Major Aviation Disasters-
Strategies to Save Lives and Control the Incident

Gunnar J. Kuepper
Emergency & Disaster Management, Inc.
Los Angeles, California

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

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

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

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

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

INTRODUCTION

Since the first powered airplane flight by the Wright brothers in 1903, the aviation industry has grown tremendously. Today the aviation sector employs 127 million people and accounts annually for $3.5 trillion worldwide.

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

PROGRAM OBJECTIVES

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

1. Saving lives
2. Preventing escalation & further damage
3. Relieving pain & suffering
4. Protecting property, the environment & the economy
5. Maintaining essential services
6. Informing the public
7. Supporting recovery
8. Facilitating investigation & inquiries
9. Evaluating activities & identifying lessons learned
10. Restoring normalcy

Location of accidents

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

It can happen in densely populated areas.

- November 3, 1957, Germany, Duesseldorf: A DC-4 crashed into residential area, 9 people died, 7 were injured.
- December 16, 1960, New York City: In a mid-air collision between an United Airlines Douglas DC-8 and a TWA Lockheed Super Constellation, 134 people died, including six on the ground.
- September 25, 1978, San Diego: A mid-air collision between a Pacific Southwest Airlines Boeing 727 and a Cessna 172. Four blocks of a residential area were devastated; 137 people aboard the planes and seven residents on the ground died.
- July 9, 1982, New Orleans: A Pan-Am Boeing 727 crashed into a residential neighborhood shortly after take-off. All 153 people on board and eight people on the ground were killed.
- August 31, 1986, Cerritos, California (near Los Angeles): As a result of a mid-air collision between a Mexican DC-9 and a small plane all 64 people on board were killed, together with 15 people on the ground. At least ten houses were destroyed.
- October 4, 1992, The Netherlands, Amsterdam: An EL Al cargo Boeing-747 crashed into a major apartment building; the four crew members aboard and 47 people on the ground died.

It can happen in smaller cities, and in rural areas

- December 28, 1978: A United DC-8 ran out of fuel and crash-landed in a suburb of Portland, Oregon, a few miles short of the airport. Ten people died and 179 survived, with 24 suffering severe injuries. Despite the destruction of some homes no one on the ground was hurt.
- December 21, 1988: A PanAm Boeing-747 was bombed in mid-air and crashed into the small village of Lockerbie, Scotland, killing 259 aboard and 11 on the ground.

It can happen in areas with limited access like swamps, jungle, and particularly the Everglades National Park close to Miami International Airport on

- February 12, 1963, when a Northwest Boeing 720 broke up in flight over the Everglades shortly after takeoff from Miami Airport, and all 43 people aboard died;
- December 29, 1972, when an Eastern Airlines Lockheed L-1011 Tristar with 176 occupants crashed during landing approach 14 miles west of the airport; despite a tremendous, non-survivable impact, 77 people survived, 60 of them with severe injuries, 99 persons died;
- May 11, 1996, when a Valujet DC-9 experienced an in-flight cargo fire and crashed into the swamp, killing 110 aboard.

It can happen in mountainous terrain.

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

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

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

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

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

- June, 1985: An Air India Boeing 747 with 329 persons aboard exploded in mid-air off the coast of Ireland;
- July, 1996: A TWA 800 Boeing 747 exploded in mid-air and plummeted offshore Long Island, New York, killing all 230 people aboard;
- September, 1998: A Swissair MD 11 crashed off the coast of NovoScotia, claiming 229 lives;
- November, 1999: An Egypt Air Boeing 767 crashed off the U.S. east coast, claiming 217 lives;
- January 31, 2000: An Alaska Airline MD 83 crashed offshore of Southern California, killing 88 people.

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

Types of incidents

In general, we distinguish three major kinds of occurrences.

The most serious of all is the **high-impact** crash. Examples are mid-air collisions or explosions in mid-air. There are almost never survivors. But even here, extensive search operations are always worth the effort. In September, 1997, Vietnam Airlines Tu-134 crashed at Cambodia's Phnom Penh Airport. Every one of the 66 people aboard were killed, but a 1-year-old child survived with only minor injuries.

