).

Counseling was needed for:

- Victims and their relatives,
- Local volunteers,
- EMS and fire personnel,
- Police and Salvage workers.

On-scene consolation and psychological assistance was initially provided by a group of

local pastors. A few days after the crash, an organized coordination program involving experts from different groups (ie Red Cross, volunteer EMS, clinical specialists, Fire Department Counselors) was established. They contacted fire , EMS, and police departments that had responded to the crash site and introduced the defusing, debriefing, and counseling services. The program was quickly accepted and showed a tremendous need for this kind of post-traumatic stress management.

Considerations and Lessons Learned

Points that emerged from the CISD experience with the ICE accident included:

- Critical Stress Debriefing and crisis counseling need to be pre-planned as part of the standard emergency operations or recovery plan. It should become part of everyday emergency operations. Crisis counseling should cover: citizens and volunteers; EMS, fire, and police responders; victims and relatives.

- On-site counselors must be part of the on-scene activities and work under the coordination and control of the Incident Commander. Freelancing of "independent" counselors must be avoided.

- On-scene crisis counselors must be certified and trained in on-scene stress debriefing and must have an understanding of the ICS.

- Counselors should be available on scene, especially for victims and relatives.

- Counselors should not intervene with emergency responders during their activities.

COUNTY ADMINSTRATION OF CELLE

The county administrator was in charge of emergency management and operations, as required by state law. The county opened an information center (set up similarly to an Emergency Operations Center) in the administration building soon after the accident. Their main focus was on gathering and providing information, as well as providing logistical support for on-site activities. Phone lines were set up and staffed to provide information to the media, to relatives, and to other governmental agencies. Press releases were also compiled and distributed from the center via fax and mail.

In the first days, this information center had to be staffed 24 hours a day. A lack of experienced and trained personnel able to work in this pressured environment was discovered. Due to the need of 24 hour-a-day staffing, and necessary replacements, it was a challenge to fill the positions needed.

The incident impacted most divisions of the county administration. It took some time before the County was able to return to routine administrative work.

COMMUNITY IMPACT (TOWN OF ESCHEDE)

The town mayor arrived at the site 10 minutes after the accident. He saw many

residents assisting victims and supporting the efforts of emergency responders. The mayor realized that the primary task for the city government would be to provide logistics support to the emergency response and recovery operations. The magnitude of the incident required space, first of all. Public facilities (including the city hall, a public works garage, and a school with two gymnasiums) were in one location about 500 yards away from the accident site.

School sessions were cancelled and students were transported home by buses. Gymnasiums were initially prepared by city workers for the admission and treatment of injured persons. Due to the fact that all injured passengers were en route to hospitals within three hours, the hall was later used for responding personnel.

Immediately after the accident, locals rushed to the scene to help, comfort, and assist the accident victims. There were no bystanders. Other residents went to city hall to assist in logistics operations such as food preparation.

SPECTATORS/DISASTER TOURISM

After a couple of hours, a wide perimeter was set up with access restricted by police check points. This procedure continued during the recovery, salvage, and investigation operation for more than a week. The barriers prevented voyeurs from reaching the crash site.

After police finally vacated the site, streams of onlookers flocked into town. They not only visited the crash site, but also approached locals on the streets. They even had the audacity to ring houses with a barrage of questions regarding the catastrophe for the already beleaguered residents.

STREET LINKAGE

The accident destroyed a highway overpass. The collapsed bridge was the only paved road that provided access to the town's surrounding neighborhoods. The only other link to public streets led through a three-mile stretch of an unpaved forest track. The need for repair of this access route with loose gravel was determined the day of the accident and subsequently a contractor was hired to enable temporary use by cars.

Even today, more than one year after the catastrophe, the people of the affected neighborhoods still have to use the temporary access route. Plans have been made rebuild the bridge, but construction has not yet begun.

SOME FINAL CONSIDERATIONS

Points that emerged from the experience with the ICE accident included:

Since April 25, 1853, train disasters have become common. On that day, the first train catastrophe occurred near Chicago, Illinois. In the two train collision, 21 people were killed.

Since then, the US and other parts of the world have experienced train crashes in densely populated areas such as Chicago (October 30, 1972); remote areas such as Kingman, Arizona (August 9, 1997) and Bourbonnais Township, Illinois (March 15, 1999); and in nearly inaccessible areas such as the bayou near Mobile, Alabama (September 22, 1993). During the final preparation of this paper in the first days of August 1999 two trains collided in India, killing at least 300 people and injuring nearly 600.

Accidents can occur in low-visibility weather conditions (snow, fog) where there is no possibility of using helicopters, or in bad weather, or where temperature extremes can hamper rescue work. Train accidents have always been highly challenging for emergency management. They can combine search, limited access, fire and explosion, hazardous material, heavy rescue, confined space, extrication, water rescue and multi-casualty incident problems in one event.

High-Speed/Bullet Trains (Shinkansen) were first brought into service in Japan in 1964. The latest bullet train there has a capacity of nearly 1300 passengers and travels as fast as 177 mph. High speed train service, designated *Acela Express*, will be introduced in the Northeast Corridor of the United States between Boston and New York and between New York and Washington sometime in the year 2000.[3]

The German ICE crash is the first of its kind. Like the first passenger jet crash, it was unexpected and opened a new era of transportation disasters. The crash at Eschede will be the forerunner of new risks for emergency planners and managers.

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NOTES

1. Gunnar J Kuepper is Chief of Operations with Emergency and Disaster Management Inc. This independent agency advises private, industrial, and governmental organizations worldwide in state-of-the-art emergency and crisis handling. Gunnar J Kuepper is a member of numerous professional and Disaster Relief Organizations (ARFFwg, IAFC, IAEM, NFPA, Advisory Board of the Los Angeles NSC, WADEM, etc.) and serves on the Technical Committee of NFPA 1600 "Disaster Management".

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2. ICE stands for InterCity Express. The English term and its initials are used in many European languages for a variety of high speed trains. Many of these trains now have a maximum speed of 300 km/h or about 185 mph. In Germany, ICE refers to a series of trains, all of which run at high speed but which have a variety of consists and capacities. This accident involved an ICE 1.

Many of the high speed trains now run on specially constructed roadbeds, but share the right of way with regular rail traffic close to major cities. Accident rates have been very low and most accidents have taken place in locations where the high speed trains were using the same tracks as regular traffic and where they were operating well below their high design speeds. In other words, they were 'traditional' accidents and had little to do with increased speed. Many accidents which took place occurred at grade crossings. Because of designed impact deformation, equipment has been written-off but passengers rarely suffered serious injuries - until the accident at Eschede. /ed.

3. The initial 20 *Acela Express* trainsets will consist of an electric engine at each end, a first class car, four coaches, and a Cafe/Bistro car and will carry over 300 passengers. Manufactured in Barre, Vermont and Plattsburg, New York by a consortium lead by Bombardier and ALSTOM, they will use 'tilt' technology to maintain speed through curves and will operate at speeds of 240 km/h or 150 mph (maximum operating speed is 265/165). To judge the effect of this operating speed note that the time for the trip from Washington to New York will drop from 3 hours to 2 hours and 30 or 45 minutes, depending on the service. From New York to Boston the time will drop from 4 hours, 30 minutes to 3 hours. Greater benefits will accrue on the Boston segment because the *Acela Express* trainsets will be able to take the numerous curves there at higher speed and because the eastern portion of the route is being electrified, eliminating the need to change engines. The *Acela Express* equipment will replace the *Metroliner* equipment now in use in the NE corridor primarily between Washington and New York.. The *Metroliner* equipment, while traditional in appearance, is capable of running at relatively high speed (120 mph), and after being refurbished will be used for *Acela Regional* and *Acela Commuter* service, raising the speeds on those services.

Acela Express service was to begin in late 1999 or early 2000, but in September 1999 it was announced that excessive wheel-wear on the train-set being tested in Pueblo, Colorado would delay the introduction until the problem was identified and fixed. /ed.

THE INTERNET: GLOBAL COMMUNICATIONS TOOL OF CHOICE

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INTRODUCTION

The world has learned through disaster experience that all mankind shares the same risks, threats, and problems. National governments and disaster-related organizations agree that the escalating costs of disasters in human suffering and in loss of life and property are something that we can no longer afford or tolerate. At the same time, communications to link the human race together have improved as never before.

This paper explores why the Internet is such an effective communication tool for disaster management and other global issues of concern today while looking at some of the more progressive, creative, and futuristic uses of the technologies associated with the medium.

DEADLY DEVASTATING DISASTERS

Disasters are hard task-masters. Experience teaches us that the world shares the same risks, threats, and problems. Today's telecommunications and satellite images make each disaster a visual reality in our living rooms. Because the visual coverage is good and immediate, we may feel that the collective disaster frequency and magnitude are worse than in the past, and that we are not very effective in doing anything other than picking up the pieces. While we all agree the escalating costs of disasters in human suffering and in loss of life and property are something we can no longer afford or tolerate, we may also feel some frustration at the world's overall lack of preparedness and mitigation efforts. No doubt, the communications to link the human race together as never before have increased tremendously. We still struggle, however, with the need for adequate, effective dissemination of information to sell disaster preparedness and prevention as concepts that every government, business, and individual citizen will buy and implement to assist in solving the collective problem. Public information campaigns through television, radio, hard-copy news, and public speaking engagements abound and reach targeted audiences. School and community programs effectively recruit and train a substantial number of citizens of all ages. For the most part, however, the masses still remain unprepared due to daily schedules of work, business, and personal lives. Public information specialists realize that it is difficult to draw large numbers of citizens to a pubic assembly or to a radio or television hazard-specific program, regardless of the message, when family, social, and recreational activities call at the end of the day.

INTERNET USERS ARE GROWING

Can we consider the Internet a global tool for getting the disaster preparedness and prevention message out to the masses? Can the disaster or emergency management

community be better prepared professionally through electronic networking, sharing, and training? Yes. From the beginning, the Internet has been touted as the first truly planetary communications mechanism. The Internet is growing so rapidly that user statistics change from one hour to the next. Until recently, the majority of Internet growth was in the United States. The *Computer Industry Almanac* states that 52 percent of the planet's 148 million regular Internet users live in the US. Internet demographics are now shifting away from the US, however. The number of users is expected to be 320 million by the year 2002, but the US share of Net users will have dropped to 29 percent by the end of 2005. The growth will likely be concentrated in Europe and the Asia-Pacific region. This year, 1999, is predicted to be a very big year for Internet growth in Europe.

Growth in Internet use is currently quite astounding in Latin America, as well. For example, Internet users in Latin America increased by almost 800 percent from 1995 to 1997; this is nearly double the average worldwide growth rate. According to a survey by Nazca S and S, the Latin American division of Saatchi and Saatchi Worldwide, the numbers are impressive - from 800,000 in 1995 to 7 million in 1997 with predictions of 34 million users by the year 2000.

With millions of users coming on-line, e-commerce is booming. Last year, 1998, was a wonderful growth year for Internet commerce with sales totals being triple those of 1997. E-commerce has come into its own and predictions say 1999 sales will be double last year's. At the same time, the banking industry is coming on strong with on-line services. There are lessons in these success stories for the development of a global disaster information network.

These statistics spotlight an incredible and accessible tool available to much of the emergency management community. One can accurately say, at any given moment, there are hundreds of thousands of computers connected to the Internet. The greatest advantage of the Internet is that it provides access regardless of time zone, location, or culture. Where else can a user communicate with those with common interests and issues? How could anything be more affordable or convenient to enable a seeker to gather the latest information, discuss a problem with known experts, and share one's own experiences? And all from the user's desktop at one's own time and convenience.

INTERACTION VIA THE INTERNET

Another wonderful thing about the Internet is the various means of interaction now available to promote networking and sharing of information. Society is becoming as reliant on e-mail as on the telephone and facsimile machine. Mail lists, discussion groups, and live on-line dialogues also provide interaction and ongoing exchange on many subjects. Mail lists go directly to the subscriber via e-mail and therefore spark immediate reaction because it is so easy and practical to respond to the latest e-mail message. Various discussion groups, similar to bulletin boards, require a little more effort as a rule, but promote interaction and sharing with topic-specific focus; this means is especially effective for sharing documents and for stimulating discussion and debate. Live on-line chats have been around for several years, but recent advances in chat software make them far more attractive for real-time discussions. In some cases,

on-line discussions with audio are being used quite successfully and video conferencing will eventually be commonplace.

More and more virtual conferences utilize one or more of the interactive modes discussed above to create dynamic exchanges with conference participants who are on-line from their desktops. For example, the Organization of American States (OAS) Sustainable Development and Environment Unit hosted their first Virtual Conference on the Hemispheric Plan for Disaster Reduction of the Education Sector in the fall of 1998. This virtual conference was accomplished through the Emergency Information Infrastructure Partnership's (EIIP) *Virtual Forum*. As a result, this OAS group now meets on-line quarterly for live discussion in English and Spanish to brainstorm certain issues while also maintaining contact and momentum with constituents via a mail list devoted to their subscribers and specific interests. This virtual conference, follow-up on-line activities, and the annual *Virtual Conference of the International Decade for Natural Disaster Reduction* (IDNDR) are also excellent examples of the speed, flexibility, and global outreach of this medium. Ongoing and upcoming conferences and dates are listed on the *Virtual Conference Center* and may be found on the Web site at: <http://www.mcb.co.uk/services/conferen/>.

THE EIIP

The EIIP was established for the purpose of networking, sharing, and informing regardless of time and space. The EIIP is a voluntary association of organizations and individuals seeking to enhance their effectiveness in coping with disasters and emergency situations by exploring the opportunities for sharing information and ideas which has been made possible by electronic technology. The Partnership believes the Internet and World Wide Web are global tools which can benefit the emergency professional community in a united and coordinated manner. The EIIP promotes disaster prevention along with the other functions of emergency management through its primary focal point, the *Virtual Forum* Web site at <http://www.emforum.org>. The *Virtual Forum* provides the latest information from experts in emergency management and related disciplines.

FIRST THINGS FIRST

The EIIP *Virtual Forum* operates on the premise of basics first, learning as we go and bringing others with us in the process. The problems of networking and sharing information with our audience, the emergency management community, have been quite basic. The *Virtual Forum* audience is typical of most of the millions of Internet users. In the past two years, we have learned that having the bare necessities for accessing and communicating electronically, and getting a basic education in 'how-to' and 'why-you-should' be on-line are over-riding issues in making the Internet work for people. Fundamental terminology is a problem for many: What is a browser? ISP? What are the differences in a mail list, listserve, and discussion group? The EIIP finds that access is still a serious issue for the local-level emergency manager and responder.

Interactive sessions with academia, business/industry, government, and volunteer organizations demonstrate there is a lack of communication and sharing across the

spectrum of parties with disaster or emergency management interests at the most basic level - we do not talk to each other! Our strategy, therefore, has been a bottom-up approach of providing topics and programs that serve as incentives to get on-line while reaching out through every means possible to attract our audience. Tutorials with considerable one-on-one instruction are and will continue to be necessary as we build a following for virtual forums on timely topics including demonstrations of various technologies of interest to emergency practitioners. Questions, concerns, and issues related to limitations on data access are secondary at this stage as we educate audiences about the resources and advantages of using and developing skills related to various technologies, e-mail, and the Internet.

The EIIP has deliberately chosen a course of action that provides electronic networking, sharing of information, and opportunities to build competency and confidence. The EIIP Virtual Forum successfully challenges its audience to try new means of communicating and to learn about new technologies. The experience is one of teaching and converting one person at a time to appreciate the excitement and inherent benefit of sharing and communicating via the Internet. Learning new tools and technologies requires courage because we naturally resist what we do not know and understand. Trying new ideas takes commitment; and, yes, it takes time and investment in the tools that enable participation in the electronic experience. Those who accept the challenge find that mastery of the Internet is not so difficult and little else offers such potential for professional growth and networking without leaving the office or home. Hopefully, we will be instrumental in bringing a number of emergency management practitioners to the point where they feel confident using this tool as a daily part of their work lives.

Since opportunities for participation in virtual classrooms for degree programs are becoming more available, and since the wealth of information residing on the Internet serves as a virtual library and resource center for research of any aspect of disaster management and prevention, what a wonderful mechanism the Internet is for professional development and learning!

EXPLORATION AND EXPERIMENTATION

The EIIP *Virtual Forum* prides itself in not only teaching others to use and explore the new technologies, but also in experimenting with new ideas and concepts to expand the virtual experience. For example, the EIIP conducted its first on-line hazardous materials functional exercise, WEBEX, as the EIIP's contribution to the Volunteer Fire and Rescue Expo, November 5, 1998. All planning meetings, recruitment of players, and training for the big event were done on-line in the *Virtual Forum*. Exercise controllers, evaluators, and role players were cyberspace volunteers. Thirty-five people from FEMA, Boeing, local governments (emergency management, fire service, and emergency medical services), and the private sector from the US and Canada learned to communicate and conduct an exercise in five rooms on the *Virtual Forum* site. The Master Controller, respective Room Controllers, and Evaluators ran the scenario for approximately two hours. As we prepared for the post-exercise debriefing, the players wanted to continue the role playing, all expressing how much they enjoyed the experience and how realistic it was. For the EIIP *Virtual Forum*, an audience that totaled 77 exercise players and spectators combined was a marvelous feat. The EIIP is

currently working to produce WEBEX II, built around one real-life community, that will be conducted later this fall.

The EIIP *Virtual Forum* recently conducted a live session in which audience participants played a card game, *Y2K Connections*, designed to prepare communities and individuals for potential management issues that may occur as the year 2000 comes in. Additionally, the *Virtual Forum* is experimenting with video conferencing using small video cameras for individual computers. We demonstrated limited capability during the annual conference of the International Association of Emergency Managers (IAEM) last fall and have enlisted a number of people to try features that allow six to eight people to meet simultaneously with video and audio capabilities. As we envision and explore creative uses of the Internet, new technologies, programs, and hardware are in the making to expand our networking in ways we cannot comprehend. The greatest impetus for getting on-line now and becoming familiar and comfortable with today's technology is to prepare us for the next generation of computers, the Internet, Web-access devices, and multi-management programs and technologies - waiting only makes it harder to catch up.

SKILLS FOR THE FUTURE

We are truly in the Information Age. As we near the Year 2000, futurists predict that technologies will continue to grow and amaze us. The technologies of communications and computers are currently inseparable. The computers, modems, and browsers we are using today will soon be obsolete. Consumer electronics and entertainment are merging into the interactive multimedia industry. Information is power and advances in information technology are the key to altering the way we work, learn, network, and make the changes necessary to improve our lives and the communities we live in. According to Jakob Neilsen of Sun Microsystems, "The ability to communicate on-line will be one of the most important job skills of the 21st century." With the present power of communication and information at our finger tips and the promise of more and better things to come, perhaps the ability to communicate on-line will be the most important skill of the next century!

Whether seeking to disseminate information related to disaster preparedness or prevention or some other aspect of disaster management, the Internet and other technologies are viable communication tools to use in conjunction with other public information and educational efforts. With time, technology will become more common in the field for disaster response and recovery as well. No other tool reaches as diverse an audience or covers so much of the planet in such a short period of time. No other tool levels the playing field quite as well regardless of where we live and work. As more and more people come into the electronic medium of on-line interaction through e-mail and the Internet, information technology offers enormous opportunities for redirecting the information flow related to disaster or emergency management to reach a web of interdependent people and the communities they call home.

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NOTES

1. Avagene Moore, CEM is the Coordinator of the Emergency Information Infrastructure Partnership. She has 24 years experience in the emergency management field, having served for 16 years as the coordinator of the emergency management program in her home county in Tennessee and 8 years as a personal services contractor. She is a past president of both the International Association of Emergency Managers and the American Society of Professional Emergency Planners. She has carried out numerous speaking engagements, published articles and papers, and testified before Congressional committees on behalf of IAEM and the emergency management profession.

As Coordinator of the EIIP, Avagene Moore's work includes recruiting and coordinating partners from the global emergency management community and overseeing the maintenance and enhancement of The *Virtual Forum*, the EIIP's focal point on the Internet. Launched in 1997, The *Virtual Forum* provides virtual conferences as well as weekly on-line sessions designed to link emergency management practitioners to global activities such as the IDNDR.

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WHY EMERGENCY MANAGEMENT AS A PROFESSION?

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Over the past several years there has been a continuing discussion in the emergency community asking "Why emergency management as a profession?" The root of the question lies in the relationship of emergency management with other emergency agencies, our communities, the states, and the nation. The debate heated up in 1998 with the proposed National Fire Protection Association (NFPA) 1600 *Standard for Emergency Management*. A number of other initiatives have also contributed to the debate. The International Association of Emergency Managers (IAEM) has had a professional credential program for the certification of emergency managers for more than five years.[2] FEMA also conducted a survey of professional qualifications and certification programs in 1998, sometimes called the "Buddy Study".[3]

This paper will attempt to answer the "why" of this issue. In order to do this, the question was broken down into two major categories: premises and conclusions.

There are at least four premises that can made about emergency management. Some of these are shared with other emergency functions and form the basis for the relationship between first response and emergency management. These are quality of life, risks (hazards), vision statements, and differences. The first premise is that citizens seek a high quality of life. Government provides those services and activities which are not provided by any other means in the community. These services are designed to contribute to the other quality-of-life activities in our communities involving economic growth and development and cultural and recreational opportunities. The second premise is that government jurisdictions face known risks from natural and man-made hazards and they have been given the inherent responsibility to protect their citizens from these risks. Premise three is that there is a common vision statement in the emergency community which is universally recognized. That is "To Save Lives and Protect Property." The last premise is that there is a difference between first response (fire, police, EMS, public works) and emergency management activities and functions. Based on definition and past experience, first response can be categorized as more tactical in the application of management principals, while emergency management is more strategic and longer in scope and range. This is an important difference and a distinction which will be discussed in the management conclusions.

Four key management conclusions can also be readily identified. The first conclusion is that population size and concentration of economic resources in an affected geographical area determines the significance of an adverse natural or man-made event.

The second conclusion is that both emergency management and first response assets are valuable community resources. The management activities of the two functions differ significantly, however. For an all hazards approach, emergency management requires a more strategic (longer range) approach than emergency response and must

cross more of the traditional political, bureaucratic, and administrative boundaries in a jurisdiction in order to lessen the impacts of a major disaster on a geographical area. Strategic planning is a central activity. Because of this, mitigation and preparation phases are more likely to be the main focus of emergency management. Conversely, response and short-term recovery phases of emergencies and disasters are the primary focus of first response. Both emergency management and first response operate together strategically and tactically in all four phases of emergency management as conditions dictate. Because recovery is usually a long-term activity, emergency management is also heavily engaged in programs for business recovery and for individual and public assistance.

The third conclusion assumes that emergency management is primarily a strategic management activity, and as such, it must analyze the threats to economic and population centers, determine the significance of the threats, gauge the potential scope of the threats (size and impact), project threat frequency, and provide a course of action (an emergency operations plan) for governing bodies. It must also identify, satisfy, and coordinate requirements that are identified in risk (threat) analysis through application of assets in geographically administered areas by integrating and using academic, business, government, and volunteer resources.

The last conclusion is based on other management functions in government. Money and fiscal policy are required for viable emergency management programs in order to man, equip, train, and maintain an acceptable state of readiness. Motivation to mitigate and reduce or negate disaster impacts will determine the level of readiness of a geographical area. It requires fiscal resources to perform this strategic function. Governing bodies are an integral part of emergency management programs because they are the legally constituted bodies that set policy, enact legislation, and exercise the legal authority over how public and private monies are acquired and utilized. Emergency managers must seek to eliminate duplication of effort or misapplication of resources in order to produce the best cost-benefit outcomes possible.

The primary activities of emergency management and first response differ, and they both require personnel who are competent, highly skilled, trained, and experienced in their own specific professional areas. Each area has a different orientation, however, based on its strategic and tactical nature. Emergency management, for instance, may require familiarity with all the resources in the community while emergency response may require detailed technical knowledge. Emergency response and emergency management encompass different sets of political and bureaucratic boundaries and resources, and are therefore subject to separate and distinct sets of management and certification criteria.

For those seeking careers in emergency management, continuing professional development, training, experience, and professional networking is a must. Success in emergency management requires an individual to have both breadth and depth of professional experience in one or more of the following general career categories: academia, business, government, and volunteer organizations. As the profession has changed and matured, a four year college degree or its equivalent, particularly with a major in Emergency Management, Public Administration, Business Administration,

Political Science, Urban Planning, or in Strategic Planning has become more desirable. In some cases, advanced degrees have become more common. Leadership and management skills coupled with competency in communications, information systems, and public speaking have become a must. Professional certification is becoming a more frequent requirement for emergency managers and is becoming a standard by which emergency management programs are appraised.

NOTES

1. David T Crews, CEM works in Information and Planning, Emergency Support Function 5, FEMA Region VII as a Disaster Assistance Employee. He is also the Webmaster of *Emergency Management Gold!* at <http:www.disasters.org/emgold>. His experience includes staff duty with the United States Air Force where he served in the North American Air Defense complex at Cheyenne Mountain, Colorado with responsibility for strategic planning, recovery, and reconstitution of the North American Continent. He is a graduate of the National Defense University and Kansas State University and has undertaken advanced studies in education, public administration, and computer applications. He has completed FEMA's Professional Development Series and has attended the Emergency Management Institute at Emmitsburg. David Crews has served as the mayor of a municipality and as a Director of Emergency Management in local county government.

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2. The designation of Certified Emergency Manager is based on the following elements:

Emergency management experience
Referees
Education (a degree or additional experience)
Emergency management training
General management training
Contributions to the profession
A management essay
An examination

Re-certification is required every five years.

3. Named after Buddy Young in FEMA Region VII who was appointed by James Lee Witt to conduct the study for FEMA.

THE VIRGINIA MODEL FOR NATIONAL DISASTER MEDICAL SYSTEM AIRHEAD OPERATIONS

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THE AIRLIFT CONCEPT

The National Disaster Medical System (NDMS) is a joint venture of four Federal agencies: the Department of Defense, the Federal Emergency Management Agency, the Department of Health and Human Services, and the Department of Veterans Affairs. Its objectives are to supplement state and local medical systems in a catastrophic disaster and to support military and Veterans Affairs medical facilities in providing medical care for military personnel in wartime. The National Disaster Medical System has three major components: (1) medical response by field medical teams, (2) patient evacuation using military air medical evacuation capabilities, and (3) definitive medical care through participating civilian and government hospitals. In a catastrophic event, the field component assists in the stabilization of patients, and the airlift component evacuates them out of the disaster impact region to hospitals in other states for definitive care (NDMS, 1990).

From the perspective of a region receiving patients in a disaster, the airlift and hospital components are the critical parts of the system. Patient evacuation depends largely on the Air Force's airlift capability which can range from 40 (in a C-9) to 103 (in a C-141) litter patients, and on the capability of the Global Patient Movement Regulation Center at Scott Air Force Base (NDMS, 1990). Definitive care depends on the relationship between Federal Coordinating Centers (lead Veterans Affairs, Army, Navy, and Air Force hospitals located in 107 metropolitan areas) and the participating civilian hospitals. Data from 1994 listed 1818 participating hospitals with 110,000 beds (NDMS, 1994).

Two trends influence how this system will function. First, there appears to be a decreasing availability of beds for National Disaster Medical System use. This may result from the general trend toward reduced numbers of staffed beds in hospital systems nationwide, a trend that can be expected to continue (Moore, 1999). Second, there appears to be a shortfall in performance based on priorities and perceptions that a major domestic response by the hospital component of the National Disaster Medical System is not a forseeable possibility. For example, the 50th Anniversary celebration for the North Atlantic Treaty Organization was assessed as generating a high potential for terrorist action which would require a multi-state and national response. During this period reports indicate that a number of military Federal Coordinating Centers which were tasked to provide bed counts for their civilian partner hospitals did not do so (Reik 1999).

In operational terms this means that a receiving jurisdiction that is ready and has a system in place can expect a steady flow of patients over a several day period until available bed spaces are exhausted. The Central Virginia Federal Coordinating Center reached a high bed availability of 612 beds on 24 April during the NATO Anniversary celebration (Table 1). If the average air medical evacuation aircraft load is 50 patients, this means that Richmond could expect 13 aircraft.

Table 1
Bed Availability Central Virginia Region 24 April 1999

Code	Category	Number of Beds
MM	Medicine	158
MP	Psychiatry	30
SS	General Surgery	65
SSN	Neurosurgery	27
SSM	Maxillofacial	14
SSO	Ophthalmology	26
SSCT	Thoracic Surgery	25
SSU	Urology	28
SO	Orthopaedics	101
SCI	Spinal Cord Injury	13
SBN	Burns	8
SG	Obstetrics and Gynecology	45
MC	Pediatrics	70

Source: National Disaster Medical System, Office of Emergency Medical Preparedness, Department of Veteran Affairs Medical Center, Richmond, Virginia, "Bed Status Report," 24 April 1999.

MANAGING THE AIRHEAD

If patients are going to be delivered from the aircraft to a hospital, someone has to manage this process. The actual reception of patients at the airhead (the termination point for the airlift and its interface with ground transportation) has the potential to make an airlift effort either a success or a suboptimal experience for all involved.

Aircraft Arrivals Are Mass Casualty Incidents

The concept of a mass casualty incident is widely referred to in disaster literature.

Garcia (1985) suggests a mass casualty incident overwhelms local resources and requires mutual aid resources for its resolution. Goodwin (1986) provides protocols for mass casualty response to incidents categorized as 3 to 15, 16 to 150, and over 150 patients. Seliger and Simoneau (1986) differentiate between a multiple casualty incident which can generate up to 50 casualties but can be resolved in a short period of time, and a mass casualty incident which overwhelms local resources. Marumo (1988) uses the term "mass disaster" to describe an event which requires the mobilization of outside resources.

When we consider what qualifies as a mass casualty incident (MCI) in most systems, one C-130 Hercules, C-9 Nightingale, or C-141 Starlifter with 50 patients on board is, in practical terms, a MCI. First, 50 patients are significantly more patients than most routine incidents generate, especially if, second, they all arrive at the same time. And third, the aircrew wants the patients off their aircraft as soon as possible so they can continue the mission, introducing a considerable element of stress. It makes sense, therefore, to manage the airhead as a mass casualty incident site.

Aircraft unloading and patient management closely mirrors the processes used in mass casualty incident response - a sequence of extrication, triage, treatment, and transportation (Edwards, Player, and Schwartz, 1996). Patients must be removed from the aircraft (extrication) and repackaged for movement to a triage and treatment area. This process includes backboarding patients who come off the aircraft in military D-ring stretchers (since few ambulances today physically accept the D-ring with either bench seat runners or hanging straps). Patients have to be transported to the triage area (transportation), in some cases by vehicles if parking aprons or taxiways will not support the aircraft. Patients must be retriaged to ensure they remain stable and have civilian triage tags applied in place of the military medical tag (triage). Those patients that are not immediately transported to hospitals must receive appropriate medical care (treatment).

Organizing for Mass Casualty Response

Auf der Heide (1989) suggests the need for a functional organization to deal with large numbers of patients in an effective way. To provide these functions, Virginia has adopted a standard organizational structure for response to mass casualty incidents (Figure 1). This structure is a self-contained Medical Group, organized in a way that is interoperable with all of the commonly accepted incident command or management systems (Green, et al, 1999). Each of the four critical functions is assigned to a Unit Leader under the direction of the Medical Group Supervisor.

