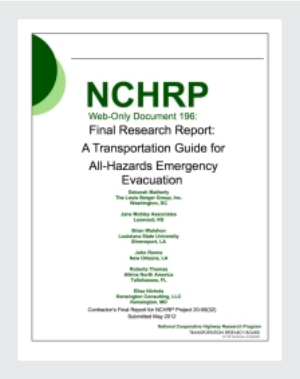

Final Research Report: A Transportation Guide for All-Hazards Emergency Evacuation

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ABSTRACT

This report documents and presents the results of a study to develop a guide on transportation's role in all-hazard emergency evacuations. Research, interviews, and a field test identified the need for a guide that emergency managers and transportation managers would both find useful. Emergency evacuations regularly occur throughout the United States, due to floods, wildfires, hurricanes, intentional acts and more. Transportation managers and operators across all modes have significant resources, including infrastructure, vehicles, operational strategies and information to support emergency managers and other partners in carrying out an evacuation. Information resources include roadway status and intervention capability through Traffic Management Centers, locations and transportation needs of people with access and functional needs, through bus and paratransit service operations, and relationships with local service providers. Transportation managers and operators need to be full partners with emergency managers in all stages of evacuation planning, from planning and exercises, through response, recovery, and after action plan modifications. Emergency managers need to understand the full range of transportation resources and constraints. Transportation managers need to understand the language, planning cycles, and organization of emergency managers. The guide is designed to accomplish both objectives, following the steps of FEMA Comprehensive Preparedness Guide 101 v2.

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SUMMARY

Introduction

This report documents and presents the results of a study to develop a guide on transportation's role in all-hazard emergency evacuations. Emergency evacuations regularly occur throughout the United States in response to floods, wildfires, hurricanes, chemical spills, intentional acts, and more.

Findings

Research, interviews, and a field test identified the need for a guide that emergency managers and transportation managers would both find useful. Transportation managers and operators across all modes have significant resources, including infrastructure, vehicles, operational strategies, and information to support emergency managers and other partners in carrying out an evacuation. Every day Traffic Management Centers across the country help manage traffic through rapid identification, response, and clearance of traffic incidents, providing information to drivers to help them avoid incidents, or to be alert for weather conditions or other delays. Every day transit and paratransit service providers interact with the general public and with people with access and functional needs who require transportation support. Planners in Metropolitan Planning Organizations (MPOs) and transportation agencies routinely compile information on demographics and roadway networks, providing a deep knowledge of where people live and work, their demographic status including age and poverty, and how they travel. Transit agencies often have contracts with over-the-coach operators to provide suburban transit services, as well as contracts with paratransit providers. Transit agencies and/or MPOs may also coordinate with local service and transportation providers, through networks such as "United We Ride."

Emergency managers often interact with a representative from transportation, often in the emergency management/ security area, but they may not be aware of the broader array of transportation resources, particularly in regions that have had little experience with wide-scale evacuations. In addition, emergency managers may not understand the constraints on transportation and transit resources. For example, if an emergency event happens in the middle of the night that requires support from transit, drivers will likely have to be called in, which takes time. If an emergency happens at rush hour, drivers will likely need to complete their routes with existing passengers prior to responding in large numbers.

Likewise, transportation and transit planners outside the emergency management/ security area may have had little exposure to emergency management planning cycles, protocols, and organization frameworks such as National Incident Management System (NIMS) and the Incident Command Structure (ICS), Emergency Support Functions (ESFs). Information resources include roadway status and intervention capability through Traffic Management Centers, locations and transportation needs of people with access and functional needs, through bus and paratransit service operations, and relationships with local service providers.

Recommendations

Transportation and transit managers, planners, and operators for all modes need to be involved in emergency planning at local and regional levels. This can occur in various ways, in the process of building a collaborative planning team (Step 1). One of the first tools presented in the Guide is "Potential frameworks for integrating modes and entities for effective evacuation: Convener Agencies for Multimodal Evacuation Planning (CAME)." Following the steps of the Guide, holding collaborative, inclusive planning meetings; working through goals, objectives, and strategies; developing a plan; and holding exercises and establishing agreements

to support such a plan, will help any region advance in its planning. Some regions may already be far along in this process, but from our research we believe most regions can greatly benefit from increased collaboration and understanding, in particular between the various modes and operating entities of transportation and emergency management.

Products

The Guide follows the planning steps of FEMA's Comprehensive Preparedness Guide 101, version 2: Step 1- Form a Collaborative Planning Team; Step 2- Understand the Situation; Step 3- Determine Goals and Objectives; Step 4- Develop the Plan; Step 5-Prepare, Review and Approve the Plan; and Step 6- Implement and Maintain the Plan. Each step includes directions on how to accomplish the step. Further, each step is followed by an array of tools- guidance and information documents, such as an overview of Emergency Support Functions with their relation to transportation; discussion guides to support meetings and workshops throughout the planning process; templates to organize demographic or other information about populations with needs; templates to organize databases on essential information on transportation assets; checklists of transportation strategies and information sharing; information and templates on exercises; and a template outline and checklist for a full regional evacuation plan, including all support functions (not just transportation).

Conclusions

Transportation managers and operators need to be full partners with emergency managers in all stages of evacuation planning, from planning and exercises, through response, recovery, and after action plan modifications. Emergency managers need to understand the full range of transportation resources and constraints. Transportation managers need to understand the language, planning cycles, and organization of emergency managers. The guide is designed to help agencies and jurisdictions in diverse regions accomplish both objectives by following the steps of the Guide, consistent with FEMA Comprehensive Preparedness Guide 101 v2, and by using the tools that both emergency managers and transportation managers can understand.

CHAPTER 1 BACKGROUND

Research Problem Statement

Disasters and emergencies requiring the evacuation of people can occur at anytime and anywhere. It is vital that emergency responders and their partners in response be ready and prepared to handle any event. Whether it is moving people out of harm's way or bringing supplies and resources into an impacted area, transportation facilities are involved and affected. The idea that it "can't happen to me" is no longer feasible in the United States. We must plan and be prepared to address and respond to any event.

Every day, evacuations varying in magnitude take place. The need to construct simple, coordinated plans between emergency responders and transportation agencies representing all modes is critical for successful evacuations that limit casualties and respond to the needs of the general public, including those with the full range of functional transportation challenges. There is a wealth of transportation-oriented evacuation material, but that information needs to be consolidated and targeted so that the relationships between transportation agencies and emergency managers are efficient and functional, *and* also correspond to the range of transportation needs and available resources.

While the majority of past study and assessment of evacuations has focused on auto-based independent self-evacuees, more recent emphasis has shifted toward providing evacuation transportation resources to transit-based assisted evacuees. However, recent reviews of practices have shown that evacuations are not limited to these processes. Aerial evacuations for tourist and populations with access and functional needs are used in the Florida Keys. Evacuation by air, rail, and buses are key elements of the New Orleans city assisted evacuation plan. Maritime evacuations, using ferries, are planned in both Washington state and Alaska and were used during the 9/11 (September 11, 2001) evacuation of lower Manhattan. Pedestrian-based evacuations have been a critical part of many past evacuations (including 9/11) and are now being looked to as a need in the development of tsunami-related coastal evacuation where people are urged to get to higher ground as quickly as possible.

A plethora of plans currently exists for emergency situations – city operations plans, contraflow plans, evacuation route maps, county emergency management plans, DOT plans – but none of these represent a template for "how to" specifically coordinate transportation efforts and resources in a variety of emergency situations, across multiple modes, for self-evacuees and assisted evacuees.

A straightforward guide is necessary to depict the optimal processes and tools to help widely divergent communities 1) identify the varied evacuation needs from a transportation perspective; 2) identify the range of available transportation resources and options; and 3) match resources to needs, including identifying and filling gaps. Each communities' needs and resources will be unique, but the processes for identifying needs and resources (e.g., through peer collaboration) and making accurate and scalable resource requests based on the severity of the evacuation can be "standardized" in decision trees, process graphics, flow charts, checklists, needs and resource templates, and other representations and guidance. The step-by-step, "how to" practical applications and guidance gleaned from research and from others' experience represent the ultimate objectives of this research project.

Research Objective and Scope

Because of the lack of money, time, and other resources available to emergency managers and transportation agencies, simplicity, practicality, flexibility, and scalability are essential when creating a functional guide. As evidenced by many recent disaster examples, processes are in place for emergency evacuations. However, some of the "bridges" between evacuating populations and the resources available need to be rebuilt and others need to be reinforced. The Guide includes practical methods and processes for making these bridges as strong and flexible as possible.

Some important questions addressed in the Guide are:

- What are the defined roles of transportation agencies in evacuation planning, response, and recovery?
- How can or how does transportation interact with other emergency support functions to support evacuations?
- What are available transportation modes and assets in evacuation planning and how is this information communicated to and coordinated with emergency responders and other entities?
- At the regional level, what type of framework for coordination can make sense for a particular region or mega-region? In particular, what alternatives can be considered for convening agencies for coordinating transportation resources?
- In emergency situations, how does the transportation plan address the general public, which may be self-sufficient with regards to transportation, but needs direction as to the need to evacuate, routes, and timing (generally referred to as self-evacuees), as well as vulnerable populations who have particular functional needs for transportation assistance (generally referred to as assisted evacuees)?

CHAPTER 2 RESEARCH APPROACH

The work was performed in a series of 10 sequential tasks. The approach to each task is briefly summarized in the following paragraphs, with the task reports included as appendices, as appropriate.

Task 1: Literature Review

The team developed a matrix for capturing appropriate and actionable information from the sources reviewed, and then completed the matrix and organized the sources. Team members categorized and prioritized information and sources based on practical utility. They then developed a comprehensive bibliography from multiple sources. Only selected references are included in the Guide; the entire bibliography is included in this Draft Final Report as Appendix A.

Task 2: Roles of Modes and Other Entities in Evacuations

The team compiled a list of transportation resources (by mode) available for emergency operations throughout the NIMS cycle approach to incidents: Prevention / Protection / Response / Recovery / Mitigation / Prevention. The major focus was on the Planning (part of Protection), Response, and Recovery phases. This task was incorporated in the Guide as Tool 3.3, Primary Entities and Transportation Modes Involved in Evacuation, and Tool 4.2.1, Examples of Resources. Interviews and the workshop (Task 5) emphasized the importance of resource identification, especially to emergency managers, and preferably within the framework of existing FEMA Resource Typing. FEMA Resource Typing for Transportation Resources is described in Tool 4.2.2., with examples. FEMA typed resources for moving people include buses (scant detail) and “multi-patient medical transport vehicles” (akin to paratransit vehicles), as well as ambulances, and fixed-wing and rotary wing aircraft for medical transport, but do not include other modes of transportation or support facilities such as intermodal terminals. Similarly, the FEMA public works resource typing includes some resources such as variable message signs, but many others are missing. The team developed many templates to assist in gathering and organizing data for varied resources. These are included in the tools under Task 4.2, Identify Resources, and are listed in Table E-1, the outline comparison (see Appendix E) as well as in the description of Step 4 of the Guide.

Task 3: Mode Integration

The team reviewed the findings from Tasks 1 and 2 as they apply to organizational and operational frameworks and mode integration, and developed and evaluated alternative means of integration. These are incorporated in the Guide under Tool 1.2, Potential Frameworks for Integrating Modes and Entities for Effective Evacuation: Convener Agencies for Multimodal Evacuation Planning; Tool 3.4, Transportation Operations Coordination Checklists; and Tool 4.3, Checklist for Interagency Communications and Information Sharing Between Transportation Agencies, Emergency Management, and Others.

Task 4: Matching Resources to Evacuation Needs

The team described a process for matching appropriate resources to evacuation needs. This included developing tables to help identify likely risks (included in the Guide under Step 2, Task 2.1, Gather information on potential risks/hazards that might require evacuation, and Tool 2.1, Preliminary Risk Assessment). The team developed tables and templates to identify likely and potential partners in evacuation efforts, incorporated in the Guide in Step 1, Tool 1.4 Potential Community Partners. Team members developed templates with instructions to identify population groups that may need to evacuate, including more detailed templates for those that may need additional assistance to evacuate (all Step 2 Tools). They developed a step-by-step process (flowchart) to be used by local transportation, public safety, and emergency management to match the needs of those

evacuating with the correct resources (see Step 4, Figure 4.2 in the Guide, and the revised flowchart below in the expanded description of Step 4). They developed a matrix to help transportation planners coordinate with those responsible for medical transportation case management, identifying the Transportation Coordination Spectrum of Considerations for Access and Functional Needs Populations in Tool 3.2. They developed a plan/matrix checklist for planners to inventory and match resources to the needs of self-evacuees and assisted-evacuees, incorporated in Step 4, Tool 4.2.6, Resource Inventory Checklist, in the Guide.

Task 5: Evaluate Alternative Research Approaches

The team created a series of templates, instructions and handouts to conduct peer exchanges as well as support additional steps in the process – Workshop in a Box – to accompany and explain the use of the draft plan/ matrix. Team members planned and facilitated a workshop in Kansas City, Missouri, to test the Task 4 Plan/Matrix and other tools. They documented the workshop development process and modified and revised workshop materials based on workshop outcomes. The revised tools and templates, including the Workshop in a Box, are included in the Guide, in addition to other tools and documentation developed in response to requests from the workshop and evolving needs. The Workshop in a Box is included as a resource to be used in all steps of the process, and is therefore presented in the Guide at the end of the six steps, rather than as part of one step.

Task 6: Propose and Evaluate Case Studies

The team listed and briefly described approximately 20 recent disasters differing in type and geography. With panel input, team members selected six events for further development as case studies, focused on transportation integration across modes and with emergency management. Using the information from Tasks 1 through 5, the six case studies were evaluated to illustrate the intended outcomes of the Guide, to help emergency responders and transportation agencies understand:

- The roles of various modes in evacuations;
- The roles of various entities in evacuations;
- How entities and modes can coordinate to plan, respond to and recover from disasters requiring evacuation;
- How resources and assets can be identified and effectively utilized for vulnerable populations and other evacuees; and
- Areas where coordination, communication, planning, response and recovery can succeed and where they may fall short.

After the selection and research, two of the case studies did not have sufficient information available to document all questions; information that was available was used. The others proved to be very useful. The case studies were not directly incorporated in the Guide, and were included in this report in their entirety as Appendix B.

Task 7: Operations Plan Templates

The team used the work completed in Tasks 1 through 6 to establish decision trees, flow charts, graphics, checklists and other appropriate formats within templates. These are found throughout the Guide. The Multijurisdictional Multimodal Evacuation Coordination Template Outline and Planning Checklists (Tools 5.1 and 5.2, respectively) are specifically aligned to the evacuation phases, and include the roles and responsibilities for all participants in an evacuation plan and response effort (beyond the transportation focus of steps 1 through 4 of the Guide).

Task 8: Preparation of Interim Report, Outline for the Final Guide, Revised Work Plan

The team documented Tasks 1 through 7, including the proposed outline for the Final Guide. Team members also developed a PowerPoint presentation to describe the project and findings to date, and the proposed outline and next steps. The Principal Investigator (PI) met with the Panel to discuss the Interim Report and Outline. The Outline and Work Plan were revised based on discussion with and comments from the Panel. Subsequent to the Panel Review, an internal review of the Guide identified various FEMA resources that were not adequately referenced or represented in the Guide. The draft outline was reworked and the Guide developed to include or refer to relevant FEMA resources. In November 2010, FEMA published the second version of the Comprehensive Preparedness Guide 101: Developing and Maintaining Emergency Operations Plan.

The CPG 101 was produced to assist planners at all levels of emergency management with guidance as they develop and review their all-hazards emergency plans. While the basic process remained the same from the draft to the revised outline, steps were reorganized and renamed to conform to the CPG 101 planning steps. The Panel was notified of this proposed change in Quarterly Progress reports and substantially agreed with the proposed approach. The change is intended to facilitate communication and coordination between transportation and emergency managers. A comparison between the original and the revised outlines is provided in Table E-1 in Appendix E.

Task 9: Develop a Guide

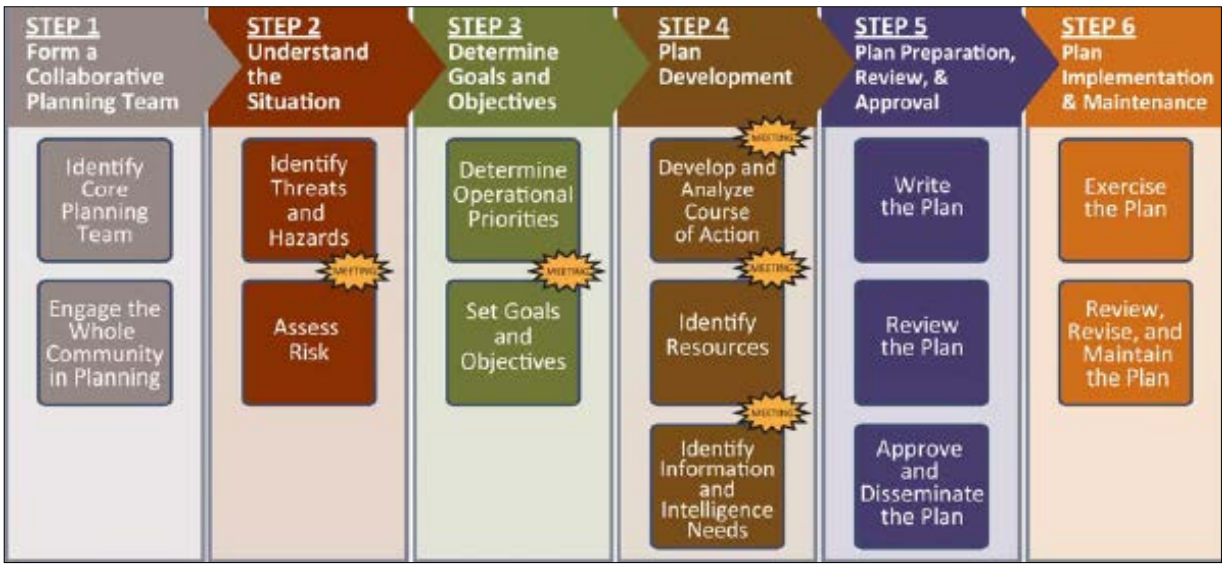
The team developed a Guide that a) described what would be needed in a viable evacuation operations and management plan for DOTs and emergency management agencies; b) provided examples of practical tools; c) described options for monitoring the effectiveness of evacuation in real time and sharing information with appropriate entities; d) provided a series of questions for an after-action review; and e) included a glossary. Note: the glossary was omitted from the Guide, and is included as Appendix C to this Draft Final Report. We anticipate receiving Panel comments and feedback on the Guide concurrent with comments on this Draft Final Report. We will then produce the final draft of the Guide.

Task 10: Prepare Final Report Documenting Research Results

The team compiled documentation and technical memoranda from Tasks 1 through 9; edited as necessary for flow and continuity and to eliminate redundancy, in particular eliminating overlaps in tools and other research products incorporated within the Guide. The current document (Draft Final Report) represents the draft deliverable for Task 10. The Guide was submitted as a stand-alone document January 6, 2012. The team also developed the final PowerPoint presentation describing the project, the guide, and major findings for review by the Panel. Subsequent to Panel review, the team revised the report and PowerPoint to respond to Panel comments and submits both to TRB for review and publication.

GUIDE ORGANIZATION

The stand-alone "Transportation Guide to All-Hazards Evacuation" (Guide) follows the planning steps of the CPG 101, Volume 2. CPG 101 includes an emphasis on whole community planning, among other topics.



CHAPTER 3 FINDINGS

Introduction

Evacuations are the movement of people, and animals, to a safe area from an area believed to be at risk, when emergency situations necessitate such action. Every day, evacuations varying in magnitude take place. A major event requiring multijurisdictional, multimodal coordination involving several layers of government (local, regional, state(s) and perhaps Federal) as well as private and nonprofit entities can occur in any jurisdiction. Examples, such as the 1,000 year floods in Tennessee and major floods in Vermont, South Dakota, Iowa, and many other states, wildfires in Florida, Arizona, California, Texas, and New Mexico, and chemical plant fires and train derailments in North Carolina, Michigan, Maryland, and other parts of the country, demonstrate that few if any communities are immune from frequent, unprecedented and large-scale emergencies. Many emergencies require evacuation of large numbers of people (and sometimes animals, including livestock), including persons needing extra assistance in emergencies (such as nursing home residents, persons without access to personal vehicles or to regular transit, and others). The challenge is to coordinate in advance the full potential range of all modes of transportation resources, working with other agencies, other jurisdictions and levels of government, and with community resources that know what and where the needs for transportation are.

The Department of Homeland Security (DHS) and the Federal Emergency Management Agency (FEMA) (which is part of DHS) lead initiatives to improve planning for incidents of all types. DHS has developed policies, plans, and guidelines and a systematic and organized set of emergency preparedness and emergency response doctrines and procedures, including preparation and response for evacuations. In addition, the National Cooperative Highway Research Program (NCHRP), the Transit Cooperative Research Program (TCRP), and the Federal Highway Administration (FHWA) – in particular the Office of Emergency Transportation Operations – have developed guidance documents examining emergency response planning, the DHS incident command structure, transportation's role in evacuation, and other facets of emergency transportation planning. The objective of the separate, stand-alone Guide is not to replicate and reiterate the research that has been done before, but to distill the essential elements pertaining to large-scale, multimodal evacuation, referring to other guidance as appropriate, and adding the lessons learned from the current research, interviews, and case studies.

