



Preparing for a Catastrophe: The Hurricane Pam Exercise

Statement before the Senate Homeland Security and Governmental Affairs Committee

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Chairman Collins, Senator Lieberman, and members of the committee, I appreciate the opportunity to testify today on Hurricane Pam and its role in catastrophic planning and preparedness. My name is Madhu Beriwal and I am the President of IEM. IEM was the prime contractor for the Southeast Louisiana Catastrophic Hurricane planning workshops generally referred to as “Hurricane Pam.”

First, I would like to mention my background and that of my company. I have 25 years of experience in emergency management and homeland security, and the application of information technology to these areas. I began my career with the State of Louisiana, working in floodplain management and hurricane emergency preparedness for New Orleans and the surrounding areas. In 1985, I founded IEM, a disaster consulting firm dedicated to keeping people safe—at home, at work, and on the battlefield. We have worked closely with many federal, state, and local organizations to improve preparedness for hazards ranging from natural disasters to those involving chemical, biological, radiological, and nuclear threats. We have worked with the Chemical Stockpile Emergency Preparedness Program for 15 years, helping to improve preparedness for accidents involving lethal chemical weapons stored at 8 sites in the continental U.S. For the Department of Homeland Security’s Office of Grants & Training Office (formerly the Office of Domestic Preparedness), we are providing state and local agencies with technical assistance in developing prevention and preparedness plans and procedures. Over the last 21 years, IEM has received numerous awards, including the National Reinventing Government Hammer Award, the James S. Cogswell Award, a Profiles in Innovation Award in Emergency Preparedness & Response Excellence from GOVSEC, and, in 2004, the first DHS Emergency Preparedness and Response Under Secretary’s Award for Superior Service awarded to a contractor.

At IEM, we base our work on sound science to provide objective solutions that support difficult decisions about preparedness and protection. We strive hard to create solutions that allow all stakeholders to collaborate effectively. IEM is known as an “honest broker.” Organizations like the Department of Homeland Security and Department of Defense routinely rely on our company to function as an independent evaluator of emergency planning strategies and tools. We are called upon to perform independent validation and verification for mission-critical systems and to conduct comparative analyses of various protective options, often in politically charged environments. But most importantly, we at IEM are passionate about designing and producing effective outcomes that help our customers and stakeholders keep people safe.

Hurricane Pam

IEM, with a team of three subcontractors, competed for and received a FEMA contract for catastrophic planning for Southeast Louisiana and the New Madrid Seismic Zone on May 24, 2004. Because of the urgency associated with the project, IEM personnel met with FEMA Region VI officials and State officials from the Louisiana Office of Homeland Security and Emergency Preparedness (LOHSEP) within 18 hours after verbal notice of contract award. At this initial meeting, the overall purpose of the project was presented by FEMA Region VI and LOHSEP. The goal was to develop a functional, scenario-based exercise that would drive the writing of Incident Action Plans and build the foundation for Functional Plans. Ultimately, the project was intended to create a “bridging document” between local and state plans and the National Response Plan. The first “Hurricane Pam” workshop was held 53 days after contract award. As the planning proceeded, it became evident that multiple workshops would be required.

Hurricane Pam was an innovative concept that combined two facets of emergency management: planning and exercises. Traditionally, a small group of planners first develops an emergency plan, and then training is provided to those who will execute the plan. The plan is then exercised to identify gaps, omissions, and areas for improvement. Plans cover a wide range of hazards; hazard-specific plans cover from small-scale to large-scale of the same hazard. Exercises are typically scenario-based and consider a specific event that could happen. The full process takes time—plan development generally takes 6 to 18 months, and training on the plan may require 6 to 12 months. Then small-scale exercises lead to larger exercises where hundreds of personnel and dozens of agencies participate to test the generic plan against a specific scenario. Planning, execution, and evaluation of exercises will generally add 18 to 24 months to the process. The full process of planning, training, and exercising can take 2 ½ to 4 ½ years to complete. Hurricane Pam was a “planning exercise” designed to develop usable information in a much shorter timeframe.