Matching Resources with Requirements

Staffing patterns for an airhead must meet basic criteria: (1) adequate numbers of people and ambulances to manage the patient load, (2) a standard organizational structure that is well understood by all participants, and (3) sustained operations over an extended period without degrading local emergency medical services capabilities. Asking a community to tie up their resources by sitting at an airport waiting for aircraft is not a good solution; neither is reconstituting the airhead with a new shift of people every time an aircraft is inbound.

Figure 1
Virginia Standard Mass Care Organization

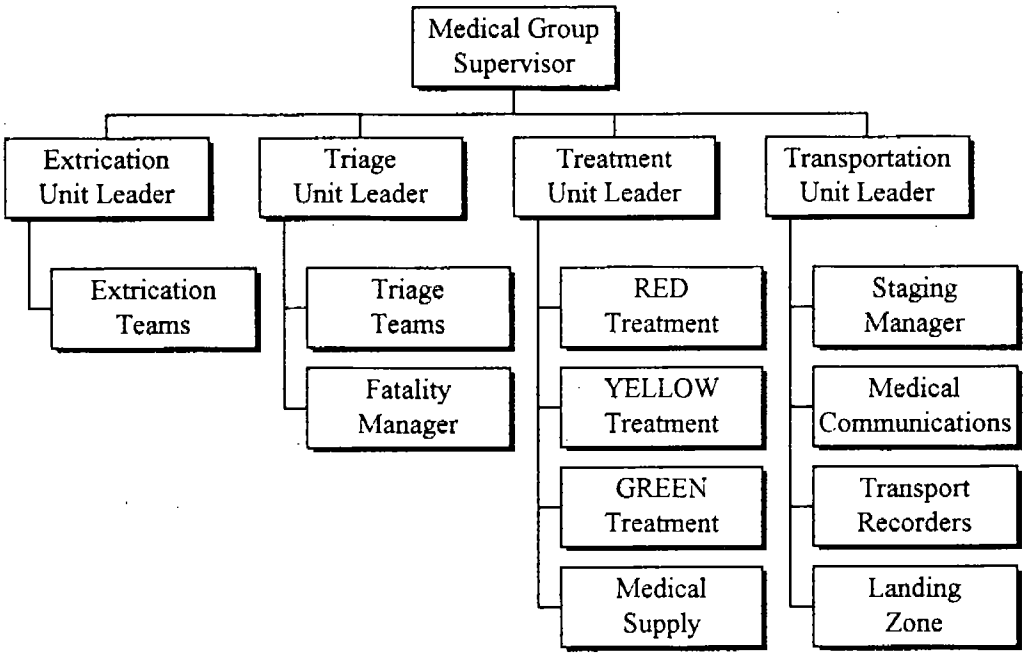
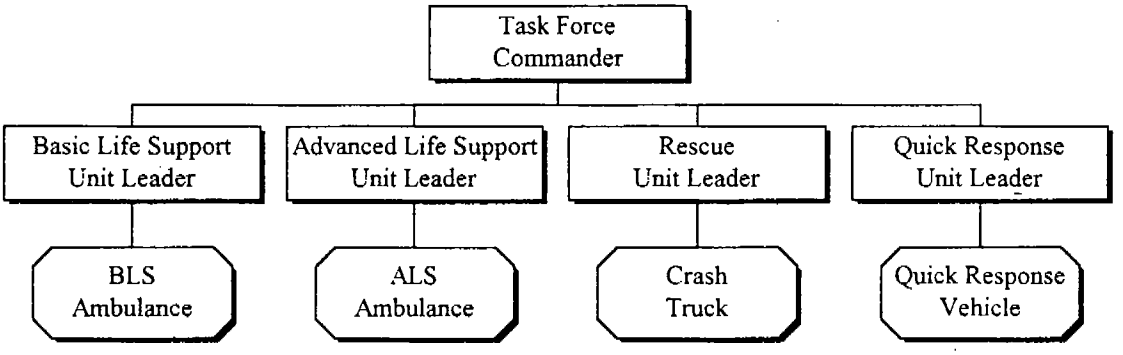


Figure 2
Virginia EMS Disaster Task Force Organization



Virginia has an established system of permanent state-level Emergency Medical Services Disaster Task Forces, composed of a standard organization of people and vehicles (Figure 2). These Task Forces are mobilized and dispatched by the state Office of Emergency Medical Services primarily to assist local jurisdiction emergency medical services systems in natural and man-made disasters. They are capable of operating as self-contained units for 72 hours (Commonwealth of Virginia, 1998).

In 1998, the Virginia Office of Emergency Medical Services completed an agreement with the Central Virginia National Disaster Medical System (CVNDMS) to provide the Task Forces as staffing for the central Virginia airhead (CVNDMS, 1997). In this relationship, a Task Force is assigned to perform each key mass casualty incident function at the airhead. The Medical Group Supervisor role is assigned to another state deployable resource, one or more two-person Coordination Teams which normally provide the command and control overhead and the logistics support for the deployed Task Forces. Normally, more than one team will be assigned, not only to provide for 24 hour coverage, but also to allow additional staff to serve as Safety Officers and to augment the patient tracking function. Patient registration, patient tracking, and medical supply functions are provided by a reception team staffed from the local Federal Coordinating Center. Transportation of patients to local medical facilities is handled by local government, commercial, and volunteer emergency medical services agencies. This allows local resources to come only when needed and to rapidly return to normal operations.

Triage Decisions

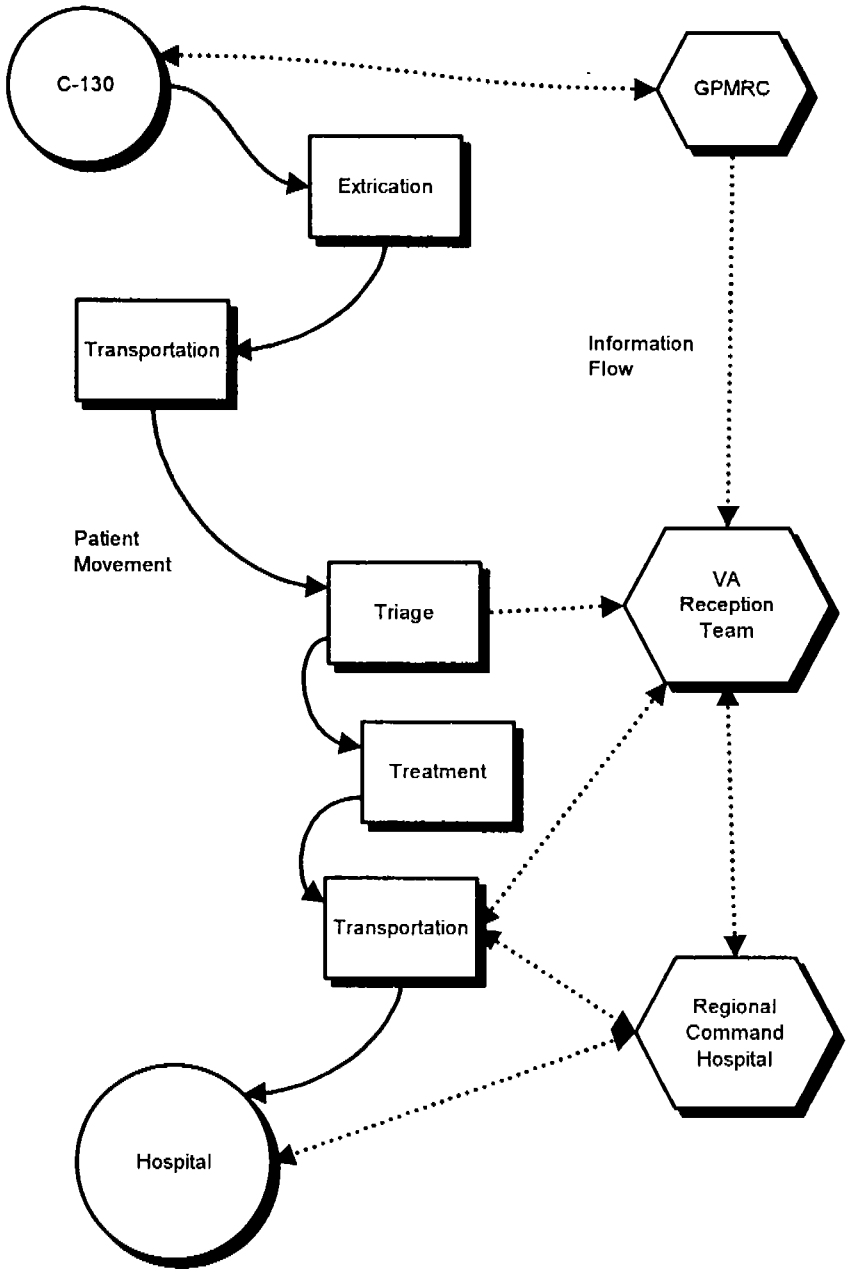
Neither traditional assessment-based triage nor START (Simple Triage and Rapid Treatment) appear to apply to the airlift scenario.

Table 2.
Initial Patient Triage

Color Code	START Criteria	NDMS Airhead Criteria
BLACK	non-salvageable based on absence of respiration	deceased in flight
RED	immediate respiration, perfusion, or mentation problems by algorithm	condition deteriorates in flight - and unstable on arrival
YELLOW	non-ambulatory but without immediate life threatening problems by algorithm	non-ambulatory stable patients
GREEN	minor injuries based on ambulation	ambulatory stable patients

Source: Mark Adams, Thomas Schwartz, Michael Player, Robert L Glover Jr, and Bruce Edwards. *Virginia Mass Casualty Incident Management Program: Module I Responder Level and EMT-B Course Supplement.* Walter G. Green III, editor. Richmond: Virginia Office of Emergency Medical Services, 1996.

Figure 3
People and Information Flow at the Airhead



First, unlike field triage which deals with patients who have not been stabilized or treated, patients delivered by airlift should be stable. Therefore the sense of urgency is not as great as in the commonly understood mass casualty environment. Second, the majority of transportation decisions now depend on the National Disaster Medical System standard patient categories and the available beds at facilities. Unlike the major-accident mass casualty, patients are being moved to facilities because those facilities have the capability to care for their specific injuries.

MANAGING INFORMATION FLOW

Operation of an airhead is an information intensive activity. The actual mechanics of patient reception and care requires one set of information links (Figure 3). These focus on pre-arrival notification of the Federal Coordinating Center of the aircraft load, coordination between the Federal Coordinating Center and the Regional Command Hospital to determine the best allocation of patients to beds, and coordination of triage, transportation, and patient allocation decision-making. This information flow is a combination of in-person, telephone, and radio communication among the participants, and requires that National Disaster Medical System procedures be meshed with the region's normal patient handling procedures.

External Coordination

An event of this type, however, will also require coordination with the receiving state's disaster medical system. In Virginia the Coordination Team assigned to manage the Task Forces at the airhead becomes a key link in this process (Figure 4). The Coordination Team keeps the state's ESF-8 (Health and Medical) Emergency Support Center informed of actions taken. In addition, the Emergency Support Center maintains a parallel set of patient tracking data to help answer questions it will receive from the state Emergency Operations Center.

Patient Tracking with TRANSAID

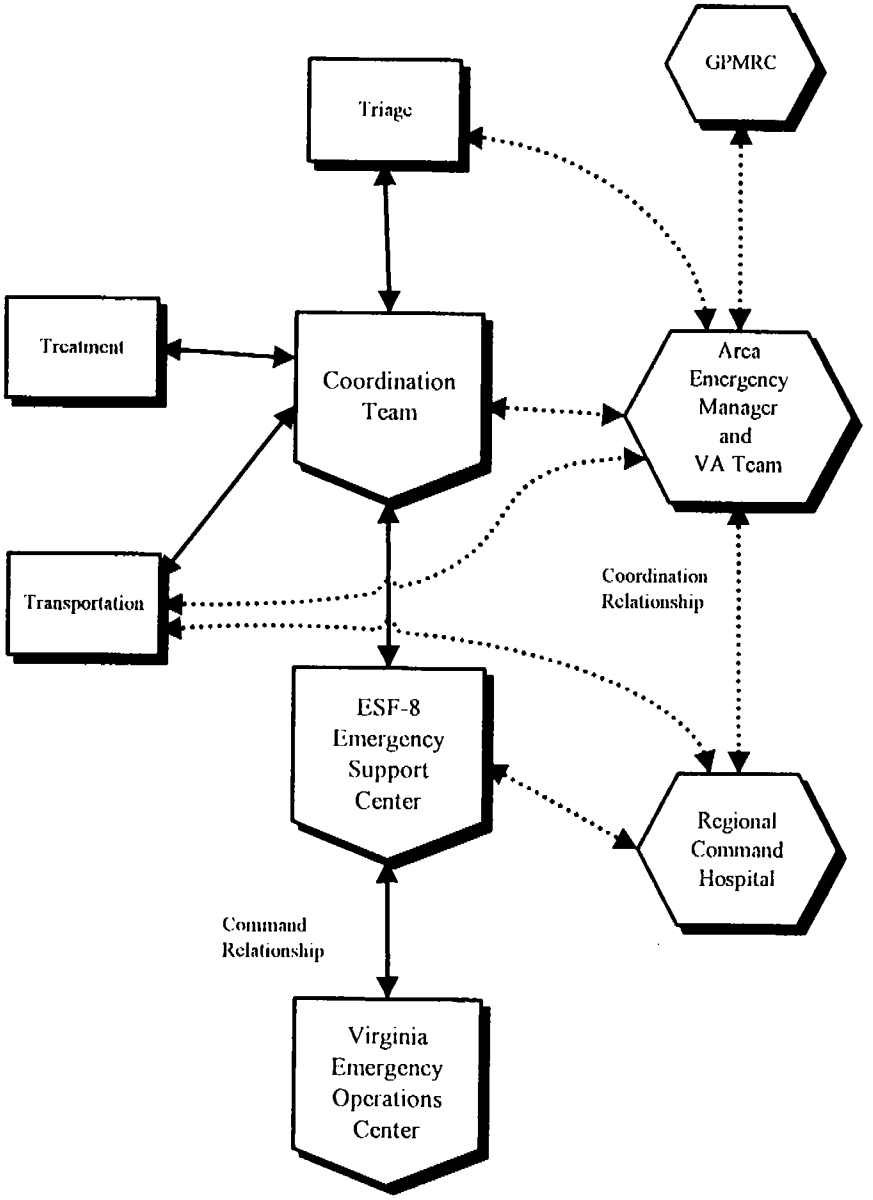
Patient tracking is a key component of the information flow. The Virginia Office of Emergency Medical Services has adopted TRANSAID, a patient tracking software developed by Ed Summerfield at Castle Point Veterans Affairs Medical Center in New York, as its standard. This system tracks patient name, sex, whether or not a pediatric patient, triage tag number, patient category, and triage color. Patients are tracked through dispatch to hospitals, with the software permitting analysis of clearance times and providing a record of actions taken on each patient. The hospital display on the screen also allows tracking of patients dispatched versus receiving hospital capacity.

WHAT IF?

Most planning for operations of a casualty collection point and an air head focuses on receiving patients. What if the disaster happens to your region, and you are operating a patient dispatching location? Integrated emergency management and emergency medical services planning for moving patients outbound may need to consider the following issues:

(1) Aircraft and patient flow is likely to be continuous until the region's hospital

Figure 4
Casualty Information Flow



system recovers. This drives a requirement for all weather, 24 hour operations. In turn, this demands adequate shelter from the environment, more staffing (perhaps as much as three times as many personnel), adequate night-time lighting, a full-time feeding operation, and more extensive sanitation facilities.

(2) Patient tracking needs to be flawless and to include every possible means of identification (tag numbers, name, address, physical description, etc). If the patient is lost at the dispatch end, the chances of tracking them across the country just became significantly smaller.

(3) Mental health services and pastoral counseling need to be available for patients, who will be both traumatized by the event and by their injuries and by the strange process they are going through. Even if this contact is brief, it may reassure the disoriented and bewildered trauma victim and make the flight (which will be vastly different from any previous civilian flight experience they may have had) less threatening. Critical Incident Stress Management support should also be in place for the airhead staff, as this will be a prolonged high stress environment.

(4) Personal protective equipment and rigorous attention to safety become even more critical. High stress, night, lifting, and high noise level operations mean that vests, good leather gloves, ear protection, goggles, and environmentally appropriate clothing are vital. Unlike the typical two hour drill, issues such as adequate hydration, attention to heat and cold stress, and sunscreen become critical if the dispatch point is to avoid injury to its own staff.

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NOTES

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MANAGING NATURAL HAZARD CONSEQUENCES: PLANNING FOR INFORMATION MANAGEMENT AND DECISION MAKING

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INTRODUCTION

In an integrated emergency management (IEM) environment, inter-agency communication is essential for understanding complex, dynamic, and evolving emergencies and for providing information for decision-making. These two issues are closely related. Decision effectiveness is a function of the capability to access data and render it meaningful within a time frame dictated by urgent or evolving event demands. Crisis decision-making, however, also requires the development of dedicated decision systems and capabilities.

Emergencies create a decision environment that is complex and which differs substantially from that within which decision expertise and support systems develop. Emergency decision-making involves using ambiguous and incomplete data to manage uncertainty and evolving events. Emergency managers can be called upon to deal with inadequately defined, changing, and sometimes competing goals under considerable time and physical pressures (Flin, 1996). The management process is further complicated in multi-agency operating environments by diversity in, for example, organizational objectives and political agendas.

The decision environment is also influenced by hazard characteristics. For example, managing earthquake hazards necessarily entails responding to an historic event. Under these circumstances, response effectiveness is determined by the extent to which the planning process has anticipated the hazard effects which were likely to occur, the decisions necessary to manage them, and the data/information required to facilitate this process. The unpredictability and suddenness of earthquakes requires that this competence has been established and is capable of becoming operational immediately. A similar scenario could arise when considering bush/forest fire and flash flooding hazards. For other hazards, effects can be spread over time, creating a different

decision environment. For example, volcanic crises can be preceded by a warning period whose duration can vary considerably. Although a warning period may provide sufficient opportunities to consider plan implementation, it would be unwise to assume that it would provide sufficient time or opportunity to develop the necessary systems and capabilities. Uncertainty regarding warning duration, the need to understand and maintain a state of readiness to respond to changes in scientific alert status, and readiness to manage the eruption hazards necessitates that information and decision systems be in place and capable of timely implementation. The complexity of the integrated emergency management environment further precludes the possibility of dealing with these issues on an ad hoc basis once a disaster has occurred.

Nor is it sufficient for any one agency to consider information and decision needs solely from its own perspective (Paton, Johnston, Houghton, and Smith, 1998; Smallman and Weir, 1999). In an IEM environment, the planning process must consider these issues from several perspectives. For example, information needs must be considered in relation to those from whom data/information is obtained, those with whom they will collaborate to manage hazard effects, and those to whom information will be provided (eg, the public and the media).

Central to hazard management is the ability of agencies to access and utilize scientific and other information. This paper draws upon evaluation of responses to the 1995/1996 Ruapehu eruption (Johnston et al, in press; Paton et al, 1998) and subsequent workshops (Paton, 1998) to examine information and decision needs and their implications for emergency planning. The nature and perceived severity of communication problems recorded after the 1995 eruption are described in Table 1. Although focusing on volcanic hazards, the issues discussed are also applicable to planning for the management of other hazards.

Table 1

Information Management Problems Following Ruapehu 1995 (N = 30)

	Organizations (%)	Perceived Importance Mean	SD
Information Problems		2.85	0.34
Information difficult to obtain	56		
Received too little information	50		
Communicating with media and public	43		
Problems making decisions with available information	41		
Inadequate communication with other agencies	37		

Scale of Perceived Importance is from 1 (unimportant) to 3 (very important).

INFORMATION MANAGEMENT

While some communication problems emanate from hazard effects (eg, the effects of ashfall or seismic activity on communication infrastructure), others can be attributed to the quality of crisis information management systems and their efficacy in facilitating understanding of hazard consequences or the type of mitigation measures required. In doing so, emergency managers take scientific data (eg, raw seismic data, eruption parameters such as size or location, or ash composition) and interpret and assimilate them to suit their specific needs.

Although acquiring data is vital, its value as a management tool lies in the ability to render it meaningful in relation to specific decision and response needs. The complexity of natural hazard phenomena, and the diversity of agencies involved in an integrated response, makes this a complex task, and one which, if it is to be tackled effectively, requires careful planning and development (Global Disaster information Network, 1997, hereafter GDIN). Prominent issues in this context include: defining data and information needs; establishing information networks; decision-making; developing shared terminology, systems, and operating plans; and communicating with the public and the media (Table 1).

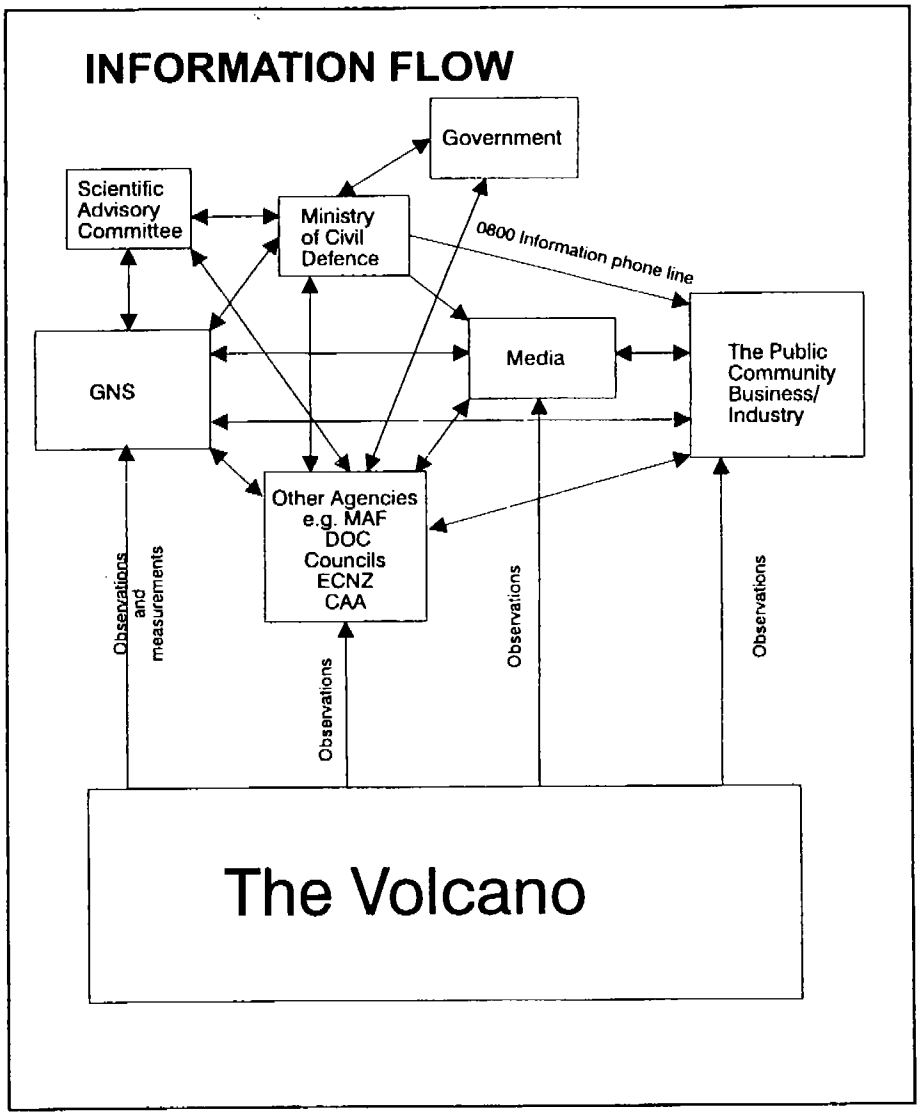
Data and Information Needs

A corollary to the identification of hazard effects is the analysis of the data and information required to manage them, the sources from whom it will be acquired, and the processes and expertise required to render it meaningful for response plan implementation and decision-making. The rarity of disasters, and limited experience in their management, renders information needs-analysis into a complex task, and one which will rely on both innovative and rational analysis. The identification of the hazard effects to be managed provides a framework for entering into dialogue with scientific, specialist, and other agencies to determine what information they can furnish to assist planning and response management. At this stage, it is also important to identify gaps in data/information availability (and to plan strategies to reduce these gaps) and to define the nature and amount of processing and/or interpretation required to render data meaningful in the context of the decisions to be taken.

Inter-Agency Networks and Information Provision

Several agencies had leading roles during the response to the 1995/1996 Ruapehu eruptions. The complex patterns of inter-agency relationships that can prevail during emergency response are illustrated in Figure 1.The Institute of Geological and Nuclear Sciences (GNS) played a central role in providing scientific advice to the government, local response organizations, and industry. Although the information they provided was crucial to the response activities of several agencies, only one of 30 agencies involved had formally discussed their response information needs with GNS prior to this eruption (Paton et al, 1998). Lack of functional dialogue contributed to communication problems and this signals a clear need for formalizing relationships with scientific and other agencies.

Figure 1
Information Flow Between Key Agencies
During the Response to the 1995 Ruapehu Eruption



Because it involves agencies who may have little or no contact with one another under normal circumstances, networking between information providers and recipients is essential. The information-knowledge transition falls between the spheres of science and management. Bridging this gap is a key communications issue, and one which must be accomplished through the planned, systematic development of shared understanding of information and decision needs and the operational environments within which information will be used and decisions taken. Response agencies, however, often presume that these sources will go beyond scientific advice to provide for their information and decision needs. This is likely to be the exception rather than the rule for several reasons.

The rarity and complexity of major emergencies and disasters makes it imperative that scientific agencies concentrate their resources on developing understanding of the hazard phenomena to be managed rather than on translating data for diverse agencies with wide-ranging information needs. Acknowledging the urgency and complexity of demands made upon scientific agencies highlights the fact that they are unlikely to have the time or resources available to respond to new or unanticipated requests for assistance and information. Consequently, it is imperative that agencies have developed sound relationships with the scientific community prior to an eruption and for this to constitute part of the planned development of hazard information management systems (GDIN, 1997).

The development of an independent information management capability is important for other reasons. For instance, several agencies may require data on ash distribution and composition, however, different agencies will use this information to meet distinct needs. Conservation (effects on flora and fauna), utility (effects on power/water supply), agriculture (effects on crops, livestock), civil aviation (effects on aircraft movement), and transit (effects on road/rail networks) agencies interpret these data to meet their specialized information and decision needs. Geographical (eg, changes in ash thickness with distance from source, implications of interaction between ash and soil, water, or the built environment) and temporal and meteorological (eg, the nature and location of ash threats depending on time, wind speed and direction, humidity, and rainfall) factors contribute added complexity to the decision environment. Scientific agencies will have neither the resources nor the expertise to respond to all the possible requests that could emerge within this decision environment. Response agencies must acknowledge that while they can receive data from scientific sources, rendering it into a meaningful format, and one that is consistent with their decision needs, is a function of the quality of their prior dialogue with the scientific community and their own interpretative capability.

While response agencies may be familiar with the activities of the scientific community, this may not be at a level appropriate for emergency management (Paton et al, 1998). Consequently, the planning process must direct the systematic development of the dialogue and simulations necessary for effective crisis information management. In addition to defining data/information needs, this process will consider whether, and to what extent, processing and interpretation will be required to facilitate its compatibility with agency decision needs, processes, and systems. Because the decisions, and the information required to make them, differ radically from their routine counterparts, the planning process must anticipate the specialized expertise and decision support systems required for this function, including specifying inter-agency relationships. This exercise will provide an input into training needs-analysis by specifying the staff expertise required for information analysis and decision-making. Relationships with scientific and other data providers must be reviewed periodically to cater for changes in the hazard-scape and the nature of demands to be managed.

Because it is obtained within an environment characterized by uncertainty, response agencies must accept that scientific data cannot be viewed as prescriptive. Recipients of this information must recognize this uncertainty, develop their interpretative capability accordingly, and accept that judgement will be required for decision-making and

determining appropriate actions. There is a clear role within this context for the scientific community to play a more active role in educating end-users about the information they provide and to discuss the implications of its inherent uncertainty.

Shared Terminology/Systems

The multi-jurisdictional/disciplinary context of emergency response, limited inter-agency familiarity, and the atypical and high stress circumstances of the operating environment can, as a result of the use of different terminology and jargon, create confusion and constrain response effectiveness. Comprehensive planning, based on a needs-analysis that accommodates non-routine activities, and joint inter-agency simulations and exercises can highlight areas where shared terminology and operating structures are required and can provide a forum for its derivation (Granot, 1999; Hightower and Coutra, 1996; Paton et al, 1998). A related issue concerns the value of shared mental models of hazard consequences and response roles. This issue will be discussed below.

The complexity of hazard effects, the uncertainty inherent in management data, and the diversity of agency information needs makes information management a complex task, one that requires comprehensive planning. While developing the capability to access and comprehend information is an important organizational task, it is equally important to be able to utilize this information to make response management decisions.

DECISION-MAKING

Decision-Making and Diversity

As a consequence of the diversity inherent within the disaster operating environment, (eg, agency membership, their expertise, and their geographical location), decision effectiveness is a function of the extent to which those involved possess a shared understanding of the response environment (including how events evolve over time). 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 (Paton et al, 1999), including being able to anticipate the needs of those with whom they are collaborating (Flin, 1996).

Collectively, the quality of shared understanding and procedural integration determine the capability of the emergency management group to utilize their collective expertise for problem definition and response planning, even if dispersed or contributing different perspectives. It also helps ensure that they are operating, as far as possible, with a shared mental model of their situation that facilitates the effective and efficient allocation and use of scarce resources (Flin, 1996). Facilitating this capability requires the planning process to have anticipated and articulated operational diversity and to have specified collaborative exercises, simulations, discussions, and projects necessary to attain operational integration.

While having a shared mental model of the response environment, and the role/function of others within it, can facilitate effective performance, its operation must be carefully

monitored. 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. This is assisted by using an all-hazards approach, by engaging in comprehensive discussions with the scientific community to obtain as accurate information as possible, and by ensuring that simulations designed to facilitate this shared understanding are based on a comprehensive review of possible scenarios, involve key agencies, and are followed by critical evaluation. 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 utilization (Smallman and Weir, 1999).

Decision Style

Emergency decisions are typically made against a backdrop of varying levels of complexity, time urgency, uncertainty, and shifting and competing demands. Being able to adapt to these changing circumstances becomes an important management capability.

Acute stress can have positive or negative implications for emergency decision-making. In the short term, increased alertness, faster reactions, and accelerated thinking combine to enhance performance and decision-making, particularly if individuals are trained to manage time pressures and to operate under conditions of high workload and threatening conditions (Klein, 1997). If the level of demand increases or the period of leadership responsibility is prolonged, performance and decision effectiveness decline. Typical problems under these circumstances include: "tunnel vision", failure to prioritize, "freezing", and loss of concentration (Paton et al, 1999). It is thus important to plan for the allocation and use of management resources to limit the risk of these adverse consequences. If, however, resources are insufficient to allow rotation of incident commanders, it is essential that those in leadership roles acknowledge the need to draw more upon team resources when operating under these circumstances (Paton et al, 1999).

Decision effectiveness is also a function of the ability to match decision style to the demands of the situation. The decision-making of those experienced in managing crises is characterized by intuitive or recognition-primed decision-making (Klein, 1997). This is where the individual recognizes the type of situation encountered and, from previous experience, knows what course of action is appropriate. Klein (1996) argued that properly trained and experienced emergency managers can show adaptive reactions in high stress situations, including the selection of simpler and more robust decision strategies, a focusing of attention, and a rapid closure on a course of action. There are also situations where the person may have to spend more time thinking about the situation to remember the appropriate rule or procedure to use. Another style is analytical decision-making, where the individual must consider several possible courses of action and then select the best option. This style should be used for operational planning.