To find even one survivor would give the dreadful task of searching through dead, burnt and mutilated bodies meaning.

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

- On August 22, 1999, a China Airlines MD-11 crash-landed and burst into flames at the new Hong Kong International Airport. Aircraft Rescue Fire Fighting (ARFF) units were available within minutes. Of the 315 people aboard, three died, and 188 were injured.
- On June 2, 1999, American Airlines Flight 1420 crash-landed at Little Rock Airport. There was a delay in response because the location of the MD-82 jet, which had skidded off the runway, was unknown. Of the 145 people aboard, nine persons died and 83 were injured.

Low-impact accidents are initially survivable, but can have a catastrophic outcome. Examples are the Pago-Pago accident of 1974, and the Quincy, IL, runway collision in November 1996.

On January 30, 1974, a Pan-American Boeing 707 en route from Auckland, New Zealand, to Los Angeles, CA, made a scheduled stop at Pago-Pago International Airport. Due to stormy weather and human errors, the plane crashed in the jungle at 11:40 p.m., less than 900 yards short of the runway.

All 101 people aboard survived the impact without serious injuries. But in the subsequent fire and smoke conditions, 97(!) people died and only four severely injured persons were rescued.

On November 19, 1996, at 5:00 p.m. a United Express commuter plane collided with a King Air Beechcraft at Quincy Municipal Airport, Illinois. All passengers survived the initial accident, but the occupants were not able to evacuate. When the local fire department showed up 14 minutes later after a 10-mile approach, all 14 persons aboard both planes had perished.

The airport had no Aircraft Rescue & Fire Fighting (ARFF) services and was not required to do so. Nevertheless, the NTSB stated that *"contributing to the ... loss of life were the lack of adequate aircraft rescue and fire fighting services...."*

AIRPORT INDEXES AND ARFF REQUIREMENTS

The International Civil Aviation Organization (ICAO) is the worldwide regulatory body for airports and airport emergency services.

In the U.S. the Federal Aviation Administration (FAA) establishes the rules for airports. In 14 CFR § 139 defines the airports and mandatory levels of fire protection.

U.S. Airports are classified from Index A (the smallest) to Index E (the largest), which equals very much the international ICAO classification from 1 (the smallest) to 9 (the largest).

Airport Index FAA Requirement	**A**	**B**	**C**	**D**	**E**
Length of Aircraft (ft.) Example	<90 Bae 146	90 < 126 Boeing 737	126 < 159 Airbus A310	159 < 200 L-1011	>200 Boeing 747
Maximum Seating	86	170	280	400	592
Fire Fighting Vehicles	1	1 or 2	2 or 3	3	3
Fire Personnel	1	1	2	3	3

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

Much stronger directions are give by NFPA (National Fire Protection Association) Standard 403, the ICAO recommendation 9.2.19 – 20, and DODI (Department of Defense Instruction) DODI 6055.6. These regulations mandate within their jurisdictions that the first airport fire apparatus has to arrive at any point on the operational runways in less than 2 minutes and that all other required apparatus have to be at any point on the operational runways in 3 minutes or less.

ICAO, DOD, and NFPA standards have also higher requirements in regards to extinguishing agents, staffing levels, etc.

Interestingly, the obvious need for adequate EMS (emergency medical services) is not covered by FAA or any other US regulation. It is because of this that the new Denver International Airport (DIA) is justified only one Paramedic on airport premises for more than 104,000 passengers and 1,300 commercial flights daily. The response time for the closest ambulance will be 15 to 20 minutes in good weather conditions.

AIRPORT EMERGENCY RESPONSE

The benefit of having proper and trained ARFF units on-site in less than two minutes became even obvious in an earlier accident at Los Angeles International Airport (LAX). On March 1, 1978, a Continental Airlines DC-10 crashed during take-off due to blown tires and the subsequent collapse of the landing gear. The plane carried 198 people and 81,000 gallons of Jet-A fuel. At least 10,000 gallons of kerosene spilled and ignited instantly, engulfing the fuselage in flames and toxic smoke. Approaching airport fire units encountered people outside the plane on fire and many still trapped inside the burning jet. The first ARFF crash truck was on-scene and in foam operation within 90 seconds of the initial alarm. Total extinguishment of the massive fire was accomplished only six (!) minutes after the crash. In the end, three people had perished, but 195 others survived, 43 with injuries.