DHS and FEMA planning structures and vocabulary are used throughout the document, as transportation managers and operators will generally be working within the framework of local, state, and Federal emergency managers when planning for or responding to events calling for large-scale evacuation. However, by and large DHS and FEMA guidance pertaining to evacuation does not go into the level of detail necessary for planning and coordinating multimodal transportation resources.

This report includes a section on "Evacuation Nuts and Bolts." It includes "why plan," evacuation planning mandates and key roles, statutory authorities, and an overview of the Planning Process, consistent with the steps identified in CPG 101 Version 2. This section was not included in the Guide because it seemed too detailed for a guide with too much focus on DHS and FEMA; it did not seem essential to the planning steps for transportation. Statutory authorities and other elements are incorporated in the full outline and checklist in Step 5 of the Guide.

The Guide goes through the six planning steps in detail, focused on the relationships between transportation and emergency management in building a robust emergency evacuation plan. It is designed to help transportation managers and agencies to prepare to fulfill their role in large-scale evacuation and to help emergency managers better understand the broad array of transportation resources and roles that are likely present in or near their jurisdiction. It highlights emerging promising practices of interjurisdictional coordination of transportation resources for emergencies, and presents example frameworks for organization. It includes extensive tools, templates, checklists, and other aids to planning.

Evacuation "Nuts and Bolts"

Why Plan?

Planning is generally the best way to prepare for the future. It allows for the identification of problems before an event and allows time to work through to solutions. Planning allows emergency managers and others the ability to set priorities to tasks. Planning also allows people to brainstorm on new ideas and contingency plans. Planning allows the identification of unmet needs that may exist. The Technical Assistance Catalog published from FEMA should be consulted. The Technical Assistance (TA) program seeks to build and sustain capabilities through specific services and analytical capacities across two primary functional areas: (1) preparedness TA activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and (2) homeland security program management. This two-pronged approach ensures that initiatives measurably contribute to the enhancement of state and local homeland security programs and the specific homeland security capabilities they build and manage. The TA program is designed to be an agile program that addresses areas of greatest state and local need; is committed to transferring and institutionalizing knowledge at the state and local level; and provides a dynamic menu of services that is responsive to national priorities.

Preparedness TA services seek to build and sustain capabilities in support of the four homeland security mission areas (prevention, protection, response, recovery). In addition to the four mission areas, these services also address the suite of priorities and capabilities outlined in the National Preparedness Goal. As capability gaps are identified within state and local jurisdictions, Preparedness TA services are designed, developed, and delivered to address those needs and build capabilities in the most critical areas. The following text provides an overview of the services that comprise the NPD's Preparedness TA program:

Prevention Technical Assistance: In coordination with lead federal law enforcement and intelligence agencies, including the DHS Office of Intelligence and Analysis (I&A), the Federal Bureau of Investigation (FBI), and the Office of the Director of National Intelligence (ODNI), NPD seeks to ensure that state and local jurisdictions possess required capabilities and are proficient in tasks essential to preventing terrorist attacks against the homeland. As referenced above, TAD has made the establishment of the fusion capacity the top prevention priority for state and local governments.

Protection Technical Assistance: The protection mission area focuses primarily on the following two national priorities: Implement the National Infrastructure Protection Plan (NIPP) and Strengthen Chemical, Biological, Radiological, Nuclear, and Explosive Detection, Response and Decontamination Capabilities. NPD has partnered with the DHS Office of Infrastructure Protection (IP) to enhance protection-related support to State and local jurisdictions.

Planning Support: The planning support mission areas focus primarily on the following four national priorities: Implement the National Incident Management System (NIMS) and National Response Framework (NRF); Expanded Regional Collaboration; Strengthen Interoperable Communications Capabilities; Strengthen Chemical, Biological, Radiological, Nuclear, and Explosive Detection, Response and Decontamination Capabilities. NPD has partnered with the NIMS Integration Center (NIC), the Department of Energy (DDOE), and others to enhance response and recovery related support to state and local jurisdictions.[1]

Evacuation Planning Mandates and Key Roles

Post-Katrina

In August 2005, Hurricane Katrina devastated the City of New Orleans and wiped out whole towns along the Mississippi coast. The 2005 Atlantic hurricane season prompted DHS to drastically change federal policy and the organization of responsible federal entities, notably within the DHS. Many of the changes "Post-Katrina Emergency Management Reform Act of 2006" (hereafter referred to as the Post-Katrina Act)[2], established new leadership positions and position requirements within FEMA, brought new missions into FEMA and restored some that had previously been removed, and enhanced the agency's authority by directing the FEMA Administrator to undertake a broad range of activities before and after disasters occur. The Post-Katrina Act contains provisions that set out new law, amend the Homeland Security Act (HSA), and modify the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Stafford Act). [3]

UASI (Urban Areas Strategic Initiative)

Per FEMA the UASI Program provides funding to address the unique planning, organization, equipment, training, and exercise needs of high-threat, high-density urban areas, and assists them in building an enhanced and sustainable capacity to prevent, protect against, respond to, and recover from acts of terrorism. Additionally per the 9/11 Act, states are required to ensure that at least 25 percent (25%) of UASI appropriated funds are dedicated towards law enforcement terrorism prevention activities.

LEPC (Local Emergency Planning Committees)

Local Emergency Planning Committees (LEPC) were established under the Emergency Planning and Community Right to Know Act of 1986 (EPCRA). LEPCs are federally mandated committees with membership from business and industry; emergency response groups such as fire, medical and law enforcement; community groups; media; hospitals; environmental interest; universities; and members from the general public. Their primary work is to receive information from local facilities about chemicals in the community and then use that information to develop a comprehensive emergency plan for the community regarding the release, containment, and cleanup of any hazardous materials. LEPCs also work within the community to prevent and prepare for accidental (and terrorist-related) releases of hazardous chemicals.

In 2008, the U.S. Environmental Protection Agency (EPA) Office of Emergency Management (OEM) conducted a nationwide survey of LEPCs.[4] Among the survey results it was found that dedicated membership is the single greatest factor that contributes to an LEPC's success (33.3%). It was further found that only 15.9% surveyed said that regularly scheduled meetings contribute most to their success as an organization. The results also showed that 64.9% of responding LEPCs said the establishment of the LEPC had a positive impact on chemical safety within the community they serve.

FHWA (Federal Highway Administration)

September 11, 2001 served to remind everyone that there is a very real need to ensure the operation and integrity of America's surface transportation system. A healthy transportation system is vital during emergency events to allow the continuous movement of people and goods to where they are most needed. FHWA established the Emergency Transportation Operations (ETO) to provide tools, guidance, capacity building and good practices that could aid local and State DOTs and their partners in their efforts to improve transportation network efficiency and public/responder safety when a non-recurring event either interrupts or overwhelms transportation operations. A non-recurring event can be as simple as traffic incidents or as complex as a natural disaster such as a flood or hurricane. The ETO focuses on using highway operational tools to enhance mobility and motorist and responder safety. The ETO spans a full range of activities: from transportation-centric (fender benders) to those where transportation is a critical response component (e.g., hurricane evacuations). Transportation is critical to emergency response, no matter the size or the frequency of the event. FHWA is committed to improving our nation's ability to manage emergencies that take place within the transportation network infrastructure or affects it in some way.[5]

Statutory Authorities and Roles

Suppose an earthquake, measuring 8.0 on the Richter scale, was to rock the coast during a typical morning while residents are going about their usual activities. Then approximately an hour later an aftershock of 7.5 hits the same area. Hundreds of thousands of people would be injured or dead and thousands more could not be located. Roads and bridges would have been destroyed and are impassable. Thousands of buildings and homes would be destroyed. The magnitude of this event would be felt across the nation and response would be immediate.

Neighbors would rush to help neighbors while offices and business employees would assist with evacuations of their facilities. The local emergency operation center would be activated and the mayor and other city officials would meet to discuss the plan of action and response. The mayor would contact the governor to declare a state of emergency while the governor would have already been in contact with the President. Homeland Security immediately would begin coordinating the federal response. The governor would request a major disaster be declared under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), and the President would do so.

Local, State, Federal

Although the above situation is hypothetical the response chain is real. Local authority is the primary first responder and designates the Incident Commander following the chain of command as laid out in the National Incident Management System (NIMS). On February 28, 2003, the President directed the Secretary of Homeland Security to develop and administer NIMS. The system provides a consistent nationwide template to enable Federal, state, tribal, and local governments, nongovernmental organizations (NGOs), and the private sector to work together to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity. This consistency provides the foundation for utilization of NIMS for all incidents, ranging from daily occurrences to incidents requiring a coordinated federal response.[6]

In general, state laws and local ordinances provide the authority to state and local officials to order or recommend the evacuation of people from their homes or businesses before disasters occur. This would be the case in the event of pending natural disasters such as flood events or hurricanes. The Governor of a state is

generally given the authority to order and enforce evacuations in the event of emergency situations. Under the Homeland Security Act of 2002 (HSA) the federal statutory authority greatly increased in relationship to emergency situations. Recognizing that the HSA was such a drastic increase in the federal role, Congress quickly added policies that encouraged more of a partnership between state and local governments and the Federal government. It is therefore now federal policy to defer to the states to enact laws pertinent to evacuation, and subsequently local officials then work with state officials to enforce those laws.

Pertinent Definitions and Statutory Authority

Part of the planning process establishes, for a jurisdiction, region or state, whether or not there is authority to order mandatory evacuations, and who can do so. In most jurisdictions, a "mandatory" evacuation means that no one is physically removed from their residence or business, but notifications are often provided that if the mandatory evacuation order is not heeded, no public agency assistance will be provided. This policy is in place to protect responders, who often work in extremely adverse conditions in disasters at considerable personal risk. The recent hurricane Irene, which caused billions of dollars' worth of damage along the Atlantic Seaboard, was the direct cause of the death of one Emergency Medical Technician in Princeton, NJ. The EMT was swept away by floodwaters while attempting the rescue of the driver of a car engulfed by water on a Princeton street.

It is always best for jurisdictions to have a legal agreement as to who can order mandatory evacuations. The practice differs by jurisdiction, but often it is a chief executive (mayor, governor) or a public safety official (fire or police chief, Director of Emergency Management, Chief of Public safety). During the adverse event, chief executives may delegate legal authority to public safety officials for the express purpose of ensuring that public safety issues are of primary concern and are being handled by those most competent to make the decisions. Again, this issue is best defined by ensuring that statutes are in place to facilitate any transfer of authority.

Other legal considerations include some of the proposed highway and traffic changes and strategies as identified in Tools 3.1, 3.3, and 3.4 (contraflow lanes, traffic signal timing/cycling suspension); as well as environmental concerns (runoff, spills, contamination and cleanup issues, and requirements to secure hazardous materials or cease hazardous operations); suspension of normal services and activities (this is a wide range of activities, including suspension of roadway construction activities to restore roadway capacity, storage and access to fuel, water treatment and control, business services such as banking, postal services, etc.); and policing and law enforcement concerns, including and up to declarations of martial law, suspension of habeas corpus rights and other issues, as was seen in Louisiana during and after Hurricane Katrina.

Voluntary versus Mandatory Evacuation

Depending upon the event, the evacuation order may call for voluntary evacuations. If this is the case, people will decide for themselves if they consider the risk to be great enough for them to leave their homes or businesses and seek shelter someplace else. If they perceive the risk is great, or the possibility exists that they might be trapped if they decide to stay, then more than likely they will leave and seek someplace else to stay until the emergency is resolved. However, if the emergency is considered to be serious enough that local and state officials call for mandatory evacuations then the choice is no longer theirs to make. Mandatory evacuation orders require compliance from the people being ordered to leave an area. Nevertheless, individuals have free will and some may decide not to leave (in some cases endangering minor children and others). Most cities and states have laws that can be used to enforce compliance with mandatory evacuation orders. Fines and imprisonment can be used to force citizens to leave areas that have been ordered to evacuate. More than likely this will not be the case. However, if people choose to ignore mandatory evacuation orders, emergency help will

not be sent to assist them until the emergency is resolved. State and local officials have even used tactics such as advising people to write their social security number with an indelible marker on their limbs so the parts can be identified, or complete a form that can be used to notify the next of kin. Mandatory evacuations should not be ignored

Private Sector Support

FEMA has long noted that key infrastructure sectors are often owned and operated by the private sector. Because these enterprises are for-profit, planning for business continuity has frequently already been prepared. This existing planning often follows recognized industry standards and established regulatory requirements. This resource can be valuable to complement state and local planning.

In addition, in recent years, it has been common for FEMA and other emergency management groups to partner with large retailers (big-box stores) to increase access to resources that are already local to the event. In evacuations, the use of private property with shelter and large paved areas to use as assembly and transfer points, as well as provide supplies for evacuation populations can be a very valuable

The Planning Process

Chapter 4 in the CPG 101 is dedicated to the planning process. The Figure 1 illustration from the CPG 101 (above) depicts the ideal steps in the planning process. As each plan needs to be adaptable, each jurisdiction may not need to complete each step but should attempt to complete as many as possible to avoid gaps in their plans.

Large-scale evacuations requiring regional collaboration are not common in every region, but events that can lead to a major evacuation can happen almost anywhere at any time. However, smaller scale events (planned and unplanned) and evacuations happen on a fairly regular basis. Relationships established and lessons learned from smaller events can increase readiness for larger events, but collaborative advance planning is essential to identify needs, resources, and gaps that need to be filled prior to a large-scale event. This report follows the general outline of the Guide, but includes additional detail and discussion on the topics covered in the Guide, as well as the reports from each task as appropriate, without replicating the tools and templates from the Guide except in special cases.

Step 1 – Form a Collaborative Planning Team

Identify and Coordinate with Stakeholders

The planning process should be a team effort. Teams help organizations define roles that will be played during an operation. Members of the team are also given the opportunity to see and interact with other team members and can gain insight into how each member role impacts the overall operation. Teams help build and expand relationships. Each member of the team brings their own creative ideas and insights into the planning process. Teams also help to establish pre-formed units that can respond and follow-up to incidents with the concepts established in the planning process.

Teams should establish a meeting schedule that calls for regularly scheduled sessions. It is essential that at the first meeting team expectations should be defined and identified so each member can see how their contributions will benefit the overall process. Members should be instructed that while their attendance and participation is required and expected, allowances can be made for scheduling conflicts. It is also a good idea to

use a third-party facilitator to keep the meetings focused. Since the key to group planning is open and frank discussions, the third-party facilitator can also help mitigate any conflicts or disagreements that may come up in the meetings.

The Guide provides extensive "how to" support for developing a collaborative planning team. The "Workshop in a Box" provides the essentials of planning an effective working group. Discussion guides are tailored to the early planning steps that require the most input and meetings. Lists of potential partners, sidebar tips and tools such as the CAME (Tool 1.2) all support this crucial first step, which becomes the foundation for the entire planning process to come.

Typically, the emergency manager or homeland security manager leads the planning process and directs the enforcement of policies for prevention, protection, response, recovery, mitigation, and overall preparedness. They may also be tasked with leading the planning and coordinating the establishment of the emergency operations plan (EOP). Since other members of the team may also include individuals from law enforcement, they too will ensure the plans address prevention and protection as well. The Guide provides effective discussion points and tools for transportation and transit agencies to assume their roles as key members of the core planning team.

Many emergency management agencies are now employing experts to provide assistance and guidance on non-emergency matters. These include persons with expertise in dealing with the disabled, assisting individuals with access and functional needs, and experts on dealing with the elderly. Some new employees may also have experience with household pets and service animals. These additions to the emergency management agency allow for diversity in planning as well as providing a wide range of perspective when thinking about incidents that may impact a community. Early in the planning additional members should be included to diversify the team and to help fill gaps. Other members of the team may include individuals from:

- Law enforcement
- Transportation
- Fire services
- Public Health
- Hospitals and health care facilities
- Education
- Agriculture
- Social Services
- National Guard
- Civic organizations
- Faith-based organizations
- Animal Control

Jurisdictions that utilize the Emergency Support Function (ESF) system may select their core team members from each ESF. Regardless of where the individual members of the planning team come from they must be able to speak for their agency or department with authority and be accountable to the process.

The planning process is for the whole community and should involve the whole community. Community leaders understand their citizens and can help ensure that the plans are carried out when they need to be. Communities can assist in getting critical messages from the emergency manager out to the public. They can

also assuage any fears the community might have in disaster events. Pre-established partnerships and relationships are important for leveraging expertise and resources before, during, and after disaster events.

Step 2 – Understand the Situation

Risk management is the identification and assessment of the threats and hazards that could impact a jurisdiction or region. The risk assessment is the process to collect and identify information about the threats and hazards and then assign values to each for the purpose of determining those that have the highest priorities so that plans for action can be developed for addressing them. The jurisdiction can then catalog everything from specific asset vulnerabilities to staffing levels for emergency personnel. That is paired with the collection of information about the population of the region, from general demographics to an in-depth understanding of the various communities and potential vulnerabilities and human resources in the region.

Step 2. Part 1. Identify Risk Scenarios and the Type of Evacuations They Require

An early step in the evacuation planning process is to analyze potential conditions and hazards that may warrant an evacuation. Planners should begin by conducting research and analysis on every threat or hazard that could affect a jurisdiction. The initial step in the research should be to gather information about potential risks, population demographics, household pet and animal service populations, and any geographic characteristics that could impact emergency operations. Threat assessments should include the identification of any potential targets. Hazard identification should include natural, man-made, and technological hazards. Any incidents that may have already occurred in the jurisdiction should be identified.

"Those who cannot remember the past are condemned to fulfill it" –Georges Santayana, Reason and Common Sense, 1905

There is no better teacher than history in emergency management and planning, much like its sister disciplines of safety and security. It is the reason why critical incident debriefings, after action reports, and lessons learned are compiled – they are of critical value to planning for future events.

Data about historical incidents provides invaluable information for planning for foreseeable and unforeseeable events. This information must, therefore, be readily available to planners. There are a number of national resources for historical data, including the Lessons Learned website (llis.gov) and the FEMA website. Local and state emergency management agencies and their partners, including transportation, should make it a high priority to maintain archives of events, including After Action reports, statistical information including areas and numbers of people affected, etc., concerning the area, and to perform critical data analysis on the information to assist in risk assessment and management, including emergency planning. The tools identified in Step 6 of the Guide provide direction for gathering critical information on After Action Reporting.

Local organizations (e.g., the local chapter of the American Red Cross), utilities, other businesses, and members of the planning team may also provide records and accounts about their experiences in adverse events as well.
Sources for expertise on hazard or threat potential include jurisdictional agencies; academic, industrial, and public interest group researchers; private consultants specializing in hazard or threat analysis; and professional associations concerned with the hazards or threats on a planner's list. Step 2, Task 2.1 provides guidance and resources on risk assessment. Tool 2.1 provides a matrix to assess risks and consequences from various hazards, which are intended to be evaluated from local knowledge and history. The people that may be affected by a

given hazard or risk are addressed in Step 2, Task 2.2, and in the accompanying database templates and other tools.

The planning team must also have extensive information about the jurisdiction itself. The local planning commission or department should have demographic and land use data. There should also be building inspection offices that would have data regarding the structural integrity of buildings as well as any building codes that would have been in effect at time of construction. Local public works (or civil engineering) departments and utilities are sources for information on potential damage to and restoration time for the critical infrastructures that may be threatened by hazards. Also the local chamber of commerce may be able to give their perspective as to what the damage to businesses would be to the general economic losses.

Planners also need to recognize that one threat or hazard event may have a ripple-effect. For example a hurricane (natural event) may cause power failures (technological event) that could lead to civil disturbance (human caused event). Planners need to realize events may not be independent of each other and therefore they need to plan responses for all contingencies.

During the analysis facts and assumptions will be produced. Facts are verified pieces of information. They can be laws and regulations. They may be population statistics or terrain maps. They are documented and real. Assumptions are not facts. Assumptions consist of information accepted as being true in the absence of facts in order to provide a framework or establish expected conditions of an operational environment so that planning can proceed. Assumptions should only be used as facts if they are considered valid, or deemed likely to be true, and are necessary for solving the problem. In the planning process, assumptions should be used sparingly and every effort should be made to obtain facts or historical precedent.

The assessment and planning on how to address the various hazards and risks represent a major element of the process, with the people and institutions that may be at risk on one side of the equation, and the resources available to address the risk and assist the population on the other side of the equation. The people at risk are discussed in this Step (Step 2, Part 2, below) and the resources needed and/or available are discussed in Step 4 of the process.