During a disaster, these styles may be used to varying degrees depending on the situation (Paton et al, 1999). Those operating at a strategic level should use the analytic style. In certain situations, emergency managers may need to switch their style of decision-making. For example, during the warning period preceding a volcanic crisis, optional response plans

can be carefully evaluated and compared, making the analytical approach more appropriate. When managing earthquake hazards or a rapidly evolving bushfire, however, the need for rapid decisions makes the intuitive style appropriate. Attention must be directed to understanding the naturalistic decision-making of experts and how it can be modelled in simulations to develop this contingent management capability.

Information Recipients

While it is important that agencies focus on their information needs, their role as providers of information should not be neglected. Recipients of information can include internal (eg, staff, directors, and policy makers) and external groups. Externally, information may have to be supplied to collaborating agencies, the media, and the public. The media and the public are prominent recipients of information. Both will experience the hazard directly and receive information from several sources (Figure 1). Because public demand for information can be immediate and substantial, it is imperative that the planning process defines the resources and information required to meet these demands.

Johnston et al (1999) identified several sources from whom the public sought information about the 1995 Ruapehu eruptions. Most of this search was directed to family and friends, followed by a range of organizations, with local councils being prominent sources (Ronan and Johnston, 1998). This study demonstrated the importance of developing community awareness, being responsive to community needs, making information available to the community, and ensuring the accuracy and consistency of information from different sources.

Community information needs during and after disasters differ radically from those prevailing within a non-disaster environment. Common problems for agencies providing information to the public include the accuracy of assumptions of community needs, consideration of differences in needs and vulnerabilities within communities, and consideration of how community needs change over time. While planning typically focuses on providing information about physical hazard effects, a more comprehensive analysis of how hazard consequences interact with community vulnerabilities and functions over time will be required to determine information needs, sources, and dissemination mechanisms.

Miller, Paton, and Johnston (1999) observed that the most salient volcanic hazard threat to the community that they studied was economic rather than physical. Basing threat communication on physical hazard threat may not, therefore, always be appropriate or sufficient to address community needs. Threat-communication should reflect this understanding rather than untested administrative assumptions. This conclusion has implications for planning mitigation strategies. These should focus on activities designed to safeguard salient community functions and resources rather than focusing on physical hazard effects which, because they may be perceived as hypothetical and uncontrollable, may fail to stimulate adequate preparation. In addition, we should we not automatically assume that hazard experience represents a catalyst for future preparation.

Johnston et al (1999) concluded that although experiencing the eruption increased awareness, its low level of impact may have triggered a "normalization effect" (Mileti

and O'Brien, 1993). This describes how individuals and organizations attribute a lack of negative impact as indicative of their preparedness (rather than as resulting from low levels of hazard activity or from fortuitous meteorological conditions) and reduce the level of perceived threat they attribute to a particular hazard (Johnston et al, 1999; Paton et al, 1998). It should not, therefore, be assumed that hazard experience or awareness will automatically increase preparedness and receptivity to hazard warnings. Achieving the latter will require analysis of factors that encourage both awareness and willingness to act (Millar et al, 1999).

Differences between objective measures of risk and community perceptions thereof can be influenced by other processes. During the 1995/96 eruptions inaccurate media reporting of volcanic hazards resulted in the "social amplification" (Kasperson et al, 1988) of perceived risk, heightening anxiety in several communities (Johnston and Paton, 1998; Ronan and Johnston, 1996, 1999). For example, media coverage of the effects of the Ruapehu eruption undermined the effectiveness of school intervention programs and resulted in the social amplification of children's threat perceptions. To attenuate this problem, negotiation with the media to provide balanced coverage and additional work with schools was necessary (Ronan and Johnston, 1996; 1999). Managing this social amplification constituted a demand that both undermined earlier mitigation work and required that scarce resources be allocated to dealing with a problem that had already been contained. It is thus important that the planning process anticipates this problem and facilitates the development of sound media and community management plans.

By understanding the social amplification process, steps can be taken to improve communications and mitigate some of its undesirable outcomes. Attending to this issue may also underpin the public credibility of scientific and administrative agencies and increase the likelihood that future warnings or information is utilized in the manner intended.

TRAINING

Training is crucial to response effectiveness and should utilize an all-hazards approach to develop skills in information analysis, inter-agency communication, decision-making, managing uncertainty, and communicating with the media and the public. Because opportunities to practice these skills are rare, planning must specify the activities necessary to realize the levels of expertise required for effective plan implementation. Training needs-analysis will identify the demands, competencies, and contextual constraints that must be modelled in emergency simulations (Paton, 1996; Paton et al, 1999). Simulations afford opportunities for emergency managers to review and develop 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 minimize stress reactions. Critical and comprehensive process, content, and performance evaluation should follow all simulations and training exercises.

CONCLUSION

Response agencies must have sufficient understanding of scientific data and their inherent limitations in order to make appropriate and effective decisions. One function of the planning process will be the identification of information needs and the development of networks with information providers. This process will also anticipate the implications of uncertainty and develop information management strategies accordingly. Because the decisions required, and the data used to make them, differ qualitatively and quantitatively from their routine counterparts, the planning process must specify the expertise and systems required to render data meaningful, use it to make decisions under conditions of urgent and dynamic demands, and facilitate the capability to make decision when those responsible contribute different perspectives or are geographically dispersed. Information management planning must anticipate the need to adapt information and/or distribute it to different functions and end users, including the public, the media, and policy makers.

The rarity of disasters and major emergencies, the complexity of hazard effects when they occur, and the diversity of agencies involved makes information management highly complex. Add to this resource, political, and competitive pressures and it is evident that realizing the ideal crisis communications system is likely to prove difficult. The issues reviewed here provide a basis for strategic emergency planning. The identification and inclusion of such constraints within the planning process can facilitate the development of more realistic estimates of plan performance and contribute to planning the progressive evolution of information management capability.

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NOTES

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THE COSTS OF EMERGENCY MANAGEMENT

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PAY NOW OR PAY LATER

Pay now or pay later. No matter when, you will eventually pay! The field of emergency management can be a costly endeavor. There are no "free lunches" when it comes to having an effective emergency management program. We cannot rely on Ed McMahon or the Prize Patrol to bring a big check to solve our problems. As emergency management professionals, we must acknowledge that an effective and comprehensive program costs money, but we must also understand that the lack of an effective program may be even more costly when calculated in lost lives and property. Our job is to demonstrate the need for funding from public or private sources and to show the "cost" to the community of any inaction. We must also demonstrate that we are good stewards of the public's funds and resources. In many cases, the public never knows if its emergency management or emergency services program is adequate or efficient until it is too late.

There is never enough money to meet all of the needs of a comprehensive emergency management and emergency services/public safety program. The costs are many: staffing, equipment, warning systems, supplies, and other factors, such as overtime and benefits. The challenge is to find ways to fund these essential portions of the emergency management program.

STAFFING

It costs money to attract and to keep quality emergency management professionals. Personnel costs rise each year for salaries and benefits. If a community does not offer appropriate salaries and other compensation, it will not be able to attract the best candidates. The quality of personnel and leadership is directly linked to the quality of the program. A community may not be able to provide a quality program if it pays only minimum or uncompetitive wages. It must also find the money for training, for maintaining its staff's professional skills, and for keeping them current on new emergency management practices and procedures.

A Emergency Management Agency must also meet the needs of its emergency management programs in terms of the numbers of staff members required as well as the quality of its staff. Some emergency management departments with paid staff have several staff members, either full or part-time; others may have only one full-time staff member supported by volunteers or may be entirely staffed by volunteers. In any case, the onset of a disaster requires more staff than day-to-day operations. Small offices need the ability to bring in temporary or part-time help during emergency periods. It is disturbing when money cannot be found to hire temporary workers to process disaster paperwork (such as damage assessment reports) when it is the filing of these reports

that triggers disaster assistance funds for the community.

If a community demands better police and fire protection, that also translates into additional expenses. The cost of an additional police officer at $25,000 for salary and benefits may actually require an additional $25,000 in equipment and training for that officer in the first year. The requirement for one additional firefighter usually translates into more than just one salary because of shiftwork and because of the need for full crews. If the community wants to add an Emergency Medical Service unit to improve on ambulance response, not only must it hire the appropriately trained medical personnel to meet all shift and apparatus requirements, but it must also purchase response vehicles and the associated medical equipment and supplies. What is the role of the emergency manager when the public will only support funding for the purchase of low-end or surplus emergency medical equipment, but expects the paramedics to be able to do everything short of cardiac surgery when they are the victim being transported?

EQUIPMENT

It takes money to fund necessary equipment, facilities, vehicles, and supplies. Facilities must be adequate to meet the emergency needs of the community, not just the routine activities. In the views of some, an emergency management staff needs only a minimum of office space and a minimal area from which to operate during an emergency. A fully operational Emergency Operations Center is often considered an inefficient use of space and equipment, because a large space with equipment, radios, telephones, and supplies should not be used only once or twice a year. In many communities, the EOC is only used during training exercises and drills. In times of tight budgets, the "bean counters" would argue the money could be better spent on other programs or the space better utilized for full-time offices or storage space. When a community is hit by a disaster, however, the EOC will be worth every penny; and if it is not there, the public will demand to know why.

Equipment must be adequate for use during emergencies and kept up to current standards. It does not serve the public if the Emergency Management Agency is still using typewriters and out-of-date computers and software that are not compatible with the systems of other agencies in the community. This does not mean that computers and software must be upgraded each year - they could be upgraded almost daily - but it does mean that the hardware and software must be compatible with the systems in use by the agencies with which the EMA must work. This also holds true for such other items such as telephones, radios, and other types of office equipment.

Purchases and upgrades must also keep pace with the current technology. Emergency response vehicles, for instance, are more expensive to purchase and to insure than private use vehicles, but an agency cannot afford to have emergency vehicles that are unable to respond to the specific problems which affect its communities, such as snow, high water, or extreme cold or heat. Vehicles must be reliable. Older vehicles actually cost more to maintain as they age beyond 7-10 years. Supplies must also be maintained and replaced as they are expended, and there must be additional administrative supplies on hand, just to be ready for the emergency that occurs on the weekend or

holiday when the office supply store is closed.

COMMUNITY MITIGATION

There is a cost to the community for emergency-management-specific systems, such as indoor and outdoor warning systems. If a community is in an area with tornado potential, sirens can mean the difference between life and death. They are expensive to install and maintain, however. Complete siren systems can cost between $15,000 and $25,000 per siren, depending on the type and model. A community almost always needs both indoor (alert radios) and outdoor systems (sirens) in order to insure that all of the public can be alerted. A counter-argument is often made that in many cases, you cannot predict a specific tornado and you may put in an expensive system which may then never be used. Small communities must often choose between total, overlapping siren coverage and a severe rise in taxes; warning systems are therefore very controversial.

Where a community is in an area with a flood potential, flood control systems, dams, levies, drainage systems, and retention ponds may not be adequate for a worst-case scenario. These systems are very costly to establish and to maintain, but costs may be higher yet if they are not in place when they are needed or if they fail at a critical time. Many Midwest communities know that their flood control system will not be adequate if conditions go beyond certain levels. The cost of upgrading such a system is great, however, and since that level of flooding has not been seen since "Grandpa wore knee britches" projects are put on hold and tax dollars are spent on other, worthy programs. When floods do come, communities may lose many homes and businesses, as well as their continuity as a community.

What does the emergency manager do when the public wants to reduce government spending but demands quality services? There is a dilemma in trying to meet both demands. Take, for example, the amount of snow removal equipment required so that the public is not inconvenienced during a blizzard leaving three feet of snow. If the public demands that all of the streets, both primary and secondary, be clean within 48 hours, it will probably require more equipment and personnel to meet this level of service, all of which costs the taxpayer more.

THE CELLULAR EXPERIENCE

There have been situations were the emergency management community has been able to have an effect. Consider the funding of cellular 911 service. Public outrage resulted when the public learned that, if they dialed 911 from their cellular telephone, the call could be routed to several possible Public Safety Answering Point (PSAP) locations across a state, none of which were local. The public had been accustomed to wired and then enhanced 911 service where the emergency dispatcher knew exactly where the caller was located. With the cellular system, the dispatcher did not know the callers location and often neither did the caller. How many of us know our exact mile-marker on an Interstate or US Highway? One of the proposed solutions for determining the location of a cellular 911 caller was a surcharge on the cellular service to cover the cost of equipment which would indicate the tower which was receiving the call. The telephone companies lobbied legislatures on the premise that such a charge was an

unfair tax and that it should not be supported. A survey of cellular users found that the additional charge of fifty cents to a dollar was not considered to be an unfair burden when the benefits of the service were realized. The measure finally passed only after the legislature was informed by state emergency management associations and the emergency communications associations that if the cost of the remote 911 system was not charged to the cellular telephone users, it would be assessed to all taxpayers in the community, regardless of whether or not they were cell phone users.

FUNDING

What does an emergency manager do when the community must meet the requirements of a program with an unfunded state or federal mandate? Can you afford not to carry out the program when you know that failure to meet the standards of the program can cost the community lives and property or could lead to lawsuits of official negligence and official omission? Where does the emergency manager get the funds to operate the program? The most likely places are from the taxpayer through some to-be determined formula. As mentioned earlier, this can be a problem, because members of the public often demand first class, quality services but do not want to have their taxes increased to pay for it. In order to get the necessary funds from the public, you must demonstrate the need for the program in relation to manpower, equipment, facilities, vehicles, and supplies, and contrast that with the cost to the community in not having the program in place. Usually, the necessary public funds are acquired after a disaster to insure that it will not happen again.

Other public funds can come from grants and similar programs, usually from the state or federal level. Grants, unfortunately, are usually for a finite period. They must be applied for, and reapplied for, on a periodic basis with no guarantee of the availability of the initial or subsequent funds. In addition, once the grant has expired, it is the responsibility of the community to continue to fund the program from local sources. Often, funds can be generated in the form of some type of user fee, or in the form of fines or penalties. These funds can also turn out to be temporary and can be viewed as a penalty instead of a contribution to community preparedness.

Fundraisers in the community can also be useful; but the success of these events is tied to community demographics. Fundraisers can be successful in communities that rely on volunteer emergency services, but generally do not do well in communities whose emergency services are funded through the tax rolls. Volunteer fire and ambulance departments across the county are noted for pancake breakfasts and chili suppers to raise funds for new equipment; but a community must eat a lot of chili and pancakes if it needs to purchase a fire truck at $120,000-$150,000. Is that a more pleasing alternative to using public funds or raising the community tax rate?

Other funds can come from private sources. Generally, these come from private industry and businesses that create a specific risk. Chemical production facilities and nuclear power plants must fund community preparedness programs to meet the risks their facilities entail. Often, this support is mandated by law to provide funds for training and equipment to meet the needs of an emergency at the facility. These same items can also be used to support the community as a whole in a multi-hazard

approach.

THE EMERGENCY MANAGER

The funding of comprehensive emergency management programs is a continuing problem. Quality programs involve a cost to the taxpayer, but the lack of a quality program during the time of an emergency or disaster also brings a cost to the community in lost lives, property, and in the disruption of the community. There is no easy solution or magic pill to solve the funding problem. Emergency managers at the local and state level must constantly compete for tight resources with other programs that are equally important to the total community. They must push for strong program standards and the accompanying funds needed to meet those standards. The community must take charge of its emergency management destiny or be ready to face the consequences of their inaction. The emergency manager has an important role in making this argument clear to the public. Pay now or pay later!

NOTES

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RESCUERS OR TROUBLEMAKERS?
The Massachusetts Response to the 1917 Halifax Catastrophe

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At 9:04:35 am on December 6, 1917, the *Mont Blanc*, a French ship carrying aviation gasoline and munitions exploded in the harbour of Halifax, Nova Scotia, Canada with one-seventh the power of the first atomic bomb. Within seconds, the harbour was full of broken ships. The rail lines were covered with the wreckage of train cars and engines, the Army installations were shattered, hundreds of homes were damaged or on fire, and one-fifth of the city's 55,000 residents were dead, dying, or injured. Thousands more were homeless. The official death toll was 1963 and the injury toll something like 9000. It was far and away the worst catastrophe ever to hit a Canadian city.

In the wake of the explosion, there was a massive response by rail from nearby communities such as Truro, Kentville, Wolfville, Windsor, New Glasgow, and Stellarton, Nova Scotia and from Moncton in neighbouring New Brunswick. There were eventually also trainloads of personnel and supplies from places further away such as Sydney, Nova Scotia; Saint John, New Brunswick; and Montreal and Toronto as well as from Maine, Rhode Island, and New York. There was even a response from United States ships in harbour and offshore, the *Old Colony*, *Old Glory*, *Tacoma,* and *VonSteuben*. Legend would have it, however, that the crucial response came from Boston, Massachusetts. The story goes that Halifax was unable to cope with the devastation and no effective response took place until Abraham Ratshesky and his group arrived from Boston. That legend is so persistent that in recent years the people of Halifax have sent a giant Christmas tree to Boston to thank their American neighbours for what they did in 1917.

There is, however, another side to the story. Although this was brushed over in some early accounts of what happened, the way assistance was administered provoked a revolt by the victims, and the cause of that revolt was the approach to relief that the group from Boston sold to the Canadians. The antagonism became so great that an American in Halifax advised Boston that something needed to be done. This article explores the overall response to the 1917 Halifax catastrophe then examines the response from Boston in an effort to determine if the Americans were, as legend would have it, benevolent rescuers, or if in fact they were actually foreign troublemakers.

It is not difficult to find accounts of what happened in 1917. There are five non-fiction books on the explosion (Smith, 1918; Bird, 1962; Monnon, 1977; MacMechan, 1978; and Kitz, 1989) and six works of fiction, including the classic historical novel *Barometer Rising* (MacLennan, 1941). There are articles about various aspects of the response and continual references to it in autobiographies (Carstens, 1917; Deacon, 1917; MacLennan, 1938; Raddall, 1976; and Morton, 1986). Books keep coming out. The latest include Robert MacNeil's novel *Burden of Desire* (MacNeil, 1992) and a series of articles

based on papers presented at a conference at St Mary's University (Ruffman and Howell, 1994). There are records of what happened in archives in Canada, the United States, England, France, and Norway and more material is continually being discovered (Scanlon, 1997c). Recently, an Ottawa area man found his mother's account in a school scribbler.

To disaster scholars, the Halifax explosion is especially important because one of those present on the day of the explosion was an Anglican priest named Samuel Henry Prince. In 1917, Prince already had a Master's degree in Psychology from the University of Toronto and emergency experience; he had gone to sea as a priest to say the services for the dead from *Titanic*. Three years later, he would complete his dissertation in Sociology at Columbia University. It was called *Catastrophe and Social Change* and it was a study of the Halifax explosion, the first academic study of disaster (Prince, 1920; Scanlon, 1988). He wrote,

> "The whole subject is a virgin field in Sociology. Knowledge will grow scientific only after the most faithful examination of many catastrophes . . . this little volume on Halifax is offered as a beginning. It is hoped that the many inadequacies . . . will receive the generous allowances permitted a pioneer." (Prince, pg 24)

Today, we know a lot more about human and organizational behaviour in disaster. We also know a great deal more about what happened in Halifax. That means it is possible to revisit the 1917 explosion to see what we can learn from such a dramatic event and to find out whether the legend about Massachusetts is accurate.

THE SETTING

In 1914, when Canada entered the First World War, Halifax became the most important port on the North American side of the North Atlantic. Through it flowed the essentials of war: troops, horses, guns, and ammunition. By 1917, the British with their new American allies were insisting that all neutral shipping traffic heading either way across the Atlantic stop in Halifax for clearance. On December 6, 1917, therefore, Halifax harbour was filled with warships and armed merchantmen as well as British ships awaiting convoy. It was also filled with ships from neutral countries like Norway and Holland awaiting permission to sail. Although no harbour records have been located, convoy records and Lloyds' *Record of Shipping Movements* suggest there were about 40 ships in harbour on the morning of the explosion.

Halifax was more than just a seaport, however, Canadian soldiers were quartered at Wellington Barracks and were training at the Armouries and on the Commons, the open space in the town centre. There were also soldiers at Camp Hill and Pine Hill, two military hospitals; Halifax was the reception depot for wounded soldiers returning from overseas. It was also the home of the provincial hospital and several other specialized hospitals, Dalhousie University, the School for the Blind, the School for the Deaf and Dumb, and the Royal Naval College. Finally, it was the home of two Roman Catholic institutions, St Mary's College and Mount St Vincent, both popular with former Canadians living in Boston who wanted their children to get a Roman education.

Despite all the military and other activity and despite the fact that there were fears of submarine attacks or even air raids by Zeppelins, Halifax had no emergency plan. The provincial and municipal governments had not even thought about planning. The military authorities never considered the possibility they might have to warn the civilian population in the event of an air raid or other threat. Nothing was done even after some American insurance analysts came up to Halifax and reported that the city, consisting mainly of frame houses, presented major fire risks and that the fire department was ill-equipped to deal with them.

There were no convoys scheduled to sail on December 6th so the two ferries that link Halifax to its sister city Dartmouth had little traffic to worry about that morning. Three ships had arrived during the night, however, and had been held up until the submarine nets were lifted. One was an armed convoy escort, *Changuinola*. She entered the harbour and anchored beside the British warship *Highflyer*. The others were *Levisa,* an American banana boat, and *Mont Blanc*. *Levisa* entered the harbour next and moved along without encountering traffic, except the ferries, until she neared the entrance to Bedford Basin, an inland anchorage at the upper end of the harbour which is large enough to hold a fleet of ships. As *Levisa* approached the Basin, she moved over to the Halifax shore. Just as she did that a Norwegian ship, *IMO*[2] came out of the Basin en route to sea. The *IMO* had been cleared to sail the previous day but by the time she was ready to depart the submarine nets were down.

While leaving Halifax, *IMO* should have been on the starboard or right side of the channel, the Halifax side. But as she exited Bedford Basin (she had circled around other ships at anchor), she was closer to the Dartmouth shore. Before she could move over she noticed *Levisa* was closer to Halifax. The two ships exchanged signals and agreed to pass starboad to starboard instead of the more normal port to port. *Levisa* then continued to her anchorage and *IMO* readied to cross to the proper side of the channel. Before *IMO* could make that move, however, she ran into more harbour traffic. The tug *Stella Maris* came out of the Halifax docks towing two scows loaded with ashes. Rather than try juggling positions with a tug with an unwieldy tow, *IMO* whistled again to indicate she would stay where she was. She was approaching the narrowest part of the harbour channel and, although she hadn't noticed this because of the bend in the channel, *Mont Blanc* was now dead ahead. The two ships whistled at each other and tried some last minute maneuvers – *IMO* tried to stop and *Mont Blanc* tried to swing sharp left – but it was too late. The ships collided. *IMO*'s bow cut a hole in *Mont Blanc*'s starboard side exposing *Mont Blanc*'s cargo. *IMO* then pulled away.

THE EXPLOSION

Even for wartime, *Mont Blanc*'s cargo was an especially evil mix. Drums of aviation gasoline were lashed down on deck surrounding two guns, each with a stack of shells beside it. In *Mont Blanc*'s forward hold was a material used for detonators called picric acid. Centre and aft her holds contained gun cotton and TNT. The collision broke open the drums of gasoline, a spark set the gasoline on fire, and the flaming gasoline seeped into the forward hold containing the picric acid. By then, the burning *Mont Blanc* had drifted into the wooden docks that lay just below the residential North End of Halifax. As the fire grew in intensity, drums of gasoline and shells exploded followed by the

detonation of the picric acid, the gun cotton and the TNT.

The impact of the explosion came in waves. First, there were shock waves that battered buildings and blew apart windows, cutting those who had been watching the fire through closed windows. Many survivors bled to death from those wounds; those who survived were blinded by the flying glass. Next came a tidal wave which was so powerful that it lifted the tug *Hilford* and dropped her on the docks, and which broke the moorings of other ships and sent them skidding across the harbour. After that, there was a rain of debris. One sailor thought a low-flying aircraft was attacking his submarine when *Mont Blanc*'s funnel whizzed by. Finally, there was a black rain of oil, dirt, and coal dust. It turned everything black and contaminated many wounds, often starting an infection that would lead to death. There were no antibiotics in 1917.

THE INTIAL RESPONSE

Although there was enormous devastation in the harbour and at Wellington Barracks and all the hospitals and many businesses were damaged, the worst destruction was in the residential North End. The force of the blast had jammed doors and windows and tipped over the wood stoves used for heating and cooking. The burning embers set the wooden homes on fire and, within minutes, there were innumerable fires. Despite desperate efforts by survivors to pull the trapped to safety, hundreds of persons, some injured, some just caught in the wreckage, burned to death. Those first efforts at rescue were inevitably done by those present, by family members, and by neighbours. Most were women. Because the explosion took place on a weekday morning in wartime, most men were at war or at work and school-age children were at or on their way to school. (Because of the war some schools did not open until 9:30.) Women also did the initial first-aid of pulling splinters of glass from faces and hands and sewing up cuts with needles and thread.

Minutes later, sailors from the Canadian ship *Niobe* joined these rescuers, as did soldiers, many of them wounded, from the Armouries. There was also a stream of persons from the downtown hotels and businesses. Initially, many came out of curiousity, but they began to join in the rescue work and began to move some of the injured to medical care. At first, most worked on their own, but gradually they organized themselves into groups. A young bank teller, for example, rounded up soldiers and sailors, found some boats, and started transporting injured by water past the flames to the heart of the city. From there, they could be taken to hospital. It was slightly more organized across the harbour in Dartmouth. The engineering staff of *Highflyer* had been on shore for training; their senior officer organized some of them into search parties and had others find mattresses and used them to turn a school into a casualty treatment centre.

While the initial medical response was as informal as the initial search and rescue, it soon involved both experienced first-aiders and medical professionals. Because of the war, Halifax had more trained personnel than most cities. It had an active corps of St John Ambulance personnel including semi-trained nurses, known as VAD's, from the Voluntary Aid Division of St John. Many had gone overseas but there were still several hundred in Halifax. In addition, there were what today would be called "medics",

military personnel trained in the basics of casualty medicine, a training that proved most appropriate for the situation in Halifax.

The first place many persons went for medical care was to the nearest physician's home. That was because in 1917 most physicians lived near the patients they served and had their offices in their homes. Soon physicians' homes in both Halifax and Dartmouth were jammed full of injured, even though some of those homes were damaged. In some cases, physicians simply moved their offices to the streets. One physician in Dartmouth operated on a sidewalk with fur coats as an operating table.

The bulk of the injured went to the various hospitals, however, all of which were damaged, and there the scenes were unimaginable. Although very few statistics are available – no one was keeping records – one volunteer counted 1400 critically injured patients in Camp Hill convalescent hospital on the night of the explosion. Camp Hill had 180 beds and no operating room. Although physicians supplied most medical services at the hospitals, volunteers did whatever they were asked to do. One man administered anaesthetic while a surgeon removed eyeballs. One woman held legs firm while a surgeon amputated. Despite the volunteers, many victims lay unattended for days, sometimes left on floors or tables because there was no place else to put them. A few left without ever receiving treatment.

A lot of what happened in Halifax is now familiar to us for it is typical of initial disaster response (Quarantelli, 1984; Drabek, 1986; Scanlon, 1992b). First, the initial response is by whoever is present. Usually men do most search and rescue but, as early American research shows, women will do whatever is necessary if men are not available (National Opinion Research Center, 1954). Second, we know that while at first rescuers will work on their own, they will soon team up into what we call emergent groups. Third, we know that emergency agencies often play little or no role in the early stages of disaster response. Fourth, we know that the concept of on-site triage which may be relevant to accidents such as air crashes at airports has little relevance to mass casualty disasters. That is partly because in a disaster like Halifax there is no site and partly because in a disaster like Halifax the medical community has no control over the flow of victims to hospital (Scanlon, 1997a).

ORDERLY EVACUATION

Less than an hour after the explosion, a blast of steam was seen to rise through the broken roof of Wellington Barracks. Some onlookers thought it was smoke from the magazine. There were shouts of "fire" and soldiers, sailors, and police rushed through the North End telling everyone to flee, shouting that the magazine at the Wellington Barracks was on fire - there was going to be a second explosion. Most persons who have just experienced an explosion don't need much convincing if they are told that it can happen again; there was a major exodus from the North End. The senior medical officer in Halifax, Lieutenant Colonel F McKelvey Bell, labelled that exodus as panic,

> "The population was thrown into . . . panic by the announcement that a second explosion was to come. The victims of the disaster were stunned and stupid, but a large proportion of those injured ran away, terror-stricken at

the prospect of this second explosion . . ."

The evidence does not support this. The civilians who left evacuated in an orderly way. They helped the blind and they carried the disabled. In addition, many ignored the warnings. The firefighters stayed where they were, and so did the hospital staff, including volunteers. The woman running the switchboard in the dock area stayed on the job, as did many rescuers. Edith Bauld, for example, shamed some sailors into piling into her car and heading back to the North End with medical supplies. McKelvey Bell was wrong to say there was civilian panic. Instead, Halifax is an early example that panic is more myth than reality. It also shows that theories about role abandonment, that people will leave responsible positions to attend to their families, are inaccurate.

CONVERGENCE

Even as these things were happening, word of the explosion was spreading via the railway telegraph and the rural phone systems. (At that time, everyone on a rural party-line could listen in to all the calls; the day of the explosion the telephone system acted like a radio.) As the growing flow of information made clear how bad things were in Halifax, nearby communities wanted to help. Soon, there were trains en route from the nearest city, Truro, from the two nearest railway headquarters, Kentville and Moncton, and from the railway junction town of New Glasgow. Those trains carried nurses, physicians, medical supplies, firefighters and fire equipment, social workers, and the railway personnel and equipment needed to repair the damaged rail system (Scanlon, 1997b).

The initial response would have been more overwhelming except for a blizzard that tied up rail traffic for two days. Forty-eight hours after the explosion, however, the initial response was followed by other trains from Maine, Rhode Island, Massachusetts, and places as far away as New York and Toronto and more trains from towns and cities nearer to Halifax. The mayor asked the railways to stop these uninvited and often unwanted visitors, but to little avail. Before long, the damaged city was swamped with personnel and supplies. The most pressing need was vehicles and drivers to move those supplies from the overcrowded railhead. A few places recognized the problem. The mine-mill community of Sydney, Nova Scotia, sent workmen in trains fitted with kitchens and sleeping accommodation and sent enough supplies so the men on those trains could be self-sufficient - but that was the exception. Convergence was not identified in the disaster literature until four decades later (Fritz and Mathewson, 1957) and the early work wasn't tested until decades after that (Scanlon, 1992a) but there is sufficient evidence from Halifax to show that post-disaster convergence has always been a serious problem.

MUNICIPAL ORGANIZATION

Despite the absence of a plan or any emergency organization, in less than three hours the city put together a detailed response organization. The work began at an informal meeting at City Hall organized by the acting mayor, H S Colwell. (Mayor Peter Martin was away because the explosion occurred days before a federal election.) It ended with

a well-designed structure that included committees to deal with feeding and housing, transportation, fuel, and a morgue. By mid-afternoon, the committee had even arranged a line of credit with the Bank of Nova Scotia. It had also started keeping records; a complete set of minutes of all meetings of the Halifax Relief Committee can still be found in the Public Archives of Nova Scotia. Since record keeping often falls apart in disasters, this was a remarkable achievement for a beleaguered city.