Inside the fence lies the principal jurisdiction of the airport and its fire and rescue services (ARFF), required by Federal Aviation Administration (FAA) regulations. They should be expected to be trained, prepared, staffed and equipped to deal properly with an accident situation during the very first minutes.

But even a recent study of the National Fire Protection Association (NFPA) proved otherwise. Fifty-four percent of category 9 airports (which are the larger airports like Chicago O'Hare, Los Angeles International, New York JFK, Dallas/Fort Worth, etc.) did not meet NFPA standards in regards to response time (fire vehicles arriving in two minutes or less to any point of the operational runway).

However, the success or failure of ARFF in a major crash depends on qualified assistance from outside resources. Support is needed from local fire, EMS, and other emergency departments for water supply, providing personnel and equipment for rescue operations, triaging, treating and transporting injured victims to appropriate hospitals, accounting for and securing survivors and human remains, scene and access control, etc.

Responding emergency departments need to understand the characteristics and their rules and responsibilities in an airplane crash.

In the initial response and chaos phase the goals are:

- communicating all needs and assignments,
- coordinating all resources,
- commanding all activities,

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

On August 31, 1988, a Boeing 727 crashed at Dallas International Airport, very near the perimeter fencing. Responding airport fire and rescue crews set up a triage sector at the accident site.

Local EMS units from neighboring counties and other jurisdictions approached the scene from outside the airfield. The Incident Commander, who was the ARFF chief, was not informed when a second triage area was set up.

This "freelancing" created a serious breach of proper response activities, and in the accounting and identification of victims. Further, it endangered the safety of rescue personnel, who were searching for passengers already evacuated.

Assisting departments should only fulfill assigned tasks and not work on their own. "Freelancing" will create chaos and confusion, and is always counter-productive.

It is also dangerous for unassigned crews rushing to the accident scene without proper protective equipment. An aircraft accident scene is like a Haz-Mat area. It is absolutely necessary that responders have adequate training and equipment.

Individual EMS and law enforcement agencies are often not familiar with the ICS concept. It is a common scenario, even during airport exercises, that ambulance crews rush to the scene without protective equipment, load victims on stretchers, and rush them to a hospital.

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

Availability of neighboring emergency services

Most major airports are close to the large cities they serve, and, therefore, surrounded by municipal fire-stations, EMS units, and hospitals. These facilities provide additional resources and assistance in a major aviation disaster.

Due to environmental and noise protection concerns, new airports are often built far away from urban areas (i.e., Osaka-Japan, Denver-USA, Munich-Germany). These airports have become self-contained and self-sufficient entities located on artificial islands or in the middle of what was once farmland.

Consequently, the response times for outside emergency resources has grown to at least 30 to 40 minutes in good weather conditions. As a result, the airport's fire, rescue, and EMS departments are on their own for that period of time and, therefore, must develop the capability to handle any situation ranging from a failure of power and communication systems, to a mass-casualty incident involving a fiery collision of two major passenger jets, to an act of terrorism.

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

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

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

- Lack of communication: Responding agencies and personnel do not know to whom they have to report, and who reports to them. Different radio frequencies or systems are used, not allowing to switch to a common ground channel.

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

- Lack of proper resources.

LOCAL/COMMUNITY EMERGENCY RESPONSE

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

If an airplane with 300 passengers crashes in a community, local emergency services are the first to respond. They might not have the training or resources to successfully fight 50,000 gallons of burning fuel whose flames reach up to a 100 feet and they are presented with an unfamiliar and overwhelming situation.

An outside fuel fire goes through the metal skin of a passenger jet in approximately 90 seconds. Because responders will only have minutes or seconds to react, it is vital that they become thoroughly trained and well prepared.

The first on-scene priority is fire control at the fuselage to ensure an escape route for the people aboard.