In contrast to the traditional planning and exercise process, Hurricane Pam allowed both planners and operational personnel to collaborate in developing a plan based on a specific scenario. Hurricane Pam focused on developing plans for a specific catastrophic hurricane striking Louisiana. Thus, it was both a planning workshop and a scenario-based exercise. All 13 parishes and most of the 20+ Louisiana State agencies, and 15 federal agencies involved in Hurricane Pam had emergency plans or procedures and many of them had hurricane plans. **Hurricane Pam was designed to bring planners and decision-makers together from all levels so they could begin to grapple collectively with response issues for a catastrophic event and start the process of reviewing and reconciling their existing emergency plans.** The intent of Hurricane Pam was to produce the preliminary “bridging document” addressing catastrophic hurricane response between state and local plans and the National Response Plan. The Hurricane Pam documents were designed to serve as a foundation for more detailed catastrophic planning in the future, and to provide the architecture for an integrated catastrophic plan. (Note: The National Response Plan was not finalized until early December 2004, while the Phase 1A workshop was being conducted, and 5 months after the initial workshop was conducted.)

The 300+ workshop participants at the Hurricane Pam workshop in July 2004 were provided with a catastrophic hurricane scenario, a set of consequences that would result from that scenario, and assumptions designed to stress the emergency management system and force thinking on critical planning topics. In addition, they received a copy of Louisiana's Emergency Operations Plan, 12 parish emergency operations plans, the City of New Orleans' Comprehensive Emergency Management Plan, and emergency plans and related documents from Louisiana Department of Transportation, Louisiana State Police, the US Army Corps of Engineers, and FEMA Region VI.

To create catastrophic conditions, Hurricane Pam was modeled as a strong, slow-moving Category 3 storm preceded by 20 inches of rain, spawning tornadoes and storm surge, and resulting in 10 to 20 feet of water within the City of New Orleans. A slower hurricane builds a higher head of storm surge and is more catastrophic, as historically 9 of 10 storm-related deaths are due to drowning. (Note that according to a December 20, 2005, report by the National Hurricane Center, Hurricane Katrina was a faster-moving Category 3 storm when it reached the Louisiana gulf coast.)