Within 24 hours, after a presentation by Claire MacIntosh, Lady Superintendent of St John Ambulance, the Halifax Relief Committee went even further. It authorized MacIntosh to recruit a team of volunteers to visit the damaged areas of the city and do two things: assess the problems faced by the survivors, and provide those survivors with information about what was available. MacIntosh rounded up a team of women, mainly teachers and members of the Salvation Army, and, despite the blizzard which made driving impossible and walking difficult, completed a canvas before the end of that second day. By the next morning, she was ready to do a follow-up. By then, the Commissioner of the Salvation Army had arrived from Montreal and endorsed MacIntosh's view that information was the key to effective response.

While social services were organized fairly quickly, at first the Halifax Relief Committee did not have a medical committee. It left those concerns to the medical community. Soon, however, the committee began to realize that the medical response also needed organization. It commissioned a retired Army engineer to put together a medical response team. Assisted by staff from the Canadian Army Medical Corps, he created a response that is still a model worth studying (Scanlon, 1994):

- There was a supply unit run by pharmacists assisted by commercial travellers to provide supplies to all the hospitals and medical centres, supplies that even included clothing for the victims;

- There were a series of casualty treatment centres – units that compare to modern-day clinics – laid out in a semi-circle around the main impact area so the victims could go for help as outpatients;

- There was a team of physicians on standby at City Hall, ready to respond within minutes to any urgent call for medical help; and

- There were a number of emergency hospitals, fully staffed and fully equipped, most of them in converted residential facilities such as St Mary's College and the YMCA.

Later, arrangements were made for all medical centres to be inspected. Qualified physicians were even sent to Truro and New Glasgow to check out the services being offered victims outside Halifax. (Injured survivors had been taken by train to both these communities.)

In addition to taking care of the injured, Halifax began to look after the dead. Right after their initial meeting, members of the Relief Committee visited Chebucto School and chose it as the morgue. That evening, soldiers checked out the school with the help

of a student, then began to collect bodies and place them in the school basement. (Many burned bodies had been piled in stacks along the main streets to clear the way for traffic.) The next morning, the committee decided the morgue ought to be under civilian control. A police officer, Leo Tough, was sent to supervise the soldiers. Under Tough's direction, soldiers began to tag each body and place anything that might help identify it in a bag with the same number. The provincial registrar moved in upstairs and began keeping the files that would eventually record the 1963 known dead. All bodies had to be brought to the morgue but, as soon as they were identified, were released for private burial. The speed and efficiency with which all this was done reflects the fact that, unlike most communities, Halifax had experience with handling large numbers of bodies. It had used the same school, for example, when the bodies were brought from the *Titanic*. The man who looked after record keeping for the *Titanic* was the father of the man who did it in 1917 (Scanlon, 1998a).

Many bodies were burned beyond recognition; many others had nothing which would help identify them. In any case, there was often no one left who might be able to recognize them. Some city blocks were totally destroyed. Some families were wiped out. Even if there were survivors, they were often seriously injured and in hospital, unable to come to the morgue. Added to those problems was the fact that strangers had moved many of those who were dying and the morgue had not the slightest idea where a body came from. As it became clear that many bodies would never be identified, there was a suggestion there might be a mass burial. This caused immediate public opposition. Eventually, there were mass funerals for the unidentified dead, but each unidentified body was buried in a numbered grave. That same number appeared in the morgue records and on a bag holding any material that might help to identify the body. Because of the freezing weather, graves at the various cemeteries had to be opened using dynamite.

THE AMERICANS

The first American response came from *Old Colony* and *Old Glory*, two US Navy ships in harbour. Sailors from those ships rushed ashore to assist with search and rescue and *Old Colony*, a former passenger liner, was turned into a hospital ship for about 150 injured. Within hours, those ships were joined by *Tacoma* and *Von Steuben.* They had been passing offshore and their lookouts had seen the explosion. At the request of the Canadian Army, their crews took over night security for the first week after the explosion. They were armed and prepared to arrest or shoot looters but there is no evidence any looters were found. They also provided some assistance to American medical teams when some damaged buildings were turned into emergency hospitals.

The major American response, however, came by train, first from Maine, the nearest neighbour, then from Massachusetts and Rhode Island and New York. That response was delayed by the blizzard that tied up all rail traffic along the Atlantic seaboard for two days so that, by the time those trains arrived, a great deal had been accomplished. The situation in Halifax, however, had been so bad that, even 48 hours after the explosion, it appeared to a new arrival that little had been done. There were still bodies everywhere in the impact area, many now buried beneath the snow. There were still survivors huddling in the basements of their damaged homes. There was still confusion

at City Hall as officials tried to sort out the various problems. There were still persons in need of medical treatment.

Because he saw those problems as signs of a failure to create a proper organization, Abraham Ratshesky, head of the Massachusetts relief group, managed to convince Canada's Prime Minister Robert Borden that a new organization was needed. (Borden had also arrived on a train delayed by the blizzard.) That was done on Saturday afternoon about 52 hours after the explosion and it is hailed in Prince's dissertation and MacNeil's novel as the start of organized response:

> ". . . when Mr. Ratshesky of the Public Safety Committee of the State of Massachusetts came into the room . . . it was the coming of a friend in need . . . Only nine hours later, the Citizens' Relief Committee was ready, and a working plan adopted, and from it came a wonderful system worthy of study by all students of emergency relief. With the coming of the American unit . . . the systematic relief work may be said to have in reality to begun. (Prince, pg 82)
>
> "Well let's get on with it. Who's in charge of the Medical Committee, the Transportation Committee, the Housing Committee? We're going to need cooperation from all of them."
>
> "We don't have such committees," Halliwell said huffily (Halliwell is chair of the Halifax Relief Committee), "It's all we have been able to do to set up the Relief Committee. There's been simply too much emergency work to do."
>
> "Well, sir," the commissioner said, "I don't want to step on any toes here but I have had experience with disasters and we need to get some organization fast. I suggest you get together and make separate committees for food, housing, sanitation, medical care and transportation . . . " (MacNeil, pg 105)

Both the above accounts, non-fiction and fiction, reflect the public perception that the Americans brought order out of chaos. It is true that Ratshesky's intervention led to some changes. There were fewer politicians in key positions. There were women on the managing committee and there were American advisers attached to key functions such as reconstruction. But the same person remained as chair, and the original functions were all maintained. The relief effort had been sensibly organized and was well underway long before the group from Massachusetts arrived.

The major change inspired by the Americans was not organizational, however, it was philosophical. The relief committee had been handing out food and clothing and fuel and other necessities to anyone in need. There had been few attempts to verify those needs and record keeping was, at best, perfunctory. This appalled the American social workers and American Red Cross officials. They had been taught that social sciences exist to help welfare personnel catch the crooks. They said that aid must be given only after a careful assessment of the victim's resources and the victim's needs. Prince's

thesis supervisor, Franklin Giddings, spelled out what was needed:

> ". . . accurate information regarding the present and previous income of cash . . . previous occupation, amount of losses, resources in savings, insurance . . . interviews with members of the family . . . reference calls by social workers upon those who can shed further light on the family situation (Giddings, pg 41)

That view prevailed and as a result, trained social workers, including some Americans, began to do detailed interviews with survivors. They also began to crosscheck the records of one help group against others. Soon there was a "black list" of persons ineligible for aid. As this approach continued, there were at first rumblings of discontent indicated by letters to the editor. Before long, there were also protest meetings that attracted the support of the municipal politicians who began to feel relieved they had been removed from the relief committee. The problems were eventually resolved by turning over assistance to a federally appointed Halifax Relief Commission, but the whole experience left a sour taste in the mouths of many survivors.

A CHANGE IN THE APPROACH

The people from Boston were largely responsible for the actions that led to public protests. Yet the anger about the approach to relief has disappeared and the memory of Boston's role is positive. The main reason for this is that some persons from Boston realized what had gone wrong and set about to change things. The key player in this turnabout was G Fred Pearson. He was disturbed at the way the relief effort developed and he was quietly passing reports to Henry Endicott, the head of the Massachusetts relief effort in Boston.

> "The people who lived in the devastated area," Pearson wrote, "have been investigated and investigated until they are sick at the thought of investigation. The investigation in all cases has not been carried out by sympathetic and mature people . . ."

Concerned, Endicott decided to pay a personal visit to Canada. He brought with him the vice-chairman of the Massachusetts-Halifax Relief Committee, James J Phelan, and its treasurer, Robert Windsor.

After a lengthy meeting with the Halifax Relief Committee, Endicott decided that Massachusetts should step aside from the existing Halifax relief process and set up its own procedures. That new approach was so sensitive and so well run that it did not lead to a single recorded complaint. It led to the legend about the Massachusetts response to Halifax. The idea came from Pearson. He suggested that Massachusetts open a warehouse and make furniture available to those who had lost their possessions and to those whose homes were relatively intact but whose furnishings were not. He suggested that a catalogue be produced showing residents what was available so they could choose what they wanted. The

catalogue was never produced but the rest of Pearson's ideas were adopted. It was decided that the best way to choose those who would receive aid was to form a committee of local women and ask them to quietly investigate local residents to determine who was in need. Their recommendations would then go to Massachusetts. If the committee approved their choice then and then only would be person chosen be informed. No one would know he or she was being considered, only that they were among the chosen.

The persons chosen were invited to the furniture warehouse where they were allowed to choose the sort of furniture they wanted and the appropriate supplies such as knives, forks, spoons, table and bed linen, and kitchen utensils. Once their choice was made those supplies were ordered from Massachusetts. They would then be shipped directly to the family as a gift from the people of Massachusetts. Arrangements with Canada provided that all such gifts crossed the border free of duty, a decision that, in effect, allowed the merchants of Boston to invade the Canadian market. When the Canadian relief agencies asked about those supplies – they planned to deduct the appropriate amount from other relief – they were told it was none of their business. The supplies were a gift, not charity, and should not be included when relief payments were handed out.

APPROPRIATE GIFTS

The minutes of the committee at the State Capitol Archives in Boston leave no doubt that those who received help needed it. One report covered John and Margaret Stokes, their six children, their son-in-law, John Hinch, and two grandchildren. All had lived together at 21 Acadia Street. One of the Stokes children lost an eye, another a leg. Mr Hinch and his youngest son were killed in the explosion. The family lost its home. The committee gave them four beds, springs, mattresses, sheets, pillow-cases, and bedroom furniture such as bureaus and commodes.

The committee also helped refurbish St Joseph's Orphanage, the Protestant Orphanage, the Old Men's Home, St Joseph's Home, St Patrick's Home, the School for the Deaf and Dumb, the Just Mission of the Independent Order Daughters of the Empire, and the Home of the Guardian Angel. It provided a piano to St Joseph's Convent and an organ to the Children of Mary in St Joseph's parish. It provided playground apparatus for the new apartments, named after Massachusetts Governor Samuel Walker McCall. (Governor McCall eventually visited Halifax and posed for pictures with children enjoying the new playground.)

Despite its rigid procedures, the committee was responsive to suggestions from others. The principal of Acadia University, Dr G B Cutten, who had come to Halifax on the first relief train from Kentville the day of the explosion, took leave from Acadia in the summer of 1918 to help manage the rehabilitation process, using his background as a psychologist. On his recommendation, the Committee

provided washing machines, bread mixers, special high chairs, and kitchen cabinets for Mrs James Hynes, Mrs Mary Miller, Mrs James Monamy, Mrs Elizabeth Bewes, Mrs Winnifred Brown, Mrs Victoria Conrad, Mrs Sarah Heaton, Mrs Frank Robinson, Mrs James Foran and Mrs D Hinds. The explosion had blinded all these women. (Mrs Monamy was an especially sad case. She had been pregnant at the time of the explosion and lost her baby as well as her six-year-old son.) The person responsible for the blind program wrote his thanks:

> "When we first came, practically all the women who had lost their sight in the explosion were sitting in absolute idleness in their homes. It occurred that the best thing we could do for these women was to re-educate them sufficiently to perform their household duties."

What really left a good impression was the willingness of the committee to deal with individual problems. It provided a piano for Evelyn Moseley, who supported herself and her mother by teaching music and who had lost her piano in the explosion. It provided tools for Alfred Fougere, 15, who had patiently saved his own money to buy shoemaking tools so he could apprentice as a shoemaker and then lost those tools in the explosion. It refurbished the homes of clergy. The thank-you letters poured in. William Swetnam, a minister who lost his wife and son, wrote from his new home in the Methodist parsonage in Bridgewater how much he appreciated their kindness, "a kindness that will never be forgotten by me and my motherless girl." (Swetnam's wife had been playing the piano when she died and that piano was destroyed. The Relief Commission had declined to replace it.) V R Purcell painstakingly typed his thanks on his new typewriter:

> "This typewriter furnishes me with the missing link which connects me to the outside world from which I was so suddenly cut off on the morning of December 6th . . . I had the misfortune to lose both my eyes."

Sydney King, the pastor of the Zion African church, also sent his thanks. Massachusetts had provided $150 for a small organ for his church. Massachusetts estimated that its gifts would cost $500,000. That turned out to be far too high, partly because the committee managed to buy all its supplies wholesale and partly because its gifts came in duty-free. That left the state with several hundred thousand dollars. It spent much of that money on long-term health care, especially in an effort to deal with and eliminate tuberculosis and that, too, left a lasting impact and a lasting positive impression on Nova Scotia.

SUMMARY AND CONCLUSIONS

The 1917 Halifax explosion is far and way one of the worst catastrophes to hit the American continent. It ranks with the Galveston flood, the San Francisco earthquake, the Texas City explosion, Hurricane Hazel, the Mexico City

earthquake, and Hurricane Andrew. For scholars, however, it is more important than any of the others because it marks the start of academic research into human and organizational behaviour in disaster.

It is now possible to revisit the explosion and use archival data to test many of the current theories about disaster (Scanlon, 1998b). That data shows that initial search and rescue is done largely by the survivors, that those who do respond form emergent groups, that panic and role abandonment are myths rather than realities, that convergence has always been a major problem, and that, even without planning, community leadership arises and can be very effective. It also shows that our theories about medical response to a site and triage have little relevance to incidents involving widespread destruction and mass casualties. In short, it confirms much of what American scholars have already taught us about the reality of disaster.

These findings should help put to rest the belief that community leaders did nothing until the Americans arrived. These findings also show, however, that while the legend of the importance of the response from Massachusetts may be distorted, it is based on a real achievement. Like some rumours, it survives because it includes a substantial element of truth. The Massachusetts group arrived after much had been done and they created problems with their approach to social services. Yet their eventual program of assistance was so well conceived and managed that Massachusetts deserves all it applause it has received.

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NOTES

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2. The IMO was named for Jurgens M Osmundsen and was known by the Norwegian version of his intials.

DISASTER INFORMATION NETWORKS

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INTRODUCTION

Local communities need disaster information for such purposes as alerting populations to incoming tsunamis or to out-of-control forest fires which are approaching urban areas. A disaster information network may be able to help local communities by coordinating disaster information from a variety of sources and making it available to those communities which might be affected. Local communities can also provide detailed information to the outside world about damage after a disaster in order to make the shipment of humanitarian relief supplies more timely and effective. Vice-President Al Gore became interested in 1997 in the possible use of the Internet for dissemination of information to reduce disaster losses. A task force studied the problem and published a report, "Harnessing Information and Technology for Disaster Management". The report concluded that an international disaster information network using the Internet was technically feasible and that remote sensing from satellites could produce timely information. The report recommended that action be taken to begin international coordination and collaboration to develop a system called the Global Disaster Information Network (GDIN) which will help all countries prepare for and respond to disasters.

The goal of this evolving system is to reduce disaster losses by making timely and accurate information available to emergency managers and to others who need information to make decisions about actions to prepare for, respond to, recover from, and mitigate the effects of disasters. The international network is in early stages of development. A first international conference of experts was held in Washington, DC, July 16-18, 1998 and a second international conference was held in Mexico City, May 11-14, 1999. The third international conference is scheduled to be held in Turkey in April 2000 and the fourth in Canberra, Australia in April 2001.

Some of the organizations which are involved in this initiative and their activities are reviewed here. In particular, organizational and procedural improvements in the State of California's management of disasters and of disaster information are examined to determine whether or not some of these approaches might be appropriate to the development of national and world-wide disaster information networks.

THE CALIFORNIA EXPERIENCE

The Loma Prieta earthquake which occurred at 5:04pm on October 17, 1989 near Santa Cruz, California resulted in the death of 63 people, injury to 3757, the destruction of 1018 homes, and damage to 23,408 homes and 3530 businesses. There was extensive damage to the business districts, homes, and hospitals in the city of Santa Cruz, and in

nearby Watsonville, the other city in Santa Cruz County. Television and radio broadcast stations, however, concentrated their attention on damage in San Francisco and Oakland 60 miles north of the epi-center. The collapse of one span of the San Francisco-Oakland bridge, the collapse of a mile of the upper deck of a major expressway in Oakland which crushed 42 automobiles, and a large spectacular fire which burned blocks of expensive houses and apartments in the Marina District of SanFrancisco monopolized the news broadcasts.

For almost 24 hours, the media barely noticed that earthquake damage to roads and bridges near the epi-center had isolated the city of Santa Cruz where many homes had been damaged. Fortunately, the implementation of pre-disaster local mutual aid agreements resulted in fire engines from other municipalities rushing to Watsonville to help even though the telephone communication systems had been damaged. There were 17 almost simultaneous fires in Watsonville after the earthquake. One of the important lessons learned from this disaster was how vulnerable highway, electrical distribution, gas, and telephone systems are in California. Another lesson learned was that important information about earthquake damage in this disaster did not get to the Governor's Office of Emergency Services in the State capital at Sacramento, 200 miles away, quickly enough.

CALIFORNIA'S SATELLITE COMMUNICATIONS FOR DISASTERS

As a result of this experience, the State of California decided to invest $9 million in a satellite communications system for the Governor's Office of Emergency Services so that disaster information could be exchanged reliably in future earthquakes even though the commercial telephone system might be heavily damaged. There are 58 counties in California, so 58 satellite uplink/downlink stations were purchased, along with four trailer-mounted mobile stations, stations for the Governor's Office and three regional emergency operations centers. This satellite communications system is called OASIS - Operational Area Satellite Information System. Each county with its cities and special districts is now designated as an "operational area" for disaster purposes. Each operational area is responsible for coordination of disaster planning, response, and mutual aid within its area, and for communicating with other operational areas and with the Governor's Office and regional centers. The satellite links permit each operational area to talk to and send data to any or all of the other 57 operational areas, to the three regional emergency operations centers, and to the Governor's State Operations Center. This system is exclusively for disaster-related information.

CALIFORNIA'S DISASTER INFORMATION SYSTEM

The State next developed standardized formats for messages: for reporting information about disasters, for requesting mutual aid, for reporting the status of operations and resources, and for providing information for after-action reports.

This California information system is called the "Response Information Management System" (RIMS). The information can be distributed using the OASIS satellite communication system or by using other communication systems if they are operable after the disaster. RIMS uses off-the-shelf commercial software, Lotus Notes.

Information about RIMS can be found on the State of California's OES web site which has details about all of the formats for the various disaster information reports.

The formats for distributing disaster information have been developed to follow a logical time sequence. After an event such as an earthquake occurs, the local community prepares a basic incident report to tell all the appropriate authorities that something has happened. This is called the Event/Incident Report. Situation Reports are subsequently distributed to provide updated information on the incident.

Mission Request/Tasking messages asking for mutual aid are next sent if the disaster is so large that the resources of the local community are insufficient. The responding agency indicates whether or not it can provide the requested resources.

Status Reports for the Standardized Emergency Management System (SEMS) Reports Databases are prepared and distributed so that everyone will know what has happened, what is happening, and what is planned to happen in a variety of functions such as:

Initial Damage Estimates

Movements

Mass Care and Shelter

Fire and Rescue

Law Enforcement

Hazardous Materials

Medical/Health

The use of standardized formats by the Lotus Notes software makes it possible for all relevant organizations to put their information into the RIMS system and update it so that everyone can receive the information simultaneously. The requests for mutual aid are directed to coordinating authorities, and the information as to whether or not the aid can be provided is available to all, since some other organization might be able to provide assistance.

DEVELOPMENT OF THE STANDARDIZED EMERGENCY MANAGEMENT SYSTEM

The OASIS satellite communications system and the formatted emergency information of RIMS are part of California's new Standardized Emergency Management System (SEMS). This new statewide emergency management system was developed as the direct result of the disastrous East Bay Hills fire in Oakland and Berkeley in October 1991 which resulted in 25 deaths and 150 injuries. There were 3354 houses and 456 apartments destroyed in spite of the efforts of more than 300 mutual aid fire engines brought to the disaster. The estimated cost of the East Bay Hills fire is $1.5 billion and it is the most costly urban fire in the history of the United States.

There were a number of factors which were pertinent to this major disaster according to the official "lessons-learned" report prepared by the East Bay Hills Fire Operations Review Group. The weather made fire fighting almost impossible with temperature of 92 degrees Fahrenheit, relative humidity of only 16 percent, and winds of 30 knots gusting to 50 knots. The fire ignited 790 homes in the first hour. As the fire spread, it was difficult for the police to evacuate people from their homes because the streets were narrow and clogged with burned-out hulks of more than a thousand automobiles. The terrain was hilly with lots of trees. Many houses had wood shingle or wood shake roofs which caught fire easily.

There were also important organizational problems. The Oakland Fire Department did not use the Incident Command System and had few formal mutual aid agreements. The Fire Department moved its field command post to three different locations as the fire spread, which made communications with the Oakland Police Department difficult. The police department had also established its command post in two different locations. When the Governor of California arrived it was difficult for him to find out who was in charge and what was going on.

Furthermore, the Oakland Fire Department had a different size fire hydrant from all other California cities so that the 300 mutual aid engines arriving from other cities needed to use adapters which were in short supply. The Oakland Fire Department's budget had been cut so much in the preceding ten years that about 40% of the firefighting personnel had retired without replacement. There had not been enough money in the budget for training in fighting wildland fires. Because of the small budget for modernization, the fire engines had antiquated four-channel radios for communication instead of modern sixteen-channel radios. This made it difficult to communicate with the 300 mutual aid fire engines which had arrived to try to help.

State Senator Petris, whose home in Oakland had been burned, prepared the draft of Senate Bill 1841 which was quickly approved by the state legislature and signed by the Governor. This law is found in Section 8607 of the Government Code. The intent of the law was to improve the coordination of state and local emergency response in California. The new "Standardized Emergency Management System" (SEMS) became effective December 1, 1996.

BASIC COMPONENTS OF SEMS

The new Standardized Emergency Management System was based on improvements to existing systems and some new concepts. The five basic components are:

1) The Incident Command System (ICS) - The Incident Command System as developed by fire departments in Southern California in the 1970s will be used at the field level by all responders;

2) Multi-Agency Coordination - Multi-agency coordination is the coordination among different agencies within a jurisdiction, such as Fire and Law Enforcement. Inter-agency coordination takes place between different levels, such as city police, county deputy sheriffs, State Police,

and California Highway Patrol officers;

3) A Master Mutual Aid agreement - State, counties, and cities originally signed a master mutual aid agreement in 1950. This has been further developed so that it now covers fire, law enforcement, coroner, emergency medical, and search & rescue systems;

4) Operational Areas - An operational area consists of a county and all political subdivisions within that county's area; and

5) The Operational Area Satellite Information System (OASIS) - A satellite communications system with a high frequency radio backup installed at each of the 58 counties, the regions and the State.

The collection of formatted message reports designed to be transmitted over this satellite system is called the Response Information Management System. Some of these aspects of standardization of disaster information management in California may be of interest to the developers of the Global Disaster Information Network. There would appear to be numerous advantages to using standardized terminology and standardized formats to reduce the possibility of misunderstandings particularly when a truly global system is being designed.

OTHER DISASTER-RELATED ORGANIZATIONS

State and Local Emergency Management Data Users Group

There have been problems after many disasters for outside organizations in providing appropriate humanitarian assistance to local communities. After a hurricane, for example, there may be many damaged houses. There may be a shortage of sheets of plywood and roofing material to make the houses temporarily habitable and keep the rain out. The community should have access to a disaster information network where these needs can be promulgated and read by appropriate organizations which may be able to provide the humanitarian assistance requested. The State and Local Emergency Management Data Users Group (SALEMDUG) developed a "National Donations Information System" some years ago. The goal of this disaster information system was to allow the communities affected by a disaster to specify in detail what sort of assistance they would like to receive, where they needed it, and when. It also contained information from the providers of the equipment or personnel to the recipients as to what was being provided, where it would arrive, and when, so that the recipients could know that their request was being filled and when it would arrive. There had been a number of unfortunate examples after Hurricane Andrew in Florida of donations, which had been sent spontaneously from organizations in northern states, arriving unannounced and causing problems rather than solving problems. The specific things or equipment which arrived had not been requested and were either inappropriate, delivered to the wrong location, or were too late. These well-intended efforts had the unfortunate effect of causing overwhelming problems for the receiving organizations. A disaster information network should address this issue.

Pacific Disaster Center

The Pacific Disaster Center is a Federal information processing center located in Kihei, Maui, Hawaii which is being developed as an organizational and technological model for global, national, and local initiatives in disaster management. The Pacific Disaster Center serves as a nodal model for the Global Disaster Information Network. Federal participants in this development program have included the Federal Emergency Management Agency, US Geological Survey, National Oceanic and Atmospheric Administration, National Reconnaissance Office, and the National Aeronautics and Space Administration. The Pacific Disaster Center uses data from a variety of sources to produce more than 70 different products, such as tsunami travel-time maps, tsunami evacuation maps, flood inundation maps, annotated imagery of damaged areas, and maps of available shelters.

The Pacific Disaster Center held a three-day Users' Conference on April 28-30, 1999. The purpose of the conference was to familiarize users with the Center's capabilities and products and to provide a forum for users. Each user was invited to give a presentation on his organization and its mission, overview of operations, recent activities, suggestions for ways the PDC could assist the user, and description of ways the user might be able to assist the PDC.

The Pacific Disaster Center and the Center of Excellence in Disaster Management and Humanitarian Affairs co-sponsored the Asia-Pacific Disaster Conference '99, September 19-22, 1999 at Lihue, Maui, Hawaii. The conference was designed to identify user needs and enhance collaboration among the participants who included disaster managers and responders from Alaska, Hawaii, North America, Pacific island states, Asia, and international humanitarian organizations. Technologies examined at the conference included remote sensing, image manipulation, information management, medical technology, telemedicine, chemical and biological sensors, decontamination, water, and power.

Western Disaster Center

The Western Disaster Center Inc is a nonprofit public-benefit corporation which has been organized to provide for increased public safety through the enhancement of disaster and emergency management capabilities through the application of advanced technology and research associated with the establishment of the National Disaster Information Network. The Western Disaster Center is proposed as the US western regional component - the Western Disaster Information Network - of the evolving National Disaster Information Network. The mission of the Western Disaster Center is to provide effective and timely dissemination of information to federal, state, and local emergency commanders in the western contiguous United States. The Center is operating under NASA Ames Research Center sponsorship at the WDC Prototype Operations Facility at Moffett Federal Airfield, California.

In Project Quake, the Western Disaster Center has been working with the California Governor's Office of Emergency Services to develop the California Disaster Information Network HAZUS prototype project to demonstrate the value and utility of all-source satellite remote sensing for earthquake damage intelligence. In Project Sanctuary, the Western Disaster Center is working on a pilot project to demonstrate the value of

all-source satellite remote sensing to detect large ocean oil spills in the Monterey Bay National Marine Sanctuary. This will support the US Coast Guard, EPA, the Office of Oil Spill Prevention and Response of the California Department of Fish and Game, and local jurisdictions such as Pacific Grove, Monterey, and Carmel-by-the-Sea.

National Interagency Fire Center

The National Interagency Fire Center in Boise, Idaho needs a near real-time fire monitoring system for the United States. The Center started in 1965 as the joint US Forest Service/Bureau of Land Management Fire Coordination Center. It is now an interagency organization supported by the Department of Agriculture's US Forest Service, the Department of the Interior's Bureau of Land Management, Bureau of Indian Affairs, National Park Service, Office of Aircraft Services, and US Fish and Wildlife Service, NOAA's National Weather Service, and the National Association of State Foresters. The National Interagency Fire Center and the US Geological Survey hosted a conference on GIS and remote sensing technologies, "Crossing the Millenium: Integrating Spacial Technologies and Ecological Principles for a New Age in Fire Management" on June 15-17, 1999 in Boise, Idaho.

Global Fire Monitoring Center

The German Government, Ministry of Foreign Affairs is sponsoring a Global Fire Monitoring Center as a German contribution to the International Decade for Natural Hazard Reduction. This Center is at the Fire Ecology Research Group at Freiburg University, Freiburg. The Center publishes (on the Internet) the UN International Forest Fire News. The Global Fire Monitoring Center's website commented on one of the reasons why the center was established in June 1998.

> ". . . however, it is evident that in many countries of the developing world the state of scientific and technical knowledge is either not known or readily accessible for developing adequate measures in fire policies and management. The fire and smoke episode in 1997-98 in South East Asia was a good example that existing fire information systems or fire management expertise was utilized to a limited extent only. These circumstances led to confusion at national and international decision-making levels and led to the delay of response by a series of national and international projects, some of them even missing the targets. This can be explained by the lack of an information system which is accessible globally. . ."

The Global Fire Monitoring Center has established contact at the working level with the Global Disaster Information Network. One of the goals of the Center's research program is to be able to provide real-time or near real-time information related to fire to the GDIN and similar initiatives.

National Geophysical Data Center

The National Oceanographic and Atmospheric Administration's National Geophysical Data Center in Boulder, Colorado is currently developing a near real-time multi-source active fire monitoring system. The National Geophysical Data Center gets global fire detection data from the US Air Force Defense Meteorological Satellite Program. This

information should be available through the Goddard Space Flight Center.

US Geological Survey's Hazard Support System

The US Geological Survey is establishing a Hazard Support System in Reston, Virginia to receive and coordinate information from satellites, Doppler weather radar, nationwide lighting-strike detection, etc in order to provide detection of fires, volcanic eruptions, and ash clouds to appropriate disaster management organizations. The National Reconnaissance Office has given a two-year $23 million development contract to Raytheon.

HazardNet

HazardNet is a prototype natural and technological hazard information sharing network which has been under development as a demonstration project of the International Decade for Natural Hazard Reduction. The goal is to enhance the timeliness, quality, quantity, specificity, and accessibility of disaster information for persons and organizations worldwide. The prototype development has been led by researchers at Simon Fraser University, Vancouver, Canada and the Canadian Forest Service.

PROGRESS ON THE GLOBAL DISASTER INFORMATION NETWORK

There have already been two GDIN conferences. The first was in Washington, DC, July 16-17, 1998. The second international conference was in Mexico City, May 11-14, 1999 with 130 delegates from 18 countries. The third is scheduled to be held in Ankara, Turkey in April 2000 and the fourth conference will be held in Canberra, Australia in April 2001.

The conference in Mexico City formed five GDIN working groups:

Policy

Outreach / User Need Identification and Partnering

Technology / Systems Engineering

Pilot Projects / Demonstrations / Validations and

Capacity Building.

Individuals and organizations interested in participating in the development of GDIN are invited to contact the US Transition Team at the US State Department.