It is, therefore, essential for local fire and rescue departments to know:

- the basic principles and techniques of fuel fire fighting,

- aircraft design, including the different compartments and materials,

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

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

ACCESS

Staging and traffic direction

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

It is crucial to organize staging area(s) as soon as possible. These should be at designated locations or at well-known places of adequate size (i.e., major highway intersection, ARFF station, parking lot). The staging area must be easily accessible and provide direct approach to the

accident site. On airport premises or in off-road conditions, the use of escort vehicles is a prerequisite.

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

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

Fuselage
But even if rescuers are able to get to the wreckage, how will they get access to and into the fuselage? Wide body jets (Boeing 747, etc.) are as high as a three-story building. Ladders, elevated working platforms, or stairway vehicles will be necessary.

Entry into the cabin is the next challenge. Conventional rescue tools like sledgehammers, etc., are often not successful. The aircraft's aluminum skin and pressurized windows are nearly unbreakable.

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

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

In-flight cabin fires
The demand for a fast entry into the fuselage became obvious in some in-flight cabin fires incidents. Despite a safe emergency landing without crashing the outcome for many people aboard was often fatal.

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

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

PLANNING AND PREPAREDNESS

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

A comprehensive Aviation Emergency Plan should describe the agencies involved (FAA, NTSB, FBI, Fire/Rescue/EMS, Hospitals, ARFF, Airline, Aircraft Manufacturer, Coast Guard, Military, Coroner, Law Enforcement, etc.) and their functions.

The plan must cover aviation specific resources and procedures for the Emergency Operations Center (EOC) and the Mobile Command Post, including unified Command, and clear lines of Communication and Coordination for all response and recovery activities.

Specific considerations should be given to Mass Casualty Management, On-Site Access Control, Mass Fatality Management, Family Assistance, Media Handling.

Therefore:

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

- Implement mutual training and exercises on a regular basis, including airport and aircraft familiarization.

- Designate staging areas and immediate installation of staging officer (staging is the exclusive resource).

- Allow no-site access only to units with specific assignments.

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

- Establish comprehensive Incident Command System (ICS). Make all command functions unambiguous and visible (vests).

Checklist

Emergency responders adjacent to an airport or its arrival and traffic pattern should have an Airplane Crash Checklist (ACC). This checklist should be laminated and fit into every glove compartment.

It must follow the KISS principle (Keep It Simple, Stupid), and should contain the following information:

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

- the specifically assigned radio frequency;
- priorities, the DOs and DON'Ts at an aircraft accident scene;
- rapid fire control at the fuselage from upwind is essential;
- never approach without proper protective equipment;
- no freelancing- Always work inside established ICS.

and aviation specific hazards

- Kerosene fuel can always ignite.

- Sharp metal debris can cut.

- Engine force can blast objects and persons away.

- Damaged aircraft structures can collapse and/or rollover.

- The Unknowns: radioactive materials, explosive devices, chemicals, biological samples, and other Hazmats.

RECOVERY / AFTERMATH

Investigation

After life-saving operations and affirmation of scene-safety, investigation becomes the next priority. In the US, the National Transportation Safety Board (NTSB) or the Federal Bureau of Investigation (FBI) will be in charge of the accident site, and their overall goal is to examine the cause of the accident. Similar agencies exist in most countries, i.e., in Braunschweig, Germany, it is the Bundesstelle fuer Flugunfalluntersuchung.

State, local, or airport emergency management should be prepared to support the federal agencies with resources (i.e., with personnel, facilities, and equipment).

To illustrate the extent of an aircraft recovery operation, consider TWA flight 800 that crashed into the ocean close to Long Island on July 17, 1996. One million (!) pieces of the Boeing 747 were salvaged, which equals 96% of the airplane. Another 40,000 personal items belonging to the 230 persons who perished on board were also recovered.

Mass Fatality Management

Many bodies in high-impact crashes will be found nude, sometimes with no signs of injuries. Others are discovered terribly disfigured, with faces deeply gashed or limbs torn off or even decapitated.

In the aftermath of the mid-air collision of a Boeing 727 and a small Cessna 172 above San Diego in 1985, fragments of 135 human bodies lay scattered in the streets, in trees, on rooftops and in suburban backyards.