Consistent with CPG 101, various elements of risk scenarios are addressed throughout the Guide, with highlights as follows:

Step 1: Form a Collaborative Planning Team

Task 1.1 Identify likely interagency and inter-regional partners (jurisdictions and levels of government) required for transportation and emergency management coordination

Task 1.2 Engage the Whole Community in Planning

Tool 1.2 Potential Frameworks for Integrating Modes and Entities for Effective Evacuation (describes roles of various partners)

Tool 1.3 Introduction to Emergency Support Functions and Transportation Roles and Interactions with Each ESF (roles, interactions related to evacuation)

Step 2: Understand the Situation,

Task 2.1 Identify Threats and Hazards

Tool 2.1 Preliminary Risk Assessment

Step 3: Determine Goals and Objectives,

Task 3.1 Determine Operational Priorities, Task 3.1.1 Develop/ consider scenarios

Table 3.1 Example Scenarios from "Guidelines for Transportation Emergency Training Exercises"

Table 3.2 National Planning Scenarios – summary with elaboration as to notice, public protective measures, and need for regional coordination

Step 4: Plan Development

Task 4.1, Develop and Analyze Courses of Action

Task 4.1.1, Establish the Timeline

Task 4.1.2, Depict Decision Points in the Scenario

Tool 4.1.1 Real Time Evacuation Planning Model

Tool 4.1.2 Public Assisted Evacuation Plan Timeline for Notice Events

Step 5: Plan Preparation, Review and Approval

Tool 5.2 Multi-jurisdiction Multimodal Evacuation Planning Checklists

Step 6: Plan Implementation and Maintenance

Resource: Evacuation Workshop Planning 101 "Workshop in a Box"

Step 2, Part 2 of Understanding the Situation: Identify and Assess Needs and Capabilities of Evacuees

It is critical to identify in advance the populations affected by an evacuation order. Ensuring that adequate demographic information is maintained and updated frequently will be invaluable for effective evacuation planning. Even more important is the continual building and expansion of collaborative relationships with government agencies, private sector, non-profit, faith-based and community based organizations as well as unofficial community leaders, to garner information and to create a resilient network for communication, planning participation and action.

Incidents can affect how a community accesses their jurisdiction. Incidents can also impact the functional needs of the residents. It is therefore vital that planners have the best estimate of the number and types of individuals with disabilities and others that may have access and functional needs. The planners should also obtain as much information regarding the types of services these individuals may require so that emergency staff can be adequately trained and necessary resources can be made available when needed.

Operational classifications of self-evacuees and assisted evacuees, with associated goals and objectives, are primarily addressed in Step 3. Step 2 focuses on information gathering across the full range of demographics and access and functional needs. For example, basic population demographics can be obtained from the United States census website, with more detailed information from local or regional planning organizations.

To assist planners in determining the number of people that may need to be evacuated during an emergency, Step 2 of the Guide includes several specific tools and templates that can be used to estimate the number of self-

evacuees and evacuees in support facilities and in the broader community that may require specialized transportation resources, support, equipment, and attendants as well as individuals with other access and functional needs, such as those requiring specialized communication, supervision, mobility, and transportation resources and personnel.

Institutional Facilities

Institutional care facilities, including hospitals, public schools and nursing homes, are required to have individual emergency plans. Prisons and universities are not required by law to plan for mass evacuations, although some have plans.

Evacuation planners should contact all institutional facilities to determine what their plans are, and consider how these may affect a larger evacuation in the area of those institutions.

As emergency managers and transportation coordinators are reviewing plans with nursing homes, hospitals, senior care centers, and other institutions, it is also important to be on the alert for overlapping "calls" on a single or limited resource. For example, multiple nursing homes and hospitals may have written agreements for support from a single ambulance service; in a large-scale event affecting multiple hospitals and nursing homes at the same time that resource may be overwhelmed, and it may require additional time to call in resources from out of the region or out of the state. Some states, particularly those with nuclear power plants, have stored "kits" that can quickly convert school buses to transport stretchers. Similarly, some jurisdictions expect that the local transit authority will be able to transport their residents in case of emergency, not realizing that in a major emergency the calls for transit services are likely to vastly exceed the availability. Tool 2.3, Institutional Facilities, provides templates for gathering and summarizing key information on many different types of institutions in any given community or region. (This set of templates is also intended to be used to coordinate with reciprocal receiving jurisdictions.) Note that many of these responsibilities are typically delegated to support functions such as Public Health and Medical Assistance, Law Enforcement, and others. In the planning and coordination, transportation managers can provide valuable insights into logistics, likely roadway congestion, and other factors that may impact their planning and the types of data they gather and share.

Tourists

In areas where tourism is a large industry, evacuations can present special problems. Tourists may not be able to leave the same way they came in, as air or rail transportation may be suspended. Some may not have good language skills. In some cases, tourist areas have some available transportation (shuttles, cruise vessels, sightseeing vehicles), which can be mustered for evacuation support. Good evacuation planning will involve working with the tourist industry to determine effective courses of action in the event of an evacuation being necessary. For events with advance notice, tourists are often encouraged to be among the first to evacuate a region, by air, personal auto, or other means, both for their own safety and to reduce the burden on local resources including first responders. Tool 2.2, Estimated Number of Evacuees, includes categories for estimating various population groups including tourists. Tool 4.1, the Real Time Evacuation Planning Model, includes the capability of adding in estimated seasonal populations to assist in planning for potential clearance times.

Business, Government and Industry

In some areas, employers have large campuses, some even with 24-hour operations. Evacuating a large industrial, government or military complex will have complicating factors, including limited access, high numbers of personal vehicles outside of large urban areas, and the need for employees to go home to evacuate their families with them, creating, in effect, a smaller scale evacuation within the context of a larger evacuation.

There is a need for the business community to participate in the planning process to ensure that all community stakeholders are involved. Planning for teleworking or liberal leave policies for foreseen events can address some of these concerns, as can ensuring that any location with a large number of people in it at a given time is responsible through statutory means for preparing an evacuation/shelter-in-place plan for everyone in the location.

Functional Needs Support

The National Response Framework uses the terminology "functional needs" to refer to support for persons who may have additional needs during emergency operations. FEMA provides guidance for functional needs planning for emergencies through its Office of Disability Integration and representatives of that office in each FEMA region, as well as in many of its publications, with examples shown below;

- Guidance on Planning for Integration of Functional Needs Support Services in General Population Shelters
- Comprehensive Preparedness Guide 101 Version 2
- Preparedness Resources for Individuals
- Preparedness Resources for Communities
- Tools for Communicating With All Audiences, Including People with Disabilities

All FEMA publications are available in portable document format (PDF) on the FEMA website.

TCRP Report 150, Communication with Vulnerable Populations - A Transportation and Emergency Management Toolkit, also provides practical guidance for building an outreach network.

The evacuation planning process will begin with identification of persons needing additional assistance in the planning area. Starting with community and advocacy groups in the area can assist in defining the scope and numbers of people needing additional assistance. Moreover, some of these groups have some resources for transportation, and may be able to support and assist in evacuation. Bringing them to the table for planning is strategically effective.

The types of functional needs include people who have or are:

- Mobility impairments
- Medically fragile
- Need for supervision, including children as well as individuals with developmental and cognitive impairments
- Communication and language barriers
- Carless/poverty

Some states and communities, including communities in New Jersey, Florida, Louisiana and Texas, have established registries for those who need additional support during emergencies. It bears noting, however, that

any such registry is voluntary, and not all those with needs will want to or know how to register. While they may provide an additional resource, planning organizations should not rely on a registry to represent the totality of individuals who may have additional functional needs.

Ensuring that all groups are represented throughout the evacuation planning process will be crucial to planning for all who will need to relocate. This "whole-community" planning process will ensure that the most vulnerable citizens are provided for throughout the process. The Guide includes multiple templates to establish databases for various institutional facilities such as hospitals, schools, and correctional facilities (Step 2, Tool 2.3) as well as for groups and agencies that work with people with access and functional needs that are not in institutions (Step 2, Tool 2.4). These templates are intended for use in planning for potential source jurisdictions as well as receiving jurisdictions. The Guide also includes lists of potential community partners (Step 1, Tool 1.4). References and tips to guides for building collaborative partnerships (such as the TCRP Report 150, Communication with Vulnerable Populations - A Transportation and Emergency Management Toolkit) are also provided.

Livestock and Other Animals

Although not technically a demographic issue, the topic of animals is included here since any discussion of evacuation of people necessarily affect any domesticated or controlled animal in human care.

First and foremost, many pet owners will not evacuate without their pets. Planning for mass transportation of evacuees both prior to and after an event should accommodate pet transport wherever feasible.

In addition, animals provide a livelihood in many areas of the country. Mass livestock evacuations may not always be feasible, but have been attempted in a number of events, including hurricanes and wildfires. The primary planning dictate should be establishing areas where livestock can be sheltered rather than transport of the livestock. Auction houses, fairgrounds, and other large areas can be adapted to help shelter livestock in evacuations. Large herds of cattle and horses are most often moved over ground or in large specialized vehicles. In states where large herds of animals are common, such as Texas and Colorado, planners should coordinate in advance with ranching associations, which play a crucial role in networking throughout the region to find assistance, transportation and sheltering for livestock. Departments of Agriculture typically provide guidelines and assistance in emergency preparedness regarding livestock.

Animal shelters and hospitals should be asked to provide evacuation planning for their facilities, and to share any such plans with local authorities to ensure the safety of both pets and people. The same should be required of zoos and research facilities, especially since animals in both types of facilities can be dangerous to humans if they are not controlled appropriately. The USDA provides guidance on preparedness for animal research facilities and zoos. Step 2, Tool 2.5 LA addresses Livestock and Other Animals, including an on-line tool for estimating the numbers of pets and companion animals in a given jurisdiction or region. Another source for this data can come from rabies vaccination records.

Spatial Components and Parameters

A crucial element of risk planning is the time element, such as the amount of advanced planning available. To maintain consistency with the CPG 101 framework, the temporal aspects of a hazard are discussed in this report in Step 4, Task 4.1, Establish the Timeline. Like the temporal characteristics, spatial aspects of hazards, such as their direction and speed of movement, geographic extent of threatening conditions, and geographic extent and intensity and type of damage to physical infrastructure, directly impact the areas that need to be evacuated, the urgency with which the evacuation must be carried out, the duration of the evacuation (hours/ days/ weeks/

months) and the complexities of recovery and reentry. While not always directly related, the size of a hazard often influences the required travel distance to safe shelter. Evacuations can range from the size of a building or city block to regions encompassing thousands of square miles. From a transportation perspective spatial components such as the distribution and density of the threatened population, the arrangement of all modes of the transportation network, including intermodal connections, and the location of potential bottlenecks need to be taken into account.

Population Density

While it is much more time-consuming to evacuate a densely populated area due to the number of people affected, the time factor is mitigated by the fact that most densely populated areas have readily available mass transit systems. In addition, pedestrian evacuation may be feasible, and potentially the only viable means for evacuating a dense region in a limited time. These options will both be extremely important when the densely populated area has infrastructure limitations, such as limited bridges and tunnels in and out of the urbanized area.

Areas of lower density have fewer people to evacuate, but fewer options for mass transit, and larger areas to cover per each individual needing to evacuate.

The planning process should take all of these density factors into consideration.

Step 2, Part 3: Bringing Meaning and Organization to the Risks and Hazards to the Region's Population Groups

Once the data is assembled on the hazards and risks, and the people potentially affected by the hazards and risks, planners can organize the data into a matrix that will be usable to the planning team. The threats and hazards can be organized by frequency of occurrence or magnitude of the event. They may be grouped by intensity or severity of the event. Planners could decide to organize by the size of an area the event may impact or the duration the event may last. Or planners may decide to organize the data by the number of fatalities the event is likely to cause. Planners must decide how best to organize the data for their own jurisdiction and how each would impact the community they are developing the EOP for.

Risk assessment is the basis for the EOP development. Planning teams must decide what threat or hazard should be planned for and what resources may be needed if the event were to occur. During the analysis inventories are created and evaluated. Loss estimates are also provided on assets deemed critical during the response and recovery phases of an incident. FEMA's Hazards U.S. Multi-Hazard model (HAZUS-MH) is a nationally used and standardized methodology and software program that estimates potential losses from earthquakes, floods, and hurricane winds. Communities that already have a FEMA approved multi-hazard mitigation may use them as reference documents in the hazard analysis.

During the risk assessment emergency planners need to begin to evaluate the quantity and types of resources that may be needed during an event (these are more fully developed in Step 4). For example unaccompanied minors will need special resources from social services or faith–based organizations to ensure their safety. A community with large numbers of disabled individuals will need special assistance in evacuations. They may also need special facilities for sheltering during some events. These issues need to be addressed by the planning team in the EOP development process. CPG 101 and the Guide recommend at least one comprehensive workshop to work through many of these issues.

Step 3 – Determine Goals and Objectives

The outcome of the analysis process will assist planners in determining goals and objectives. For each threat or hazard, the planning team will now work through how the incident will develop, through the warnings issued, to the impact on the jurisdiction, to the consequences of the event. The planning team should focus on the incidents that will have the worst-case impact on the jurisdiction, to those that are most likely to occur, or to incidents that involve a variety of risks associated with it. The planning team will be looking for the requirements the threat or hazard will generate and the response to it, plus the restraints/constraints that may be involved with it.

Requirements may be caused by the event. This could be warning the population or activating additional law enforcement. Response requirements are caused by taking actions for the event, such as the positioning law enforcement at critical intersections during an evacuation to keep traffic moving. Restraints are things that must not be done. There may be laws prohibiting something, or resource limitations. For example, a jurisdiction may only be able to shelter so many people due to limited space. Constraints are things that must be done. For example, you must evacuate low lying home in the direct path of an approaching hurricane. Once the planning team identifies the requirements, they will restate them as priorities and they will reaffirm them with the senior official on the team.

Goals

Goals are broad, general statements that indicate the intended solutions to the problems identified as threats or hazards that the planning team established in Step 2. They are what personnel and resources are supposed to achieve. They will be used to gauge when the response is achieved and the operation is deemed successful. For example a jurisdictions goal in fire events may be to minimize the loss of life by evacuating the maximum amount of people possible from the immediate hazard area as quickly as possible. The desired result would be to move the maximum amount of people out of the fire area to safety.

Objectives

Objectives are more specific and identifiable. They lead to achieving response goals and determine the actions that participants in the event must accomplish. Objectives then refer to activities that must take place, procedures to do so, or procedures by specific organizations. Using the fire evacuation from the above goal, some objectives may be:

- Prevent people from entering the evacuation area and becoming an additional burden to the road system.
- Properly plan evacuation routes to provide for the best balance of flow, and eliminate or minimize gridlock.
- Maximize use of roadways early in event, to reduce traffic load later in event (when smoke and panic will hamper evacuation efforts).
- Provide proper guidance to motorists, through the use of uniformed officers, public works and/or mutual aid employees along with appropriate signage.
- Insure timely response by pre-staging necessary resources, such as changeable message boards, signs, uniformed officers, tow trucks and public works/mutual aid personnel.

As each objective is accomplished resources supporting that objective can then be shifted to other goals or objectives.

Evacuee Types: Self Evacuees and Assisted Evacuees

Generally speaking, there are two broad types of evacuees: self-evacuees and assisted evacuees. The demographics developed in Step 2 will help to develop more specific goals and objectives for self-evacuees and assisted evacuees, as well as begin to think through the nuances of transportation coordination for the range of assisted evacuees. Self-evacuees generally encompass all evacuees with the ability to evacuate themselves using personal transportation or by sharing a vehicle with a friend, relative, or other acquaintance.

Non-self-evacuators, as shown graphically in Table 1, generally belong to one of two broad categories. The first are non-self-evacuators who can walk or otherwise move themselves to some form of assisted evacuation vehicle; bus, aircraft, ferry, etc. The second are functionally and or medically disabled non-self-evacuators who may require special care provisions either before, during, and/or after the evacuation travel process. Often, these groups include hospital patients, frail elderly, and other mentally and physically disabled populations.

Table 1. Basic Framework for Defining Transportation Needs for Evacuation

Evacuee Group	Access to Personal Transportation	Utilization of Public Transit Buses and other Public Modes	Utilization of Private or other forms of provided transportation
Self-evacuators	Yes	No	No
Assisted evacuees: Primary need- public transportation	No	Yes	No
Assisted evacuees requiring specialized assistance as well as transportation	No	No	Yes

Source: Adapted from Table 3, Evacuee Mode Choice, NCHRP Synthesis 392, Transportation's Role in Emergency Evacuation and Reentry, p. 33

Tool 3.2 in the Guide, Transportation Coordination Spectrum of Considerations for Access and Functional Needs Populations, provides a more nuanced version of this table, summarizing the levels of independence, the types of access and functional needs and the corresponding sheltering and transportation mode options, as well as when case management through the Public Health and Medical Support Function is likely to come into play.

Self-evacuees will make their own decisions about when to evacuate and will do so utilizing their own transportation. These people, both permanent residents and visitors, are able to evacuate on their own and make their decision to do so on the level of risk they perceive from the event. While this group may be able to self-evacuate, they could also be transporting individuals with access and functional needs. These could include: elderly, sight/hearing impaired, have limited ability to speak English, or may require the use of a wheelchair. For these evacuees the planning process should be focused on coordinating and assisting the evacuees to get them to places of safety. Evacuation routes should be clearly marked to assist these evacuees. Additional resources that could assist these self-evacuees (such as signage, fuel stops, and rest areas) should be in place or easily assembled before the population begins making their movement away from danger. Self-evacuation should be encouraged and therefore the plans developed should reflect this.

Planning for evacuation by personal vehicle is important, including traffic flow, timing and highway capacity considerations, as the majority of evacuees are typically self-evacuees. Tool 3.4 in the Guide includes various strategies that can be employed to facilitate the movements of self-evacuees, including contraflow lanes, selective closure of access roads and ramps to increase capacity, coordinated signal timing, incident teams and tow trucks strategically staged to quickly clear incidents, clear public information to reduce the volume of shadow evacuations, and other approaches. The Real Time Evacuation Planning Model (RTEPM) (Tool 4.1.1 in the Guide) and many other locally-developed models help planners to estimate clearance times for self-evacuees under varying situations and traffic conditions. The examples of resources in Tool 4.2.1 in the Guide include many types of equipment, intelligence, personnel and other resources that can be deployed to help traffic move more smoothly. Likewise, the FEMA public works resource typing templates identified in Tool 4.2.2 and the resource templates for Transportation Resources identified in Tool 4.2.3 are largely, but not exclusively, directed to helping self-evacuees reach their intended destinations. These include major evacuation routes, selected food/ vendors along major evacuation routes, variable message signs, and various public works vehicles and equipment. It should be noted that in many cases assisted evacuees may be relying on the same roadway resources for evacuation, so making effective use of highway infrastructure and other available modes, and limiting congestion as much as possible is important for everyone's safety.

Assisted Evacuees

Areas that have high numbers of carless households, including large urban areas (e.g., the 2011 evacuation of lower Manhattan in preparation for Hurricane Irene) and socio-economically disadvantaged areas will require more planning to accommodate those without personal transportation.

There are also people with additional access and functional needs in an emergency that must be considered in evacuations. All of these special areas of transportation require additional and more complex planning. Those with medical needs also have requirements for specialized care during transport as well as specialized vehicles. As noted above, Tool 3.2 in the Guide can assist in categorizing and therefore coordinating the transition between public mass transportation and medical needs transportation. In addition, the proposed database inventories for evacuees and assisted evacuees (in Step 2 of the Guide) include placeholders for identifying the range of transportation needs of residents and clients.

Tool 3.3 provided as part of the Guide lists potential available transportation options for those without cars, or in the case of evacuation after an event where the use of vehicles is limited or impossible, options for the use of other transportation modes, including bus, train, paratransit (special-needs) vehicles, ambulettes, air and water transportation.

Medical Transportation and Case Management

Medical triage and mass care must be established at collection points for medically fragile evacuees. Tracking and keeping people together with their medical records, their durable medical equipment, medicines, service animals, and caregivers is extremely important. Some nursing homes have begun issuing vests to their patients with essential items; some store critical medical records on flash drives that are secured with the patient's belongings. Some issue bar code "bracelets" for tracking purposes, while others (more low-tech) write essential information on a bracelet. This is primarily the responsibility of ESF 8, Public Health and Medical Services, as discussed in the Guide in Tool 1.3. It is also addressed in the Guide in the Plan Outline and Checklists in Step 5, Tools 5.1 and 5.2.

Sheltering-in-Place as a Protective Action for Some Populations

Sheltering-in-place rather than evacuating may be a preferred option for some populations, such as the medically fragile, or for persons in detention, but only if the facility is suitably hardened against hurricane or other threats such as flooding. There is some risk in evacuation, and it is important to understand that some loss of life may occur due to the stress and trauma of evacuation, especially for the medically fragile. If a building is not safe, it may be advisable to transfer to another facility that is close by and safer, rather than attempt a much longer and more stressful journey. Of course, sheltering-in-place is the only option for some individuals in certain types of events (such as some types of chemical spills), and sheltering-in-place (or "staying put") is the recommended alternative for those not in harm's way, in order to avoid shadow evacuations and unnecessary roadway congestion.