User Needs

The Global Disaster Information Network should have the potential for providing local communities with timely alerting and warning information on disasters. For example, during the Oakland/Berkeley urban fire, the Oakland Fire Department did not really know where the fire was and where it might be spreading. The Fire Department did not have helicopters for observation and was too disorganized to ask the US Air Force

or NASA for special photographic surveillance of the area of the fire by aircraft or satellite. We might some day have a similar problem in our City. Pacific Grove is adjacent to 5000 acres of the Del Monte Forest. In the area is a golfing and expensive residential area known as "Pebble Beach". There was a 1000 acre fire in the Del Monte Forest in 1901. A fire there in 1987 destroyed 31 homes. This part of California has several State and National forests as well as federal wilderness areas within a few miles of our small cities. The Marble Cone fire in 1976 in nearby Los Padres National Forest burned more than 150,000 acres. Just prior to the rains of the 1998 "El Nino" year, we experienced five years of drought which raised concerns about the possibilities of extensive forest fires in these dry forests and wilderness areas. Anyone interested in user needs of disaster information networks is invited to contact the author who is chairman of GDIN Working Group 2c.

A GDIN system might be able to help us by getting fire information from NASA assets at the Goddard Space Flight Center in Greenbelt, Maryland. Scientists at the Goddard Center and the University of Virginia have recently established a new global fire monitoring Web site which incorporates satellite information from the United States and international partners. NASA's coordination of these various capabilities for detection and monitoring of fires in California could be of tremendous value to our local communities and provide us with alerting information to prevent a repeat here of the Oakland / Berkeley urban fire disaster. Also, the Western Disaster Center might be able to obtain unclassified imagery-derived products on ocean oil spills which could alert the US Coast Guard, California Department of Fish and Game, and our local communities to take prompt response actions.

CONCLUSIONS

Local communities need information on such potential disasters as wildland fires which might get out of control and advance on urban areas or ocean oil spills which may threaten our shoreline. Disaster information networks should have the potential of providing timely fire detection and monitoring information to the affected local cities and providing alerting information on oil spills. Local communities may be able to use the resources of the network to make requests for specific humanitarian supplies after a disaster. Donation information systems in the network would be of value for providing accurate information back to the local communities as to what will be arriving, where, and when.

The Global Disaster Information Network has a tremendous potential for improving the capabilities of local communities to cope with disasters. GDIN should promote more effective collaboration among the providers, disseminators, and users of disaster information by complementing existing networks for sharing disaster information such as ReliefWeb. Some of the developments in management of disaster information by the State of California may be pertinent to evolution of national and global disaster information networks.

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NOTES

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HURRICANES AND CASINOS IN BILOXI, MISSISSIPPI

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INTRODUCTION

This study examines the effectiveness of the current hurricane plan and the relationship of dockside casino siting to natural hazards, specifically hurricanes. The Mississippi Gaming Commission mandates that coastal casinos stay in place with moorings designed to withstand a Category 4 hurricane instead of evacuating the moorings. In addition to evaluating previous and current hurricane plans, Storm Index and Effective Damage Index (EDI) models were developed to calculate potential damage from storms based on storm intensity, distance from landfall, topographic location, and casino structural integrity. The EDI estimates the percentage of damage to each casino. This study found less risk in mooring in place, however, properly constructed land-based structures offer a better solution for mitigation.

The greatest threats to life and property in coastal areas are from tropical cyclones or hurricanes. Since the development of dockside casino gambling on the Mississippi Gulf Coast in 1992, there has been an increased risk from hurricanes. Because the first casinos were self-propelled riverboats, initial evacuation plans called for relocation to protected waterbodies prior to hurricane landfall (Meyer-Arendt and Abusalih, 1994). As gaming "vessels" became increasingly larger and less maneuverable (many floating structures are effectively three-story buildings of over 100,000 square feet fastened to large barges) the relocation plan became less viable. The newest emergency management plan calls for dockside casinos to "moor in place" rather than relocate.

Casinos in Biloxi have a major impact on the local economy in terms of employment, tax revenues, tourist arrivals, and hotel occupancy, so it is important to evaluate the present plan as decreed by the Mississippi Gaming Commission (MGC). The aim of a recent research project was to determine if the current hurricane preparedness plan for casinos to moor in place is less hazardous than the previous plan of evacuation (Schwartz, 1997).

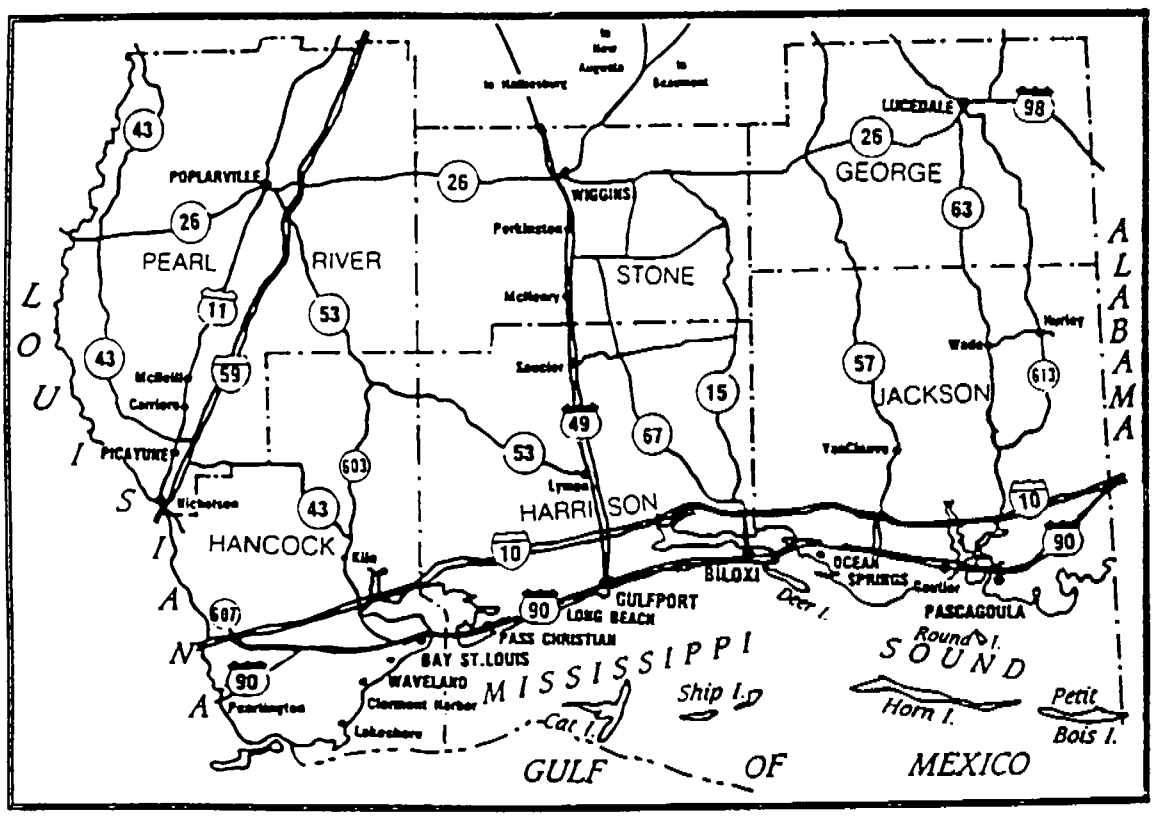
BACKGROUND

Physical Setting

The Mississippi Gulf Coast is composed of the mainland, barrier islands, and Mississippi Sound (Figure 1). The mainland coast consists of a Pleistocene coastal barrier ridge system formed during a high interglacial sea level (Canis et al, 1985;

Otvos, 1997). North of the Pleistocene barrier complex are two major bays - St. Louis Bay and Back Bay of Biloxi - into which several rivers empty and along which extensive wetlands are found. Mississippi's barrier islands lie about 8 to 12 miles south of the mainland, except for Deer Island which is immediately offshore from Biloxi. These islands act as a first line of defense for the mainland against incoming storms from the Gulf of Mexico by buffering winds and waves. Mississippi Sound, generally less than 14 ft deep, adds protection to the mainland from hurricane waves by acting as a cushion to absorb wave energy (Canis et al, 1985).

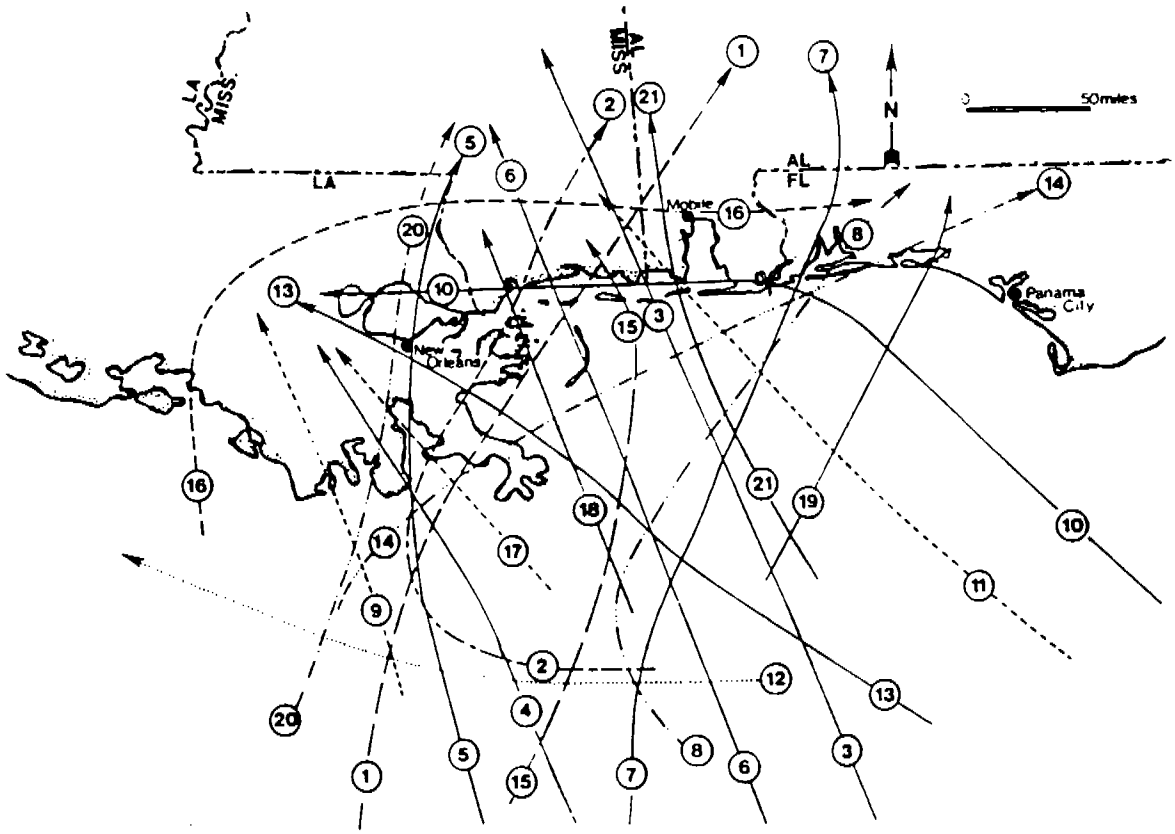
Figure 1
The Mississippi Gulf Coast



Sullivan, 1988 / Artist: Chester A Delacruz

Since 1886, the Mississippi coast has experienced the landfall of 24 tropical cyclones ranging from strong tropical storms (58 mph or greater) to a Category 5 hurricane (Camille in 1969). Six of the 24 storms were considered major hurricanes (Category 3 or greater) (Neumann et al, 1987; Purdue University, 1996; Sullivan, 1988). There have been several near misses by hurricanes that eventually made landfall in nearby Louisiana, Alabama, and Florida (Figure 2). The latest hurricane was Georges, a Category 2 hurricane which made landfall in Biloxi in September 1998. According to Simpson and Riehl (1981), a hurricane with maximum winds greater than 120 kph (74 mph) will strike the Mississippi coast once every 17 years. Very strong hurricanes (of high Category 3 strength) with winds greater than 200 kph (125 mph) will make landfall every 85 years.

Figure 2
Historic Hurricane Tracks



1.	1893	MH	8.	1917		15.	1932	Ethel
2.	1901		9.	1920		16.	1940	Hilda
3.	1906	MH	10.	1926	MH	17.	1965	Betsey
4.	1909	MH	11.	1932		18.	1969	Camille
5.	1915	MH	12.	1940		19.	1975	Eloise
6.	1916	MH	13.	1947	MH	20.	1979	Bob
7.	1916	MH	14.	1956	Flossy	21.	1979	Frederic

MH = Major Hurricane
Source: Canis et al, 1985

Patterns of Land-use Development

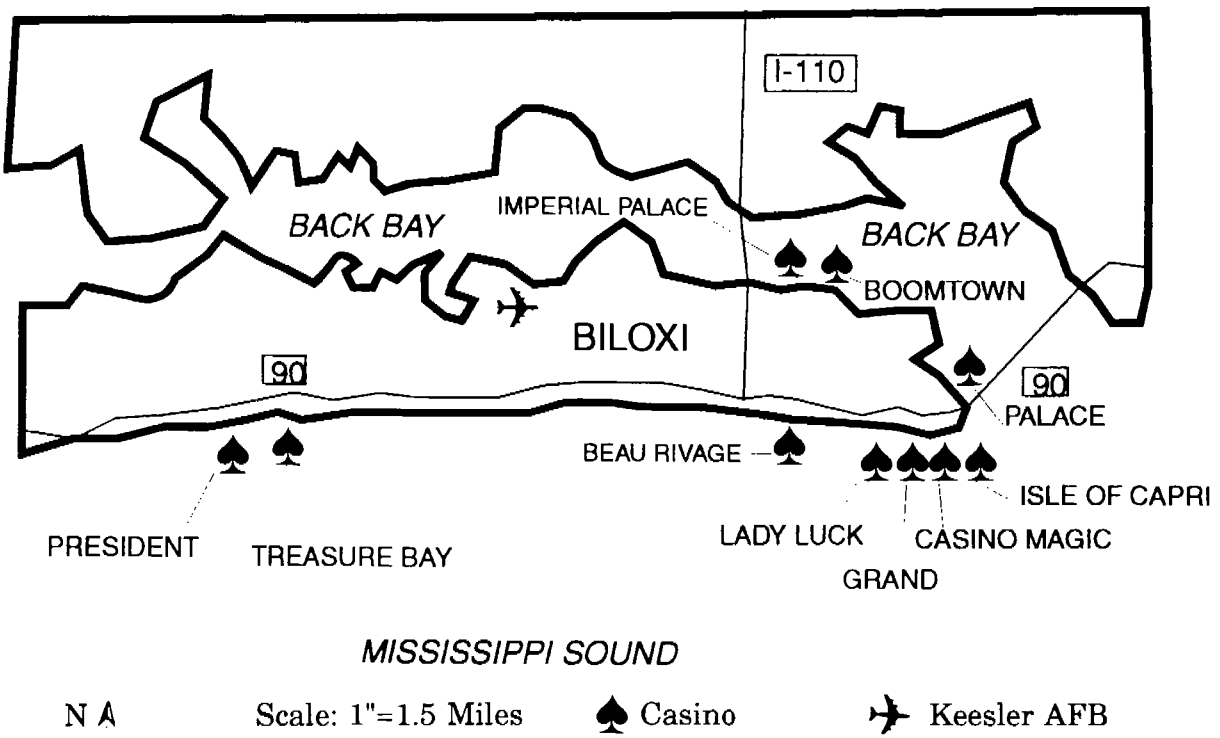
One of the oldest areas of settlement in North America (Biloxi celebrated its tricentennial in 1999), the Mississippi Gulf Coast boasts a diverse economic base, including lumbering, commerce, fishing and seafood processing, military bases, and tourism (Sullivan, 1985; Husley, 1998). Tourism has been the most significant industry since the Civil War both in terms of economic impacts and also in terms of significant alteration of the mainland shorefront.

Like many old seaside resorts, Biloxi has experienced many booms and busts in its tourist economy (Abusalih, 1994). Between the 1960s and 1990s, tourism was relatively

flat (or even on a decline) according to most economic indicators. As newer resorts in Alabama and Florida attracted beach-goers, the Mississippi Gulf Coast felt the financial effects and many properties fell into disrepair.

To help combat a decaying statewide economy, Mississippi legislators enacted the Mississippi Gaming Control Act of 1990 which legalized dockside casino gambling along the Mississippi River and the Mississippi Gulf Coast (Meyer-Arendt, 1998b). In 1992, the first three Mississippi casinos opened in Biloxi; gaming was regarded as the economic "shot in the arm" to rejuvenate declining levels of tourism (Meyer-Arendt, 1995). Casinos were quickly built in other coastal communities, but Biloxi remained the prime casino venue (Meyer-Arendt, 1997).

Figure 3
Biloxi Casino Sites



Source: USGS / Rob Schwartz 12/06/98

There were eight operating casinos in Biloxi at the time of this research in 1996-1997. Of the eight, four (*Isle of Capri*, *Casino Magic*, *Grand Casino Biloxi*, and *Lady Luck*) were in "Casino Row" (the former "Front Beach of Point Cadet"), a strip of shorefront oyster-shell deposits in the lee of Deer Island. Two casinos (*President* and *Treasure Bay*) were along Mississippi Sound-exposed West Beach, although the former is somewhat sheltered within a marina. Another casino (*New Palace*) was at the eastern tip of Point Cadet, and the eighth (*Boomtown Casino*) was located on the Back Bay along with seafood processing plants and working-class housing (Figure 3). Since the research was conducted, one casino has closed (*Lady Luck*), one opened in late 1997 on Back Bay (*Imperial Palace*), and another (Steve Wynn's $600-million *Beau Rivage*)

opened along the downtown Biloxi waterfront in early 1999. Several more casinos are planned for Biloxi (Meyer-Arendt, 1998a).

Hurricane Emergency Management

The first hurricane emergency management plan for coastal casinos consisted of evacuation to sheltered waterbodies such as Back Bay of Biloxi. Most coastal officials utilize information from the National Hurricane Center to determine if and when evacuation is necessary (Baker, 1987). In Mississippi, casinos follow Mississippi Gaming Commission orders which are based on recommendations from Harrison County Civil Defense officials and Mississippi Emergency Management Agency (MEMA) (Kingman, 1996). During the first threat of hurricane landfall - in 1992 - the three existing gambling vessels sailed under their own power into Back Bay in a time frame of two to five hours after an evacuation order was issued.

With additional casinos, the relocation process would not have been so simple. In order to facilitate evacuation, the casinos must close, remove assets such as cash, and be towed (if not self-propelled) to the approved evacuation area. Relocation of three casinos may have been manageable, but the prospect of evacuating eight casinos at the same time became very unmanageable (Community Associates, 1994; Mitchell, 1996). When the casinos were self-propelled, evacuation was less of a problem. With increasing casino size, however, came major complications such as negotiating the bridges and power lines, as well as mooring in the Back Bay. Relocation of the casinos required tow boats, which were not always available, and the U.S. Coast Guard does not permit towing in winds over 15 mph (Community Associates, 1994).

Table 1
Saffir - Simpson Scale

Category	Maximum Sustained Wind Speed	Minimum Surface Pressure	Storm Surge	Damage
1	33-42 m/s 74-95 mph	>980 mb	1.0- 1.7 m 4-5 ft	Minimal
2	43-49 m/s 96-110 mph	979-965 mb	1.8-2.6 m 6-8 ft	Moderate
3	50-58 m/s 111-130 mph	964-945 mb	2.7-3.8 m 9-12 ft	Extensive
4	59-69 m/s 131-155 mph	944-920 mb	3.9-5.6 m 13-18 ft	Extreme
5	>69 m/s >155 mph	<920 mb	>5.6 m >18 ft	Catastrophic

(Simpson and Riehl, 1981)

Another problem with evacuation is the necessary lead time mandated by the MGC. The process must begin 60 to 72 hours before estimated landfall (at least 48 hours before any storm effects are felt) and evacuation must be completed 36 hours before landfall. Storms that form rapidly in the Gulf of Mexico, however, rarely provide adequate lead time to accomplish a successful evacuation. This is due to potential rapid intensification from the warmer Gulf of Mexico along with the unpredictable nature of hurricanes as evidenced by hurricanes such as Elena and Opal (Schwartz, 1997). Typical lead time may be 36 to 60 hours but there are many exceptions (Community Associates, 1994).

Harrison County Civil Defense and Mississippi Gaming Commission officials decided that a better solution was necessary and adopted a Hurricane Preparedness Policy on March 9, 1995 that was described in Sections 8 and 9 of the Gaming Control Act of the Mississippi Code. This policy required that "gaming vessels that are not self-propelled are to be moored to withstand a Category 4 hurricane (Table 1) with 155 mile-per-hour (249 kilometers-per-hour) winds and 15-foot (4.5 meter) tidal surge (Green, 1996)."

Construction Standards

Most residential, commercial, and industrial buildings constructed in the southeast United States today follow the Southern Standard Building Code (SSBC). Fully engineered structures perform well in high winds due to the extra attention to connections and load paths (Ayscue, 1996). In addition to construction inspections by building officials, the barge structures are examined by a licensed marine surveyor and the moorings analyzed by a registered structural engineer (Green, 1996). Design and construction of the casino moorings in Mississippi must comply with the Southern Standard Building Code requirements and the latest version of *ASCE-7ANSI Minimum Design Loads and Other Structures* published by the American Society of Civil Engineers (ASCE). Finally, the mooring devices are required to secure the vessels for the total hurricane wind load plus wave load, including a storm surge indicated by FEMA at the permanent location of the vessel (Green, 1996). Essentially, this means all casinos would remain at their moorings and be designed to withstand a Category 4 storm. This applies only to the barges, however, and not the superstructure of the casino itself. These buildings (casino superstructures) are built to the Southern Standard Building Code which requires only a 110-mph wind load.

METHODS OF INVESTIGATION

To evaluate the effectiveness of the present hurricane emergency management plan along the Mississippi Gulf Coast, several methods of investigation were employed. These methods included both empirical and theoretical analyses.

The first step of the methodology was to evaluate the present plan mandated by the Mississippi Gaming Commission. This was done by subjectively comparing the current plan to the previous one (as well as alternatives) and identifying the positive and negative aspects. To help make this determination, several site visits were made.

The second step of the study was to develop a set of local-scale mathematical models which could be used to test the plan under various storm conditions. This involved

extracting storm data from historical archives and determining the storms' maximum wind speeds and landfall distances from Biloxi.

Construction of the models was initiated by creating a quantifiable index to rate storms for predicting damage called the Storm Index (SI). Different variables were tested and wind speed and distance from landfall were consequently utilized in the model. After an acceptable model (one that did not violate Ordinary Least Squares assumptions) of the SI was developed, a Damage Index (DI) was compiled to determine the amount of damage to an individual casino structure as a function of storm character. This DI model was based upon the SI, with the dependent variable intended to estimate the amount of potential damage in square feet.

An Effective Damage Index (EDI) was compiled from the DI multiplied by a Site-Structure Coefficient (SSC). This SSC incorporated the additional ratings of specific geographic location and the structural integrity of the casino. The EDI was then multiplied by the square footage of a specific casino to estimate the area damaged. Once this potential area was determined, the cost in dollars was calculated by multiplying the square footage by the cost per square foot.

The square footage of the casinos was determined from the building plans (when available) filed with the Harrison County Building Department, the City of Biloxi Building Department, or from interviews with casino operators. Costs of the casinos were derived from the building plans on file at the Harrison County or the City of Biloxi Building Departments, and from the Harrison County Tax Assessors Office.

Two steps were taken in order to develop specific SSCs. First, a qualitative rating was established for the topographical location. This involved a system where the lowest rating was given to sites exposed directly to Mississippi Sound and the highest assigned to sites in the Back Bay. This non-dimensional scale ranges from 1 to 5 with 5 representing the safest location. A second qualitative rating was established for structural integrity. This involved an evaluation of the building plans and specifications to determine if wind loads and wave factors were designed to meet Southern Standard Building Code (SSBC) requirements. As with the topographical location, this non-dimensional scale ranged from 1 to 5, with 5 representing the highest structural rating.

Construction inspection records were also checked to determine if construction was performed according to the plan specifications or if substitutions and inspection failures occurred. The structures were physically inspected by the senior author, a licensed general contractor with 21 years of experience.

There were separate ratings given for both the structural plans and physical inspection, and these were averaged together to provide the structural integrity rating. These inspections were performed to determine structural upkeep, rooflines, potential penetrations of the building envelope, methods of protection (such as hurricane shutters or plywood for windows), and apparent overall quality of construction.

Once the overall model was created, a series of sensitivity tests were performed for each casino and for a variety of theoretical storms. These tests were run to determine the

potential damage in dollars lost based upon storm character, casino structural integrity, and geographical siting of individual casinos.

RESULTS

Examination of the previous evacuation plan for casinos revealed several complications. For instance, the amount of time necessary for evacuation (including the tug boat's positioning time, preparation, towing, and securing at evacuation sites) ranged from eight hours for the *President* casino to 96 hours for the *Lady Luck* casino. Actual towing times ranged from two hours for the *Isle of Capri* casino to 10-12 hours for the *Treasure Bay* casino (Community Associates, 1994).

If a storm is already in the Gulf of Mexico, there may not be enough lead time for preparation and evacuation. Additionally, if power lines need to be de-energized and bridges tied up for long periods of time while the entire Mississippi Gulf Coast is preparing for a storm, a smooth evacuation is unlikely. The concern with power lines is due to the height of the casinos, which are up to four stories high - much higher than normal boats. Normally, when the temperatures are very warm and the humidity high, power lines sag as much as an additional 10 feet. Interviews with casino operators, City of Biloxi planning officials, Harrison County Civil Defense personnel, Mississippi Gaming Commission agents, and consulting engineers confirmed that all agreed that a large-scale evacuation would be very complicated and difficult at best.

Table 2
Composite Percentage of Damage for "Ground Zero" Hurricanes

Casino	Storm Category and Assumed Wind Speed (mph)				
	1 @85 mph	2 @110 mph	3 @130 mph	4 @155 mph	5 @190 mph
Boomtown	18.55	26.36	34.00	45.46	65.47
Casino Magic	24.74	35.15	45.33	60.61	87.29
Grand Casino	32.78	46.57	60.06	80.31	100.00
Isle of Capri	24.74	35.15	45.33	60.61	87.29
Lady Luck	45.14	64.15	82.73	100.00	100.00
Palace	49.47	70.30	90.66	100.00	100.00
President	37.10	52.72	68.00	90.92	100.00
Treasure Bay	51.33	72.93	94.06	100.00	100.00

Notes: Distance is 0.01 miles or "Ground Zero"
Values expressed = % damaged.

Model results were demonstrated by the EDI, which equals the percentage of damage to the casino. Since the replacement costs vary, a comparison was made to assess the damage by percentage among the casinos (Table 2). These composite results reflect the individual damage estimates along with the geographic and structural ratings. Structures that were rated lowest had the highest potential damage. For example, a Category 4 hurricane with 155 mph winds (the design threshold for the casino vessel moorings) would theoretically cause 100% destruction for three casinos (*Lady Luck*, *Palace*, and the *Treasure Bay*). In contrast, *Boomtown*, which is located on the Back Bay would theoretically have 45.46% damage.

DISCUSSION

Comparison of the two strategies suggests that the mandated plan of mooring in place is superior to the former plan of evacuating the casinos as far as a hazards/risk perspective is concerned, especially since other risks, in addition to the actual threat of the storm, are possible as a result of the evacuation process. Some of the risks identified by both this study and Community Associates (1994) are:

1) potential damage to bridges, utilities, and public facilities could cost millions of dollars;

2) potential damage to channels, waterways, and navigation aids could cost hundreds of thousands of dollars;

3) potential interruption or loss of essential and emergency services with possible losses of hundreds of thousands of dollars;

4) potential liability for damage to upland areas with a possible cost in the millions of dollars;

5) loss of business for people who normally commute across the damaged bridges could cost millions of dollars;

6) possible damage or loss of casino vessel from collision or sinking, along with the loss of casino business, potentially costing billions of dollars; and

7) the inconvenience of evacuation for residents, tourists, and smaller marine vessels with possible costs in the hundreds of thousands of dollars.

These additional risks are from the evacuation process itself and do not take actual storm damage into account. The potential for confusion and unexpected problems is also very large. This could create great chaos resulting in a loss of order in the evacuation process and leading to a greater potential of loss of life and property.

If the casinos moor in place, damage should be minimal for storms up through Category 2. For a Category 3 or greater hurricane, however, the winds and storm surge might cause serious damage or total destruction to casino structures with potential losses in the billions of dollars. There is also damage potential to upland residential and

commercial properties as well as roads and utilities that could cost hundreds of millions of dollars. The total loss of jobs, visitors, and tax revenues due to casino destruction could provide a great blow to both the State of Mississippi and the local Gulf Coast economy.

Mooring in place puts most of the risk on the casinos themselves, as opposed to public facilities. The potential for damage from a tropical cyclone exists whether casinos remain at their permanent moorings or are evacuated, however, the evacuation process itself opens up many more elements of risk to both the public and the casinos.
The EDI proved useful in estimating relative potential damage; however, it is a characteristic of models to have certain limitations due to their inherent simplicity. There are many "real-world" elements that the model cannot possibly take into account. For example, the model assumes damage will occur with all storms. This does not always occur in the real world. Secondly, the model estimates *potential* damage to the casino. Some of the damage costs are greater than expected at the lower end of the Saffir-Simpson scale as the structures should not be seriously damaged by a Category 1 or 2 hurricane. A Category 1 or 2 storm that is very slow moving or stalled, however, has the potential to create substantial damage as the winds and waves pound the structure for long periods of time. This was the case with Hurricane Danny which "sat" over the Alabama Gulf Coast in July 1998. The distance from "ground zero" also has a significant impact on the amount of damage.

Most of the Biloxi casinos are built with metal studs of varying thickness, and their exterior skins are predominantly stucco on a "dryvit" system. This is basically Styrofoam with stucco applied to the exterior. The *Palace* is composed of glass walls in metal frames and the *Boomtown* has vinyl siding along with the stucco. During Hurricane Andrew, buildings in Miami with the dryvit system received much more damage than concrete block and stucco structures in comparable locations. The dryvit system, although meeting SSBC standards, is much more prone to debris-penetration of the building envelope during severe storms. There is also a greater risk of high winds removing the panels than with reinforced masonry structures.

When the plan is scrutinized from a contractor's perspective, mooring in place is a better alternative than evacuating. As with the hazards viewpoint, there is less danger to the general public. If the buildings were built on land with the latest mitigation measures, the amount of damage to the structures and surrounding property could be much less. A much safer structure can be built with a properly engineered foundation with reinforced masonry.

There is speculation that with complete destruction, the casinos may not rebuild. It is also possible that they will insist on rebuilding on land rather than on barges. Although this is presently against Mississippi law, the issue could become politically very controversial because the casinos generate hundreds of millions of dollars in tax revenues. The issue, however, should also involve consideration of safety and risk to the public. Building on land may be a sensitive political and moral dilemma, but as far as minimal risk and maximum public safety are concerned, there is no doubt that land-based casinos are the best approach. The government will maintain the tax revenue base, casino operators will see their income continue, employees will keep their jobs,

tourists will have an inviting resort to visit, and there will be less risk to the general public.

In September 1998, Hurricane Georges, a strong Category 2 storm, made landfall at Biloxi. It stalled for hours and weakened before moving inland. Because the eye itself was over Biloxi, damage was not as bad as anticipated. The *Treasure Bay* did break loose from its moorings, however, and suffer some structural damage. The *Grand Casino Biloxi* had damage to the building envelope in the form of several holes in the dryvit panels, and *Casino Magic* found mud and thousands of dead minnows from the storm surge on the first floor (Bridges, 1998).