A mass fatality plan should be implemented in advance, covering

- Capable personnel (i.e. Dmort Teams),

- Equipment and facilities (i.e. body bags, hearses, refrigerated and secured mortuaries),
- Health and safety considerations for recovery and investigative workers,
- Procedures to ensure dignified handling of bodies and human parts, with the incorporation of adequate religious rites (i.e. Christian, Jewish, Muslim, Hindu).

Media

An aviation disaster grabs the immediate attention of national and international news media. It is crucial to provide accurate and coordinated information in a timely manner to the media, the affected public, employees, etc.

As in any crisis situation *the media can become your best friend or your worst enemy.*

An airplane crash grabs the immediate attention of the national and international media. The Public Information Officer (PIO) must be prepared and trained in dealing with sometimes very confrontational media representatives or camera crews.

An experienced PIO and a Press Information Center has to be assigned as soon as possible. Following the initial emergency operations the NTSB will usually be on-site and carry out press briefings and conferences.

Local PIO's should never speculate about the cause of the accident. This is in the exclusive authority of the NTSB or other designated federal agencies.

A clear and agreed understanding of all entities involved (fire, local and state police, EMS, hospitals, air-carrier, airport, emergency management, etc.) must be established as to who will be disclosing which particular details during the different phases of the incident. Varying messages from different agencies and speakers will cause rumors and negative publicity, as seen in the TWA 800 crash. Press briefings should be given at one location, after their appearance under the leadership of the NTSB.

Family Assistance

The "Disaster Family Assistance Act of 1996" and the "Foreign Air Carrier Family Support Act of 1997" were prompted by complaints made by families of victims in three recent tragedies: the May 1996, Valujet DC-9 crash into the Everglades that claimed 110 souls; the July 1996, TWA 800 crash into the ocean off the shore of Long Island that resulted in the death of 228 people; and the August 1997, Korean Airlines Boeing 747 crash in Guam, in which 228 persons perished and 26 survived.

Air carriers are now required to submit a plan to the NTSB addressing the needs of families in an aircraft accident. The airline is instructed to establish a family support operations center, secured facilities for the grieving relatives and friends, as well as logistical support, proper notification and communication procedures, etc.

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

Critical Incident Stress/Emotional Impact

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

Most aviation incidents are coming with

- High number of victims (injured and dead)
- Mutilating injuries of survivors, including children
- Bodies destroyed beyond recognition

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

Patty S. was exhausted and afraid of collapsing. When she had scrubbed down and got back in her clothes, someone handed her a slip of paper advising her that she might suffer nightmares in the coming weeks. The warning proved prescient. A few days later, on a television program about the crash, she would see a family video of the little girl in black sneakers. The girl was laughing. Patty recognized her as one of the bodies she had pulled up that night. Over the next few months, the image of the girl laughing was what she saw just before she woke up, sweat-drenched, in the dark. Or else she imagined what the passengers of Flight 800 experienced before the plane hit the water, alive on the way down. For months afterward, she would find comfort in the docks in the company of boaters who had also been out there that night. You could just stand there with them, looking out at the inlet and the ocean beyond; you didn't need to talk at all.

Training, Drills, and Full-Scale Exercises

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

CONCLUSION

The initial impact of an airplane accident is often survivable, as shown on many occasions. The final decision of life or death for the occupants is made by fast and skilled response.

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

NOTES

1. Gunnar J. Kuepper is Chief of Operations with Emergency & Disaster Management, Inc. This independent agency advises private, industrial, and governmental organizations throughout the world in state-of-the-art crisis management. He and his team have developed strategic planning projects to improve preparedness and response activities to major aviation disasters. These programs have received industry-awards and are introduced and endorsed by international aviation entities. Gunnar J. Kuepper is a member of numerous professional and Disaster Relief Organizations (ARFFwg, IAFC, IAEM, NFPA, NSC, TIEMS, WADEM, etc.) and serves within the NFPA on the Standard Committee on 1600 "Disaster Management" and on the standard task force on "Airport/Community Emergency Planning."

For further information on this paper contact Gunnar J. Kuepper, Emergency & Disaster Management, Inc., 1888Century Park East, 19th. floor, Los Angeles, CA 90067. Tel: 310.284.3194; Fax: 310.284.3195; E-mail: <gjk@emergency-management.net>