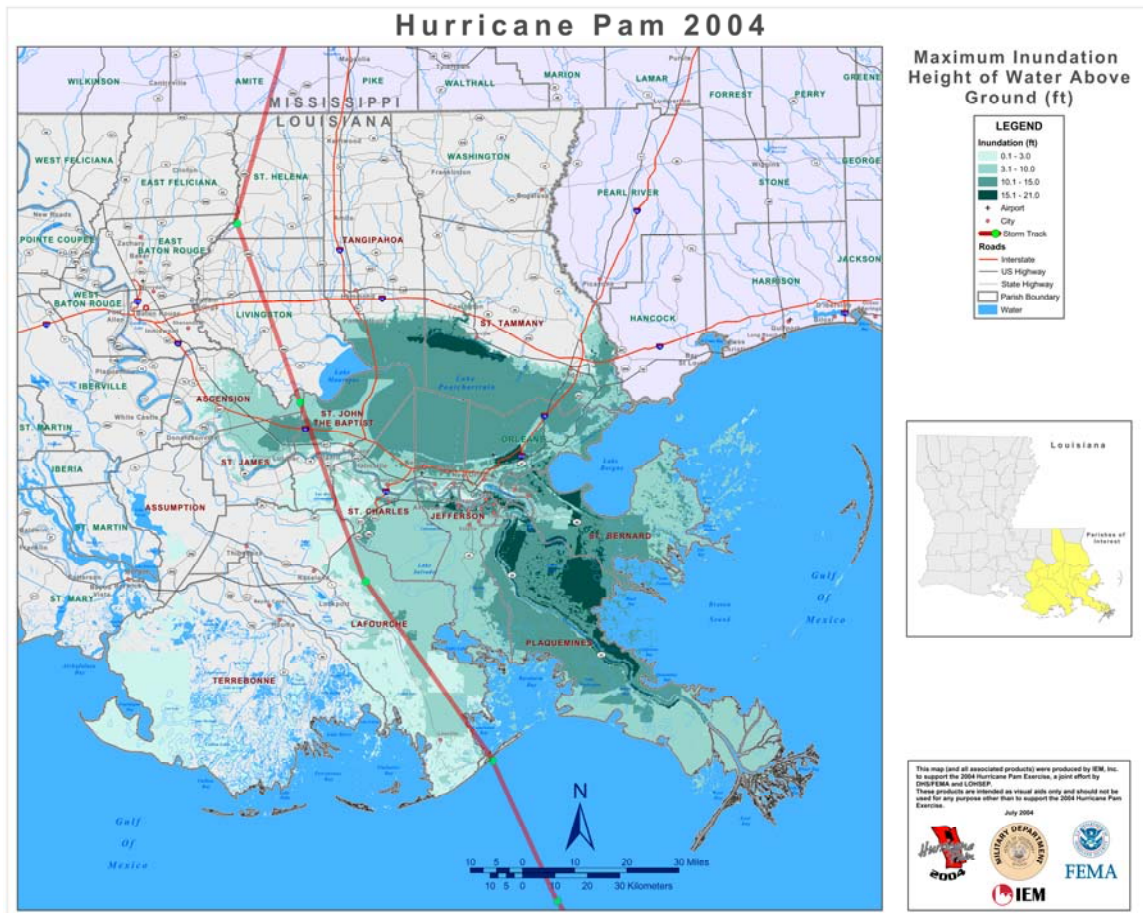


Figure 1: Map from “Hurricane Pam” illustrating maximum height of water above ground in the affected areas (storm surge and rainfall).

To present participants with a realistic situation and to provide context for the event for which they were planning, IEM projected a detailed list of consequences that would be

expected from the hypothetical Hurricane Pam. For example, IEM calculated that 55,000 people would be in public shelters outside Southeast Louisiana prior to landfall, more than 500 miles of major roads would be flooded by the storm, 1.1 million residents of Southeast Louisiana would be displaced, and that 80% of the structures in the 13 parish area would be affected by wind and flooding, varying from minor wind damage to total structural collapse. (See Table 1 for a list of other projected consequences.) Affecting more than 12,000 square miles in Louisiana and over 1.9 million people (residents and tourists), Hurricane Pam presented a complex web of topics and missions to be addressed in the planning for such an event.

Hurricane Pam was designed to be a series of workshops, conducted as “phases,” focusing primarily on post-landfall response issues. Before August 29, 2005, when Hurricane Katrina struck, four workshops had been completed. At the first workshop in July 2004, there were over 300 officials from Federal, state, local, and voluntary organizations in attendance. The second and third workshops had over 100 officials each. The last workshop, completed four days before Hurricane Katrina struck, had about 80 officials. All total, there were more than 350 unique attendees from Federal, State, local, and voluntary organizations. The atmosphere in these workshops was intense, focused, and dedicated. Participants knew that they were facing a real threat, as articulated in the detailed scenario. There were intense discussions on strategies—open, participatory, and creative brainstorming on how best to protect a deeply vulnerable region from a massive catastrophe.

Hurricane Pam Phase 1

The first Hurricane Pam workshop was conducted in Baton Rouge on July 16-23, 2004; approximately 300 federal, state, and local officials attended. These included representatives from FEMA, over 20 Louisiana State agencies and organizations, 13 parishes, the National Weather Service, over 15 federal departments and agencies staffing the Emergency Support Functions (ESF), Emergency Management Assistance Compact (EMAC) participants, volunteer agencies, and neighboring states of Mississippi and Arkansas.

The workshop was organized by topics determined by FEMA and the State of Louisiana prior to the workshop. These were: Hurricane Pre-Landfall, Schools, Search and Rescue, Sheltering, Temporary Housing, Temporary Medical Care, and Debris Management. Based on the consequences presented to them, the 300+ participants in Hurricane Pam Phase 1 began developing action plans for these topics. As the week progressed, it was evident that additional topics urgently needed to be addressed. These topics were added and covered over one or more days of the eight-day workshop. These additional topics were Billeting of Emergency Response Personnel; Hazardous Materials; Power, Water and Ice Distribution; Access Control and Re-entry; Unwatering; External Affairs; Transport from Water to Shelter; and Volunteer and Donations Management. Many other topics could not be addressed within the 8-day workshop and were deferred for future workshops.

Use of topics rather than Emergency Support Functions (ESFs) allowed cross-ESF thinking on each topic. Since it was evident that many issues were interrelated, such as

Search and Rescue, Sheltering, and Temporary Medical Care, joint-topic committees were formed during Hurricane Pam to address these issues together.

At the end of Phase 1, it was apparent that the complexity of particular topics necessitated additional planning attention. Subsequent workshops were held to focus on these issues. In particular, Sheltering, Temporary Housing and Temporary Medical Care issues were all addressed more than once, some three times over the four workshops.

Hurricane Pam Phase 1A

Hurricane Pam 1A was held November 29-December 3, 2004, in New Orleans. Attended by approximately 100 officials, this workshop focused again on Temporary Housing, Temporary Medical, and Sheltering.

Hurricane Pam Phase 1B

Hurricane Pam Phase 1B was conducted July 25–29, 2005, in New Orleans, and was attended by 100 officials. This workshop focused again on Temporary Housing and addressed a new topic: Transportation, Staging, and Distribution of Critical Resources.