CONCLUSIONS

This study involved the comparison of a previous hurricane plan that called for the evacuation of moorings with the present mandate of the Mississippi Gaming Commission. The present plan requires that all casinos moor in place and that the moorings be able to withstand a Category 4 hurricane (with winds up to 155 mph and a 15-foot storm surge).

While the moorings themselves are engineered to withstand these thresholds, the superstructures are only built to the SSBC standard of 110 mph winds. These are the same requirements for other structures that are constructed in Biloxi and Harrison County. The risk of destruction of the casino buildings while keeping the barge moored in place is substantial due to the difference between the design threshold of the mooring and the casino structure.

When considering the overall risk to the general public, the research hypothesis that the present hurricane-preparedness plan of casinos mooring in place is superior to the previous approach of evacuating the vessels to safe harbors appears to be acceptable. One of the primary considerations in accepting the hypothesis is the risk associated with the casino evacuation itself, which is substantial regardless of the effects of the storm. A secondary contribution of this research was the development of an Effective Damage Index (EDI).

The State of Mississippi and the local municipalities are receiving hundreds of millions of dollars of tax revenue annually from the gaming industry. If there were a major tropical storm, rated a Category 3 or higher, it is possible that significant destruction would occur and have a substantial impact upon the citizens of the state. Due to the economic dependence upon the casino industry, it is important to Mississippi that proper steps are taken to ensure survival of this industry. As a result of this study, it is recommended that the casino structures be built on land with the latest in hurricane construction methods to keep damage, injury, and death to minimal levels.

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NOTES

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USES OF THE INTERNET IN EMERGENCY RESPONSE

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INTRODUCTION

Can the Internet be of value in emergency response? The answer is yes, on the basis of its use in several emergencies, including the Loma Prieta earthquake in California in 1989, the Kobe earthquake in Japan in 1995, and the ice storms in the United States and Canada in January 1998. This paper examines use of the Internet during these emergencies and addresses the advantages, disadvantages, promising applications, and issues that may arise in use of the Internet for emergency response.

BACKGROUND

The Internet and associated information technologies are already valuable components of emergency preparedness. The Internet has been used most extensively in networking on a daily basis (via e-mail communications) and in making available general resources to the emergency preparedness community. These resources include the Emergency Information Infrastructure Partnership (EIIP) Web site; the Medical, Emergency, Rescue, and Global Information Network (MERGInet) and the Natural Hazards Center (NHC) Web site. Some states, such as Pennsylvania, have networks that connect their counties with the state Emergency Operations Center.

The amount of information on emergency management and disaster preparedness on the Internet is growing rapidly. Use of the Internet during actual crises, however, is not occurring at the same pace; experience with the Internet in post-disaster operations is even more limited. The Internet and related technologies, including geographic information systems (GISs) and communications technologies, could be utilized further in coping with disasters. As access to, and familiarity with, the Internet increase, its use in both emergency preparedness and actual emergencies most likely will expand.

EXAMPLES OF INTERNET USE IN DISASTERS

The Internet has been used during and following several disasters and has proved useful in some cases in which other communications systems have broken down. It also has been useful as a supplementary form of communications that is well adapted to some particular applications (Herzenberg, 1998).

Loma Prieta Earthquake, California, 1989

One of the first disasters in which the Internet was used was the 1989 Loma Prieta earthquake in California. The Internet proved useful when some of the other communications methods had broken down (many of the radio and television stations went off the air) (Ivefors, 1997).

Although in some communities the telephone services was lost (Wilson, 1991), in others the telephones remained operational but other communications systems went down (Ivefors, 1997). Some radio stations were able to keep broadcasting while others could not broadcast during and following the earthquake. These radio stations were off the air because the cables to their transmitting antennas were destroyed; the cables were located far from the stations and crossed the earthquake zone. In contrast, Internet communications remained largely unaffected during the Loma Prieta quake as well as during some other California earthquakes (Ivefors, 1997).

Kobe Earthquake, Japan, 1995

The Kobe earthquake, which occurred in Japan in 1995, is prominent among the disasters in which the Internet was used appreciably and its use documented. The usefulness of the Internet in this case can be judged to some extent by a news release from Tokyo immediately following the Kobe earthquake. The news release, titled "Japan Quake Buzzes on the Internet" stated:

> "When Tuesday morning's devastating earthquake hit Kobe in western Japan many people around the world looked to the Internet for first news of the disaster unfolding. The first place to see a reaction was on Internet Relay Chat (IRC), a global system allowing people to send messages live to other users. As the news was spread across the world more and more people joined the #kobe channel to find out the latest news. Some of the users had access to up-to-date news, including one person in Tokyo, who was entering messages while listening to the radio, and a user in London who was watching NHK TV News coverage. As the two users saw and heard information, they sent it direct to the #kobe channel for worldwide reading. Some users, with family in Kobe, were desperate for any news available and while local TV stations around the world were slowly starting to report news, the IRC users were getting it already. Through the night more and more people joined IRC, and the full scale of the disaster slowly became apparent. When Newsbytes logged on the next day, the information was still flowing and offers of help were being made across the Internet. Users in Japan offered to place phone calls across the overloaded Japanese telephone system for users around the world who were confronted by overloaded international circuits." (*Newsbytes News Networks*, 1995b).

Thus, the Internet was initially useful in providing both public and personal news and information about the earthquake. Soon, it also began to be used to provide specific information on Web sites:

> "During the next day companies in Japan were also contributing information. The Sony Corporation has provided a page on the World Wide Web which indexes much of the information, although most of it is in Japanese. The Sony page is <http://www.csl.sony.co.jp>." (*Newsbytes News Networks*, 1995b).

The Kamsai Area Earthquake Information Web site, set up during the 1995 Kobe

earthquake (Sony Computer Science Laboratories, 1995), is still present on the Web. It is an example of a Web site developed for use during a disaster; it includes government announcements, links to pages listing the deceased and survivors, damage information and images, information on relief, mail services information, lists of out-of-service and useable phone numbers, information on Internet connections in the area, information on congregate care and relocation facilities, information from banks, railway service status, arrangements for donating money, information on volunteering, arrangements for pet care, information for donating blood, maps, local information, hospital information, and many other topics. It included a message board.

As regards casualties:

> "One of the most useful uses of the Internet after the Kobe quake was the 'Deceased mailing list,' which I recall was coordinated by Sony and mirrored on Web servers at Sony, NTT (Nippon Telephone and Telegraph), some Japanese universities and other places. It was basically a list of the confirmed dead, updated twice a day from the lists being read out on Japanese public TV, NHK. It was so useful for people overseas who couldn't call into Japan or didn't speak Japanese so couldn't call emergency numbers. I'm sure it took a huge load off embassies and city offices." (Williams, 1998)

Furthermore:

> "The Japanese PTT (Post, Telegraph, and Telephone Administration) has set up an automatic mailer that will provide the latest version of the list of the deceased. Send a blank e-mail to quake@ponytail.ntt.jp for the list which is available only in Japanese." (*Newsbytes News Networks*, 1995b).

The Internet proved useful when other communications methods broke down. During the Kobe earthquake, telephone lines across the city were immediately cut; those that remained operational were overloaded in minutes (Iverfors, 1997). However:

> "Despite the massive damage in Kobe, the local University's Foreign Studies Department still has their Internet connection and a spokesperson told Newsbytes that the University had sustained some damage although the network is up and functioning normally. A World Wide Web page has been set up and offers access to pictures of the quake taken by a faculty member." (*Newsbytes News Networks*, 1995a).

Further information about images of earthquake damage on the Web was provided in a subsequent news release:

> "The World Wide Web site also includes a picture gallery of images taken by Matsuzaki from the day of the earthquake onwards. He explained the pictures were taken from video, 'after the earthquake there was no (photographic) developing in Kobe, so we used video capture on a Macintosh'." (*Newsbytes News Networks*, 1995a)

Concern also existed regarding potential problems in the use of the Web page :

> "The address is <http://www.kobe-u.ac.jp>. Sony notes that the link to Kobe is fragile at present and should not be abused." (*Newsbytes News Networks*, 1995b).

Some additional information regarding the functioning of the Kobe Internet connection was reported later:

> "The Internet service was housed at the computers of the City University of Foreign Studies whose ISDN (integrated services digital network) service to the Internet was restored the morning after the earthquake, allowing a vital link to the world." (*Newsbytes News Networks*, 1995a).

Since the Internet link to the Kobe City University of Foreign Studies survived relatively unscathed, as did the university's local computer network, in the days that followed, the Internet provided a critically important communications link with the rest of the world. (Ivefors, 1997).

Even three months after the Kobe earthquake, the Internet was still in use in post-emergency applications:

> "Three months after a devastating earthquake hit Kobe killing 5,500 people, the city is still in need of help and is using the Internet to find it. Speaking to Newsbytes, Taisuke Matwuzaki of the Kobe City's Mayor's Office, said that it wasn't material help that was so much in need now, but experience and knowledge. 'We are looking for two types of suggestion. The first is rebuilding the City of Kobe, and how to avoid the disasters.' In particular, the World Wide Web page asks for 'Useful suggestions and ideas regarding reconstruction after an earthquake and disaster prevention programs, based on the expertise of those who have experienced a major earthquake or who have knowledge of urban planning after an earthquake'. The second (area of information), Matsuzaki continued, 'is how to operate volunteers for the long-term. After the earthquake there were many volunteers but now there are not so many, there are very few so we want more and we need to know how to operate a long-term volunteer program'. He added that they were particularly keen to contact overseas establishments and universities who may be able to provide some assistance or knowledge . . . The city had made extensive use of the Internet since the January 17 earthquake as Matsuzaki explained, 'The Internet is very useful. We have used Eudora to receive hundreds of messages from all over the world'." (*Newsbytes News Networks*, 1995a).

Ice Storm in Northeastern United States and Canada, 1998

A more recent example of Internet use during a crisis occurred during the January 1998 four-day ice storm in the northeastern United States and in Canada. That storm affected some 600,000 people for up to 14 days in northern New York State alone. This

devastating ice storm, which paralyzed eastern Canada and the northeastern United States, dramatically illustrated how power and telephone companies are crucial to disaster recovery but may often be the victims of calamity themselves (Lamarre, 1998). Many phone lines and electrical lines went down during the ice storm; however, those that remained operational and others that were restored supported some Internet use. With help from other state agencies, the New York State Emergency Management Office developed a Web page to assist in disaster recovery (Simpson, 1998a, 1998b). This Web page was posted with a range of useful information, such as which roads had been opened up and which colleges were open for students. It also had information such as warnings about the potential hazards of carbon monoxide from the use of portable generators during power outages. In many cases, emergency workers and residents struggling locally with the storm's effects during the day would then access the Web site in the evening to get the big picture of the emergency (Simpson, 1998a).

Other Disasters

Internet use has also been reported during and after a number of other disasters and emergencies. For example, the Ruapehu volcanic eruptions in New Zealand in 1995 and 1996 were watched on the Internet as well as on television (Anderson, 1998). Much Internet use in conjunction with disasters continues to be devoted to news, disaster reports, and appeals, as, for example, in the Church World Service Emergency Response Program (Church World Service, 1999a, 1999b).

INTERNET USE IN FUTURE DISASTERS

Pre-Disaster

The Internet can and is being used as a source of emergency preparedness information for concerned citizens. For example, the Missouri State Emergency Management Agency has a Web site that provides information on the Callaway and Cooper Nuclear Power Plants, advice on listening to local Emergency Alert System stations following a siren warning, and specific things to do and not to do during a nuclear power plant emergency. It also provides county emergency information phone numbers for use during such an emergency. Thus, for these plants, important information can be printed out and used by citizens both before and during an emergency (MSEMA, 1999). Mention of the availability of such information during public service broadcasts prior to emergencies, or in emergency broadcasts during emergencies, could help establish wider use of the Internet.

Further, additional emergency response information can be put on the Internet either before or during nuclear or chemical plant emergencies involving dangerous off-site releases. For example, evacuation routes, host schools, and reception center maps mailed out in brochures by utilities could also be put on their Web pages prior to any emergency. Then, during such an emergency, parents working on personal computers in their offices could access this information. Even though their brochure would be at home, parents could print out maps at the office for use in their own evacuation and for reunification with their children. The reunified family could then use the evacuation maps to proceed to their designated reception center.

The Internet also can be valuable for public outreach efforts in the absence of an

emergency, but when the public is concerned that an emergency might occur. Although nuclear power plant exercises are usually shown or described briefly afterwards in television, radio, and newspaper stories, full descriptions are not given. A more graphic description of plant exercises in Illinois, however, is available on the Illinois Department of Nuclear Safety Web site (IDNS, 1999). Providing more complete information to interested and, more importantly, concerned citizens living near commercial nuclear power plants, federal nuclear sites, chemical plants, World War II chemical weapons depots, and other technological facilities with risks of off-site impacts can do much to ease the concerns and fears of nearby residents.

FEMA has been interested in opportunities for incorporating the use of new or existing technologies more fully into the emergency management community to in order to improve both emergency preparedness and response to disasters. The incorporation of these technologies would facilitate a reduction in loss of life and in damage or destruction of property and would advance the adaptation of cold war technology to modern domestic response needs (Goss, 1998; Gregory, 1998). Creation of an Internet-like inventory of resources that can be accessed by communities struck by disasters might prove helpful even if the Internet is not viable.

Post-Disaster

The Internet could be used in conjunction with a significant number of the activities associated with post-emergency response. Many command and control and surveillance tasks could be supported by the Internet both during and after emergencies. Satellite communications, remote sensing images from space, and location data from global positioning system satellites could be transmitted, coordinated, and disseminated through the Internet. The global positioning system, together with a GIS, can be used to track the locations of vehicles, ships, and other resources and display them. The GPS can provide coordinates for monitoring and sampling operations so that the location at which a monitoring measurement was made or from which a sample originated can be known accurately and in a format suitable for use in databases and in a GIS for Internet-based searches and displays.

In the post-emergency phase of a radiological emergency in which radioactive materials have been dispersed over a wide area, the gathering of samples and sample analysis are critical. The Internet has proven to be quite useful for communicating sample analysis results (eg, by file transfer protocol). In particular, if the number of samples is very large and they are being sent for analysis to several different laboratories, communications of results on the Internet and the integration of results into databases will be highly important.

Private, secure intranets can be established for the communication of information among groups collaborating in post-emergency activities. Advanced encryption techniques are now emerging and are being incorporated into secure Web browsers (eg, both Netscape and Microsoft browsers support 128-bit encryption).

The potential for Internet use exists in many other areas. These range from communications and data management to public information, economic and legal aspects, medical and social needs, relocation needs, ingestion pathway considerations,

and provision of maps. For example, Internet listings of evacuees or relocated persons and their locations could be helpful in reuniting families. (The potential for misuse of information is considerable, however, and must be considered for this and other Web postings.) An Internet site with information on financial assistance and legal issues following a particular disaster could provide accurate, detailed, and accessible information and forms for use by individuals and businesses affected by the event. A post-disaster Internet site devoted to recovery can also provide a kind of centralized post-disaster information locus for all of the activities involved in recovery and assist in coordinating the activities of local governments involved in this effort.

The Internet is a valuable asset in emergency management and most likely will become even more so in the future. Computer networks (secured networks) will be used increasingly during actual emergencies, for example, to support communications among emergency organizations, police, medical services, the Red Cross, and other organizations. This increasing use will see existing state and local networks coordinated and extended.

ADVANTAGES OF INTERNET USE IN DISASTERS

The Internet can provide such features as inter-activity, two-way communications, and multimedia information on demand. A substantial amount of real-time information can be made widely available. Post-emergency response information might include maps of the locations of local shelters and details regarding medical assistance, road closures, and storm tracks. Access to these data can be either restricted (eg, by password use) or open to any Internet user. The potential for disseminating information is immense.

Excellent potential exists for contacting other persons, either individually (with e-mail) or in groups, for on-line discussions. An important aspect of the Internet is that it can also provide information one-way, without permitting direct inquiries from those receiving the information. This could be advantageous for public information personnel and others responsible for information dissemination during disasters; they could provide information without simultaneously having to deal with a flood of direct inquiries from the media or the public. One-way information dissemination also has the advantage that the reply can be delayed until accurate information is available.

DISADVANTAGES OF INTERNET USE IN DISASTERS

Limited Access

Use of the Internet in disasters has some definite drawbacks, one of which is limited access. Currently, this is more of a problem world-wide than it is in the United States. The Nielsen Media Study (Maggpie, 1999) estimated that about 70 million adult Americans are on line. This means more than one-third of adults in the United States are using the Internet, and this percentage is rising rapidly. Currently, over 100 million English-speaking people have Internet access, but only about 80 million non-English speaking people (Global Internet Statistics, 1999). To communicate or receive communications on the Internet requires literacy, knowledge of the language and technologies in use, the ability to use computers and software, and access to both a computer and the Internet. Also, relevant portions of the Internet must be operational;

both clients and servers need to be up and not overloaded.

All of the communications systems used in emergency response, including networks, can be fragile and technically vulnerable. The Internet, in particular, is heavily dependent on electrical power and telephone lines, which are frequently down after disasters. Also, Internet traffic jams could present potential problems during emergency and post-emergency use. During Internet node problems, traffic is rerouted, thereby clogging other nodes and slowing or stopping traffic. To compare the technical vulnerabilities of the Internet with those of other communications systems, such as television, radio, telephone, cellular telephones, and facsimile machines, is well beyond the scope of this paper. In a crisis, redundancy is needed, however, and this can be accomplished by having access to many different communications methods. Redundancy of Web sites may also be needed in different regions so that Internet traffic can be rerouted to one of the redundant servers.

Quality of Information

Another drawback of the Internet is the presence of incorrect information. The quality of information on the Internet varies considerably. In the past, in other contexts, bizarre ideas and false information have been spread. Emergency managers must be prepared for the dissemination of false information and rumors during emergencies. Most likely, some type of rumor control would need to be implemented.

One-way vs Two-way

While one-way electronic information dissemination may be an advantage for some applications, it may also be a drawback for others. Users would have to explicitly request information that may not have been provided, although they might still make such requests by e-mail (eg, on-line forms for Federal Emergency Management Agency purposes or for loan assistance). Also, people in crisis sometimes need a direct, interactive relationship with other individuals; this need can be addressed to a limited extent on the Internet by providing contact information along with the data.

Security Issues

In general, Web sites are not secured systems, and this is a significant disadvantage of the Internet. An increasing number of organizations may become dependent on the Internet, however, and demand secure and efficient communications both during and following emergencies. Web sites set up for emergency use need to be protected from hackers and others who could alter information. Recently, the Web site of a prominent East Coast newspaper was altered by hackers with a vendetta against several writers at the newspaper. Several government Web sites have been recently attacked as well. These attacks can originate from anywhere and the passing of Web connections from server to server around the world can easily mask the origin of the attack. Passwords and user IDs for sites can be "sniffed" with tools that monitor the packets being moved over the Internet. Although technologies for protecting Web sites are improving, more hacker tools are available on the Web than are technologies to protect sites.

If a Web site is to provide accurate and reliable information, it must be protected from compromise. To that end, the exchange of information between the public and the government and between government agencies requires increased protection methods as

well, similar to the encryption technologies being developed for electronic commerce. Encryption and certification technologies need to be utilized in these applications to ensure that the information being exchanged is not altered and that it originates from the presumed source. Although the Internet can rapidly disseminate information, this technology requires protective mechanisms to safeguard the integrity and sources of information. The federal government's Next Generation Internet (NGI) project is working on improving both the speed and reliability of the Internet.

Network Traffic Jams

During a disaster, increased transfer of information will occur through the Internet to and from the public and the press and among separated family, friends, and colleagues. Thus, there may be concern about traffic jams on the Internet, that is, network traffic load. This topic is being studied, but primarily under normal rather than emergency use conditions (Crowcroft et al, 1997). When the Internet experiences traffic jams or congestion, overflow may be rerouted, thereby bringing other nodes down. What capacity might be needed during an emergency? Could a restriction on the use of the Internet by the public be required during an emergency, or even be implemented? These and many other issues need to be addressed during the post-emergency response phase of an accident or disaster (Herzenberg et al, 1994).

Maintaining the Connection - The Wireless Internet

Internet service providers are sometimes rendered inoperable by disasters. Use of the Internet depends on the user's connection: if links to the Internet are down, the computers connected to them are useless for that purpose. When phone lines go down, a wireless Internet could be of considerable value in emergency situations.

In some disasters, wireless communications could enhance the robustness of the system against disruption by disasters (Pope, 1998). Wireless local area networks (LANs) that use microwave-frequency radio technology are now available (Freed, 1998). Use of cellular telephones for connections to Internet service providers could offer a means of Internet connection independent of local telephone lines. Global telephone communications systems using satellites, such as the Iridium system, might become helpful in supporting wireless Internet use. Even now, hand-held satellite communicators can send and receive short e-mail messages from any location on Earth (Langenberg, 1998).

A recent example of progress in a wireless Internet that could be widely useful in emergencies is a high-speed Internet connection via satellite antennas. In partnership with Eutelsat, one of the world's largest satellite operators and an Internet service provider, a French manufacturer of satellite antennas has launched a service to provide high-speed Internet access, data transfer, and reception of digital television images (OST 1999). This concept might also be extended to a disaster area-wide wireless intranet, similar to or based on the wireless intranet (the Applique system) for the battlefield that has been successfully developed for the US Armed Forces (Langford, 1998; Adams, 1998).

Cities where there is a significant probability of a large earthquake should consider a backup radio or satellite link to the Internet for emergency use, if the Internet is part

of the city's disaster plan (Williams, 1998).

SUMMARY AND CONCLUSIONS

If a large disaster, such as an earthquake, were to hit an area, the Internet probably could not be expected to be particularly useful in getting instantaneous emergency messages to the population within the immediate area. Under most circumstances, people react to an immediate emergency by turning on the radio and TV, if they are operating. As more members of the general public gain access to the Internet, its viability as a means of issuing emergency information may increase, however.

The Internet may be expected to become much more useful during the post-emergency response period than during the initial emergency response period. In the hours following an emergency, when the need for immediate information diminishes, the Internet becomes more useful to emergency responders and to people at large. As demonstrated in emergencies such as the Kobe earthquake, the Internet has considerable potential to provide answers that people outside the affected area need (information regarding the affected areas, the communications situation, the identity of casualties, etc) and may relieve the load on other sources of emergency information. Emergency managers could also use the Internet to appeal for specific equipment, personnel, help, and advice from people around the country or around the world.

The Internet has many potential uses in the post-emergency response phase despite various concerns associated with its use, such as limited access and security. It is clear that all of the potential uses of the Internet have not yet been realized, and that emergency management personnel can look forward to new applications of what has already become an extremely useful tool for emergency preparedness. Although this paper has focused on post-emergency aspects of the Internet, the Internet also has important uses prior to and during a disaster, particularly in disseminating information for the preparation phase (eg, hurricane preparation information and current location). As Internet technology continues to develop, additional uses will emerge for emergency preparedness and for response and recovery.

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NOTES

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THE STATE OF THE STATES
A Survey of Emergency Management Certification Programs

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A casual observer would think that the only certification available in emergency management today is the International Association of Emergency Managers' (IAEM) Certified Emergency Manager designation. This is not the case. For example, the State and Local Emergency Management Data Users Group is currently developing a certification program for emergency management technologists, and the University of Richmond's Certified Crisis Operations Manager certification provides a credential which is focused on response phase management. The greatest number of certification programs by far, however, are conducted at the state level.

Currently 23 states sponsor emergency management certification programs, with three additional states actively pursuing development of a program (Tables 1 and 2). Of the 23 certification programs, 16 are sponsored by professional associations and 7 by state agencies. State level certification programs have been in existence since 1982, with five state programs (Wyoming, Pennsylvania, Nebraska, North Carolina, and Minnesota) preceding the initiation of the development of IAEM's Certified Emergency Manager program in 1990 (Table 2) (Chartrand, 1991). Considering the age of the programs, their essentially voluntary nature, and the small size of the population for which these credentials are designed, the total number of certifications is noteworthy.

MANDATORY CERTIFICATION

All but three of the state certification programs (Pennsylvania, Minnesota, and Nebraska) are based on voluntary participation. In those three states, however, certification of emergency managers is required either by statute or by administrative regulation. Pennsylvania requires certification for county emergency managers, their staffs, and local emergency managers. The first level of certification (Certification) must be completed within one year of hiring and the second level (Advanced Certification) must be completed within three years. The third level (Professional Certification) is an optional incentive level (Pennsylvania Emergency Management Agency, 1990).

The first level of Minnesota's certification program is mandatory (Minnesota Division of Emergency Management, no date), with Level II providing significant prestige incentives, including presentation of the certificate by the Governor or Lieutenant Governor and award of a distinctive and highly valued pin.* In Nebraska, completion of the first level (Basic Certification) is mandatory, with the Advanced Certification serving as an incentive level.*

TITLES OF CERTIFIED PERSONNEL

Emergency managers who complete certification are designated by a wide variety of titles (Table 3), although two seem to be more common, Certified Emergency Manager and Professional Emergency Manager. The use of Certified Emergency Manager by state certification programs predates its use by the International Association of Emergency Managers by at least three years. Michigan (Michigan Emergency Management Division, 1998), Florida (Florida Emergency Preparedness Association, 1999), and Virginia (Virginia Emergency Management Association Certification Board, 1998) all use the title Professional Emergency Manager, and Pennsylvania uses Professional Certification (Pennsylvania Emergency Management Agency, 1990).

CERTIFICATION MODELS

It is possible to classify certification programs based on certain key elements of program design. Some programs have become standard models that have been considered by other states in their program design process (Table 4) and that are commonly mentioned in the discussion of approaches to certification. In some cases, the similarities are overt and obvious; for example, the Oregon and Maine programs are virtually identical in their materials, the only substantive difference being in the insertion of different organizational names in the documents (Maine Emergency Managers Directors Council, 1999; Oregon Emergency Management Association, 1997). In other cases, such as among the various states that have adopted a Kansas model for certification, there are minor differences in requirements and the periods of time allowed to fill them.

Certified Emergency Manager

A number of states have adopted certification program requirements that directly parallel those adopted by the International Association of Emergency Managers, with minimal changes in training-hour requirements and in the menu of required contributions to the profession. There is some variability in whether states also include the essay assignment requirement. None, so far, have adopted an examination, which has been phased in as a requirement for IAEM's Certified Emergency Manager program. (IAEM, 1998).

In some cases, adoption of this model was done specifically to make it easier for emergency managers who are interested in applying for the International Association of Emergency Managers's Certified Emergency Manager credential, to do so.* There may also be some element of selection based on convenience, however, since minimal effort is required to convert the Certified Emergency Manager's requirements to state standards.

Kansas Model

The Kansas model of certification is one of the older models. It is based on completion of a modest number of hours of training in a set, recent time period (in the case of Kansas, 80 hours of training in the last 8 years) with two years of experience, current appointment to an emergency management position, and completion of two specific skills. These skills are common to all of the programs that use the Kansas model: the

development of an emergency operations plan, and significant participation in a functional or full scale exercise (Kansas Emergency Management Association, 1997).

Course Completion Models

A wide variety of certification programs are based on the completion of a specific menu of emergency management training courses. Some provide specific lists of courses that must be completed for each level (North Dakota Emergency Management Association, 1997; Utah Division of Comprehensive Emergency Management, 1996). Others provide an overall menu of eligible courses and allow individuals to choose from these to complete the required number of hours (Alabama Emergency Management Council, 1995).

North Carolina Model. The North Carolina certification program served as the model for the development of the certification program developed by the South Carolina Emergency Preparedness Association.* It was also considered as a basis for certification in Virginia* and in Florida,* although neither state adopted it. This course completion model is distinguished by four levels of certification, with a number of options in the course menu at each level (North Carolina Emergency Management Association, no date).

Georgia Model. The Georgia certification program is serving as the model for development of a state agency sponsored certification program in South Carolina.* It is distinguished by three certification levels and by minimal requirements for the first level of certification as a Basic Manager (appointment as an emergency manager and completion of a two day orientation to the job) (Georgia Emergency Management Agency, 1998). The minimalist approach was chosen as the basis for initial certification to encourage new emergency managers to become involved in the training process.*

Examination Models

Two states, Michigan (Michigan Emergency Management Division, 1997) and Wisconsin (Wisconsin Emergency Management, 1994), combine a course completion model with a written examination. Although this has not proven to be a popular model in other states, it is reported to be well accepted by emergency managers in Michigan. In Wisconsin the training program is seen as preparing candidates thoroughly to pass the test, and failures are extremely rare.* I have taken the Michigan examination and can say that, given reasonable preparation, it should not exclude an experienced emergency manager familiar with Michigan's laws and procedures from certification.

Professional Training as a Requirement

Training is measured in a number of ways in emergency management certification programs. The use of examinations, as is done in Michigan and Wisconsin, is a standard Level 2 evaluation strategy to determine whether participants can retain the material taught in the training courses.* Specific menus of courses, as discussed in more detail in this chapter, provide some assurance that candidates have had the opportunity to learn material that may be relevant to their emergency management responsibilities with a real* or desired outcome of improved job performance. And finally, the requirement for specific numbers of hours of training, with or without guidance as to the content, provides some measure of control over the amount of

exposure an individual will have to knowledge that is generally applicable to the job. The IAEM Certified Emergency Manager credential set this standard by requiring 100 hours of emergency management training and 100 hours of general management training without any specificity as to content (IAEM, 1998).

Closely related to training requirements for initial certification are continuing professional education requirements. These address several objectives including encouraging continued involvement in the profession, broadening of knowledge through attendance of courses addressing different types of knowledge, and some assurance of currency in terms of new developments and new information in the field. Continuing education hour requirements range from 8 to 50 hours a year, and recertification periods range from one year to five years (Table 6).

ALTERNATIVES TO CERTIFICATION

Among the 27 states that do not offer certification for their emergency managers, there are several common alternative approaches. The Professional Development Series Certificate appears to remain a viable credential in the broad sense of promoting completion of a standard package of training. Other state emergency management agencies suggest that emergency managers complete the requirements for IAEM's Certified Emergency Manager credential.

Four states (Kentucky, Arkansas, Montana, and South Dakota), however, have adopted a significantly different approach to assurance of competency. There is considerable commonality in the requirements they have established. Kentucky requires all newly hired local emergency managers to complete an orientation within two weeks and then introduces a schedule of requirements at the 6 month, 1 year, 2 year, and 4 year points.* Arkansas requires completion of FEMA's independent study course IS-1, *The Emergency Program Manager*, within the first six months.* Kentucky, Montana, and South Dakota* require the completion of the *Introduction to Emergency Management* course or its replacement, *Principles of Emergency Management.* Both Kentucky and South Dakota require the standard Professional Development Emergency Planning and Exercise Design courses. In effect these states have adopted a certification model similar to that in use in Pennsylvania without attaching the controversial title "certification" to it.

THOUGHTS ON STATE CERTIFICATION

State certification programs appear to be both growing in number and increasing in rigor. Some of the program managers I interviewed seemed to be almost apologetic about the lack of sophistication of their states' efforts, and a number defended their program as a stepping stone to what the International Association of Emergency Managers terms "the ultimate credential in emergency management" (1998), the Certified Emergency Manager. A comparison of training hour requirements of state programs with those of the Certified Emergency Manager, however, suggests that many state programs based on training completion and examination models require significantly more exposure to emergency management knowledge. Further, the use of levels of certification based on continued involvement in training would seem to provide

an incentive for continued involvement and professional development over time.