Potential Roles for Jurisdictions in a Region or Megaregion in an Evacuation

Evacuating Jurisdiction

For most individuals, the decision to evacuate is based on the perceived risk. For emergency management officials the decision to recommend an evacuation order be issued is based on established plans and past occurrences. CPG 101 provides guidance for developing emergency operations plans. It promotes a common understanding of the fundamentals of risk-informed planning and decision making to help planners examine a hazard or threat and produce integrated, coordinated, and synchronized plans.[7] In most situations the emergency manager(s) in the evacuating region or jurisdiction(s) will determine the area at risk and the population contained in that area, in consultation with elected officials and emergency operations partners such as law enforcement and transportation. These partners can provide informed opinions as to likely impacts (such as traffic congestion) and potential mitigation strategies (such as phased evacuation and operational and information interventions. Coordinated planning will greatly increase the success in evacuating the at-risk area. The Steps, Tools, and Resources in the Transportation Guide are designed to help transportation, emergency management and other partners identified and established through the planning process identify, locate and communicate with the diverse populations in any given community. Highlights follow:

Step 1: Form a Collaborative Planning Team -all the text and tools

Step 2: Understand the Situation

Task 2.2 Gather contacts and data on people and animals that may need evacuation

Task 2.3 Plan and convene a regional workshop, building on the information and contacts developed in Tasks 1 and 2

Step 2 Tools

Tool 2.2 EE – Estimated Number of Evacuees

Tool 2.3 IF – Institutional Facilities

Tool 2.4 AE – Assisted Evacuees (Non-Institutional)

Tool 2.5 LA- Livestock and Other Animals

Tool 2.6 Evacuation Needs Discussion Guide

Resource: Evacuation Workshop Planning 101 "Workshop in a Box"

Step 3: Determine Goals and Objectives

Tool 3.1 Evacuation Operational Priorities and Goals and Objectives Discussion Guide

Tool 3.2 Transportation Coordination Spectrum of Considerations for Access and Functional Needs Populations

Tool 3.4 Transportation Operations Coordination Checklists

Step 4: Plan Development

Figure 4.1. FEMA Capability Activity Process Flow for Citizen Evacuation and Shelter in Place

Figure 4.2. Evacuation Flowchart Related to Resource Databases

Figure 4.3. Detailed Evacuation Flowchart with Processes

Tip, Step 4: Oak Ridge Evacuation Modeling System (OREMS)

Tool 4.1.1 Real Time Evacuation Planning Model

Tool 4.1.2 Public Assisted Evacuation Plan Timeline

Step 5: Plan Preparation, Review and Approval

Tool 5.2 Multi-jurisdiction Multimodal Evacuation Planning Checklists

FEMA has developed extensive resources to support planning, response, recovery and mitigation, including evacuation planning. The Target Capabilities List (TCL) provides detailed checklists and guidance for many different emergency response requirements, including citizen evacuation and shelter-in-place capability. The flowchart for the TCL for citizen evacuation and shelter-in-place is included in the Guide as Figure 4.1 under Step 4, Plan Development. The entire TCL section on evacuation and shelter-in-place is included in the Guide as Appendix A. The capabilities relate to the four homeland security mission areas: Prevent, Protect, Respond, and Recover. The TCL defines and provides the basis for assessing preparedness. It also establishes national guidance for preparing the nation for major all-hazards events, such as those defined by the National Planning Scenarios.[8] FEMA is currently evolving the TCL into Core Capabilities. The crosswalk between the TCL and Core Capabilities can be found on the FEMA website at http://www.fema.gov/pdf/prepared/crosswalk.pdf.

Evacuation planning is fairly straightforward and systematic, but requires planning and coordination among many agencies and community partners. The TCL diagram summarizes the operational response phase to an evacuation; however, the development of the contacts and resources must occur well in advance of the emergency.

Receiving Jurisdiction

Depending on the type of evacuation, a jurisdiction may not be able to accommodate evacuees and people may have to go outside the area to avoid exposure to the danger. The destination could be as close as to a neighboring community or state, or several states away. The evacuees could show up on their own using their own transportation (self-evacuees) or could be brought to the host destinations (transportation assisted evacuees). The receiving jurisdictions may have to prepare to receive persons with access and functional needs, medical needs, people who may not be proficient in English, and other challenges. Depending on the magnitude of the evacuation event, receiving jurisdictions could be faced with varying timeframes that the evacuees may need shelter. Long-term events are characterized by evacuees requiring sheltering for more than six months. Intermediate events require up to six months and short term events may be a few days to a few weeks.

Receiving jurisdictions would be well served to follow the FEMA Evacuee Support Planning Guide. The publication includes strategies, planning tools, templates, best practices, and other assistance receiving jurisdictions can utilize to assist in preparing to host evacuees.[9]

The Transportation Guide for All-Hazards Evacuation includes tools designed to assist transportation, emergency management, medical assistance, law enforcement, mass care and agriculture and livestock in coordinating in advance with a receiving jurisdiction. In particular, the templates for Institutional Facilities (Tool 2.3), Non-Institutional Assisted Evacuees (Tool 2.4), and Livestock and Other Animals (Tool 2.5) should be completed and coordinated between potential source and potential receiving jurisdictions to identify best matches. Tool 4.2.5, Public Shelters Transportation Reference is specifically focused on potential receiving jurisdictions. Shelters are addressed among the Resources identified in Step 4.

Pass-Through Jurisdiction

As evacuees make their way to their choice of destinations, pass-through jurisdictions can serve as oases for evacuees as they make their way. Evacuees may stop seeking food or fuel but may also obtain information regarding their choice of destinations. The pass through jurisdictions may set up variable message boards advising evacuees about shelters, road delays, and other information for motorists as they make their way along the routes. Traffic management should also be in place as evacuees may not be familiar with the pass through location and may require additional assistance. The pass through jurisdiction is tasked with coordination to help move the evacuees along.

In Louisiana, recognition of the critical nature of intermediate pass-through locations between evacuation origin and destination points during major regional evacuations has resulted in the use of strategic measures to reduce the levels of local traffic through these areas. For example, during evacuations of the New Orleans region of southeast Louisiana, the State of Louisiana implements wide closures of major public-sector traffic generators in Baton Rouge, the state capital. The includes many state offices, Louisiana State University, as well as other public-sector employers that do not have any critical or direct need during the emergency. Along with being a major pass-through jurisdiction, Baton Rouge is also often the single largest host area for evacuees during evacuations of New Orleans.

Supporting Jurisdiction

The supporting jurisdictions do not necessarily interact directly with evacuees. Their role and function is to support the evacuating, receiving, and pass through jurisdictions. This may be in the form of resource supplying in staffing, equipment or both. For example, if a local city is in the path of a flood and must evacuate, a neighboring city, not directly in the path of the flood, may send resources (cots, food, etc.) to the shelters in the receiving cities to assist the evacuees when they arrive.

While a jurisdiction may serve a single specific role in an evacuation, it may also serve multiple roles; for example a pass through jurisdiction may also supply staff to shelters in a receiving location.

Step 4 – Plan Development

This step takes the goals and objectives from Step 3 and develops, compares, and selects possible solutions that will be used to achieve them. The three major tasks in Step 4 are 1) Develop and analyze courses of action and decision points (including the time line); 2) identify resources; and 3) identify information and intelligence needs. Exhibit 4.1 (revised somewhat from Figure 4.2 in the Guide) shows how the databases of the population

groups from Step 2 in the Guide match up with the Resource templates from Step 4 of the Guide across the timeframe steps for evacuation.

Planning Strategies

FEMA describes three approaches to emergency planning, which can be used singly or in combination. These approaches are well-suited to the evacuation planning process, and are highly recommended for use in development of evacuation plans. It is unrealistic to think that any one approach will result in an optimal evacuation plan. It is strongly recommended that all three methods be used during the planning process, and for some tasks, combining methods will be most useful, especial in combining function and capabilities.

Scenario-based planning: This approach starts with building a scenario for a hazard or threat. Planners then analyze the impact of the scenario to determine appropriate courses of action. The most effective use for scenario-based planning is to develop planning assumptions for hazard- or threat-specific annexes to a basic plan. At least two possible solutions should be developed for each. The development of only one may result in inadequate response and lead to high costs to life and property.

Function-based planning (functional planning): This approach identifies the common functions that jurisdictions must perform during emergencies. Function-based planning defines the function to be performed and some combination of government agencies and departments responsible for its performance as a course of action.

Capabilities-based planning: This approach focuses on a jurisdiction's capacity to take a course of action. Capabilities-based planning considers the array and interaction of training, organization, plans, people, leadership and management, equipment, and facilities to perform a required emergency evacuation.

Planning Considerations

Planners should take each incident and then begin to develop how it will unfold. First, planners should develop the timeline placing decision points where necessary. The decision points will serve as indicators when responses occur and where varying responders enter the event. Next the planners will place the scenario on the timeline. Any subsequent scenarios should be placed along the line also. As the incident unfolds, additional decision points should be added to the timeline. Next planners will need to identify and place operational tasks on the timeline. Planners can use the following list to help identify operational tasks.

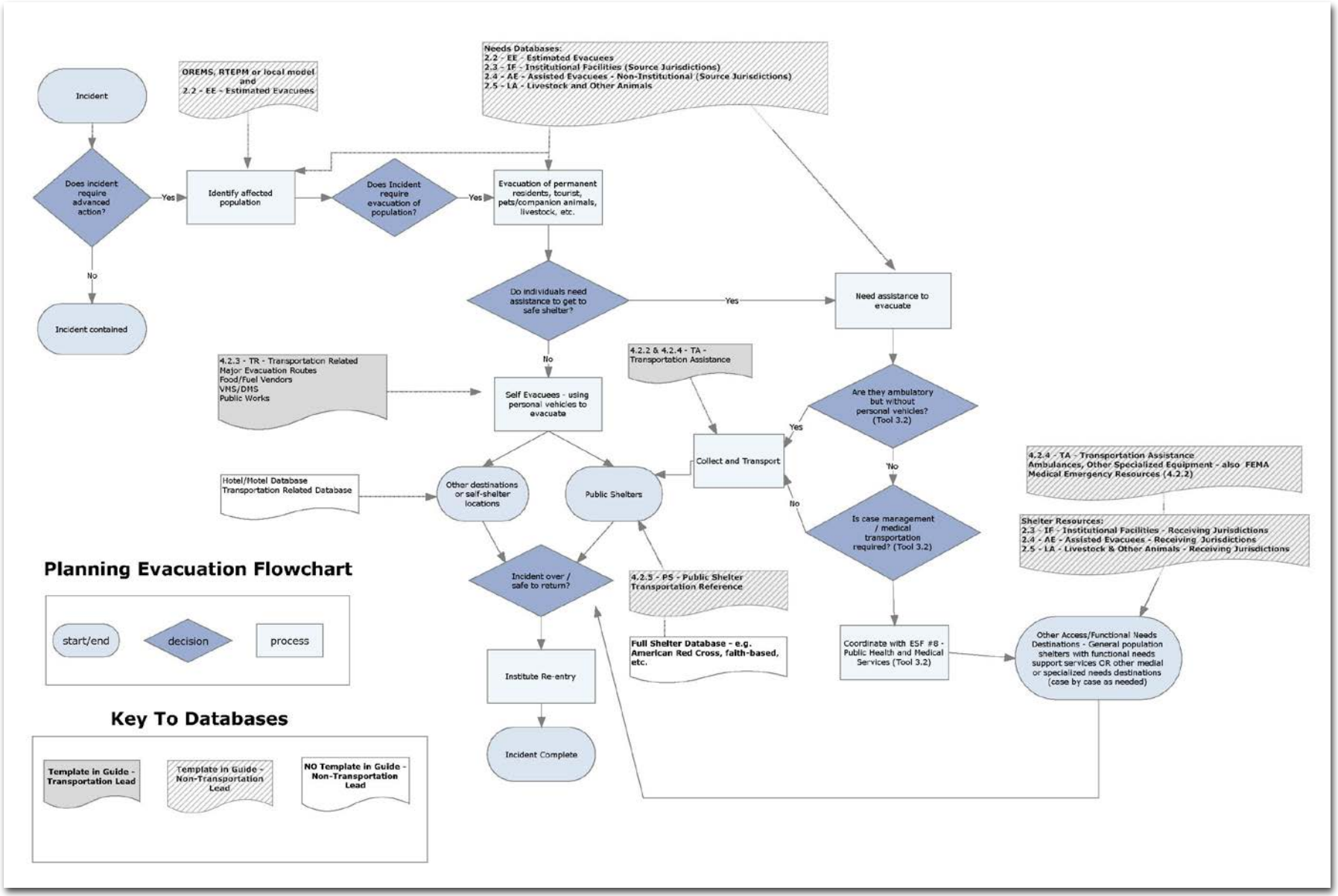


Figure 4.1 Evacuation Flowchart and Corresponding Information Databases

- What is the action?
- Who is responsible for the action?
- When should the action take place?
- How long should the action take and how much time is actually available?
- What has to happen before?
- What happens after?
- What resources does the person/entity need to perform the action?

Once the above has been completed, planners can decide the course of action. This is accomplished by comparing costs and benefits against the goals and objectives. While it is not necessary to identify every course of action, the best possible should be identified and presented to senior officials for approval. The NCHRP Report 525 Volume 15 Costing Asset Protection: An All Hazards Guide for Transportation Agencies (CAPTA) Tool may be useful for this analysis.

When developing the course of action, planners need to periodically stop and "test" to see if the action is making progress towards the end of the event. They will want to see if new goals and objectives have been created. They need to watch for tasks that may not have been completed. The failure of one task could cause the operation to fail. They will want to check for gaps and omissions. The team needs to check for inconsistencies in organizational relationships such as if they are supporting another jurisdiction, would their event conflict.

Task 4.1 Develop and Analyze Courses of Action

Threat – Evacuation in the Context of Space and Time

One way of viewing the threat-evacuation relationship is within the context of space and time. The duration and size of various temporal and spatial parameters associated with the hazard, in particular speed of onset, the duration of the event itself and the anticipated recovery time for time and the geographic location and spread of the event for space, influences most, if not all, of the key considerations for the evacuation plan including:

- the size of the evacuation zone,
- the definition of areas or zones where sheltering-in-place should be encouraged,
- the number of evacuees that will be required to move,
- the demographic and behavioral characteristics of the evacuees,
- the distance they must travel to safe destinations,
- the urgency with which they must flee,

- the resources available to aid in evacuation (including multiple transportation modes, law enforcement, destination shelters and support services along the way)
- the amount of time that it takes to clear the protective action zone, and
- the logistics and complexities of reentry

While some of the key considerations for evacuation planning are based on the characteristics of the hazard, including its level of danger, speed of movement, and the extent of it deleterious effects, many are also based on the robustness of the transportation network and resources and perhaps most critically, the response behavior of the evacuees themselves.

Framing the components of the evacuation process in both time and geography or space (temporospatially) is helpful from two perspectives. First, it is helpful to segment the often enormously complicated evacuation process into many smaller easier to model, track, and adjust components. Second, from a modeling and decision-making point-of-view, it permits each of the key components of the process to be represented quantitatively, as equations or as a distribution of continuous data.

Temporal Components and Parameters

Consistent with the CPG 101 framework for planning, as noted above, the timeline elements of the evacuation plan in the Guide are primarily addressed in Step 4, Plan Development, Task 4.1 Develop and Analyze Courses of Action, Task 4.1.1, Establish the Timeline.

Of the temporal evacuation variables, among the most critical is the amount of advanced notice available prior to the onset of hazardous conditions. Advanced warning time dictates the amount of notice that evacuees receive which, in turn, impacts the amount of pre-evacuation mobilization activities they can undertake. It also dictates the amount of notice that response agencies have to implement control and management measures like contraflow, road closures, and emergency signal timing plans as well as the time to activate assisted evacuation plans like evacuation bus services, assisted evacuation services such as paratransit for people with access and functional needs, and medical and secure evacuations for institutional populations such as hospitals, nursing homes and correctional facilities. It also greatly impacts the amount of pre-evacuation mobilization time during which populations under threat can determine the activities they can undertake. These often include activities like picking up children from school, closing homes and businesses, gathering materials and supplies, and so on. Finally, advanced warning time affects the ability to issue evacuation orders because they must be communicated through various official and unofficial networks including media and direct social links (friends, family, co-workers, neighborhoods, etc.). Effective communications through multiple modes and media are especially critical for persons whose access and functional needs relate to communications, such as deaf or hard of hearing, blind, or those with little or no ability to speak, read or understand English, as well as for non-resident transient populations who may be within the evacuation zone for work, shopping, visiting friends or family, or as tourists.

Amount of Advanced Notice

There are two distinct evacuation plans: notice and no-notice. While both can be significantly catastrophic, and while both can be planned for in advance, to some degree, notice events allow jurisdictions some lead time, permitting emergency management agencies and their transportation, law enforcement and fire and safety service partners to determine alternate shelter-in-place and evacuation strategies based upon the expected impacts of the disaster. Examples of notice disasters include hurricanes, floods and sometimes, wild fires. (See Tool 2.1, Preliminary Risk Assessment and Table 3.2, National Planning Scenarios in the Guide for more examples of notice and no-notice events.)

A no-notice, potentially catastrophic, incident requiring community-wide evacuations has unique dimensions or characteristics that require response strategies to be flexible enough to effectively address emerging needs and requirements. These include regional impacts on the health and welfare of bordering community populations, transit systems, law enforcement coordination, and other areas. No notice incidents may include multiple events that occur simultaneously or sequentially in contiguous and/or noncontiguous communities. Such an incident will diminish the availability of mutual aid resources. Some incidents, such as a biological attack, may be dispersed over a large geographic area resulting in the lack of a defined incident site.

If the incident is the result of terrorism, the Homeland Security Advisory System (HSAS) level likely may be raised regionally, and perhaps nationally. Elevation of the HSAS level carries additional local, State, and Federal security enhancements that may affect the availability of certain response resources such as law enforcement, access to roadways or facilities, and communications.

A CBRNE (chemical, biological, radiological, or nuclear) incident will require prompt and effective emergency response and short-term recovery measures. Transportation infrastructure may be impacted and local transportation services may be disrupted. Additionally an interruption of commercial communications service would serve to further impair emergency response agencies ability to communicate.

Homes, public buildings and other critical facilities and equipment may be severely damaged or destroyed. Debris may make streets and highways impassable, seriously impeding the movement of emergency supplies and resources. Public utilities may be damaged and either partially or fully inoperable. Many county and municipal emergency personnel may be victims of the emergency, preventing them from performing their assigned emergency duties.

Thousands of residents may be forced from their homes and large numbers of tourists may have to be evacuated which will complicate the response. A large number of injured and dead people could be expected, and many people could be in life-threatening situations requiring immediate rescue and medical care. Hospitals, nursing homes, pharmacies and other health/medical facilities could be severely damaged or destroyed, and those that do remain in operation may be overwhelmed by the number of victims requiring medical attention.

The Catastrophic Incident Annex to the National Response Framework (NRF-CIA) establishes the context and overarching strategy for implementing and coordinating an accelerated, proactive national response to a catastrophic incident. The NRF-CIA is primarily designed to address no-notice or short-notice incidents of catastrophic magnitude, where the need for federal assistance is obvious and immediate, where anticipatory planning and resource pre-positioning were precluded, and where the exact nature of needed resources and assets is not known.[x]

A catastrophic incident will have unique dimensions/characteristics that will require response plans/strategies to be flexible. The event may come with little or no warning and could be underway before authorities even know it is occurring. The event may impact multiple jurisdictions simultaneously. The catastrophic incident very likely will severely challenge the ability and capacity of local and state governments and individual communities to achieve a timely recovery. Additionally the event will likely cause large-scale evacuation orders be issued and carried out. The involvement of both state and Federal Departments of Transportation (as well as Law Enforcement, Fire and Rescue and other partners) will be required to ensure all impacted persons are removed from harm's way. The Secretary of Homeland Security will immediately implement the NRF-CIA in the event of a catastrophic incident. The DOT will be charged with transportation direction and control.

Whether an event has notice or no notice, the advance planning and coordination of transportation and related resources described in the associated Guide will help communities and regions prepare for the worst and prepare "for real," as FEMA Administrator Fugate emphasizes; this will also help prepare for smaller scale regional events and evacuations.

Task 4.2 Identify and Assess Resources

While the planners are deciding the best course of action they need to almost concurrently be identifying the resources that will be needed to complete the tasks. The primary focus is on completing the task, it does not matter at this point if the resources themselves may or may not be available. Once the team has identified all the requirements, they may then begin to match up resources. This will help to identify resource shortfalls. The planning team can then begin the process of developing lists of private suppliers or other jurisdictions that will be called upon to supplement the gaps. Planners should match resources with other geographical/regional needs so that multiple demands for the same or similar resources can be identified and conflicts resolved. A capability estimate would be recommended at this point.

A capability estimate is an assessment of a jurisdiction's ability to take a course of action. Capability estimates help decide if pursuing a particular course of action is realistic and supportable. It represents the capabilities and resource types needed to complete a course of action. The capability estimates may be written documents, tables or matrices, or oral presentations. The information should be able to answer most questions about whether a jurisdiction has the ability to support a course of action. Planners can use capability estimates for both present and future operational planning.

Among the obvious resources needed for evacuation are origin or collection points, destination points such as shelters, and means of transportation between the two. FEMA has done very well in typing some resources, such as shelters, public works heavy equipment, and medical transport equipment, but for other resources, such as collection points and modes of transportation, the resource typing is less robust.

Collection Points

It is a common practice to set up collection points for those who are transported by common carrier or who are medically fragile, whether from pre-existing conditions or from event-related causes. A collection point is an interim destination point designated for the assembly of personnel, evacuees, resources, etc., for further movement to destination points.