Hurricane Pam Temporary Medical Care Workshop

On August 23–24, 2005, the Temporary Medical Care Supplementary Planning Workshop was held in Carville, Louisiana. It was attended by approximately 80 officials. This was the third workshop that addressed medical issues.

Many topics were deferred for future workshops were not addressed before Hurricane Katrina struck. These include: Security, Command and Control, Feeding, Communications, Continuity of Government Operations, Banking and Finances, Missing Persons and Family Reunification, Personal Records, and Recovery and Rebuilding of Infrastructure.

Hurricane Pam Results

There is a maxim in warfighting “No plan survives first contact with the enemy.” There is another in emergency management “Plans are useless; planning is priceless.” Though the plan was not finished, many elements of Hurricane Pam still proved to be highly useful in response and recovery to Hurricane Katrina days, weeks, and months after the massive storm struck the Gulf Coast.

The IEM Team developed detailed consequence assessments for Hurricane Pam over a scant 53 days. Many of these consequences were eerily echoed in the impact of Hurricane Katrina. Planning needs to be based on sound science of what can be expected during an emergency. I am proud of the work of IEM’s scientists and technical professionals and those of our subcontractors in developing a sound foundation for Catastrophic Planning for Southeast Louisiana. Some of the many similarities and dissimilarities are listed below. Please note that the data provided here for Katrina is based on currently available data only. As more information becomes available, some of these numbers could change.

Table 1: Comparisons between projected consequences for Hurricane Pam and actual results produced by Katrina.

“Hurricane Pam” Data	Actual Results from Hurricane Katrina
20 inches of rain	18 inches of rain
City of New Orleans under 10-20 feet of water	Up to 20 feet of flooding in some areas of New Orleans
Overtopping of levees	Levees breached
Over 55,000 in public shelters prior to landfall	Approximately 60,000 people in public shelters prior to landfall
Louisiana Offshore Oil Port (LOOP) shut down pre-landfall and back on in 2-3 days after storm – LOOP handles 12% of US crude oil imports	The LOOP was inoperable from August 29 to September 2 (5 days)
9 refineries shut down during storm	7 refineries in LA shut down during the storm
57 chemical plants shut down during storm. Many flooded and with no power	More than 50 chemical plants shut down during the storm
Over 1.1 million Louisiana residents displaced (500,000 households affected & 230,000 children)	1 million Gulf Coast residents displaced for the long-term; majority are LA residents
Leeville Bridge on LA 1 collapsed (west of city)	New Orleans Twin Span bridge collapsed in sections (east of city)
20,000 boat-based rescue missions and about 1,000 helicopter-based rescue missions	33,500 US Coast Guard missions; 9,313 National Guard missions; 2,911 DoD active duty missions. The Louisiana Department of Wildlife and Fisheries have rescued more than 16,000 people.
786,359 people in Louisiana lose electricity at initial impact	881,400 people in Louisiana reported to be without electricity the day after impact
Over 12.5 million tons of debris	22 million tons of debris in LA; 12 million tons in Orleans Parish; clean up could take up to 2 years
Coastal marsh erosion	Coastal erosion caused by Katrina at landfall equaled one year of erosion in that area (25 square miles a year)
Sewage treatment facilities not working in the metropolitan area	Sewage treatment facilities not working in the metropolitan area
233,986 collapsed buildings	250,000 homes destroyed

“Hurricane Pam” Data	Actual Results from Hurricane Katrina
15% of hospitals in a 13-parish area affected to some degree	All New Orleans medical treatment facilities affected by disaster. 2 weeks post-impact, only 3 out of 29 facilities in Jefferson/Orleans parishes were fully operational; 2 main state hospitals remain closed
\$40 billion in damages to LA commercial and residential structures	Costliest US hurricane on record – losses currently estimated at \$80 billion
Over 60,000 deaths	1,100 deaths reported to date in Louisiana; over 3,000 still missing
36% evacuated prior to landfall	80-90% evacuated prior to landfall

In the days before and after Hurricane Katrina made landfall, copies of the Hurricane Pam planning document were in great demand. From our review of the response to Hurricane Katrina, it appears that parts of the Hurricane Pam plan may have been used. A federal official guessed that almost 75% of it was used to a greater or lesser degree. Some examples where parts of the Hurricane Pam plan appear to have been used include (note that the data provided here for Katrina is based on currently available data only; as more information becomes available, some of these numbers could change):