This becomes important when two other trends are considered. First, survey data and interviews suggest that individuals who earn the Certified Emergency Manager credential do not complete the Professional Development Series (Green, 1998). Although similar data cannot yet be developed for the Applied Practices Series because of the recency of its introduction, this is a troubling outcome. Of equal concern is an increasing trend toward the definition of professionalism in emergency management in terms of continued contributions to the profession, rather than professional expertise in protecting the lives and property of the citizens. When we consider that the great majority of those certified in both the International Association of Emergency Managers' and the states' programs are local emergency managers (Green, 1999), the promotion of professional technical and managerial knowledge becomes a critical issue for job performance.

Although support of professional organizations and the performance of a variety of services to the profession is a worthy goal, the credibility of any profession depends on expertise in the work demanded of its practitioners. Certification programs in emergency management generally have not provided the same level of credibility as professional credentials in other fields, such as the Professional Engineer or Certified Public Accountant. Those state certification efforts that require significant exposure to the knowledge of the profession or require a high standard of demonstration of professional work products, however, offer credentials that set an important baseline for the further development of our field.

Table 1
Incidence of State Emergency Management Certification Programs

FEMA Region	State	Program Manager
I	Maine	State Association
III	Pennsylvania	Emergency Management Agency
	Virginia	State Association
	West Virginia	In Development
IV	Alabama	State Association
	Florida	State Association
	Georgia	Emergency Management Agency
	Mississippi	State Association
	North Carolina	State Association
	South Carolina	State Association; In Development[a]
	Tennessee	State Association
V	Illinois	In Development
	Michigan	Emergency Management Agency
	Minnesota	Emergency Management Agency
	Wisconsin	Emergency Management Agency
VI	New Mexico	State Association
	Oklahoma	State Association
VII	Iowa	State Association
	Kansas	State Association
	Nebraska	Emergency Management Agency
VIII	North Dakota	State Association
	South Dakota	State Association
	Utah	Emergency Management Agency
	Wyoming	State Association
IX	Nevada	In Development
X	Oregon	State Association

(a) The SC Emergency Preparedness Association began a certification program which now appears to have been abandoned. The SC Emergency Preparedness Division is now taking steps to develop a program.

Table 2
Dates of Implementation of State Emergency Management Certification and Numbers of Individuals Certified

First Certification	State	Number Certified
1982	Wyoming	250 approximately
1983	Pennsylvania	363 approximately[a]
1985	Nebraska	250
1989	North Carolina	321
1990	Minnesota	142
1991	Kansas	100 approximately
	South Carolina[b]	
1994	Alabama	20 approximately
	Michigan	120
	North Dakota	50
	Oklahoma	122
	Wisconsin	40
1995	Iowa	15 approximately
	South Dakota	60 approximately
1996	Nebraska	300 approximately
	Utah	26
1997	New Mexico	11
	Oregon	6
1998	Georgia	25 [c]
	Mississippi	25
	Tennessee	9
	Virginia	13
1999	Florida	27
	Maine	0
In Development	Illinois	
	Nevada	
	South Carolina[b]	
	West Virginia	
	Maximum Estimated Certified	2318

Notes: Information on number of individuals certified was collected from November 1998 through March 1999. *(a)* This number represents those currently certified and active. *(b)* The South Carolina Emergency Preparedness Association began a certification program which now appears to have become dormant. *(c)* First awards will be made in May 1999; this figure is an estimate of the approved applications on hand.

Table 3
Titles of Certified Personnel

State	Certification Title
Alabama	Basic Level Intermediate Level Advanced Level
Florida	Florida Associate Emergency Manager Florida Professional Emergency Manager
Georgia	Basic Manager Advanced Manager Master Manager
Iowa	Certified Emergency Management Coordinator
Kansas	Kansas Certified Emergency Manager
Maine	Certified Emergency Manager, Maine
Michigan	Professional Emergency Manager
Minnesota	Certified Emergency Manager Level I Certified Emergency Manager Level II
Mississippi	Emergency Manager 1 Emergency Manager 2 Mississippi Certified Emergency Manager
Nebraska	Basic Emergency Management Certification Advanced Emergency Management Certification
New Mexico	New Mexico Certified Emergency Manager
North Carolina	Emergency Management Coordinator I Emergency Management Coordinator II Emergency Management Coordinator III Emergency Management Coordinator IV
North Dakota	Level I Level II Full Certification
Oklahoma	Oklahoma Certified Emergency Manager
Oregon	Oregon Certified Emergency Management Specialist

Pennsylvania	Certification Advanced Certification Professional Certification
South Carolina	Certified Emergency Manager I Certified Emergency Manager II Certified Emergency Manager III Certified Emergency Manager IV
South Dakota	Certified Emergency Manager
Tennessee	Emergency Management I Emergency Management II Emergency Management Professional
Utah	Principles and Practices Response and Recovery Specialist I Response and Recovery Specialist II Emergency Management Executive
Virginia	Certified Emergency Management Assistant Virginia Associate Emergency Manager Virginia Professional Emergency Manager
Wisconsin	Certified Emergency Manager Level 1 Certified Emergency Manager Level 2 Certified Emergency Manager Level 3 Certified Emergency Manager Level 4
Wyoming	Level I Level II Level III

Table 4
Models of State Emergency Management Certification Programs

Model Type	States Employing This Model
Certified Emergency Manager Model	Florida Maine Montana - proposed but not adopted New Mexico Oregon Tennessee
Kansas Model	Iowa Kansas Oklahoma South Dakota
Course Completion Model	Alabama Michigan Minnesota Mississippi Nebraska North Dakota Pennsylvania Utah Virginia Wisconsin Wyoming
North Carolina Model	Florida - considered but not adopted North Carolina South Carolina - association program Virginia - considered but not adopted
Georgia Model	Georgia South Carolina - agency program
Examination Model	Michigan Wisconsin

Table 5
Certification Program Training Hours Requirements

State	Minimum Hours by Certification Level (Cumulative)				
	Support Staff[a]	Level 1	Level 2	Level 3	Level 4
Alabama			200	450	700
Florida				75	200
Georgia			8	284	588
Iowa					198
Kansas					80
Michigan					240
Minnesota				112	216
Mississippi		100	250	375	375
Nebraska				200	390
North Carolina		106	304	484	608
North Dakota			44	138	216
Oklahoma					40
Oregon					100
Pennsylvania[b]			28	54	98
South Carolina		64	216	328	428
Tennessee			62	110	210
Utah		120	240	360	480
Virginia	90			150	450
Wisconsin		72	176	270	338[c]
Wyoming			56	144	

Notes: All totals are approximate based on advertised lengths of courses where available. *(a)* The Support level indicates certification specifically intended for administrative staff and volunteers. Levels 1 through 4 rank from the lowest level of certification to the highest. *(b)* These totals are the minimum values for Certification as a Local Coordinator. Requirements for County Staff and County Coordinators are more extensive. *(c)* Complete data for Wyoming's three level certification program was not available.

Table 6
Continuing Education Hour Requirements

State	Period	Total Hours	Average Per Year
Alabama	5 years	250 hours	50 hours
Iowa	1 year	16 hours	16 hours
Kansas	2 years	24 hours	12 hours
Michigan	1 year	24 hours	24 hours
Nebraska	3 years	30 hours	10 hours
North Carolina	1 year	24 hours	24 hours
Oklahoma	2 years	24 hours	12 hours
South Carolina	3 years	40 hours	13 hours
Tennessee	5 years	40 hours	8 hours
Virginia	3 years	60 hours	20 hours

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Information for this paper was developed through interviews with state and local emergency management personnel as well as through the references listed. Where information was obtained by an interview * is shown as a text reference.

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ISSUES IN THE WILDLAND/URBAN INTERFACE

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On the morning of October 20, 1991, an ember from a fire the day before blew outside the fire line, immediately igniting a dry tree, and causing one of America's costliest disasters ever. The residents of Oakland-Berkeley Hills in California hoped it would never happen again, and the emergency management community took the lessons learned and tried to change the way people build in the wildland. Seven years later, the lessons we learned there appeared to be forgotten as Florida faced one of their worst disasters ever, FireStorm '98. These wildfires brought a Presidential visit to provide moral support and caused the postponement of the inaugural running of the Pepsi 400 under the lights at Daytona, because the motor racetrack being utilized as a staging area for responders brought in from across America to assist in the suppression efforts. With the loss of 337 homes and 33 businesses and dry conditions continuing, Governor Chiles requested and received a Presidential Declaration of Disaster, covering 66 of Florida's 67 counties. The evacuation of 110,000 people, including the mandatory evacuation of a county, resulted in approximately 200 injuries, but no deaths. Some of the issues that helped create this disaster, as well as some of the ways of alleviating these problems will be discussed in this article.

MOVEMENT TO RURAL AREAS

Beginning after the Second World War, American's began to move back from the city to the country in increasing numbers. The wildland/urban interface designation became the buzzword of the recent decade. People were looking for ways to relieve the stress of urban living. Since the expense of living in the city was getting higher as available urban property became very limited, people headed for the woods, "hiding" from the bustle of the cities in which they work. As America continues to build its houses in the woods, and the homes become more expensive, we will continue to have more costly brush fires with the potential for disasters of immense proportions.

INTERFACE AND INTERMIX

Two terms are generally used to describe the relation of wildland and housing that has developed. The Wildland/Urban Interface occurs when a group of residences are built in an area with woods surrounding the whole neighborhood with housing abutting wooded areas. An example of this would be a housing project that is built into a clearing in the woods or where housing is built up to a forest edge. The Wildland/Urban Intermix occurs when homes are built into the woods themselves, creating a natural privacy system from the other residences in the neighborhood with only a portion of the building site being cleared. This has become a very popular way of building, regardless of the dangers - and dangerous it is.

A home is likely to become a total loss if brush is allowed to grow less than two and one

half times the flame length away from the house. For example, a house that is 10 feet from the woods will probably be lost to a fire where the flame length reaches only four feet, a frequent occurance in some brush fires. The danger comes from the phenomenon of flame lean. Flame lean is caused by winds (sometimes created by the wildfire itself) pushing the top of the fire and preheating the home in front of it.

PRE-FIRE EDUCATION

The danger of allowing brush close to dwellings was understood by most firefighters but seemigly not by homeowners. In the past, some fire departments with limited resources even used a green rock/red rock system, placing a red rock at the end of a driveway for a residences that was not saveable and a green rock for one that was. While this technique helped to allocate resources, the legal ramifications of writing off properties in advance were frightening. Now, many departments try to establish a pre-fire routine of visiting the residents in an area and advising them of things that may save their homes such as maintaining a defensible space around their dwellings and the planting of fire resisting plants. Such a visit would assist citizens in protecting their homes, and help the fire department develop a good public relations program, something needed when budget time comes around. We really need to do these things year-round not just the week before we ask the community for a brand new brush truck to protect their homes.

SOME FLORIDA EXPERIENCE

Fighting wildfires differs from region to region. When firefighters arrived from out west, they used the methods they were used to, including "standing in the green," an area of live, unburned fuel, for protection and then using the line as a back-burn anchor point. The realization that the "green" palmettos were burning faster than the litter and slash fuels was something they had to adjust to very quickly. Another difference in the experience in Florida was the frequency with which fires spread or reignited through the underground burning of the roots, presenting the fire in a different location after firefighters thought the fire was extinguished. This caused concern for designating an area as safe or "in the black". Supposedly an area that was already burned would not burn again, but a fire would often reappear several hours later, following a root system.

BUFFERS AND PLANTING

The creation of buffer zones allows residents to feel they are still living in the country, but also allows for the protection of structures in your jurisdiction. When residences are landscaped, residents should ensure that all fuels within 30 feet of the house are flame resistant, a designation given to plants that will resist flame impingement. They should also see that any plants that can be ladder fuels (fuels that will carry flames to the top of the trees) are not placed in this area. Although some plants are fire resistive, we need to realize that all plants will burn. Plants with heavy bark and a high moisture content, however, will resist flame impingement much longer than a palmetto bush, for example, The palmetto, common to the area, has a bark that allows for rapid preheating of the fronds, causing it to be one of the largest and hottest burning plants

in Florida. A buffer of 30-60 feet around structures needs to be well maintained and with any foliage well watered. Watering will help to keep the fire resistant qualities of the foliage intact. Only smaller shrubs and well-trimmed trees, shorter than 30 feet, should be allowed in this area, and litter must cleared from the ground around the bases of the trees. The area beyond 60-90 feet from the dwelling is where you can start letting the woods become more natural. Even in this area, however, a look out must be kept for litter fuels and ladder fuels that will burn high into the trees, creating firebrands that can carry to a roof top. The area from 90 feet out can be allowed to return to nature, providing the feeling of living in the woods that the resident sought.

USE OF SCARCE WATER

The concept of pre-wetting a residence before a fire is one that promotes the waste of water. You can not put enough water on a house to prevent the evaporation of the water from the radiant heat before direct flame impingement strikes. The water would be better used in trying to extinguish fires that are burning around a structure, thereby preventing the flame from reaching the home in the first place.

MITIGATION

Preparing a Property

Ensuring that there is room in the driveway for fire apparatus to reach the property is an simple bit of insurance that should be discussed with the resident on preplanning visits. There should be ample room to bring the largest fire apparatus to the residence since you can not predict which equipment will be available for structural protection once operations are underway, although it will probably be a structural fire protection engine. Another topic to discuss with residents is the possibility of placing water sources on their properties, such as ponds or cisterns. During the planning of fire protection, a means for utilizing on-site sources of water should be addressed, not only to protect the structure on-site but other structures nearby. A dry hydrant system would be easiest, and least intrusive on a person's property.

Prescribed Burns

There are other mitigation projects that can be carried out in our communities to lessen the damage caused by wildfires such as controlled or prescribed burning programs. Prescribed burning is the deliberate ingnition of combustible material to eliminate it as fuel for future fires. Under such a program certain areas are burned off on a scheduled basis every three to five years. The burning program will limit the amount of litter fuel that accumulates on the forest floor. Litter fuel is probably the hottest and fastest burning fuel on the forest floor, so eliminating this hazard alone will prove the benefits of a controlled burning program.

A controlled burn issue is not an acceptable means of fire protection in many communities, however, because citizens complain about the smoke, and have been taught over the years to extinguish all fires in the woods. Because of major fires years ago, America was taught that fires in the woods were bad and they had to be extinguished immediately. An example of the approach taken was the "Smokey the Bear" advertising campaign. This philosophy is probably responsible for the current no-

burn policies in effect in much of America. Before the land was settled, however, we see that fire played an integral part in the rejuvenation of forests, even aiding in the growth of some plant species. Studies have shown that grasses contain more nutrients for grazing cattle after they have been burned, the soil becoming enriched by the ash.

Instituting a prescribed burning program in a community can be a major mitgation activity since a controlled fire causes less damage than one out of control. Controlled fires are usually conducted during certain wind conditions, chosen to minimize the inconvenience to the community. Residents can be warned of the time the fire will be ignited so that, if the smoke is expected to be annoying, they can go elsewhere for the day.

Even during fires, fire departments utilizing the "let it burn to the road" concept are seeing that there are fewer chances for a rekindle, therefore minimizing the repeat responses to check on a fire. Where tractor or hand lines are placed around a fire, the fire crews are instructed to let it burn to the edge of the line, not extinguishing it before then. The purpose of the lines are to eliminate the fuel for the fire, and letting the fire remove the fuel inside the burn area will prevent embers from jumping the line.

Mitigation Using Nurseries

Another mitigation tool is the promotion of fire resistive plants by subsidizing local nurseries for buy-back programs and lowering costs for the plants that are more fire resistive. A program that is designed to promote fire resistive planting can include the trading-in of plants that are not fire resistive for replacements that are. Pamphlets can be distributed which identify local foliage that is fire resistive, and a partnership can be formed between nurseries and the local emergency management agency for those nurseries which will promote fire resistive plantings and educate customers about the buffer zone concept.

Community Leaders

Getting community leaders involved in any mitigation procedure would add to the benefits, as they can respond to concerns from the citizens in their jurisdiction and promote the efforts of the emergency management community, including funding requests for additional projects. When we discuss community leaders, not only are we talking about the political leaders of a community, but also the de facto leaders of areas and subdivisions, the actual leaders of the community.

Building Codes

Many rural areas lack proper building codes; a large part of the population feels that they own the property and they should be able to do as they please and suffer the consequences. A growing consensus even in rural areas, however, is that building codes may assist in the prevention of wildland fires. A code that regulates the layout of a structure might help avoid heat traps. The establishment of a water supply on properties which are more than a certain distance from a hydrant or existing natural water supply can actually increase the value of the property. The requirement of a certain driveway width can allow access for more than the fire department since most companies have large vehicles for deliveries.

Because of damage from recent wildfires and hurricanes, there is some interest in Florida now for a statewide building code. Establishing a statewide building code would allow developers to build in various locations in the state without having to worry about a variety of confusing individual local codes. Supporters also state that it will provide a reassurance to home buyers that their home is safe from many of the natural hazards that exist in Florida. The proposal regulates building materials that are used in the wildland/urban interface areas and provides for the enforcement of a set of standards for building inspectors (a problem that was understood after reviewing damage from recent hurricanes).

Opponents of a common building code feel that different areas of Florida are subject to different risks and question why the whole state should answer for hazards that occur only in certain areas. Others who oppose a common code state that it will raise the cost of homes due to the higher standards. The proposal, as it stands, is unlikely to pass; but wise communities may take the needed parts of the bill and incorporate them into their jurisdiction's own building codes.

A CONCLUSION

Rural municipalities have very small budgets and often look to funding from senior levels of government for such programs as wildfire mitigation projects. The lack of funding, however, is one that should not hamper a community's efforts to institute a program of their own. Some of the measures discussed here are inexpensive, if not free. With the lessons learned in the Oakland-Berkeley Hills fire and in the Florida FireStorm 98, we can prevent wildland fires from destroying our homes, yet allow them to do their necessary function in nature, under control by certified prescribed burn teams.

NOTES

1. Kenneth L Patterson Sr is a firefighter/EMT in StJohns County, Florida. He was part of the suppression efforts during FireStorm '98. He is studying for a degree in emergency management focusing on the wildland/urban interface and has received his Red Card Classes in Fire Behavior and Wildland Operations.

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THURSTON HIGH SCHOOL SHOOTING TRAGEDY: THE MEDIA DOWNPOUR

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THE PROLOGUE

When the teenage shooter sprayed students in the Thurston High School cafeteria with bullets, killing two and wounding many others, it cracked our hearts and stunned our close-knit community.

What follows is my view of a brief, tumultuous time that seemed without end. Keep in mind while reading through this account you are drawn by only one horse of an eight-horse team. The seven other public information officers, each representing different agencies, have their own stories to tell, advice to give, and questions to ask.

A crisis plan deals with so much more than just working with the news media, but in the interest of brevity, this article will address primarily the media management component of an overall situation.

THE INCIDENT

Springfield is an Oregon city of 51,000 people, harbored between two rivers in the Willamette Valley about 100 miles south of Portland. It was an everyday American city with everyday people and everyday activities. Everyday, that was, until May 21, 1998 when a fair-haired, 15-year-old freshman named Kip Kinkel walked into the crowded Thurston High School cafeteria at 7:56 am and calmly opened fire, shooting 51 rounds from a semi-automatic, .22-caliber rifle. Several hundred students, attending a senior breakfast, scrambled for their lives. Kip walked down a row of tables randomly selecting his victims. He pointed his gun at a boy's face and pulled the trigger. Click. His ammo ran out. As he tried to reload, several boys fearlessly wrestled him to the floor. They seized his rifle and two handguns. He had changed the lives of so many, including his own.

Police responded within three minutes, closely followed by firefighter paramedic teams from Springfield and Eugene, the city just across the river. A triage and treatment area was set up inside the cafeteria. Ambulance after ambulance rushed bleeding children to local hospitals. All were treated and transported within an hour.

Parents, friends, relatives, students, and concerned citizens converged on the school seeking information. Officials pulled frantic parents aside to read names of the injured. The number of casualties - two students dead and 23 wounded - made this the worst of the country's recent school shootings.

Later in the morning, police found Kip's parents, both popular teachers, shot to death in their rural McKenzie River home just outside Springfield. Lane County Sheriff's deputies evacuated the area near the home after finding explosives in the house. Investigators from Springfield Police, the Lane County District Attorney's office, the Lane County Sheriff's Office, Eugene Police, and Oregon State Police worked at both crime scenes.

Kip Kinkel is awaiting trial which has been set for September 27, 1999. He is charged with four counts of aggravated murder on top of more than 50 other charges including attempted murder and assault. Under Oregon law, he will be tried as an adult and faces the possibility of spending the rest of his life in prison.

THE MEDIA INFLUX

The gunfire was over in seconds. The media barrage lasted days. Almost from the moment emergency crews were dispatched, television and radio stations and newspapers and magazines deluged the school, hospitals, and city and county offices with calls for interviews, photos, and information. We realized we were in for a huge media ride.

First on the scene were local reporters. We have three major newspapers, four network affiliated TV stations, and more than 20 radio stations. Next to arrive were the state and regional news outlets from Oregon and Washington. By evening, more than 100 national and international news crews had landed in town. Television satellite trucks sandwiched themselves in in front of the school, city hall, and county courthouse buildings. Cameras, tripods, and cables blanketed the sidewalks. Hotel vacancy signs quickly went dark.

ABC, CBS, NBC, CNN, Fox, Associated Press, Reuters, *The New York Times*, *Time Magazine*, *Newsweek*. Station after station, paper after paper. From Sidney, London, Ontario, Paris, Tokyo. Reporters, producers, technicians. They all called; they all came. They all wanted interviews and stories and photos - now. Stories about heroes, victims, families, students, teachers, friends, and, of course, Kip Kinkel. They asked to interview the hero who tackled the shooter despite being seriously wounded in the chest. They wanted to interview Kip's sister, who was still en route from Hawaii. They had questions about mug shots, family photos, weapons, bombs in the house, and 911 transcripts. They asked about autopsy information, search warrants, suicide watch, grand jury matters, and cameras in the courtroom. They wanted to know more about photo opportunities, pooling situations, perp walks, court sketch artists, satellite coordinates, van parking, and on and on and on.

The blizzard of calls was endless. Hospitals fielded 400 to 500 media calls each. More than 5000 calls came into our media information center at city hall. I personally handled more than 200 calls at my Lane County office. Not only was I drained, my beeper became drained as well. Typically, my pager battery lasts a month or two. The endless amount of pages burnt out a new battery in just one week.

The media rush came in waves; actually more like crashing breakers. The first to hit

was at the outset of the shooting incident, next for President Clinton's visit about three weeks later, and finally for Kip's court arraignment. As abruptly as the media flew in, they darted away like hummingbirds seeking new nectar. I expect Kip's trial in September 1999 to lure the next swarm of reporters.

THE SIX STRATEGIC STEPS

Just moments after the shooting frenzy - before we, as communications professionals, had a chance to become organized - radio and television stations were on the air announcing the incident. Information was sketchy. Some was inaccurate. The community was stunned. Fear, anger, worry, and agony was in the air. The media descended upon us. The public demanded answers. A response was needed.

There was no time to look for, or even think about, the crisis communications manual that was collecting dust on the shelf. We went on autopilot and did the job using instinct, experience, and common sense. Our procedure could be broken down into six strategic steps: 1) assemble a PIO team, 2) analyze the situation, 3) set up an information center, 4) communicate immediately, 5) do it some more, and 6) partner with the media.

1. Assemble a Crisis PIO Team.

By 10 am, within two hours of the shooting, we had assembled a public information team of eight members. Early on, we knew no one person could handle the anticipated media deluge. Although we had no formal mutual aid agreement, communications professionals from the school district, hospitals, and city and county governments formed the core team. A fire department PIO from the Portland area volunteered along with four other local public information specialists. In all we had 13 PIOs on the job.

The team met throughout the crisis, into the nights, days, and weeks that followed. We cancelled vacation plans for the Memorial Day holiday. When we were not physically together, we stayed in constant touch via e-mails, faxes, and many phone calls.

Part of the successful response to the incident was due to forming this multi-agency PIO team. Our role was to allow the organizations involved to get on with the operational aspects of the job without media interference. We dropped our organizational egos. We worked for each other. We worked for the community.

2. Quickly Analyze, but Don't Over-Analyze, the Situation.

When a crisis hits, the tendency of many groups is to over-analyze a situation before acting. In a crisis environment there is no time for lengthy meetings or consensus by large committees.

We knew a slow or no response to the media might be viewed and reported as apparent guilt, a cover-up, incompetency, or lack of responsibility. We knew the media would try to get the information by whatever means were available. We knew we could minimize damage by forming a clear strategy for dealing with the media. We knew if we communicated quickly, responsibly, and honestly, reporters and editors would tend to write accurate and factual stories.

Briefly and thoroughly, we gathered the facts, determined the impacts, identified necessary actions, and assigned responsibilities.

Our overall goal was to maintain credibility and provide accurate information fast. Our objectives were to:

> Maintain credibility with officials by keeping them informed.
>
> Maintain media credibility by being responsive at the information center, at the scenes, and on the telephones.
>
> Make the media part of the crisis-response by asking them to put out public service information, eg, hotline numbers, victim status reports, community events.
>
> Identify with the victims and communicate what is being done to help them.
>
> Keep the focus of blame away from officials and organizations.
>
> Let the world know that we are a normal American community struggling with a very difficult situation and handling it responsibly.

We had to be sensitive to the needs of families and people most seriously affected by the crisis. We knew family members should not learn about the status of their children from radio, TV, or next door neighbor. We had to make sure affected individuals knew the information before the media knew. These individuals had to be notified quickly, personally, sensitively, and sympathetically by school and hospital officials.

We prioritized the other publics that had to be notified. First were the responders such as police employees, EMS personnel, the District Attorney's office, school officials, youth authorities, victim assistance agencies, and so on. Next were the special "need-to-know" people such as elected officials and residents living near the Kinkel home. Finally were the media which dispersed the news to the general public.

We selected our spokespeople. We knew all information had to be consistent. Everyone had to put out the same story. Controlled information flow depends on sticking to a single source philosophy, that is, speaking with one voice. This does not mean only one person talks, but coordinated efforts allow officials from each area to speak about their area of expertise; for example, the hospital spokesperson on casualties and patient status, police spokesperson on criminal investigation, school spokesperson on school affairs, and so forth. Together, all the information forms one coherent story that is free of contradiction, misinformation, and rumors.

Reporters like to talk to people in charge. Our spokespeople included the Mayor, Police Chief, Sheriff, District Attorney, School Superintendent, Fire/EMS Chief, and, of course, agency PIOs.

We had to be careful about the information given out, especially when the entire nation was watching. We had to be up on Oregon laws about criminal investigations, court procedures, public records, hospital-media cooperation, and bar-press-broadcaster guidelines. We had to be extremely wary of giving information that might interfere with police operations, prejudice the investigation, prejudice Kip's right to a fair trial, or express an opinion of blame. The bottom line was - we had to know what could and could not be released.

3. Set up a Media Information Center.
Our immediate priority was to establish an information center - a central point of contact for the news media, away from the two shooting incident scenes. We picked the city manager's office at Springfield City Hall as the site to begin to sensitize, inform, and manage the media. The large City Council Chambers served as the site for our daily news briefings carried live by local stations and national networks.

Within an hour of the shooting, we publicized a single telephone number to use to make it easy to get information. To handle the nonstop calls, the telephone company brought in extra trunk lines. We had 12 phone stations on the single, rollover number. Media and public alike were able to funnel their requests through volunteers answering calls. They worked the phones the first 36 hours straight, then daily 7 am- 6 pm through the following week. To further accommodate media, we arranged a media post across the street in a vacant, former bank building. There we provided telephones and fax and modem lines.

At the information center, we prepared background materials and joint agency news releases. We made contact with on-scene personnel to get current information for release. We set up status boards for releasing updated information. We triaged telephone messages. We briefed each other and officials. We notified news media about briefing times. We planned how we would manage media at events such as the briefings, court appearances, memorials, vigils, and motorcades.

By creating this information hub, we used the principle of isolate, contain, and enlighten. That is, we needed to isolate media from the incident scenes by containing them at the information center, and then enlighten them with new information. We put them on "ICE". Our objective was to stay in control. With very few exceptions, it worked.

The information center operated on pure adrenaline for four straight days, at which time we had exhausted our resources and ourselves. We were out of new information. We knew the more we fed the media, the more they would eat and the longer they would stay. It was time to move back to our respective agencies. Time to wean the media away. On Monday, May 25, four days after the shooting, we closed the information center.

4. Communicate Immediately.
Communicate as quickly as possible within minutes or hours of the event. News media monitor police and emergency services' radio transmissions, therefore, it is not unusual for a reporter or photographer to arrive on the scene before police or ambulances. At

the school, minutes after the shooting, a fire/EMS PIO assisted local reporters by immediately announcing, "We confirm a shooting has happened. There are many injuries. We're working on it. We will keep you informed." That initial response was critical. It set the tone for everything that followed.

Timing is vitally important. An initial response must be instantaneous, even if it is only a prepared statement acknowledging what happened and saying when we will make a formal response.

By noon, we had more information. It was time for a formal response. The first briefing drew local media and reporters from Portland, Seattle, San Francisco, Los Angeles, and Denver. In the early stages of any crisis, it is not possible to give complete details. For example, we could not verify the identity of the two deceased adults in the Kinkel home although we suspected they were Kip's parents. It was essential, however, that at that first briefing we issued communications acknowledging the incident and officials' response. Our formal response has the power to restore order or create chaos, to heal and soothe or heighten tension and cause friction, or to clarify and reassure or cast doubt and increase uncertainty.

By late afternoon, more facts were available. A second briefing ran at 4 pm. By this time, Oregon Governor John Kitzhaber had arrived along with State Superintendent of Schools Norma Paulus. Other speakers included the Mayor, District Attorney, and school, hospital, police, and EMS officials. The city's PIO ran the briefing.

5. Provide Regular Communications on the Status of the Crisis.
Do it some more by providing regular communications on the status of the crisis. When we handle communications correctly, we can prevent a negative situation from becoming worse. That is why it is necessary to establish a method of handling communications with quick, thorough, and regular briefings by a few people, especially those closest to the crisis.

For the first four days, we had two daily briefings, one in the morning and one in the afternoon. Regular briefings and official statements gave the news form and structure. The briefings also ensured that everyone got the story at the same time. No one got scooped. This protected the media and us as well. The briefings also prevented a news vacuum or the perception of a news vacuum. It allowed us to hold down rumors and misinformation. Again, we wanted to stay in control.

We issued multiple communications about the changing status of the crisis. Instead of each organization and community group doing its own release, we consolidated releases to include information from not only the public agencies, but also the transit district, churches, Red Cross, funeral homes, businesses, and counseling agencies. Media frequently thanked us for this unique consolidated approach. In all, we issued, faxed, and e-mailed to news outlets approximately 100 individual documents that included news releases, backgrounders, and public records.

In addition, daily, we provided media with an updated contact list of names and telephone and pager numbers. We categorized names into subject areas such as

criminal charges, prosecution, criminal investigations, patient status, community concerns, schools, victim assistance, and counseling.