Planning for carless evacuations will also require setting up staging and reception areas for evacuees. This is also discussed in Step 5 in terms of setting up Mutual Aid Agreements between jurisdictions and in working with the private sector. Identification of adequate facilities and infrastructure for staging and reception areas is critical to ensuring the efficient flow of people out of dangerous areas and into safer shelter. Tool 4.2.4.1, Intermodal Facilities or Other Designated Reception/Collection Locations, identifies desirable characteristics for such locations.

Door–to-door collection is the least desirable and least efficient method of collection for evacuees, but in some cases it is required. Prior to events, the medically fragile, those with mobility challenges and other vulnerable populations may require door-to-door collection. As discussed in the Communications section and throughout the Guide, a robust communications network of agencies and community organizations who work with clients and neighbors on a regular basis may also identify resources such as agency vans and other vehicles that can provide support in an emergency. Community organizations that have acquired vehicles through federal funding support are required to be part of a local coordinated network. The national “umbrella” for these networks is “United We Ride.” Although most of these networks may not see emergency planning coordination as part of their core mission, outreach to the group well in advance of an emergency may help to convince them of why it is in their interest. In cases of mandatory evacuations, partnering with local law enforcement, public safety or the National Guard may be desirable since door-to-door operations are often part of the mandatory evacuation process.

For non-medical evacuees, collection points serve the purpose of providing services for evacuees and streamlining evacuation services. Note that evacuees who can function independently with their durable medical equipment (such as a scooter, service animal, or personal assistant) are not medical evacuees, and should be transported along with their assistive device, companion or service animal. For larger scale evacuations, having local buses or other vehicles transport people to intercity bus collection points, train stations, ports or airports for evacuation facilitates

the movement of larger numbers of people in a shorter time. For smaller evacuations, where local shelters are established and are easily accessible by vehicle, having the common carriers pick up at designated points along designated routes or at smaller collection points in neighborhoods where carless populations reside and then deliver the evacuees directly to shelters is a very effective method.

The establishment of collection points, as well as shelters, requires a great deal of coordination with Departments of Transportation, Emergency Management, Emergency Services, Public health agencies and NGO partners that support emergency operations. Planning for the safe, secure, efficient and effective movement of evacuees is the most complex element of the evacuation planning process.

Shelters as Destinations

Public shelters are a refuge for those seeking temporary safety from a disaster or emergency. Shelter planning is a distinct subset of evacuation planning, strongly involving NGO partners, such as the American Red Cross, as well as governmental agencies, including FEMA. FEMA Guidance on Planning for Integration of Functional Needs Support Services in General Population Shelters provides an excellent resource for evaluating and preparing shelters.

Shelters are designed to provide temporary safe accommodations with minimal necessities. Basic necessities include shelter from the elements and danger, relief facilities, and food and water for a short period of time.

Shelters can be designed for additional accommodations. Some will have areas for pets. Coordination with animal services and departments of agriculture will be critical to ensuring that pet-friendly shelters are properly administered.

Some shelters may provide generators for additional power, heat or air conditioning/ventilation and medical care. Again, planning is critical to ensure that the proper types of shelters with appropriate levels of resources and care are ready to receive evacuees as needed. This is especially crucial when an entire jurisdiction is evacuated, and evacuees are using resources in areas outside where they live and pay taxes. Mutual Aid Agreements are a vital part of planning for such large-scale evacuations. Tool 4.2.5 provides a template to address the transportation aspects of shelters. Only a few of these aspects are typically included in a comprehensive shelter database. Shelters are the responsibility of ESF 6, Mass Care, Emergency Assistance, Housing and Human Services. Shelter databases typically focus intensively on the shelter itself, and resources such as space, cooking facilities, showers, restrooms and other amenities. Less attention is paid to access (and feasible alternate access) to the facility, parking capacity and similar features.

PLANNING FOR RESOURCES

FEMA identifies two phases of resource management:

1. Preparedness
2. Incident

Incident resource management occurs during response to the event. However, in order to most effectively deploy resources, they must be identified and analyzed during the planning phase to ensure optimal response.

FEMA's guidance indicates that activity in the planning phase consists of these standardized resource management tasks:

1. Typing
2. Inventorying
3. Organizing
4. Tracking

Resources are defined as personnel, teams, facilities, equipment, and supplies that may be used to meet incident response needs.

Resource Typing

According to FEMA:

> *Resource typing is categorizing, by capability, the resources requested, deployed, and used in incidents. Measurable standards identifying resource capabilities and performance levels serve as the basis for categories. Resource users at all levels use these standards to identify and inventory resources. Resource kinds may be divided into subcategories to define more precisely the capabilities needed to meet specific requirements.*
>
> *Tier 1 Resource Typing Definitions:*
>
> - *Animal Health Emergency*
> - *Emergency Medical Services (EMS)*
> - *Fire and Hazardous Materials*
> - *Incident Management (IM)*
> - *Law Enforcement*
> - *Mass Care*
> - *Medical and Public Health*

- *Pathfinder Task Forces*
- *Public Works (PW)*
- *Search and Rescue (SAR)*

(www.fema.gov, 9-7-11)

These items are further defined on FEMA's website through a series of pdf guides that may be downloaded for use in the planning process.

NIMS requires resource typing. Appendix B of FEMA's NIMS documentation contains definitions, but is not detailed enough for practical use. A much more useful guide called NG 0001, published by the NIMS Integration Center (NIC) gives much more detailed information on resource typing. It is also available for download through the FEMA website. The National Integration Center (NIC) has developed and published over 120 resource typing definitions.

As noted in the Guide and in Tool 4.2.2, FEMA resource typing for Public Works includes one entry for public buses, including capacity (for adult seating), fuel (gasoline, natural gas, diesel or electric), and equipment (four types), but does not include supporting detail on operators, supervisors, maintenance supplies, and other requirements. Greater detail is included on public works items such as message boards and different types of public works trucks. In the category of Medical Emergency Resource Typing (responsibility of ESF#8, Public Health and Medical Services), a variety of "people movement" equipment types are included, along with the personnel required to operate and support them. These include fixed wing and rotary wing aircraft (helicopters), ambulances, and "Multi-Patient Medical Transport Vehicle" that basically describes types of paratransit vehicles.

There is no existing resource typing for other modes to move people such as rail vehicles (commuter rail, Amtrak, subways, light rail), water vehicles such as ferries, non-medical air transport such as commercial airlines, or the connectivity support required between modes, such as intermodal facilities (formal or ad hoc transfer stations, with attendant staffing requirements.) The templates developed for this project attempt to partially fill this gap. The templates include the following:

Tool 4.2.3 TR- Transportation Related Resource Database Templates

4.2.3.1 Major Evacuation Routes

4.2.3.2 Selected Food/ Fuel Vendors Along Major Evacuation Routes

4.2.3.3 Variable Message Sign (VMS) and Dynamic Message Sign (DMS) Inventory (it is anticipated that this will be replaced by the FEMA typing in the Final Guide.)

4.2.3.4 Public Works Equipment and Resources Inventory (it is anticipated that those that are included in the FEMA resource typing will be identified as such in the Final Guide).

Tool 4.2.4 TA – Transportation Assistance

4.2.4.1 Intermodal Facilities Database

4.2.4.2 Mass Transportation Modes Database

4.2.4.3 Vehicle Fleet Information

4.2.4.4 Manager/ Supervisor/ Dispatcher/ Operator Database

In addition, the American Public Transportation Association (APTA) has established working groups that have been working on resource typing on a volunteer basis. Their draft list of resource types are provided below, in Table 2.

APTA EMERGENCY RESPONSE PREPAREDNESS PROGRAM

(**List only the resources you can spare and still maintain your own daily needs**)

RESOURCES INVENTORY FOR: _____

(Organization Name)

VEHICLES	DESCRIPTION
# Buses (please describe) - **size, e.g. 40', 30', etc.** - **accessible (low-floor, lifts, ramps)** - **diesel fuel (posi-lock / non posi-lock)** - **hybrid powered (posi-lock / non posi-lock)** - **CNG powered** - **other fuel / power source (describe)**	
# Paratransit vehicles by fuel type & capacity	
# Supervisory vehicles (by fuel type)	
# Tow trucks (by fuel type & tow/lift capacity	
# Fuel trucks (by fuel type and capacity)	
# Policy/Security vehicles (by fuel type)	

APTA EMERGENCY RESPONSE PREPAREDNESS PROGRAM
(**List only the resources you can spare and still maintain your own daily needs**)

RESOURCES INVENTORY FOR: _____
(Organization Name)

VEHICLES (continued)	**DESCRIPTION**
# Mobile Command Centers (by fuel type)	
# General service maintenance response vehicles (by fuel type)	
# Rail locomotives; commuter rail cars	

APTA EMERGENCY RESPONSE PREPAREDNESS PROGRAM

(**List only the resources you can spare and still maintain your own daily needs**)

RESOURCES INVENTORY FOR: _____

(Organization Name)

SUPPORT EQUIPMENT	DESCRIPTION
# Generators (wheel-borne / non wheel-borne; output capacity)	
# Welding units (wheel-borne / non wheel-borne)	
# Front-end loaders	
# Rail-borne maintenance equipment (grinders, geometry cars, cranes, ballast cars, tie)	
# Other (describe)	

APTA EMERGENCY RESPONSE PREPAREDNESS PROGRAM

(**List only the resources you can spare and still maintain your own daily needs**)

RESOURCES INVENTORY FOR: _____

(Organization Name)

PERSONNEL	DESCRIPTION
# Operators	
# Mechanics (vehicle or facility)	
# Supervisors (operational / mechanical)	
# Managers (operational / mechanical)	
# Police (rank)	
# Security personnel	
# Rail (train operators / supervisors / track & signals maintenance / supervisors)	
# Other (describe)	

APTA EMERGENCY RESPONSE PREPAREDNESS PROGRAM

(**List only the resources you can spare and still maintain your own daily needs**)

RESOURCES INVENTORY FOR: _____

(Organization Name)

COMMUNICATIONS EQUIPMENT	DESCRIPTION
# Satellite / cellular phones	
# Hand-held radios	
# Mobile auxiliary operations centers	
# Other (describe)	

APTA EMERGENCY RESPONSE PREPAREDNESS PROGRAM

(**List only the resources you can spare and still maintain your own daily needs**)

RESOURCES INVENTORY FOR: _____

(Organization Name)

OTHER	DESCRIPTION
Spare parts (type)	
Tires (size/type)	
Supplies (type)	
COMMENTS / REMARKS	

Resource Inventorying

Once resources are typed, they should be inventoried based upon mission requirements, capability of resources, and response time, according to FEMA. FEMA provides a database for use by local and state entities called IRIS (Incident Resource Inventory System) as part of its National Incident Management (NIMS) support function. Guidance in the use of this system is also available at the FEMA website. It is not, however, a national resource ordering database, but a system that can be used by states to maintain inventories of resources for their own and for mutual aid use.

Organizing and Tracking Resources

Once the resources have been inventoried, they must be organized for ease of access by those needing the resources. The planning phase should include a well-considered system for organization and tracking of resources.

Organization might occur by locations, by jurisdiction, by ease of access, by special category (such as vehicles requiring Commercial Driver License certification) or by function (debris removal, information services). The participants in the planning process must define what system will provide the best access and accuracy prior to and during an adverse event. Organizations with experience in resource tracking have developed various ways to monitor actual expenditures for reimbursement. For example, the Chicago Transit Authority will assign a specific tracking number under which all expenses related to a specific event are captured for purposes of providing the necessary documentation needed in case of any disaster declaration.

The next section includes lists of the types of resources that are typically included in the planning process.

Administrative Resources

Emergency Operations Facilities

This area might include emergency operations centers, such as Joint Operations Command Centers or Security Operations Centers (JOCCs or SOCs), so-called war rooms for emergency operations. During a security threat or event, SOCs might include Fusion Centers, created through the Department of Homeland Security to bring together law enforcement, intelligence and public safety for the specific purpose of addressing terrorism concerns.

The emergency operations facility will be the key recipient of information from the field, which is relayed form the Incident Command Post per the NIMS requirement. Support for the Incident Commander, such as resource availability, can be more effectively managed through an emergency operations center.

Traffic Management Centers

Traffic Management Centers (TMCs) are used to coordinate the many aspects of highway and roadway management. Real time information is gathered from many sources such as electronic

sensors in pavement, traffic video cameras, 911 calls, officers on patrol, highway crews, ramp meter sensors, motorist cellular calls, and commercial traffic reports to ensure that traffic conditions can be monitored and response to incidents efficient. For evacuations, these TMCs will be critical monitoring resources to collect and disseminate real-time information about the progress of evacuation activities.

Personnel

The evacuation planning process should establish a core team for evacuation response. This evacuation response team may very well be made up of those staff identified for any emergency response, but in addition, transportation partners who may not participate in all regional emergency activities should be part of the team.

In addition, planning should include the largest foreseen evacuation (usually a regional event) and ensure that adequate staff is identified for all aspects of management of the evacuation. Working with NGO partners and the private sector in addition to the public sector workforce is key to ensuring that sufficient personnel are available to guide the evacuation process.

In addition, ensuring that adequate supplies are on hand for personnel at administrative facilities is an important planning function. These supplies will include cots and blankets, food, water and personal supplies since many personnel facilitating the evacuation will be required to be on duty for long periods of time, and even shelter in place at their posts. Employees required to be on duty should also be instructed in preparing a go-kit, which will ensure that needed medicine and other critical personal effects are ready to transport with them.

For some events, especially hurricanes, some public sector agencies that require personnel to report have also made accommodations for the employees' families to accompany them to the work site and shelter there with the employee. Agencies should consider whether or not this makes sense for their operations.

Administrative Equipment

Equipment will be needed to manage an evacuation, most particular Information Technology (IT) equipment and support. This will include:

- Computers, needed to manage access to software applications for resources, traffic, incident management and other critical functions, including:
    - Email and messaging
    - Global Positioning Satellite information
    - Geographic Information Systems
    - Internet access (media reports, weather)
- Communications equipment to ensure that information is exchanged with field operations. Most modern communications systems are managed through software,

including landlines, radio systems, cellular networks, and paging systems. Planning for loss or damage to these systems is critical. Satellite phones are one option, as are COWs (Cell on Wheels) and CIABs (Cell in a Box), which are portable systems that bypass the common cellular relay system.

Our increasing reliance on technology makes it critical that all computer systems, and any other supporting equipment (printers, televisions, plotters, etc.) that may be needed during an event to ensure effective operations must have continuous power throughout the event, making generators a critical part of all IT systems.

Resource typing and inventorying must include these critical items as part of planning.

Transportation Resources

Transportation resources will vary by region and by the nature of the emergency. There are two concerns in an evacuation event for transportation:

- Moving people out of the affected area to safety
- Moving resources and emergency personnel into the area to be deployed effectively

In order to ensure that both of these activities occur in a reasonable and effective manner, it will be important to ensure that transportation resources are identified, typed according to their utility, and pre-staged and deployed effectively through addressing these issues in planning.

For example, ensuring that roadways are used to maximum effectiveness for the outflow of people from the area may require public works vehicles be moved into the area to be deployed for traffic control, motorist assistance, fueling, etc.

In general, transportation resources can be categorized by the location of their modal operation:

Land Transportation

- Roadways (All wheeled vehicles, including cars, buses, vans, trucks, ambulance, motorcycles, bicycles, scooters, etc.)
- Rail systems (Commuter and intercity, light rail, freight rail)
- Pedestrian modes (walking)

Waterway Transportation

- Ferries
- Cruise and other larger passenger ships
- Naval vessels, including hospital ships
- Commercial shipping

Air Transportation

- Commercial and general aviation aircraft
- Private and business aircraft
- Helicopters
- Military aircraft

These modes of transportation have been evaluated in a table (Tool 3.3, Primary Entities and Transportation Modes Involved in Evacuation, as well as in the multiple inventory templates under Task 4.2. Potential strategies to increase the utility and integration of modes are included in Tool 3.4, Transportation Operations Coordination Checklists and Tool 4.3, Checklist for Interagency Communications. These tools in combination will be advantageous in the planning process to determine the availability and usefulness of each transportation resource. In addition, ensuring that NGOs and private sector partners are included will ensure that the maximum availability and usefulness of resources can be achieved.

Step 3, Task 4.3 Identify Information and Intelligence Needs

As noted in the Guide, the two major and equally important facets of information and intelligence needs are communications across agencies, disciplines, and jurisdictions; and communications with the public- broadly defined. Communication across agencies and jurisdictions, including use of information integration such as Emergency Operations Centers, Transportation Management Centers, and Fusion Centers, where available, are addressed in Step 4.3 and Tool 4.3 of the Guide. Communications with the public are also addressed there and throughout the Guide, with additional detail provided here.

Once the decision has been made to evacuate, the next phase that must be considered is three-fold:

1. How will we communicate the message? (See Step 4.3 of the Guide and associated tool.)
2. How will the evacuees evacuate? (See Steps 4.1 and 4.2 of the Guide and associated tools.)
3. Where will they go? (See Step 4.2 and Tool 4.2.5, plus the text and flowcharts in Step 4.)

Ensuring effective communication of the message to evacuate will be vital to save lives. Strategies to ensure that the message goes out and that everyone understands it include preparing messages during the planning process that can be pre-scripted. Such messages will include:

1. What does evacuation mean?
2. Where do I go?
3. How do I go?
4. What do I take?
5. How will I tell my family where I am?

6. Who will help me if I can't evacuate by myself?

Ensuring that all the information is presented and presented frequently though as many media as possible will be needed. The message should also be consistent, and pre-planning for messages will ensure that the same information goes out to everyone.

For populations with additional functional needs, outreach will be needed through means other than mainstream media in many cases. This is addressed throughout the Guide, with references to TCRP Report 150, Communication with Vulnerable Populations: A Transportation and Emergency Management Toolkit and to Whole Community Planning, with reminders in discussion guides, tools and resources like the "Workshop in a Box." TCRP Report 150 describes the step by step process to build a robust communications network with the many diverse communities of persons with access and functional needs. The Toolkit describes a process (with many supporting tools to implement it) to build relationships with existing agencies and community and faith-based organizations, who are already embedded with and trusted by the populations they serve. Building or reinforcing such a communications outreach network and tapping into the resources of those agencies and organizations will enable a much stronger and more comprehensive response. As Lt. Col. Honorè of Hurricane Katrina response fame stated, "Trust builds speed." We draw on the lessons from TCRP Report 150, but strongly recommend that users refer to the original Toolkit for the entire plan and the downloadable tools and templates.

How Evacuation Orders Are Issued

Depending on the scope of the emergency, state and local officials may resort to a variety of measures to advise the residents and businesses the need to evacuate. For notice events, officials might have time to broadcast the message out to people via radio and television. Often times the mayor or governor will appear and warn people the evacuation orders have been issued and when the citizens need to begin to make their moves out of harm's way. Many times officials will be accompanied by a qualified sign language interpreter when emergency announcements are televised. Note: \This should be a standard practice for all major announcements, and camera persons and editors should be advised to make sure the sign language interpreter is always on camera. Not all persons who are deaf or hard of hearing can read standard English; American Sign Language or another sign language is their first and sometimes only language. \Captioning on local television stations will display crawls advising people of emergency messages. This is often the case utilized for impending weather alerts.

Sometimes an event may shift in intensity and cause officials to escalate their warnings to citizens. Law enforcement or fire personnel may then be required to drive through neighborhoods knocking on doors, or utilizing sirens or loud speakers to get the word out to residents that they need to take actions to evacuate. This type of notification occurs for example when wildfires have shifted and different neighborhoods are now in the encroaching path of

destruction. Law enforcement has been known to utilize the loud speakers and sirens on barrier islands when hurricanes are approaching and residents have not evacuated. Note that such notifications may not alert people who are deaf or hard of hearing, and may not be understood by individuals with limited English proficiency (LEP). Emergency managers should discuss and test alternate alert means with their community partners, residents, and people who work with visitors well before an emergency to identify potential communication gaps.

Many jurisdictions rely on mass telephone notification and text alerts to get emergency messages out to citizens. Some of these require pre-registration and can be especially helpful when notifying elderly citizens or families that may include members with access and functional needs. Social media outlets are increasingly being utilized to get the word out to residents as more and more people are getting their messages through these means. Emails may also be used to notify people in emergency events.

Whatever method a jurisdiction uses, some residents may not choose to evacuate. Their reasons for refusal may vary but the gravity of their actions may not. Therefore residents need to understand that if they refuse to evacuate they will be on their own.

Community Risk Perceptions

Strategic planning must take community risk perceptions into account. Many of these perceptions will come from experience, while others may come from neighbors, family members, or other trusted messengers- who may or may not be well-informed about risks and appropriate protective measures. Providing information to address concerns (including safe shelter for families, those with pets, etc.), providing the information through multiple channels, through pre-established communication networks of trusted messengers, and ensuring that communications with the public are accurate in providing information regarding risk are crucial in ensuring people make the best decisions to protect their lives and property.

If this is an event with notice, such as a hurricane, most tourists and business travelers will likely get the message from lodging employees and will likely be among the first who are recommended to leave an area at risk. Law enforcement and / or Fire and Rescue are often tasked with going door to door in areas that are at greatest risk to ensure that people have been warned, are taking action, and, if they need assistance to evacuate, helping them to obtain the assistance.