- In Hurricane Pam we projected 36% of the 1.9 million residents and tourists of Southeast Louisiana would evacuate out of the 13-parish region. For Hurricane Katrina, over 80% and perhaps over 90% of residents evacuated out of the region prior to the storm.** Much of this can be ascribed to the accurate scientific forecasts by NOAA and the excellent media exposure of the impending storm. However, the actions of local, state and federal officials prior to the storm were surely in light of the devastating fatalities projected in Hurricane Pam. The city of New Orleans ordered a mandatory evacuation for the first time in its history, at the urging of the State of Louisiana and the National Hurricane Center. The effect of this high evacuation rate is quite clear. The loss of life projected in Hurricane Pam was 61,290. The actual loss of life from Hurricane Katrina in Louisiana thus far is approximately 1,100—although more than 3,000 people remain missing.
- During Hurricane Pam, participants developed the idea of a “lily-pad” type of search and rescue operation, which was implemented during response to Hurricane Katrina.** Victims were rescued and first transported to a safe area of high ground. From there, another group moved them to land, where they awaited transport to a medical processing center. This allowed Search and Rescue personnel to focus on their primary mission of saving lives. Somewhere between 65,000 and over 100,000 people were rescued during Hurricane Katrina by helicopter and boats. More than 20,000 of these were rescued by the valiant people from the U.S. Coast Guard and more than 16,000 were rescued by the Louisiana Wildlife and Fisheries agency.
- The Temporary Medical Care section of the plan, specifically the concept of a Temporary Medical Operations Staging Area (TMOSA) was implemented during the response to Hurricane Katrina.** The TMOSAs expanded the triage and

caretaking abilities of special needs shelters reducing the burden on medical facilities. Three TMOSAs were anticipated in Hurricane Pam—Nicholls State University, Southeastern Louisiana University, and Louisiana State University. Two TMOSAs were set up in Hurricane Katrina at Louisiana State University and Nicholls State University. Officially designated as a Search and Rescue Base of Operations, the New Orleans airport effectively functioned as a TMOSA. Almost 100,000 victims of Katrina went through two of these TMOSAs, with more than 15,000 on one busy day.

- **Hurricane Pam planning postulated the use of military bases for staging and temporary housing. After Hurricane Katrina made landfall, many military bases and military vessels were used** including Camp Shelby, Fort McClellan, Lackland AFB, NAS Belle Chase, NAS Meridian, Eglin AFB, Fort Polk, Maxwell AFB, Barksdale AFB, Camp Beauregard, Keesler AFB and NAS Stennis, USS BATAAN, USS IWO JIMA, USS TORTUGA, 14th Combat Support Hospital and USNS COMFORT. These and other installations have housed evacuees in at least 16 states.
- **For Hurricane Pam, it was expected that 1,000 shelters would need to be established and that 55,000 people would be in these shelters prior to landfall. In Hurricane Katrina, responders were able to establish 956 shelters, and approximately 60,000 people were in these shelters prior to landfall.**
- **Hurricane Pam expected that temporarily housing storm evacuees would require 200,000 trailers. After Katrina, 200,000 trailers were ordered for housing evacuees.** Over 140,000 travel trailers and mobile homes are expected to be provided for displaced families, primarily in Louisiana (about 100,000) and Mississippi (about 40,000).
- **IEM estimated that 252,327 children would be displaced from Louisiana schools by Hurricane Pam. During the first Pam workshop, it became evident that there was no plan for schooling displaced children, and plans to address this issue began to be developed.** Hurricane Katrina displaced more than 247,000 public and private school students. The plans developed during Hurricane Pam and afterwards appear to have helped place these children back into school.

When Hurricane Katrina struck, the Hurricane Pam planning was not complete. No training or exercises had occurred using this planning document. The first test was Hurricane Katrina—the deadliest hurricane to strike the United States in recent memory, which would tax even the most mature plans. However, based on the examples presented above, I would venture that, even though the plans and planning were incomplete, Hurricane Pam helped save lives and reduce suffering after the massive catastrophe of Hurricane Katrina.

Recommendations for Preparedness for Catastrophic Events

Managing emergencies is difficult; it has all the complexities of general management with the added pressure of decision making measured not in quarterly returns but in minutes and hours. And unlike in business, the bottom line of emergency management is lives, not dollars. Managing catastrophic events is harder still. Nature and man alike can throw major challenges our way; we need a more mature, robust, and flexible emergency management and homeland security system to respond to these challenges.

From the vantage point of my 25 years working at the nexus of science and technology and the operational world of emergency management, I would like, with all humility, to offer a few recommendations for catastrophe management.