6. Make the Media a Partner, Not the Enemy.
This crisis was a legitimate news event. The media and public alike were entitled to have the facts. If they did not get the facts, they might jump to erroneous and damaging conclusions. Cooperation was key. The media is there to get the story; it is their job. They will do that with or without our cooperation. The risk of being uncooperative, however, is that the story could be based on hearsay, rumor, and misinformation from outside sources. Such a story could damage our reputation and credibility.

While there were some complaints about the news media being insensitive, aloof, and "always in your face," we knew the community needed the media as much as they needed us. The media can be and was a powerful ally for providing a conduit to the community. So we made them part of our crisis response.

We relied on media to inform the public about important telephone numbers, memorials, vigils, patient status, and victim services. For instance, every day the local *Register Guard* newspaper ran page-long sidebars that listed categories such as "How You Can Help", "Victims' Status", "Community Events", and "Where to Get Help".

We did everything within reason to facilitate media. While we made suggestions for stories and photo opportunities, it was not our role to censor the media or to determine how they presented their information. In exchange, we told them we expected coverage that was fair, accurate, and balanced.

We laid the groundwork for understanding, and then answered the questions. We were able to say at any given moment, "This is what we know," "This is what we do not know," and "This is what remains ambiguous." Because we were timely, reliable, honest, accurate, and authoritative, we earned the media's respect and cooperation.

In several cases, we had to set up pooling arrangements. Pooling is where we allow a small group of media to cover an incident if they agree to share their video, photographs, court sketches, and information with their colleagues. We chose pools for space, security, or privacy reasons. Our first pool was for Kip's perp walk. A perp walk is a photo opportunity showing the perpetrator walking into the courthouse. Other pools were set up for the students' funerals, parents' memorial service, and President Clinton's address to the shooting victims and their families. Pooling had a number of advantages:

It kept the number of media to a reasonable size.

It reduced competition between reporters. This reduced competition prevented a security situation from becoming unmanageable.

It showed us as being professional. Reporters, in turn, were willing to abide by clear rules that fairly balance their needs with our need to manage the situation.

An important note - we did not get caught up in the glamour of national media. They were no more special just because they waved a Peter Jennings, Tom Brokaw, or Dan Rather flag. Playing favorites is always risky. We treated the nationals the same as the locals. If anything, we bent over backward to assist the local media keep up with the big dogs. Our rational was that once this was all over, the heavy hitters would be gone, but we still have a relationship to maintain with the local newspeople.

THE POINTING FINGERS

Whenever children are injured or killed, those involved in the violence are going to be blamed. We knew the school, juvenile authorities, and law enforcement officials would not be an exception.

In every emergency, crisis communications concerns a second reality - that is, what people think has happened, what people perceive. Perception is often more important than reality in terms of the public's assessment of any situation. Many people thought Kip was in custody for bringing a gun to school the day before the shooting, then immediately released. Not so. It was our job to set the media and the public straight.

GLITCHES, GOOFS, GRIPES AND GRUMPS

Mistakes were made. Not all were happy campers. There was the camera operator who agreed to do a pool shot of Kip's perp walk, then took off before Kip left the courthouse. Media depending on that shot came unglued.

There were scheduled live television interviews that did not happen because of crossed signals or interviewee burnout. There were some information leaks that did not please the District Attorney's office. There were producers and editors who felt cheated in not being selected to do the pools. There were some who were angry about not getting court sketches. There were reporters who were upset about affidavits and search warrants being sealed after one newspaper got the exclusive.

There were hospital officials who were livid over the antics of two reporters who sneaked into the building disguised as doctors. There were journalists who were appalled that an entertainment reporter had the gall to wave $50 bills in front of the school while offering to pay students to photograph their yearbooks.

There were unreturned or lost phone calls. There were busy signals. There were mixed signals. We had to say "No" or "I don't know" a lot.

THE SHOULDA, COULDA, WOULDA'S

Looking back, there were things we should have done, or could have done better:

> We should have monitored the news to find out who was writing or saying what. Yet we were so overwhelmed with media requests, we did not have time to thoroughly read papers or monitor broadcast news accounts. We should have

assigned a volunteer to handle that important task.

We would have controlled all rumors, but did not have the time. Rumors always give the impression of truth. The best defense against rumors is to keep putting out frequent, high quality information. While we caught and cleared up major rumors, we ignored minor ones. We focused on what we knew as fact and got that out.

We should have made better use of the Internet. Many of the agencies involved had Websites. Few of us thought of using them. We were too busy handling requests and answering questions.

We should have had more sleep. In the first three days, I worked 60 hours. That is 20 hours a day. All of us were worn and on the verge of grumpiness. Even in tragedy, we tried to keep our sense of humor to get through it all.

I should not have assumed I could do it alone. The enormity of the situation was unbelievable. On the Sunday following the shooting, I worked alone to prepare a statement from the Sheriff's office. In those two short hours my pager and telephone went off 24 times. That is one interruption every five minutes. I struggled to get the release written.

I should have done a better job in keeping my papers in order. With an overloaded clipboard full of telephone numbers, notes, to-do lists, releases, mug shots, and handouts, my records system was a mess. It was not until day three that I got wise about putting items into folders organized in a portable file.

We should have known it's not over when it's over. More than a year later, I continue to get telephone calls from the media asking about Kip's status or his upcoming trial. This was especially true immediately after the Columbine High School shooting incident in Colorado. Media wanted spin-off stories to complement their Colorado and Georgia school shooting stories. In addition, I am frequently asked to speak at conferences or write articles such as the one you are reading here.

Due to the high profile nature of this case, we expect a lot of media attention in the coming months. Using the media management model developed for the Oklahoma City bombing trial, I am organizing a media consortium for trial coverage. My goal is for media to police themselves by having a core team of journalists handle everything from assigning the available courtroom seating to deciding on pool coverage. So, it doesn't end when you think it should. This is something I should have known.

NOTES

1. Mike Moskovitz is public information officer for Lane County, Oregon. His extensive background includes 28 years in the news, broadcasting, and public relations business with prior tours of duty in city government, the University of Oregon news bureau, newspapers, radio, and television.

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PROJECTING THE IMPACT OF MAJOR TRANSPORTATION CHEMICAL RELEASES FOR FACILITY AND COMMUNITY EMERGENCY PLANNING

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Louisville is a mid-sized metropolitan area covering almost 400 square miles and has a population of approximately one million. Louisville is the crossing point of major transportation conduits, including three major interstate highways (I-65, I-64 and I-71), two interstate beltways (I-264 and I-265), three major railroad lines (CSX, Paducah & Louisville, and Norfolk Southern) and the Ohio River. Each of these transportation conduits provides for the easy movement of hazardous materials in large volumes. Some of this hazardous material originates or terminates in the Louisville area, and therefore can be tracked and planned for under the requirements of the Superfund Amendments and Reauthorization Act (SARA) Title III. A greater quantity is simply being transported through the area, however, and material tracking is impossible. Planning for emergencies involving these commodities is also difficult, because a good hazard analysis can not be performed. If a transportation accident should occur and a hazardous material released, only general community plans exist to guide emergency responders, instead of the site specific plans as required by SARA.

The Louisville/Jefferson County Emergency Planning Committee realized that more specific plans should be developed for the community response to hazardous material transportation accidents. The LEPC initiated a hazard analysis, to be conducted in preparation of developing more specific emergency response plans. The hazard analysis was broken into two phases, the first being a commodity flow analysis (CFA) and the second being hazard analyses of selected geographical areas using information provided by the CFA. The second phase of this hazard analysis required the collection of data about the selected geographical areas and running ALOHA (Areal Locations of Hazardous Atmospheres) simulations to project potential impact areas. Finally, SARA special hazard data and census tract data was compiled to determine the number of people that might be impacted.

The Center for Community and Economic Development at Morehead State University had conducted a commodity flow analysis (CFA) of I-65 and I-64. This analysis was conducted using state funds. These two CFAs included a five year history of transportation accidents involving hazardous materials on both interstates. The accident data also included the type of hazardous material involved and the DOT Emergency Response Guide used for each accident.

The CFA also presented data from field observations that determined the frequency of all commercial trucks transiting the interstates, including those transporting hazardous materials. This field data was reported as truck frequency by time-of-day, day-of-week, and commodity-being-transported.

Once the Louisville/Jefferson County LEPC had received and reviewed the data collected in the Morehead CFA, it was determined that while the information was useful, simple raw data would not really help prepare for specific emergency planning for transportation hazardous material accidents. The LEPC solicited assistance from committee members to refine the information into a product that would be beneficial in the emergency planning process. The University of Louisville Department of Environmental Health and Safety offered to assist the LEPC in developing a report that would project the impact of hazardous materials transportation accidents on selected Louisville/Jefferson County populations.

The first step in projecting the impact of hazardous material transportation accidents was to select areas along the interstate that offered the greatest problems should a hazardous materials accident occur. The technological Hazard Coordinator for the local DES office was consulted and six areas were selected:

- A section of elevated interstate 20 feet from a major hospital; this hospital is part of a complex with 6 hospitals and numerous support building and physician offices (I-65).
- A section of interstate that is a boundary of a major university (I-65).
- A section of interstate in downtown running parallel with the Ohio River (I-64).
- A section of interstate in rural Jefferson County (I-64).
- A section of interstate in suburban Jefferson County (both I-64 and I-65).

Once the areas were selected, a computer modeling program was selected to develop the scenarios. There are numerous computer models that project the dispersion of chemicals in the atmosphere. The Louisville/Jefferson County LEPC had previously accepted a computer modeling program to assist in the management of SARA data and project off-site releases. This program was developed by the National Oceanographic and Atmospheric Administration (NOAA) in partnership with several other federal agencies. Known as CAMEO (Computer Aided Mapping for Emergency Operations), the program is actually a family of three programs:

- CAMEO is used to map the location of hazardous materials,
- ALOHA is used to gauge the potential impact of a hazardous materials release,
- MARPLOT (Mapping Applications for Response, planning and Local Operations Tasks) is used to map the plume projected in ALOHA.

Since these programs were already in use in the community, it was agreed that they would also be used in the hazard analysis.

Finally, the data from the CFA was used to determine what chemicals would most

represent the worst case scenarios. The chemicals were selected for the volumes transported through the Louisville/Jefferson County areas, the potential for dispersion, and Immediate Danger to Life and Health (IDLH) levels. After careful consideration of over 100 chemicals, the following chemicals were selected for each interstate:

I-65	I-64
Propane	Propane
Chlorine	Hydrochloric Acid
Methylamine	Gasoline

Once the locations, chemicals, and modeling programs were selected, the next step was to place the data in the ALOHA program and generate projections. Each location listed was put into the ALOHA program with each of the three chemicals selected for that particular interstate. Nine projections were developed for I-65 and nine were projected for I-64.

These projections included several documents: a text summary of the data, a graphic representation of the dispersions footprint, a concentration window for one mile directly downwind of the incident (both inside and outside), the dose received one mile downwind, and the projected release rate from the transport container.

Once the footprint is calculated it can be moved to the MARPLOT program and placed at any location (in this case it was plotted on the selected locations). The plume is then scaled to fit the map and a realistic and easily understandable graphic image is generated. This image provides the emergency planning staff with information to conduct an analysis of the hazards from a transportation chemical spill at the preselected locations.

Armed with the map image (including the footprint of IDLH contamination levels), information regarding special occupancies included in the LEPC information, and regular census data, emergency planners can evaluate the populations that may be impacted. This includes evaluation of sheltering-in-place or evacuation as methods to protect the area s residents and people who work in the area. Sensitive facilities can be evaluated to determine specific planning needs should a transportation chemical emergency occur.

One example how of this information is actually being used is in emergency planning for the Louisville Medical Center Steam and Chilled Water Plant. The Steam and Chilled Water Plant provides heating and cooling for 5 major hospitals and other medical facilities in the downtown area. On-site the plant has very small amounts of hazardous materials, and an in-plant release would not curtail operations significantly. The plant is located approximately 100 yards from I-65, however, and a hazardous material accident on the interstate could impact the facility. The plant can not be easily shut down or started up and service to the hospitals can not be interrupted for an extended period.

The plant was in the process of re-writing their emergency plans and came upon the section concerning hazardous material releases. Previously, they had only planned for

releases of their own chemicals, but because they were now aware of the hazard analysis, they also planned for an off-site release that involved their plant. Considering the data provided in the CFA and the hazard analysis, they determined that evacuation of all but essential personnel will take place if called for by community leaders. In addition, they have prepared a shelter-in-place plan to maintain operations and protect personnel - either everyone or just the essential personnel left behind in the case of an evacuation.

While individual facilities may use this hazard analysis for planning, the greater benefit comes from the community being able to use this information. Community emergency planners took advantage of the hazard analysis to inform the downtown area hospitals of their potential problems from a hazardous materials transportation emergency. Hopefully, each of these hospitals will prepare appropriate emergency plans. Emergency service agencies have also been provided with this information so that they will be able to use it in their planning. EMS must plan to take patients elsewhere if a hazardous material incident closes five of the ten hospitals in the area.

The community is moving on by conducting a hazard analysis of railroad transportation accidents involving hazardous materials. The Louisville/Jefferson County LEPC requested commodity data from the three railroads that have lines through the county. In the case of rail transportation, the hazmat data collection has actually been easier because each of the three railroads provided a detailed report of not only every hazardous material shipment via rail, but also provided the date, time, and the actual type of tank car used in its shipment. In the future the LEPC will study the barge traffic on the Ohio River.

NOTES

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EMERGENCY MANAGEMENT 2000

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The daily problems we face are now much more complex than ever before and much different from those faced even a generation ago. Economic growth, environmental changes, technological advances, and new threats to the United States and to communities around the globe have created tough challenges for our society and for the profession of emergency management. Life is becoming more complicated with all of the new technologies and with the enormous variety of vulnerabilities and threats that these technologies bring. The definition of a disaster has grown in scope and the global interest in emergency preparedness continues to escalate. Population growth has placed more people in harm's way. In this country, the movement of people into the sun belt has increased, placing them at greater risk from such hazards as earthquakes, tornadoes, hurricanes, and wildfires.

LIVES AND DOLLARS

Disasters are serious and big business. In 1998, natural disasters claimed the lives of more than 50,000 people worldwide, resulting in economic losses exceeding $90 billion according to the world's largest reinsurer. There were 700 large disaster-loss events worldwide in 1998 with windstorms and floods accounting for 85% of the economic losses. Notable 1998 disasters included a tropical cyclone in India, which killed 10,000 people, and Hurricane Mitch, which resulted in more than 9000 fatalities in Central America. The most costly disaster, however, was the result of flooding in China, which resulted in 3600 lives lost and $30 billion in economic damages. Hurricane Georges in the Caribbean caused $10 billion in damages and unusually cold weather in Europe resulted in 215 deaths.

Disasters in 1998 can be compared to disasters in 1997, which resulted in some 13,000 lives lost and $30 billion in economic losses. One of the worst years on record was 1995, during which the world experienced $180 billion in economic losses as a result of disasters. The higher losses in 1995 were due in large part to the Kobe Earthquake in Japan.

On average, some 510 people now lose their lives in disasters in the United States each year, while globally the average is about 128,000 lives lost. The last decade has been the most disaster-filled decade on record for the United States with more than 425 disasters declared due to earthquakes, floods, tornadoes, hurricanes, and other storms. The number of disasters during the 1990s has already exceeded that of the next most disastrous decade, the 1970s, by almost 100 catastrophes. The 1999 tornado season in the US will long be remembered for the devastating storms that struck Kansas and Oklahoma. An F5 tornado in Oklahoma with winds as high as 318 miles per hour carved a course one-mile wide and 60 miles long. The Kansas and Oklahoma storms

killed 44 people and injured 700.

The 1999 Atlantic Basin hurricane season was predicted to be more severe than last year's hurricane season, and again this year wildfires struck Florida, Georgia, and some western States. The eastern United States faced drought conditions in many areas by mid-summer. Daily, there has been the threat of volcanic eruptions, hazardous materials incidents, radiological emergencies, landslides, earthquakes, and a wide range of other disasters.

A recent study documented that 24,000 people in the United States lost their lives in disasters from 1975 to 1994 and 100,000 suffered injuries. Since President Clinton was elected, the Federal Emergency Management Agency (FEMA) has responded to disasters in over 5000 counties and in all 50 States at a cost of well over $15 billion in Federal disaster relief funds. The average cost to FEMA for disaster response and recovery has risen to nearly $2.4 billion per year. These are just FEMA's costs; they do not include the costs to state and local governments, insurance companies, and the business sector nor do they include relief expenditures from other Federal agencies like the Department of Agriculture or the Small Business Administration.

The most costly disaster in the United States remains the Northridge, California earthquake, which resulted in approximately $25 billion in damages. This pales in comparison to the Kobe, Japan earthquake, however, which resulted in some $100 billion in economic losses. Over the past ten years, the number and the intensity of violent storms and other concentrated weather events have been increasing. The ten costliest disasters in this country all occurred in the 1990s and, of the 24 largest insured US weather-related catastrophes, 21 struck in the past decade. Disaster costs this decade have been some 400% higher than the average annual costs of disasters in previous years.

Considering all levels of government and the private sector, the costs of disasters in this country average somewhere around $1 billion each week. Globally, over the past ten years disaster costs have averaged in the neighborhood of $5 billion per week. The three States experiencing the most disasters in the United States are Florida, due to hurricanes, freezes, fires, and tornadoes; California, due to earthquakes, floods, mudslides, fires, and El Niño related weather events; and Texas, due to tornadoes, hail storms, floods, and tropical storms. All three are large states, with growing populations, vulnerable to a range of different disasters.

All of these examples illustrate that disaster management is truly big business and a big part of the global economy. The volume of losses resulting from natural catastrophes is only likely to increase - and this is an unsettling prediction. The rising costs of disasters worldwide and the increased press coverage is raising the emergency management profession on everybody's radar screen. This makes the emergency manager's job all the more important and visible and it underscores the critical need to provide the emergency manger with all the tools needed to be able to handle the increasingly complex disaster-threats facing the world community today. FEMA is aggressively pursuing the need to arm emergency managers with the tools they need through its preparedness programs and has initiatives underway to enhance planning

expertise and capabilities, to improve training and education opportunities, to provide more effective methods for conducting and evaluating meaningful exercises, to increase the access of the emergency management community to the latest in technological advances, and to accelerate the transfer of these technological advances into practical uses for emergency preparedness and disaster response. The goal is to engage in partnership with the emergency management community in order to find new ways to assist them in the future.

MITIGATION AND PREPAREDNESS

The mitigation programs in FEMA form the cornerstone of emergency management and the preparedness programs form the foundation. A key element of disaster management is to establish programs of preparedness and mitigation which take every possible step to ensure that disaster losses and costs are minimized, if not eliminated.

The preparedness mission is to provide the expertise, guidance, and assistance necessary to establish, maintain, improve, and ensure the success of the nation's comprehensive emergency preparedness system which has been established to provide assistance in becoming disaster resistant and in providing disaster relief. This is accomplished through the implementation of programs in emergency planning, training, exercising, partnership, and outreach to all levels of government, to Indian tribal nations, and to the international emergency management community, as well as to the private and nonprofit sectors. The goal is to build and enhance the partnerships which are so critical to successful first responder, emergency preparedness, disaster mitigation, and disaster response operations and which are key to strengthening the emergency management profession, FEMA, and the nation. Many different nonprofit organizations such as the American Red Cross, United Way, Baptist Conventions, Salvation Army, National Council of Churches, Catholic Charities, Jewish Federation, Mennonite Disaster Services, and other relief organizations are part of this partnership.

A major emergency preparedness initiative and accomplishment has been the implementation of a *Capability Assessment for Readiness* (CAR), undertaken at the request of Congress to provide a report on how capable the states are of performing their emergency management responsibilities. The CAR consisted of performance criteria on emergency management and disaster response which were designed to measure the capability of states to perform in the areas of mitigation, preparedness, response, and recovery and was the first readiness self-assessment ever conducted. It clearly demonstrated that the nation's investment in the emergency management infrastructure has paid off. A second capability assessment is scheduled to be conducted in 2000.

The *Compendium of Exemplary Practices in Emergency Management* has also been highly successful and informative for the emergency management community. Published in 1996, 1997, and 1998, the compendiums profile successful emergency preparedness programs from across the nation, many developed at low cost or no cost, and reflect FEMA's strong partnership with public and private sector emergency managers. Future compendiums, which will also include international practices, will be published and shared among the emergency management and first responder

communities.

TECHNOLOGY INITIATIVES

FEMA is supporting an information technology project called the Global Disaster Information Network (GDIN), an interagency study undertaken at the initiative of Vice President Gore who has advocated such a program since 1984. When fully implemented, GDIN will operate over the Internet during disasters to broadcast information and promote training and communication in the areas of emergency preparedness and mitigation. It will integrate disaster management information from all sources and provide it rapidly and readily to individuals who can take the disaster response actions needed to reduce the loss of life and property. GDIN has great potential for enhancing emergency preparedness and disaster management activities in the next century.

As part of FEMA's goal to enhance emergency preparedness, four workshops have now been conducted to facilitate the exchange of emergency preparedness and disaster response information between emergency management officials and representatives of high-tech national laboratories and private research and development firms. Some very practical and useful technologies have been adopted by the state and local emergency management and fire service communities as a result of these workshops, including a breathing apparatus for first responders developed using National Aeronautics and Space Administration technology, an improved communications capability for fire fighters developed using Department of Navy technology, and ground penetrating radar developed by the Oak Ridge National Laboratory and used by the Virginia State Police to locate a buried body.

To continue to improve this technical exchange, a cooperative agreement has been reached with the National Technology Transfer Center (NTTC) at the Wheeling Jesuit University in Wheeling, West Virginia to conduct a systematic assessment of emergency management and first responder needs, identify applicable technologies to meet these needs, and determine ways to commercialize useful products and services more rapidly and more inexpensively. This will encourage more technologies being brought into wider use in the emergency management and fire service communities to reduce the impact of disasters and emergencies.

The needs of the first responder community in responding to hazardous materials incidents are the first to be focused on. To facilitate this process an Emergency Technology Partnership Council on Hazardous Materials has been established to provide a forum for gathering information. The first responder needs will be prioritized to determine which of these merit immediate consideration; and once technology applications are identified or developed, the Partnership Council will test and evaluate the effectiveness of the products and services.

ANTI-TERRORISM INITIATIVES

FEMA will continue to play an active role in anti-terrorism preparedness that reflects the Agency's normal day-to-day role in emergency preparedness. This includes assisting

state emergency management organizations in planning, providing training for emergency managers and fire service personnel, sponsoring and participating in exercises which include scenarios using weapons of mass destruction, supporting the Department of Defense's interagency city training initiative, and serving as advocate for state offices of emergency management and the fire service community in Federal interagency terrorism discussions.

INTERNATIONAL INITIATIVES

In the past few years, there has been a dramatic increase in the interest expressed by other nations in FEMA's emergency preparedness, mitigation, and disaster response programs. Emergency preparedness and disaster management information is routinely exchanged with other governments, and FEMA often participates in joint training and exercise activities both in the United States and abroad. FEMA has entered into Memoranda of Understanding or working relationships with Canada, Mexico, the United Kingdom, Australia, Japan, Russia, Poland, China, Kazakhstan, Turkmenistan, Uzbekistan, Israel, India, and Korea. These international relationships complement FEMA's NATO civil emergency planning responsibilities and Partnership for Peace activities. In 1995 FEMA hosted 400 international visitors, over 500 visitors in 1996, 600 in 1997, and over 700 officials from various Asian, European, and Latin American nations in 1998. More than 700 international visitors are expected this year as this program continues to grow. There is much to be learned from the disaster experiences of emergency managers around the world that can be applied in protecting the citizens and infrastructure in this country.

SCHOOL PROGRAMS

New emergency preparedness responsibilities and opportunities have emerged in the past year that can serve as examples of how the field of emergency management continues to expand in scope and grow in importance. For instance, FEMA is participating in the design of a program to provide increased Federal-level assistance to schools and communities in responding to incidents of violence in the schools. Parents and teachers from communities that have experienced incidents of violence in their schools, such as Columbine High School in Littleton, Colorado and Heritage High School in Conyers, Georgia have indicated to President Clinton that they would like to see the establishment of a school crisis response-support program entailing a "FEMA-type" response to such incidents with Federal assistance.

FEMA, the Departments of Justice and Health and Human Services, the National Institute of Mental Health, and the Office of Management and Budget are participating in the development of a program called Project SERV (School Emergency Response to Violence) to help address the school violence issue. Project SERV will help state and local governments build greater capacity and capability to deal with incidents of violence in the schools, increase training and preparedness support, and augment response to such incidents with more crisis and mental health counseling and law enforcement and other services. FEMA now offers a *Multi-hazard Safety Program for Schools* training course to help the school community in planing for all types of disasters. FEMA has committed to building upon this course and assisting in the

development of additional training programs for emergency management, education, mental health, and other officials who might be involved in Project SERV or related programs.

A joint program is now underway with the State of Maryland and the Bowie, Maryland Schools to develop an emergency preparedness curriculum which would be used, first as a test in Bowie, then state-wide in Maryland, and then, possibly, nationwide. Related to this, the US Department of Education has requested that FEMA develop a generic emergency plan for all schools. The thrust of this initiative will be to get hazard awareness and disaster preparedness information into the classrooms on a systematic basis, primarily through curriculum materials, and to find innovative, no-cost ideas for getting school kids involved in supporting and encouraging children in other schools that have been impacted by disasters. This is an exciting new and important program area for FEMA.

Y2K PROBLEMS

The newest, and perhaps the greatest, emergency preparedness challenge this year has been preparing to handle the Year 2000 (Y2K) challenge. The Y2K experience will present one of the most significant opportunities the emergency management and first responder communities will ever have to demonstrate to the entire nation, as well as to the entire world, the very important role that emergency preparedness should play in everyone's lives. The Y2K challenge has presented all emergency managers with an opportunity to demonstrate leadership in preparing their organizations and communities for Y2K and to play a pivotal role in helping to manage public panic and control rumors. Preparing for Y2K has been an ongoing, year-long exercise in preparedness. When the final chapter is written, it will be clear that Y2K provided a major boost to the emergency management and first responder professions.

FEMA approached the Y2K problem from several different angles and has been involved in activities to help states, communities, and Indian tribal nations prepare for Y2K including: chairing the Emergency Services Sector Working Group of the President's Council on Y2K Conversion, conducting regional federal-state-local Y2K workshops and exercises, publishing Y2K planning guidance, developing Y2K training for state and local emergency managers and awareness information for FEMA employees, conducting Y2K EENET broadcasts, establishing a Y2K Internet-based clearinghouse, collecting Y2K State and local "best practices," developing a supplement to the Federal Response Plan, publishing consumer's information on Y2K, and publishing a Y2K brochure for the fire community with answers to frequently asked questions.

EMERGENCY MANAGEMENT EDUCATION IN Y2K

As we approach the Year 2000, it is only natural that we wonder what life will be like in the next century. Along with the excitement of transitioning into the new millennium, there will certainly be a lot of uncertainties needing attention. One certainty, however, is the clear need to work in partnership to help shape the future of this nation by preparing its young people to meet the challenges they will face in

emergency management.

Training

Emergency preparedness and disaster-response training and education are perhaps the most important component of FEMA's preparedness mission. The training and education programs are designed to teach people how to do things, not just to know things, and they now focus heavily on teaching the skills needed to accomplish the actual tasks that are required in a disaster response. There are now training curriculums at the National Fire Academy and the Emergency Management Institute (EMI) that focus on preparedness, mitigation, response and recovery, simulation and exercises, and management and professional development. A large percentage of the students are from the fire service and are offered courses in fire protection and management. Independent Study Courses are offered and courses are broadcast over FEMA's Emergency Education Network (EENET), a televised network that reaches a wide audience throughout the country. The EENET broadcasts serve thousands of students simultaneously and have won Communicator Awards, an international award, and prestigious Telly Awards.

Higher Education Program

Looking toward the new millennium, training and education will be a key to preparing emergency managers to successfully respond to whatever challenges they face, no matter how great or complex the challenge may be. This is the very reason why FEMA's Higher Education Program has been, is, and will always be one of the highest priorities of the Agency. This is the only program that touches every aspect of all FEMA's programs. The challenge is to develop an emergency management degree program in every state by the year 2001. The participation of colleges in FEMA's Higher Education Program in 1999 is up over 14% from 1998. More than 50 different colleges and universities, located throughout this nation, have answered the call. This level of interest is just one of the many indicators of the ongoing successes of the program.

Much progress has been made towards the goal of a degree program in every state by 2001. By late July 1999, 62 schools were involved in this program: nine schools offered graduate degrees (three offered PhDs), seven offered Bachelor degrees, nine offered Associate degrees, 13 offered Certificate, Diploma, or minors, and 24 were in the process of developing or investigating the development of a program in emergency management. Through this program, the outreach to Indian tribal and historically black colleges has been increased. There is now a great deal of excitement and tremendous momentum in the Higher Education Program and things are much different from what they were in 1995 when only three colleges in the entire country offered emergency management degrees. There are many individuals who want to pursue a career in emergency management and they want to be prepared to do so at institutions of higher learning. FEMA is striving to meet this demand.

While a great deal of progress towards the goal of a degree program in every state has been made, the job is not complete. The remaining states without programs need to be brought onboard, thus ensuring access in every state to this valuable program. There are four related Higher Education Program objectives that will also be pursued:

- Completion of the development of courses for the Bachelor's degree curriculum.
- Exploration of an accreditation process for emergency management degrees.
- Exploration of the establishment of an honorary society.
- Examination of the need for additional graduate level degrees.

Five prototype bachelor-level courses in emergency management topics have already been developed and a dozen more are in the process of being developed. A prototype Associate of Arts degree curriculum has been designed and college level courses are now offered at the EMI in The Sociology of Disaster, The Social Dimensions of Disaster, and The Political and Policy Basis of Emergency Management. In keeping with the goal of continuously improving and expanding training and upgrading the profession of emergency management, more than 17 new emergency management related courses are being prepared for hand-off to other institutions.

More than 300,000 students are trained each year through FEMA courses but the potential training audience exceeds 2.6 million students. To meet this demand in the future, other training approaches will be used with increasing frequency:

- Using FEMA's partners to deliver training.
- Increasing the use of independent study courses.
- Increasing the use of the Internet.
- Increasing the use of training videos.
- Increasing the use of compact discs.
- Increasing the number of EENET broadcasts.

Ensuring that higher education opportunities are available for future generations is a top priority. FEMA has embarked on a disaster-resistant universities initiative as part of the Agency's Project Impact program. In just the past five years, several disasters have harmed universities, including Syracuse, Colorado State, and the University of California (Northridge). Two University of California (Berkeley) researchers are conducting a study on the economic impacts universities have on the surrounding communities, regions, states, and nation, as well as on how major disasters affect universities. In addition, a team of university leaders from various states is developing strategies which all universities can use to lessen their risks. It is hoped that a trust fund to help universities become disaster resistant will be approved by the Congress in the future, to help better protect these higher level institutions.

Thomas Jefferson once said that people in public positions should fashion their activities and calibrate their decisions, based on what's good for the next 1000 generations. Together, the emergency management and first responder communities can build a safer

and more secure future in which there is a great reduction in the loss of life and property from disasters. Higher education has a major role to play in making this happen by offering emergency management education in colleges and universities across the United States. There is no better accomplishment, as the new century approaches, than to put in place the educational opportunities that will ensure a better tomorrow.

All of FEMA's Preparedness Programs are about the future. Actions taken today will help bring about a safer future for this generation's children and their children's children. The concern should truly be for the next 1000 generations. The emergency management and first responder partnership will mean a brighter and safer future for everyone.

NOTES

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