The Guide addresses public communications at various steps. Highlights follow:

Step 1: Form a Collaborative Planning Team

> Page 4: Tip about TCRP Report 150, “Communication with Vulnerable Populations- A Transportation and Emergency Management Toolkit”

Step 4: Plan Development

> Task 4.3: Identify Information and Intelligence Needs

Tool 4.3: Checklist for Interagency Communications and Information Sharing Between Transportation Agencies, Emergency Management and Others (also includes Public Information).

Step 5: Plan Preparation, Review and Approval

Tool 5.2, Multi-jurisdiction Multimodal Evacuation Planning Checklist

Step 5 – Plan Preparation, Review, and Approval

Writing the Plan

The next stage of planning is the challenging work of turning all the preparation into a viable evacuation plan. The planning team develops a rough draft of the base plan, including all necessary functional areas in which planning has occurred. The plan may also include a number of annexes, including roadway route plans, shelter locations, transit route pickup points, resource listings and many other items as appropriate. The recorded results of the planning process in all functional areas can be used in drafting an outline for the first draft.

It may be most strategically effective to have different authors for different sections, with an overall editing process to improve flow between different authors.

FEMA provides the following guidance for drafting plans:

1. Keep the language simple and clear by writing in plain English.
2. Summarize important information with checklists and visual aids such as maps and flowcharts.
3. Avoid using jargon.
4. Use short sentences and the active voice.
5. Qualifiers and vague words create confusion
6. Provide enough detail to convey an easily understood concept of operations.

Review the Plan

Preparedness Gaps

It is critical to identify in advance, using the approaches listed in the Guide, what shortcomings exist and what barriers are in place to an effective evacuation. Planning and collaboration will enable the jurisdictions in a region to work to close these gaps prior to an evacuation becoming necessary. Ensuring the plan is flexible enough to accommodate variations or changeable conditions will be critical to ensuring it will work in a variety of situations, and be able to address unforeseen issues. Using risk assessment tools, the planning strategies in the Guide, and the Step 5 Outline and Checklists, any gaps should be identified during the preparation and review of the emergency evacuation plan.

Re-entry

Planning must also be made for re-entry into the affected area once it is safe to do so. If re-entry has not been addressed in previous planning, it should be included and vetted no later than this stage. Activities that must be planned for in advance are damage assessment and safety inspections, debris removal, emergency repair, power restoration, security and access control, and support services for those who did not evacuate and have limited resources until normal daily activities can be resumed.

Staggered re-entries are often planned to ensure that traffic is controlled and that planning for debris removal, inspections, repairs and restoration of services by areas/neighborhoods can be put into place.

Mutual Aid Agreements

Without mutual aid agreements, formal cooperation during emergencies will have no procedural authority. For the purposes of evacuations, it is recommended that in addition to mutual aid agreements in place for other emergency services, that evacuation agreements be put into place to address use of buildings, restaurants, and homes as shelters/lodging, the use of relocation centers and transportation support as well as between jurisdictions for the acceptance of evacuees. Step 5 Tools in the Guide include two sample Memoranda of Understanding (MOUs).

As the planning team works through successive drafts, they add necessary tables, charts, and other graphics. A final draft is prepared, and this will need to be circulated among all stakeholders for concurrence.

The revised plan should be thoroughly vetted for conformity to applicable regulatory requirements and standards.

Once all comments have been collected and reviewed by the planning team for appropriate inclusion, the plan is finalized.

Approve and Maintain the Plan

Once the appropriate level of approval is determined (local, regional, state), the chief executive(s) of the relevant jurisdictions in the region should review and sign the plan into effect (promulgation). The promulgation process should be based in specific statute, law, or ordinance, including the authority to call for a mandatory evacuation. Obtaining the senior officials' approval through a formal promulgation documentation process is vital to ensuring that the plan will be effectively implemented at all levels. It is also important in this step to establish the authority and the formal process required for changes and modifications to the plan. This should include a regular review and update of the plan as needed, to be done ideally on an annual basis. In the case of a regional agreement (such as coordination through a Metropolitan Planning Organization, establishing agreement among many municipalities and counties, often crossing

state boundaries) this may take the form of a Memorandum of Understanding or Agreement, signed by the city, county and/or state executives.

Disseminate the Plan

Once approved, the emergency manager(s) should arrange to distribute the plan to those responsible for implementing it. Much of the evacuation plan should be a public document, as elements will need to be shared with non-governmental and faith-based organizations, as well as other agencies, to help them understand their roles and to encourage them to participate in planning. Some elements, however, should be considered sensitive, and should have appropriate standardized documented control processes in place, including accountability for all copies. Secured electronic access is preferable, but portable hard copies may also be necessary in some cases. Determining which elements are public and which are sensitive should be discussed during the development of the plan.

Step 6 – Plan Implementation and Maintenance

In order for any plan to be effectively implemented, all persons responsible for any part of it must be trained in it. While this makes sense for emergency management and response personnel, including transportation, it also includes the public.

Most jurisdictions have emergency management or public safety websites that have information about emergency preparedness and activities to educate the public. In addition, community outreach and awareness programs including education for persons with additional functional needs will be necessary to ensure a highly aware and well-prepared community.

The next level of training is to exercise the plan. Exercises provide a means to validate the pan and supporting procedures and evaluate the skills of personnel. The lessons learned from exercises are used in the review and maintenance process, and are an essential part of ensuring that an evacuation plan will function as intended when it is needed. Inclusive planning will make all exercises more real, and provide better preparation. Enlisting volunteers from the broader community, including the deaf and hard of hearing, the blind and those with limited vision, people with various mobility impairments, and people with limited English skills, for example, will assist those conducting the exercise (tabletop or otherwise) to identify and correct critical missing pieces in communications, transportation and response operations, in advance of a real event.

There is a drawback to evacuation exercises, of course, which is that it is not feasible to do a field exercise. Having the public actually evacuate to practice is not possible; exercises must be tabletop exercises for practical reasons. However, many communities have found that practicing evacuation coordination strategies and techniques during large, planned special events can provide excellent “lessons learned”. Therefore, critical incident debriefings after any large planned special event or actual evacuation that is mobilized will be especially important, since it

is the only “boots on the ground” practice the plan gets. It is also essential to debrief members of the broader public, including the network of people with access and functional needs and their advocates, to determine what worked well, what didn’t, and what can be improved. The text and tools provided with Step 6 in the Guide discuss after action reporting for training and for an actual event, updating the plan, and the different types of exercises that can be implemented, with references to additional resources for more information.

Appendix A: Literature Review

Revised February 3, 2012

Review of Practice and Literature

A key component in the development of the *Transportation Guide for All-Hazards Evacuation* was a review of current and recent past practices and research activities in evacuation planning, management, and operations. The review of research and practice was based on the need to investigate and compare the wide variation in practices that exist throughout the United States (U.S.), as well as to document the wealth of new information and emerging knowledge that has come about within the past decade. This guide provides readers with examples and descriptions of recent and past innovative practices that can be applied within their local jurisdictions.

In contrast to most traditional literature reviews which concentrate on research findings, historical development of practice, and identification of knowledge gaps within a field, this literature review highlights and summarizes current practices. Although a wealth of published sources are included in the bibliography, much of the information included here comes from interviews with emergency management and transportation officials involved in recent evacuations, conference presentations, unpublished after-action reports, and other informal sources. Where appropriate, specific examples have also been included to illustrate the various practices and describe how and where they are used and what might make then useful in other locations and/or types of hazards.

General Concepts

Over the past decade, emergency planning in the U.S. has taken a more generalized approach to which frameworks are developed that permit planning and management practices to be applied to any type of hazard. When identifying and planning transportation resources and assets for emergency evacuations, viewing threats and responses from spatial and temporal points-of-view is helpful. For example, it is useful to first define the spatial extent of the area under threat and in need of evacuation. Is it a single city block or a region of several tens of thousands of square miles? This not only defines the number of evacuees that may be involved, but the travel distance required to move them to safety. Similarly, from a temporal perspective, it is necessary to estimate the amount of time between the advanced notice of an event and the onset of the actual hazardous conditions. Does the hazard occur without warning or does it give hours or days to prepare and carry out the evacuation? The amount of "notice" defines the ability to marshal transportation resources and carry out evacuations. It also can be used to determine if it would be better to shelter-in-place and not move at all.

In addition to the spatial and temporal characteristics of the hazard, planning for an evacuation requires an understanding of the characteristics of the populations at risk and how these translate into their trip-making behavior during an emergency. Research and observation show that an evacuee's actions, including how many people will evacuate, when they will leave, where they will come from, where they will travel to, what routes they will take, and what mode they will use during the evacuation is governed by their understanding and perception of the threat. It has been suggested that this process closely mirrors the traditional four-step travel demand forecasting process used for routine non-emergency scenarios (212). The main difference, however, is the singular purpose for making a trip. In addition to the behavioral characteristics of

the population, their demographic characteristics also play a key role in evacuation planning. Spatial factors such as population density and mobility characteristics like vehicle ownership rates have been shown to influence both trip rate and modal selection (90).

Common Themes

Over years of interviews and practice studies, several themes have repeatedly emerged as key elements that have been applied to evacuation plan development, Although some of them may be common knowledge to readers with a background in emergency and evacuation transportation planning, most have only surfaced within the last half-decade as many large-scale evacuations have been carried out. The utility of these themes comes from the ability of readers to learn from the experiences of others. While some of the ideas described in the following paragraphs are specific, others tend to be more philosophical where common approaches or points of view have evolved in practices but are not standardized within the field. The most particular themes are those that govern operational tasks and decision-making where practice is moving toward common methods.

Develop a plan and encourage others to plan. Decades of hurricane, wildfire, flood, and other notice- and no-notice emergency evacuation responses, including multiple occasions when roadway systems were overwhelmed due to public response to evacuation orders, have highlighted the interdependence of Emergency Management and Transportation in emergency planning and response. Prior to the late 1990s only modest efforts were made to proactively manage transportation networks and resources during evacuations and those efforts were chiefly associated with coastal hurricane responses. A commonly held belief was that evacuations were outside the scope of responsibilities of transportation agencies and when they were necessary it was best to let them take place with as little interference as possible. Any additional control or restrictions would only slow the process down. Recent experience, however, has shown that this is not true and that strategic planning and tactical control can have significant benefits on an overall evacuation process.

Positive examples of the benefits of proactive planning and system management have been seen twice in Louisiana. Prior to Hurricane Georges in 1998, there was no comprehensive evacuation road management plan in the state. Evacuees were permitted to use all available routes for evacuation, but no additional measures like contraflow were used. The Georges evacuation showed that this was not an adequate method to accommodate the amount of traffic that would be generated in a major evacuation of New Orleans. By 2000, a contraflow plan had been developed and while improving some aspects of the evacuation, even it proved to be inadequate when used for the first time (prior to the arrival of Hurricane Ivan in 2004) (130). Major changes, based on the failings of the previous year, were implemented just prior to the arrival of Hurricane Katrina in 2005. These changes included the closure of long segments of Interstate freeways, the implementation of forced movements toward certain routes and directions, and the extension of contraflow into the neighboring state of Mississippi. Although it has not been widely publicized, the 2005 (pre-Katrina) evacuation plan resulted in significant improvements over any previous evacuations, reducing overall clearance times by more than 30 percent (218, 213).

The Louisiana plan was improved again after Hurricane Katrina to address the failures in evacuating carless populations. Although these changes were successfully put into action for the Hurricane Gustav evacuation in 2008, improvements have continued to be made to the plan (217). A very similar series of trial and error also occurred in Houston, during the period from

Rita to Ike. However, based on several reviews of practice, the cities of Houston and New Orleans are considered among the best prepared of major US cities to implement and carry out major assisted evacuations (159).

It should also be mentioned that the need to develop a personal evacuation plan should be encouraged among evacuees as well. Most major cities maintain basic information and instructions for planning and carrying out individual evacuations but the instructions are often limited to their personal needs. Emphasis should also be placed on preparing evacuees for emergency travel (functioning vehicle, fueling up, etc.) and guidance (familiarizing themselves with evacuation routes and bus pick-up points, etc.) (129). It is also important to convey that if they are not in an area that does not need to evacuate, they should shelter in place (20).

Communication and coordination. Of all the common themes that emerged during the review of current practice, the most frequently cited was the need to establish and maintain effective communication and coordination during emergencies. Although emergencies are often dynamic situations, the communication of timely, accurate, and reliable information during them is usually much slower. This makes it difficult to not only to get a clear understanding of the hazard conditions, it also makes it difficult to convert information into actionable guidance for evacuees. To overcome these problems many transportation agencies have incorporated existing video and pavement traffic surveillance systems into their emergency operations (76, **Error! Reference source not found.**, 217). Many have also become an integral part of web-based emergency data sharing systems, to collect and use information on which routes may be blocked, where signals have lost power, and so on (**Error! Reference source not found.**).

Communication and coordination is important not only between decision-makers and the public, it is also critical between and within agencies, at all jurisdictional levels of government, and across political boundaries. It should also take place at all phases of emergency planning including mitigation, preparedness, response, and recovery. From the transportation perspective, this means handling the planning, implementation, management, and operation of evacuation and then assisting with evacuee reentry (**Error! Reference source not found.**). Communication should also extend to public information campaigns to inform and educate potential evacuees throughout the year and in the lead up to any identifiable hazard periods (such as hurricane season, spring flooding or mudslide potential, wildfire season, etc.). In addition to informing evacuees, such campaigns can also be helpful in setting expectations. It is not always clear to everyone that major evacuations will create major congestion and delay, and as such, people should be prepared with food, water, fuel, and medicines as may be required during a lengthy travel period.

Development of evacuation plans in concurrence with sheltering plans. While evacuation planning efforts must focus on the evacuation process, attention must also be paid to the need to shelter evacuees at their destinations. Many emergency mangers have said that evacuation and sheltering are two sides of the same coin – one can never be effective without the other. Past experience has shown that evacuees tend to utilize the routes that are most familiar to them and the majority of people travel to destinations where they have family, friends, or can find a hotel for a temporary stay. In the Gulf region, these destinations are not always in locations (and directions) that are consistent with planned evacuation routes. In Louisiana, for example, observations of traffic during evacuations of New Orleans showed that evacuees tended to travel east to west along the Interstate 10/12 corridor (219). This led them towards several cities (Baton Rouge, Lafayette, Shreveport, Houston, and Dallas) with ample hotel/motel space. Ideally, the

best direction to move them would have been to the north, taking them further inland and away from arriving hurricanes. However, there are no relatively close, large cities capable of hosting several hundred thousand people. This means that evacuees will find alternative routes to these destinations and travel on these routes that may not have been written in the plan.

From the standpoint of accommodations for people requiring additional access and functional support in emergency situations (usually referred to in the literature as "special needs" sheltering, support, etc.), plans must define specific sheltering resources in advance so that peoples' basic needs can be met. Houston has cooperative agreements with several other Texas cities to shelter evacuees as well as provide fuel and services for local transit busses involved in the evacuation (116). Currently, Louisiana has not identified enough shelter space within the state and must coordinate assisted and special needs evacuations with neighboring states (117).

Evacuee services. Since evacuations can involve large segments of the population with varying levels of physical and transportation-related capabilities, it is likely that some evacuees will be poorly prepared for travel. Some vehicles should be expected to be low on fuel and evacuees will be lacking food, water, and medicine. Some evacuees will also be accompanied by infants, frail elderly, and/or infirm passengers, and may be traveling in vehicles in poor states of repair. It is in inevitable that problems will occur, especially if cars break down or other incidents occur that block lanes or otherwise restrict the flow of traffic. To avoid or lessen the impact of these situations, several areas have plans to provide basic in-route services to evacuees in need. Currently, these range from medical assistance, to vehicle removal and refueling, to services as comprehensive as providing food and drinks.

In the aftermath of the roadway problems experienced in recent major hurricane evacuations, officials in Florida, Louisiana, and Texas among others have developed (and are continuing to refine) a plan to provide basic services such as fuel, water, wrecker, food, sanitary, and medical services both along and at strategic points on heavily congested evacuation routes (117, 113). Although details on how these services will be provided, which of them will be offered, the locations where they will be available, who will provide them, and how these services will be paid for are still being developed, several commonalities among practices have emerged.

Among these similarities are:

- services that address basic needs;
- a priority on maintaining the movement of traffic;
- utilization of existing systems and resources to the greatest extent possible and augmenting them where needs are apparent;
- an emphasis on the use of local planning, management, operational control, resources; and
- encouragement of evacuees to take personal responsibility for their needs and actions so they do not rely on services with may prove to be inadequate.

Train personnel and evacuees how to carry out an evacuation and practice it. In addition to developing and formalizing evacuation plans, it is also helpful to train and rehearse the plan. Because of the infrequency in the need to carry out a real evacuation and the obvious difficulties in carrying out a full-scale test, it is common for detailed evacuation plans to be developed, but never put into practice. As a result, any problems in the plans may never be recognized until the

plan is needed to go into effect. Experience has shown that that is not the time to discover problems.

There are numerous ways that evacuation plans can be tested and practiced. One of the most common is to conduct computer simulations of traffic movements within an evacuation road network. Recent advances in computational and speed and modeling sophistication have led to simulations of region-wide multimodal evacuation processes down to microscopic (individual vehicle) levels (138, 1). Full scale exercises of contraflow are also conducted annually in several states. The Alabama Department of Transportation finds these drills to be vital to maintaining an effective preparedness posture (31). In Alabama, the entire contraflow plan is practiced at full-scale each year prior to the start of hurricane season (June 1st). This exercise is undertaken over a two-day period and involves nearly 400 state police, DOT, and EMA personnel. Direct expenses, just for the DOT, are estimated to be about $120,000 and this does not include the actual man-hours required to plan and carry out the exercise. However, they regard this as money well spent.

It is also possible to conduct live, full-scale exercises of urban mass evacuations. An example of such an exercise is the annual test of the Washington, D.C., evacuation plan during the annual Fourth of July fireworks on the National Mall (175). Although it is not obvious to most of the attendees, the egress plan from the event overlaps with the evacuation plan that would be used for an emergency in the heart of the city. Plans for pedestrian movements, bus schedules and routes, and Washington, D.C., Capital METRO train operations are tested and evaluated along with the personnel who are charged with carrying it out.

Engage stakeholders and evacuees during the planning process. The next key finding of the practice review was to identify and engage stakeholders and key evacuee groups, especially organizations that work with people that may require special assistance, long before the need to evacuate. At the recent National Evacuation Conference, Richard Devylder - Director of the Office for Access and Functional Needs Coordination for the California Governor's Office of Emergency Services stated that it is necessary to “plan with” evacuees with functional needs rather than to “plan for” them (**Error! Reference source not found.**). This was based on the recognition that truly effective planning for assisted evacuations can only come from a complete understanding of the needs and challenges of vulnerable populations.

One example of such engagement was illustrated by a recent series of drills conducted by Houston METRO, the public transportation authority for the region (116). In their exercises, METRO officials used a group of volunteers with various functional disabilities (wheelchair bound, blind, deaf, etc.) to test the ability to load and unload its transit busses. The results demonstrated the amount of time needed to load and unload passengers as well as the additional resources that could be required. Most emergency planners can engage with various interests by contacting local advocacy groups.

Utilize and adapt existing practices, systems, and resources. Although evacuations are unique and infrequent events that disrupt normal travel patterns and require special considerations for transportation system control and operations, many of the needs they require can be accommodated within existing practices and resources. Reviews of recent research, planning, and actual evacuations suggest that evacuees can often be effectively served by making incremental modifications to routine operations (217, **Error! Reference source not found.**). An example of this is illustrated by the Houston METRO plan to operate busses on normal routes during evacuation of the city using holiday and special event schedules. The plan maintains

busses on routine routes where people are already familiar with them, but increases capacity by adding busses to reduce headways (116). This "seamless" transition in operation helps evacuees know where and when to access busses. This allows people not immediately evacuating to return from work, prepare to evacuate, and attend to other pre-evacuation needs (acquiring medicines, connecting with family members, etc.).

Another example of adapting a non-emergency operation was illustrated by a recent study of urban evacuation traffic signal control in Washington, D.C., The University of Maryland study showed that the most effective timing plan for signal operation during an emergency was to implement evening peak period signal timings (**Error! Reference source not found.**). Although it was hypothesized that "all-green" signal operation on major streets would work best to clear the city, such a plan actually caused more delay and congestion by paralyzing cross-streets. Adapting routine practices often requires less time, expense, and personnel training because it is based on familiar routines which have already been proven effective through actual experience.

Empower and encourage voluntarism, self reliance, and independent decision-making among evacuees. One of the more unique themes expressed by several officials in charge of planning and managing evacuations was to "personalize" the act of evacuating (117, 122). Several agencies pointed out that the act of evacuating was a personal choice and that, practically speaking, even under "mandatory" evacuations; local authorities have neither the personnel resources nor the legal authority to compel a person to evacuate against their will (**Error! Reference source not found.**). As such, it becomes important to help evacuees make informed choices regarding their safety.

It concerns some emergency management officials that the recent emphasis on assisted evacuation has given some a false sense of security or an illusion of entitlement that all of their needs will be met with little planning, preparedness, or action on their part (117). In reality, most planning provides minimal aid for basic necessities and instead focuses on the goal of keeping the overall process moving, with as few obstructions as possible (217, 113). To reduce the potential for problems, some agencies do not reveal specifics of their plans (such as the availability of in-route fuel service or "refuges of last resort"). Obviously, not every person has the ability to move themselves. In such cases it is necessary to provide assistance. To support the variety of government assisted evacuation programs, some locations have encouraged "Good Neighbor" programs such as "Operation Brother's Keeper" and Evacuteer.org in New Orleans. They encourage citizens to help their fellow citizens by staffing evacuation processing points and providing rides to relatives, friends, and neighbors without access to personal transportation (44).