- **Homeland security and emergency management need to be results or outcome-based.** The results from Hurricane Katrina were considered “unacceptable” by the President, by Congress, and by the people of our country. What is acceptable? The political and technical reality is that we cannot have 100% protection 100% of the time. Elected officials, as the representatives of citizens, need to define what outcomes are acceptable. We in Emergency Management and Homeland Security then need to measure these outcomes in our planning, in our training, and most importantly in our exercises. If we cannot produce the level of safety that our nation desires, we need to loop back and see what combination of investments will produce the desired end results.
- **Homeland security and emergency management need to be able to measure levels of safety or protection.** Too often, we look for more and more disastrous scenarios in our planning and exercises without measuring the outcomes that our investments in planning, training, equipment, and exercises have already produced. No business would survive if it could not adequately measure how well or badly it was doing on its bottom line measure. Our nation is spending about \$1 million a minute to keep citizens safe. We need to be able to quantify how our efforts are resulting in protection or safety. The tools for making such measurements are available from science and technology; it is time to seriously and comprehensively harness these tools to measure progress. There are myriad ways to improve emergency management capabilities. Some of these can provide large gains in protection from small investments; other well-intentioned strategies can actually *lower* protection levels. We must find ways to measure this protection.
- **A reliable and mature homeland security and emergency management system needs to be developed that can consistently deliver results.** There is, in the human spirit, the desire to see individual heroes. But, it is far more important to develop a system that can allow normal mortals to do their best and produce results with great consistency. To make this happen, emergency management and Homeland Security must become professions with rigorous educational, training and certification requirements. Medicine, law, engineering, warfighting have all benefited from these requirements. So can Emergency Management and Homeland Security. Together with this, Emergency Management and Homeland Security organizations need to undergo appropriate evaluation and certification. All of this requires consistent investments in emergency management.
- **Community planning and development need to be integrated with hazards, threats, and vulnerabilities.** The American economy is vibrant and continues to grow and expand. We need to find a sustainable balance between economic growth and development, ecological and environmental hazards and threats, and the social landscape. There are multiple agencies and organizations engaged in each of these issues and there are few community-based, participatory processes to integrate these together in a meaningful pro-growth, pro-people, scientific manner.

All of these recommendations are feasible and most of them have been accomplished in one community or another. The Best Practices from these serendipitous test-beds can be applied community by community throughout the nation, but especially for regions vulnerable to catastrophic events.

Concluding Remarks

The National Response Plan is a good strategic document. However, integrated Incident Action Plans with sufficient detail are required to handle catastrophic events impacting specific communities. Catastrophes require coordinated action from Federal, State, and local agencies, as well as the private sector. For catastrophic planning to be successful, officials from all levels must be involved and committed to the process and the results. This is not always easy to achieve. There are conflicting priorities, turf issues, and resource concerns. A scenario-based planning exercise like Hurricane Pam makes the disaster real and propels officials at all levels to cut through these concerns and focus on meaningful results.

Hurricane Pam was a step toward this. More than 350 Federal, State, and local personnel—both planners and operational personnel—began tackling the enormous operational complexities involved in responding to catastrophic conditions in an extremely vulnerable area. Historically adversarial relationships were set aside for a few days to work toward the common good—protecting lives and property after a catastrophic hurricane.

Though more workshops to continue the collaboration and planning effort were needed, participants in each group were clearly focused on addressing the catastrophic consequences they had been presented with. Working together, participants developed a mission statement and concept of operations. They also identified response actions to be taken as well as available resources needed to support these actions. They were committed to producing results and there was very little finger-pointing or blame.

Not every region is vulnerable to natural catastrophes, but some are: the San Francisco region, the New Madrid Seismic Zone, the Florida Keys, and of course, New Orleans. For these locations, a detailed and integrated catastrophic plan is the first layer of protection for saving lives.

Hurricane Pam was the beginning of building such a catastrophic event plan. On August 29, 2005, it was at an Alpha stage of release, a version 1.0 of the final. Hurricane Katrina demanded a version 10.0. I urge this committee to consider the value of the Hurricane Pam process and the foundation it offers for other catastrophic plans. From the start, Hurricane Pam was meant to serve as a test-bed for catastrophic planning for other locations. Plans for those locations are yet to be developed. Planning for New Orleans is yet to be finished—with only 127 days left before the start of the 2006 hurricane season.

In August 2005, time simply ran out for one iconic America city. We must not let this happen again.