Plan for post-event reentry. After the passage of hazardous conditions, evacuees often want to return to their homes, businesses, and properties as soon as possible. The desire for a quick return is motivated by the need to determine the condition of and extent of damage to property; protect and secure property that may have been damaged or is vulnerable to looting; tend to pets and livestock; and check on friends, family, and neighbors that did not evacuate. Although post-evacuation re-entries do not involve the same life-or-death urgency as evacuations, they can also generate enormous amounts of traffic over short durations, resulting in congestion. Re-entries can also put returning evacuees at risk if roads and other highway infrastructure are not sufficiently cleared, repaired, and free from flooding or other dangers. Because of these risks and the need to maintain order and security in areas that may be without utility services, there may also be a need to regulate and control re-entries into impacted areas.

Even without the presence of imminent danger, the return of evacuees after an evacuation is not a routine transportation process. There are a number of areas of concern for transportation agencies. At the very least, conditions that have precipitated large-scale evacuations have the potential to create inordinately high inbound directional traffic over a relatively short period; in effect, a reverse-evacuation can occur. Like the evacuation that preceded it, these demand conditions can result in significant congestion, delay, and even traffic safety issues that may require the attention of transportation agencies to assure an safe, orderly and expeditious return of a population to its origin. For hazards that have caused physical damage to transportation infrastructure systems, expedited inspections and repairs may be necessary. Examples of major damage after recent hurricanes and floods includes storm surge decking damage and foundation scour on bridges; washed out pavements and embankments; and the flooding of traffic signal systems. The required repair of these items can necessitate the development of alternate traffic plans, which are important before allowing evacuees back into impacted areas. In technological hazard emergencies such as biological/chemical/radiological releases, dangerous conditions may not be immediately and directly detectable without specialized and sophisticated detection and testing equipment. Thus, experts outside of transportation who are adequately trained and equipped to assess the conditions must first be brought in. In some cases, this may take several days.

Washed out roadways and collapsed bridges are obvious. However, less noticeable threats can include conditions like leaking gas pipes, downed electrical lines, and structural and foundation failures. As a result, transportation officials are called upon within hours of a disaster to assess the extent of the damage, determine which routes can be opened, and certify critical structures like bridges, retaining walls, embankments, etc. This work can also occur simultaneously with utility company and other non-governmental agency inspections for facilities like hospitals and stores to makes sure that the basic needs required to support and sustain a populace is in place and functioning.

Discussions with local officials showed that the process of post-evacuation re-entry has several layers of complexity. Since public safety is always paramount, re-entry in practice often becomes an effort to manage or restrict the entry of returning evacuees until their safety can be assured. In all but a few of the most confined cases, the management of re-entries is a hit-or-miss proposition. Most states permit evacuees to return after the area is deemed to be safe by local and state officials. In practice, however, many evacuees leave shelters as soon as it appears that re-entry routes are open and typically well before any “all-clear” advisories are issued. In Lafayette, Louisiana, evacuees left shelters early in the re-entry process without an “all-clear” advisory from authorities after Hurricane Andrew in 1992, delaying DOT and utility repair and restoration efforts.

By the nature of their design, highway transportation systems are developed to provide convenient access to properties. Often, this is accomplished with multiple routes of access into populated areas. When combined with the eagerness of evacuees to return, these configurations also make it difficult to prohibit access on a large scale. Discussions with authorities in wildfire-affected states revealed that the only effectively managed large-scale re-entries have been at the subdivision-level where access into the impacted area can be restricted at a handful of relatively easy to control entry points.

A consistent opinion was that most areas have yet to devise an effective method to realistically (efficiently and safely) deal with re-entry, particularly because of legal and manpower issues. In

some locations, particularly in which no formal plans exist to manage re-entry, political considerations are the driving force. In one location, it was noted that some public officials liked to be viewed as the first authorities to demand that evacuees be allowed back into affected areas. In the past there have been virtual "races" among elected officials in various jurisdictions and levels of government to demand re-entry for displaced populations.

Since assisted evacuees have no method of returning home after an event, officials in both Texas and Louisiana have planned for the transport provider to return them back to their places of origin. In both states, this is accomplished by effectively reversing the steps and location order of the outbound evacuation. Thus, evacuees would be transported via the same outbound mode to the collecting point then on to local transit busses to their original pick-up locations (NYC BP refs). Past experience has shown that post-storm circumstances may not always permit all evacuees to return home immediately. In some cases, individual dwelling units or entire neighborhoods may have sustained damage or are uninhabitable because basic services like water, electricity, telephone, police/fire/ambulance, schools, hospitals, and stores, may not be operable. In such cases, it may be necessary to make alternative arrangements at the local level. After Hurricane Ike, Houston METRO relied heavily on taxi cab services to transport evacuees to local Red Cross shelters because evacuees could not return immediately to their homes.

Maintain simplicity and flexibility in evacuation plans. Despite the significant recent advancements in evacuation practice, it is apparent that considerable variability remains in the specifics of evacuation planning and response. This is not surprising since, at a fundamental level, evacuations (even for major threats) are predominantly a local issue with planning, decision-making, and direction led by local officials. However, with wider variation comes the potential for miscommunication, inconsistency, and confusion, both for evacuees and for those working to manage them. The National Incident Management System (NIMS) was developed to standardize emergency response and coordinate the various aspects of emergency preparedness and response across various levels of government, jurisdictions, and agencies. However, many of its elements are still being incorporated into local plans.

One example of the variability in evacuation communication is illustrated in the language used to issue evacuation orders. Recent reviews of practice have identified more than a dozen terms used to order evacuations, including "precautionary," "voluntary," "partial voluntary," "recommended," "mandatory," "partial mandatory," and "full mandatory" among others. Although some emergency managers feel that a range of terminology helps them to convey the urgency of the situation thereby permitting them to influence the rate of evacuation departures, others have suggested that it could be confusing and influence people to remain in dangerous locations. Instead they have proposed using a single, clear, and simple "mandatory" order for evacuations. This, it is asserted, would simplify the answer to the question "Do I need to evacuate?" to a clear-cut "Yes" or "No" response for every citizen (122). From a practical perspective, even "mandatory evacuations" may also be confusing since there are no legal mechanisms (in most locations) to force individuals to evacuate and even if there were, few jurisdictions would have adequate personnel to physically enforce the order. (Some emergency managers, however, have identified persuasive means of emphasizing the seriousness and the potential consequences, e.g., asking the individual to complete a form addressed to their next of kin and write their name and date of birth on their arm in permanent marker to facilitate identification).

Officials in Louisiana and Texas have developed websites to permit downloading of maps, plans, and instructions of contraflow and evaculane segments and how to drive on them (130, 173). The Texas website includes video that illustrates how to enter and drive in the contraflow lanes. The Louisiana maps use color coded arrows that show evacuees how to select and follow a route to a specific destination. These color codes are quite helpful because the Louisiana contraflow plan covers a large region and prohibits access to several routes, which if not understood would force evacuees into a direction far from their intended travel direction. Evacuation implementation plans can also be complex and infrequently utilized so many locations use various tools to clarify and communicate tasks and directions. Other examples are checklists used by the Alabama Department of Transportation to assist crews in the implementation of contraflow in the state. The lists are both thorough and specific and include maps of locations, lists of tasks, steps and sequences, inventories of materials, and detailed plans showing the placement locations of signs, personnel, and vehicles (1, 3, 4, 5).

Bridge disconnects between emergency management and transportation. A final common issue identified in the review of practice relates to the philosophical differences between emergency management and transportation communities. This has been described as a "clash of cultures" in how the collaborative roles of emergency management and DOTs are required to interact before, during, and after evacuations. In prior surveys it has been apparent that these two groups disagree on how resources are allocated and utilized during emergencies. One emergency manager described its DOT counterparts as "always finding a reason to say no, instead of finding a reason to say yes." One example was in the reluctance of many DOTs to use contraflow because it was contrary to many fundamental principles of roadway and traffic control, safety, and design.

These differences have been attributed to the backgrounds and types of training that the two groups receive as well as their designated roles during emergencies. Emergency managers often have background and training as first-responders, law enforcement, and military personnel and their focus is on leading and coordinating the activities of others, using a command and control structure. They must take a comprehensive view of situations and need to be flexible and creative in their approach to solving challenges. DOTs, on the other hand, are commonly populated by engineers and planners. Their training is to use more methodical and detailed approaches to problem solving. Because of their responsibilities to promote safety, they can also be risk averse and may not be willing to quickly adapt, to disregard details and standards, and to make immediate decisions with uncertain outcomes (that may in their perception cause additional public confusion and increase risk, for example).

Although there will always be disagreements, many of the challenges encountered by differing viewpoints can be overcome by frequent and improved communications during all phases of planning and response. Although emergency managers are more often in charge, DOTs have specialized knowledge, skills, equipment, and resources that can be vital during emergencies and they must work efficiently and effectively together.

Carless Evacuation

Since Hurricane Katrina there has been a surge of interest in topics related to the evacuation of low-mobility populations. These low mobility groups have been characterized in numerous ways, including special needs, functional needs, carless, etc. Ultimately, however, for the purposes of evacuation planning, the definition can be boiled down to any person who, for

whatever reason, lacks the ability to move themselves (and/or their dependents) during an emergency. In the wake of Katrina, numerous federal, state and local agencies and non-profit organizations have sponsored studies, many of which are in the accompanying carless evacuation section of the bibliography.

Consistent among the findings of evacuations involving various groups of minority, low-income, elderly, disabled and residents with limited mobility and health problems, was that relatively little systematic and comprehensive planning for these groups had taken place prior to 2005. The reports discussed many challenges faced by transportation planners, emergency managers, and non-profits when designing successful evacuation strategies. Identifying carless populations and gauging their level of transportation mobility was perhaps the greatest obstacle.

A 2007 focus group study conducted with government officials and non-profit organizations in Chicago, Miami, New Orleans, New York, and San Francisco sought to identify the current challenges, strengths and resources; cross-jurisdictional relationships; and evacuation training and planning. The findings noted that the dissemination of information was critical during an emergency, but the ability to reach vulnerable populations was quite difficult. Low participation rates during evacuations and cross-jurisdictional collaboration were noted as major challenges.

Studies have also identified three types of collaboration that are currently used for carless evacuation preparedness:

1. Collaboration which intends to capacitate the community level emergency response
2. Collaboration efforts that occur between municipalities
3. Collaboration that looks to a higher authority, i.e., Federal government to overcome any cross-jurisdictional barriers that may exist between municipalities or other local agencies.

Reviews also suggest that preparedness has not only been a function of local disaster experience, but also the national attention of large-scale disasters such as September 11th and Hurricane Katrina. However, while nonprofit agencies in New Orleans noted that Katrina probably resulted in local government being more prepared for future disasters, they also mentioned that preparedness agencies should not rely heavily on government after previous experiences. Interestingly, nonprofit agency respondents in Chicago, which has arguably had the least experience with large-scale disasters, professed more of a blind faith reliance on government to meet the needs of vulnerable populations during a large-scale evacuation.

Conclusion

This review summarizes many of the common themes of evacuation that have emerged for the past 10 to 15 years. Although not all of the ideas described in this chapter are appropriate or applicable to every location or for every type of hazard, it is expected that a better awareness of these ideas will give readers of this guide some ideas to implement in their local jurisdictions based on what has worked well in other places. Although this review discusses what others have done or are doing, the future chapters will provide more detail in what to do and how it should/could be done. A common current method is to develop a generalized (all-hazard) approach to evacuation planning once an adequate understanding of the hazard, population, and transportation characteristics of a particular location has been gained. Then, using this general framework, a plan can be spatially and/or temporally scaled as needed for any specific evacuation. The difficulty in doing this, however, always lies in the specific details of the plan.

To assist readers with addressing these details, this literature review has attempted to highlight techniques and innovations that are currently planned or have already been successfully employed.

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Best of Public Safety and Emergency Transportation Operations CD	FHWA-JPO-08-037
Using Highways For No-Notice Evacuations - Routes to Effective Evacuation Planning Primer Series	FHWA-HOP-08-003
Common Issues in Emergency Transportation Operations Preparedness and Response: Results of the FHWA Workshop Series	FHWA-HOP-07-090
Best Practices in Emergency Transportation Operations Preparedness and Response: Results of the FHWA Workshop Series	FHWA-HOP-07-076
Communicating With the Public Using ATIS During Disasters: A Guide for Practitioners	FHWA-HOP-07-068
Managing Pedestrians During Evacuation of Metropolitan Areas	FHWA-HOP-07-066
Routes to Effective Evacuation Planning Primer Series: Using Highways During Evacuation Operations for Events with Advance Notice	FHWA-HOP-06-109
Transportation Evacuation Planning and Operations Workshop	FHWA-HOP-06-076
Coordinating Military Deployments on Roads and Highways: A Guide for State and Local Agencies	FHWA-HOP-05-029
Emergency Transportation Response Overview	FHWA-OP-04-048
Public Safety & Security Program: Keep America Moving Through Emergencies & National Security Events	FHWA-OP-03-108
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Intelligent Transportation Systems Field Operational Test Cross-Cutting Study: Emergency Notification and Response	FHWA-JPO-99-033
Faster Response Time, Effective Use of Resources – Integrating Transportation and Emergency Management Systems	FHWA-JPO-99-004
Speeding Response, Saving Lives – Automatic Vehicle Location Capabilities for Emergency Vehicles	FHWA-JPO-99-003
Enhancing Public Safety, Saving Lives – Emergency Vehicle Preemption	FHWA-JPO-99-002
Effects of Catastrophic Events on Transportation Systems Management and Operations: Howard Street Tunnel Fire Baltimore City	Web publication only
Effects of Catastrophic Events on Transportation Systems Management and Operations: Northridge Earthquake January 17, 1994	Web publication only
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Additional Emergency Transportation Operations - Prevention	Not yet published
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Appendix B: Case Studies

Task 6: Technical Memorandum on All-Hazards Evacuation Case Studies

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Introduction

The study team reviewed more than 20 notice and no-notice events, seeking lessons learned for multimodal, multijurisdictional coordination for evacuations, as well as guidance matching resources to needs. The team sought a variety of types of events, as well as diverse geographic settings. Some areas with repeated exposure to catastrophic events, such as southern California (wildfires) and New Orleans and Houston, Texas (Hurricanes Gustav and Ike, respectively) demonstrate how lessons learned from previous disasters can be applied to develop new strategies – even though the circumstances and event may generate very different challenges than the prior event. Others demonstrate the very different set of challenges for evacuating in a no-notice event.

The team developed a matrix with considerations for case studies, and provided summaries of the events along with their recommendations to the Panel in an on-line survey. The Panel concurred with the study team recommendations, but many also strongly supported evaluation of the 2010 Pennsylvania blizzard. The study team agreed to add this event. However, upon further investigation, (included in the very brief case study on the snowstorm) no evacuations were undertaken in this event; therefore it has little bearing on this study. Some Panel members were also interested in examining one of the tornado events. However, since tornado events usually require sheltering-in-place, rather than evacuation, we concluded that this type of event had little bearing on this study. Table 1 summarizes the case studies selected, as well as those evaluated.

Table 1: Case Study Selection Summary

Event Description
Selected Case Studies
Apex, North Carolina, chemical fire, 8/5/2006. No-notice event, 17,000 evacuated including over 100 nursing home residents, modal integration not required.
Southern California, wildfires, 10/20/2007-11/9/2007. Notice event, 1 million+ evacuations ordered including many groups of vulnerable populations, modal integration required. Incorporated lessons learned in 2003 fires (that were much smaller).
Lafayette, Louisiana, chemical spill, 5/18/2008. No-notice event, 3,000 evacuated including nursing home and other vulnerable population groups, modal integration not required.
Coastal Louisiana, Hurricane Gustav, 8/25/2008-9/4/2008. Notice event, 1.9 million ordered to evacuate including vulnerable populations, modal integration required. Incorporated and applied lessons learned from Katrina.
Galveston, Texas, Hurricane Ike, 9/1/2008-9/14/2008. Notice event, 4.5 million ordered to evacuate including vulnerable populations, modal integration required.
Philadelphia, Pennsylvania, snow blizzard, 2/7 to 2/11/2010. Over 235,000 impacted. Added based on Panel comments and responses. (Brief report provided.)
Nashville, Tennessee, flooding, 4/30/2010-5/7/2010. Notice event, 31 percent of state affected, 1,173

Event Description
evacuated, mobile homes and schools impacted, modal integration not required.
Evaluated but not Selected
North and Central California wildfires, 5/22/2008 – 8/29/2008. Notice event, over 2,000 evacuated, many vulnerable population groups impacted, modal integration required. Incorporated and applied lessons learned from 2007 southern California wildfires. *Note: Although this was initially recommended, upon review the PI decided that the more comprehensive review of the much larger 2007 southern California wildfires, including the lessons learned from the 2003 wildfires, provided sufficient lessons for the wildfire-type event.*
Washington state, Mt. St. Helens volcanic eruption, 5/18/1980. Notice event, over 200 evacuated, modal integration not required. Length of time since event greatly hampers investigation.
Central Kentucky flooding, 3/1/-3/16/1997. Notice event, 50,000+ impacted, multimodal integration required. Length of time since event hampers investigation.
New Mexico Cerro Grande fire, May, 2000. Notice event, over 400 evacuated.
Parkfield, California, earthquake, 9/28/2004. No-notice event, over 13,000 evacuated including vulnerable populations.
Minneapolis, Minnesota, bridge collapse, 8/1/2007. No-notice, 158 evacuated, no multimodal integration, but regional coordination was required.
Alaska flooding, 5/2009. Notice, 236 homes destroyed, multimodal integration required.
Louisiana/ Mississippi tornado outbreak, 4/25/2010. Over 800 impacted.
Maryland snow blizzard, 2/1 to 2/6/2010. Over 151,000 impacted.
Central and East Oklahoma tornado outbreak, 5/10 – 5/13/2010. Widespread damage, modal integration not required.
Pike County, Kentucky severe flooding, 7/17 – 7/30/2010. Notice event.
Bronx, New York, tornado, 7/25/2010. Notice event, 4,700 impacted.
Southern Texas, Hurricane Alex, 6/25-7/2/2010. Notice event.
Romulus, Michigan, chemical fire, 8/10/2005. No-notice event, evacuated 32.
Northern and Western Hawaii earthquake, 10/15/2006. No-notice event, limited damage, no modal integration or regional coordination required.

Regarding terminology for persons requiring additional assistance in emergencies, we subscribe to the National Response Framework definition of access and functional needs that says "special needs" populations may have additional needs before, during and after an incident in functional areas, such as: maintaining independence; communication; transportation; supervision; and medical care.

Examples of these populations include:

- people who are disabled;

- People who live in institutional settings
- People from diverse cultures who do not speak English (limited English proficiency [LEP])
- Older adults and people who are frail elderly
- People who are transportation disadvantaged
- Children.

We generally use terms such as "individuals with access and functional needs," or "persons with functional needs requiring additional assistance." However, we use the term "special needs" when we are referring to or quoting directly from a plan or document that uses that nomenclature. We understand that policies are rapidly evolving in this area, towards fully inclusive community preparedness, although we also recognize that practices of inclusiveness are lagging in many communities. Our case studies include examples of the spectrum of practices in this area.

The case studies are presented in chronological order, each following the same basic outline. Our suggested outline is included below, to include all phases of the emergency, considerations of persons with access and functional needs, and pet and livestock issues, among other topics such as matching resources to needs.

Detailed Case Study Outline

Overview

Case Setting/ Description

Geographic Location

Type of Hazard

Timing (Notice/No-Notice)

Number of People Impacted/Type of Impact/Any Vulnerable Population Groups (Description)

- Self-evacuees
- Assisted evacuees
- Pets and companion animals addressed?
- Any livestock issues?

Preparedness

What plans were in place? How did the actual event compare with the scale of the plan? Had previous exercises considered an event comparable to the actual event?

Response

Matching Resources to Needs

Items to consider: resources such as management, personnel, equipment, vehicles, information and data, communication systems, public information; identifying needs such as limitations to highway capacity or transportation-disadvantaged persons who will need transportation assistance; and matching resources to needs.

Describe how resources were identified and deployed to meet needs

- e.g., highway capacity challenges met with public information, signal timing, contraflow lanes, law enforcement restricting left turns or limiting access to the highway to those in high-occupancy vehicles, or prohibiting access to those not in imminent danger or whatever
- buses to assist transportation disadvantaged – how was this done, e.g., went through neighborhoods/sent to pick up points? (How did people know about this, how did they get there, what alternatives were available, etc.)
- were community-based groups involved in the response, such as helping locate or communicate with vulnerable populations;
- issues with persons with functional needs
    - unaccompanied children
    - persons with mobility challenges and/or assistive devices and/or service animals- how were assistive devices either tracked or kept with owner
    - persons with LEP - if encountered, how handled;
    - institutional evacuations (nursing homes, correctional facilities, hospitals) - any particular issues;
    - issues with pets or companion animals - how addressed;
- livestock issues and how addressed.

Modal Integration/Coordination

Were multiple modes involved? Were transfers between modes required? How was this handled?

Regional/Interregional/Interstate Coordination

Describe what was required, what went well, what didn't

Recovery

Was reentry required? Were there any particular items or lessons for transportation in terms of security, helping keep people together with their belongings and family members, coordinating the timing of reentry with readiness of the site, etc?

Preparedness

Have the lessons learned in the event been transferred into improved planning (e.g., improved coordination, communications) and/or mitigation (e.g., structural hardening, facility relocations, etc.)?

Case Study Key Findings

Lessons Learned/ Avoidable Failures

Summary/ Conclusions

As expected, some events have far more documentation and information available than others; all topics in the outline were not relevant for each case. In one case follow-up interviews were conducted to fill in gaps in information. All references are provided at the end of the document.

2006 North Carolina Chemical Fire

Overview

On October 5, 2006, the town of Apex, North Carolina, with a population of only 30,000, was impacted by a fire and series of explosions at the Environmental Quality Company, an industrial chemical processing plant that collected, processed, and repackaged hazardous waste for transport and disposal. Due to the changing winds and inclement weather that prevailed throughout this event, the Emergency Operations Center (EOC) and evacuation zones were continuously modified and expanded, ultimately forcing the evacuation of approximately 17,000 people.

Case Setting/Description

The evacuations and partial reoccupation took place over a three-day period and involved approximately 17,000 Apex, North Carolina residents, including 100 non-ambulatory special needs nursing home residents. In addition to those residents that evacuated, a number of residents also sheltered-in-place due to the potential hazards of evacuating through the toxic cloud.

Geographic Location

Apex, North Carolina is located in Wake County, just south of Raleigh, in the central part of the state. It is the fastest growing suburb in the state.

Type of Hazard

The hazard involved fire, explosions, exposure to hazardous chemicals and toxic fumes, fire extension due to nearby structural exposure to a fuel oil company with 400,000 gallons of diesel and fuel oil, and the environmental impact of toxic run-off contaminating nearby streams.

Timing

There was no notice for this event. It began on October 5, 2006, at 9:38 p.m.; however, due to the unknown nature of the chemicals involved, the persistent fire, changing winds, unpredictable chemical explosions, and the chemical plume, this incident extended well beyond the first operational period. This incident lasted slightly longer than 48 hours when the last fire at the Environmental Quality Company was extinguished on October 7, 2006, at 1:00 a.m.

Number of People Impacted/Type of Impact/Any Vulnerable Population Groups

Due to the unknown nature of the chemicals involved and the changing winds, this incident forced the town of Apex with a population of 30,000 to evacuate more than half of its residents. Approximately 17,000 people were evacuated prior to the event's demobilization.

Residents of the homes nearest to the Environmental Quality Company facility were forced to shelter-in-place to prevent possible exposure to the chemical plume.

Apex EMS coordinated with local EMS, area schools, and public transportation to evacuate 100 non-ambulatory nursing home patients into local Wake County hospitals. This operation took approximately 4 hours and was completed with no injuries.

Response

Evacuation response to the Apex chemical fire started within minutes of the establishment of the Incident Command at 9:52 p.m. Facilities in close proximity to the Environmental Quality Company facility, including a gymnastics center, fuel-oil company, and woodworking shop were notified by on-scene first responders and self-evacuated.

Notification and warnings were sent out to the residents of Apex via the town's reverse 911 system. This system provided information on the event, as well as information for those asked to shelter-in-place. School buses were provided by the local school board to assist with the evacuation.

Apex police officers were dispatched to the neighborhoods directly downwind from the facility and went door-to-door notifying the residents of the need to immediately evacuate the area.

Apex EMS, working in cooperation with the school board, public transportation, and other area EMS providers, evacuated 100 non-ambulatory nursing home patients to area hospitals within Wake County.

As stated previously in this case study approximately 17,000 residents of the town of Apex were evacuated throughout this incident.

Reoccupation of the evacuated areas was conducted in zones and controlled by the Apex Police Department

Matching Resources to Needs

The town of Apex is entirely within the Emergency Planning Zone (EPZ) of the Shearon Harris Nuclear Power Plant. The town officials, first responders, and residents plan, train, and exercise regularly for possible wide-scale evacuation due to their close proximity to the reactor.

A federally mandated requirement for biannual exercise at the Shearon Harris Nuclear Facility and the town's participation in this exercise program foster a sense of coordination, cooperation, and familiarization of capabilities between Apex and the surrounding areas' response organizations.

Modal Integration/Coordination

Due to the fact that this was a no-notice event, and a non-specified chemical hazard, along with the changing winds during this 48 plus hour incident, various systems were utilized in the evacuation of residents. The majority of the residents self-evacuated via personally owned

vehicles (POVs) to provided shelters upon notification. Public transportation along with the school board provided buses transportation for those without access to POVs or other means of transport.

Apex EMS and other area emergency medical agencies provided transport for non-ambulatory and patients with functional needs requiring additional assistance.

Case Study Key Findings

The success of the evacuation of more than half of the town's population during this incident with no reported injuries was due primarily to the on-going planning and training, and community exercises that occur as a result of their location within the Shearon Harris Nuclear Plant EPZ. As a result of the public outreach programs that are in place to educate the town residents on evacuation and shelter-in-place procedures, the entire town is familiar with and kept up to date on these procedures. This knowledge was key to the rapid and organized evacuation during this incident.

Lessons Learned/Avoidable Failures

According to a FEMA report on the incident, there were several lessons learned and areas identified for improvement (FEMA 2008).

Lessons Learned

- Interagency coordination and cooperation improved the functionality of responders.
- The entire operation was able to adapt to frequently changing conditions.
- Tactical decisions were made efficiently and effectively.
- The public information officer was very effective.
- The evacuation was well planned.
- Incident Action Plans were used routinely by the Incident Command.
- Training is the most critical part of successful incident mitigation.

Areas for Improvement

- The evacuation of people with functional needs requiring additional assistance was not well planned (the evacuation plan had to be developed ad-hoc, and worked well, but had not been sufficiently considered in advance).
- A remote staging area was not identified and used.

- Geographic Information Systems (GIS) and Computer Aided Design (CAD) should be functions of the EOC Planning Section.

- Public information functions must be well-placed and effective.

Summary/Conclusions

Pre-event planning and training, and exercises in an all hazard environment assisted in providing a positive emergency incident response outcome. In addition, the pre-incident public education of the town residents made them familiar with the evacuation and shelter-in-place plans. This knowledge, combined with their readiness to cooperate, greatly assisted first responders and local and state officials in successfully mitigating this incident with only minor exposure issues.

2007 Southern California Wildfires

Overview

Wildfires have been a part of the regeneration cycle of natural lands throughout history. However, as cities continue their inexorable outward push into these undeveloped lands, wildfires now routinely impact inhabited communities and the constructed systems that support them. One area where brush and wildfires have become a significant hazard is in southern California. The unique combination of climate, geography, vegetation, a sprawling population, and extensive land development has made this region particularly prone to dangerous, costly, and highly destructive wildfires.

In 2003 and 2007, natural fires within the urban-wildland interface areas of southern California produced some of the most hazardous and destructive conditions in recent times. The 2003 fires burned more than 430 square miles, claimed 24 lives, destroyed more than 3,600 homes (Campbell 2004), and resulted in the evacuation of about 100,000 residents. Four years later, wildfires in the same region burned more than 780 square miles (EDD 2007), claimed an additional 12 lives, destroyed more than 2,200 homes, and precipitated the evacuation of nearly 1 million people. The destruction brought by these events was unfortunate; however, California officials used these experiences to make changes to emergency preparedness and response, and as a result, are now better prepared for and able to deal with the effects of such events.

The California wildfire experiences of 2007 are used here as a case study to illustrate the effects of these hazards and to assess the impact of changes made as a result of the 2003 fire. The 2007 fires, coming so close on the heels of those in 2003, provide an opportunity to observe and assess the effectiveness of the improvements that were implemented in the four years that followed. In addition to reviewing the general conditions of the wildfire hazards and emergency responses that occurred, this case study also focuses more specifically on the planning, management, and operation of the evacuation-related aspects of the fire experiences. While this case study does not permit a detailed discussion of all of the important details, interested readers can find a more in-depth discussion of the emergency preparedness and response aspects in Jones, et al., (2008) and Wolshon (2009).

Case Setting/Description

The fire-related evacuations in California provide an interesting case study because of their differences from other mass evacuations, particularly hurricane evacuations along the Gulf and Atlantic coasts and other smaller-scale evacuations for natural and man-made hazards (floods, fires, chemical spills, etc.) in other areas of the country. Although many of these differences stem from the nature of the fire itself, many others reflect the characteristics of the local population as well as the geography and transportation systems that are specific to southern California. A

comparison of the various events with the benefit of hindsight suggests that the effects of combinations of factors both helped and hindered various aspects the evacuation process.

For example, unlike the plans for hurricanes that rely on a pre-planned network of routes, phasing, and destinations because the general approach pattern and timing of the hazard is well-known, wildfire evacuation plans can only use a general framework that must be able to change quickly in response to the speed and direction of the fire. Similarly, since the many fires occurred in isolated mountainous areas, many of the wildfire evacuations took place on two-lane, low-speed roadways rather than on high-speed, high-capacity freeways and arterial routes. Another difference was that interviews with local officials indicated that many of the fires occurred in areas with a relatively affluent, well-informed, and highly mobile populace who were well-prepared, willing, and able to evacuate on short notice. This is in contrast to areas of New Orleans where a significant percentage of the population was unable and/or unwilling to evacuate.

Geographic Location

The wildfires of 2003 spanned a two-week period from late October to early November, and, at the time, were regarded as the largest in the state's history. The fires were spread over a multi-county area that included four primary fire zones, three in San Diego County and one in San Bernardino County. It was estimated that more than 100,000 people were evacuated during the period of the fires. Four years later, another series of fires over nearly the same two-week period were significantly larger than the 2003 event. In October and November of 2007, a series of more than 20 wildfires burned across a seven county area from Los Angeles and San Bernardino counties to the north, down to San Diego and Imperial counties near the Mexican border in the south. In total, these fires affected an area nearly double that of 2003 and precipitated the largest evacuation in California’s history, with some estimates suggesting that nearly a million people were relocated (LA Times 2007).

While many causes contributed to the scale and scope of the 2007 California wildfires, most experts conclude that drought conditions, prevalent in the area for at least 10 years, were the underlying factor that allowed the fires to spread as quickly as they did. Beginning in 1991, southern California experienced 7 years of significant drought, with 2007 being classified as an “extreme drought” year by the Climate Prediction Center. In addition to drought conditions, the spread of the fires was further amplified by the seasonally hot weather and strong Santa Ana winds (wind gusts during this period were recorded as high as 85 miles per hour [mph]), which created favorable conditions for the rapid spread of wildfires.

Type of Hazard

Wildfires present unique challenges to emergency officials with regard to conducting evacuations. While many coastal communities have detailed plans and specific timelines to initiate emergency evacuation procedures for hurricanes, wildfires tend to be unpredictable and

event-driven. Without the aid of wind, brush and wildfires might only advance at walking speeds of 1 to 5 mph. Under the influence of high winds; however, they have the potential to move at speeds of 60 or 70 mph, or more. These speeds are achieved when embers from the flame tops are blown to new locations and new flames are ignited.

In addition to their speed, wildfires can move in irregular directions. They do not move with a singular front, rather they move in the prevailing wind direction as hot embers carried aloft by high winds ignite “sub-fires” in locations miles from the original source. Such movements can cause significant complications in evacuations, because fires can skip over roads that may be used as fire breaks in addition to evacuation routes and move toward areas that previously provided safe shelter, effectively encircling at-risk populations.

Timing

Although some aspects of wildfire evacuations are similar to evacuations for other hazards, they differ most significantly from evacuations for hurricanes because they are much more fluid. The 2007 wildfires, similar to most wildfires, had no set origin and pattern of movement. As such, most evacuation plans for wildfires have no formally declared routes or temporal trigger points that govern when to initiate certain actions. Rather, actions are implemented based on a general framework in which a basic template of action exists. This involves a fire department's order of where and when to evacuate with a corresponding law enforcement agency’s role to determine how best to carry out the evacuation. Some areas, like the mountainous regions of San Bernardino County, do not even have designated emergency routes as the routes out of the area are already limited.

Because fire conditions warrant the priority movement of some areas before others, phased evacuations were implemented in 2007 by ordering certain areas to evacuate earlier. Emergency response personnel stated that using tools like the AlertSanDiego system (San Diego County OES 2010) to target earlier calls to the most threatened zones first were helpful. Although, in some situations, even when evacuations were initially staged, they were often quickly overcome by the size and speed of the fire and became more general, large area evacuations.

Number of People Impacted/Type of Impact/Any Vulnerable Population Groups

Similar to most other evacuation events, the exact number of residents who evacuated in advance of the 2007 fires, when they left, where they came from, and where they went is not known for certain. However, several sources suggest that there were a total of 1 million evacuees during, making it the largest in the history of California. The type of evacuation and when the orders were issued were a function of the speed and movement (direction) of the fires. Reports and interviews show that evacuation orders were made on both a mandatory and voluntary basis during the event. The following sections briefly highlight the evacuation processes for the various evacuee groups based on their mobility status.

Self-evacuees

The vast majority of evacuees during the wildfires were self-evacuators. Interviews with local officials suggest that the general high level of mobility of residents of southern California helped in this respect. Another finding from interviews was that the population tended to be (1) more knowledgeable of evacuations based on prior experience; (2) educated and aware of the potential dangers; and (3) prepared to leave quickly with their critical belongings.

Interviews also found that there were no special proactive traffic management techniques like contraflow or priority signalization during the 2007 fire event. In general, such actions appeared to be viewed negatively because of the additional control manpower they would likely require. Despite this, contraflow operations were seriously discussed for Ramona (north of San Diego) by local officials, but they were never implemented. In interviews, San Diego city officials indicated that contraflow was used on a major roadway in the 2003 Cedar Fire, also near Ramona.

Another alternative method of traffic control utilized by the mayor of San Diego focused primarily on limiting general traffic demand on the area roads. He requested that people stay home and off the roads to free capacity for evacuee traffic, responders, and for the basic safety of all. While the impact of the request was not measured directly, it demonstrated that a proactive message and effective utilization of the media to convey information can facilitate emergency actions.

People with Functional Needs Requiring Additional Assistance and Other Assisted Evacuees

The 2003 fires had a significant impact on lower income families, the elderly, and special needs individuals (OES 2004). The Governor's Office of Emergency Services identified this as an area where improvement could be made (OES 2004). There were no identified reports indicating that residents were unable to evacuate because of functional needs requiring additional assistance or lack of transportation. The State Independent Living Council (SILC) had participated in statewide disaster planning for many years prior to the fires. Transit for individuals with functional needs requiring additional assistance was available in some areas. The Mountain Area Rural Transit Agency (MARTA) evacuated dozens of people with disabilities. This was successful because MARTA drivers knew where their frequent riders lived (SILC 2004). Lists of disabled individuals were available in the fire departments; however, with most firefighters in the field, office activities were very limited and the disability lists were not accessed.

Although the evacuation of threatened populations proceeded relatively smoothly, some issues associated with the movement of dependent and functional needs populations during the 2007 wildfire event were noted. QualComm stadium was opened as a city-run, mega-care and shelter facility beginning on October, 22, 2007 (AAR 2007). The facility received thousands of evacuees, individuals with functional needs requiring additional assistance, and animals. Approximately 400 nursing home patients created medical and logistical needs not previously experienced at the shelter (AAR 2007).

In addition to the threatened population, 14 nursing homes evacuated nearly 1,200 residents in San Diego County (per the California Department of Public Health). There were also 85 assisted-living facilities that evacuated 2,189 seniors. Two acute care hospitals and a psychiatric hospital were temporarily shut down as a result of the fires (LA Times 2007). During the emergency, some elderly and infirm groups experienced some difficulties in evacuating. Of the 3,300 nursing home residents and elderly residents who evacuated, six were reported to have died (LA Times 2007). In San Diego, the Office of Emergency Services estimated that more than 1,000 seniors were moved through transit buses and EMS assets. This was the only noted use of transit assets in San Diego County for this evacuation.

Due to San Diego's location near the Mexican border, the county is home to a large migrant worker population. During the 2007 wildfires, reports indicate that there were several challenges in meeting the needs of this diverse group. There were several factors that contributed to the difficulties in evacuating this group, including:

- a lack of English-speaking proficiency that may have resulted in a lack of communication, confusion, and misunderstanding of evacuation and sheltering orders;
- a lack of trust of public officials because of possible illegal immigration status or prior negative encounters with law enforcement and immigration agencies; and
- limited financial resources to cover non-working periods.

Because of these issues, some migrant workers in California were reported to have remained in agricultural fields, even when under a mandatory evacuation order, and some were denied entry at shelters because they did not possess adequate identification (NPR 2007). Although city officials pointed out that no one was killed or injured as a result of not evacuating because of language barriers, the city's After Action Report did document a "chronic lack of translators, which hindered the ability to evacuate and/or provide other emergency services" (City of San Diego 2007).

A final area of concern noted during interviews with officials, classified under "assisted evacuation," was evacuation of children, including those at home during an evacuation order without adult supervision (i.e., latchkey children) or home with adult family members who chose not evacuate under mandatory evacuation orders. When notified by a parent, latchkey children were picked up by police who were on patrols in affected areas. Non-evacuating families were somewhat more complicated. While first responders in San Diego County noted that they did not have the capability to force citizens to evacuate under a mandatory evacuation, they did feel under existing child endangerment laws that they had the legal authority to forcibly remove children from a house during such an emergency. Interestingly, they found if they threatened the parents with a forced removal, the entire family would end up evacuating "99.9% of the time."

Pet and Livestock Evacuations

Throughout the 2007 evacuations, residents were encouraged to evacuate with their pets. During the wildfire emergency, all of the communities involved supported the evacuation of pets with the residents. In San Diego and San Bernardino counties, officials set up pet-friendly evacuations shelters and even accommodated pets at QualComm stadium. The estimates were that there were between 10,000 to 15,000 pets located in evacuation centers. The website Petfinder.com set up a 24-hour call center to link evacuees with volunteers willing to provide temporary homes for displaced pets. Lists of pet-friendly hotels were given for Southern California. Typically hotels were allowing pets to stay at the hotels for no extra cost. San Diego Humane Society and the Society for Prevention of Cruelty to Animals provided information regularly on their websites about animal evacuation centers.

The 2007 evacuation also included the evacuation of large livestock animals. Although much of the evacuation took place in urbanized areas, the extent of the fires was such that significant areas of open range land were also impacted. Because of this, local officials found that many people were evacuating with their horses. The region around San Diego is well-known for equestrian facilities; and arrangements were often made through such facilities. The San Diego Police mounted patrol also used their horse trailers to help evacuate horses out of impacted areas. At QualComm stadium, provisions were also made to shelter large animals like horses. Many people who could not evacuate with their horses left gates open to let horses run free in case they became cornered by the fire. These horse owners felt that if they could not be moved, the horses would have a better chance of survival on their own rather than being penned in an area with no means of escape and that they would be rounded up later after the fires were extinguished.

Preparedness

California is a mutual-aid state, and the effort to fight the fires in 2007, coordinate the evacuations, and accommodate the needs of the displaced and injured residents was shared among agencies at all jurisdictional levels, including city, county, state and Federal governments. Fire fighters and emergency management and response agencies also benefitted from the lessons learned from previous fires, most notably the wildfires of 2003. Interviews with local officials found that all of these factors combined to save both people and property from even greater losses. However, the interviews also showed that despite these successes, the knowledge gained from recent experience, and the benefits achieved from the shared effort, the enormous size and fast-moving nature of the 2007 fires combined with the enormous populations in the area did result in some problems of communication, coordination, and public response. An official After Action Report conducted by the city of San Diego documented both the lessons learned from the event, as well as recommendations to address them in the future (AAR 2007).

Response

The unpredictability of wildfires typically means that no formal written evacuation plans are developed. Under such conditions, emergency officials attempt to establish "trigger points" where fires pass a certain location and then the decision to initiate an evacuation for a specific area is implemented. Pre-determined evacuation routes do not exist and areas to evacuate are determined based on the nature of the wildfire.

Decisions of when and where to evacuate came from fire department officials who typically served as local Incident Commanders. Meetings with local officials showed that fire department officials designated where and when to evacuate based on knowledge and experience of weather conditions, fuel source availability, and threats to population. However, it was clear that their job was to fight fires and not evacuate people. The actual evacuation process was managed and controlled by law enforcement agencies.

The fire departments developed "evacuation boxes" based on recognizable and understandable physical boundaries like highways and waterways then they relayed this information to law enforcement and the city/county emergency operations centers. With the decision was made to evacuate, law enforcement and transportation officials were responsible for developing the mechanisms to initiate the evacuation plan and carry out the evacuation order. Local departments of transportation and departments of public works played a minor role overall in the evacuation by providing barricades, variable information signs, and closing roads as directed by law enforcement officials.

In San Bernardo County, evacuations were complicated by the fact that many of them took place from rural mountainous areas with very limited routes of egress. In some cases there was only a single route out of the impacted areas. Some evacuations in these areas also took place at night through areas without power. Such conditions not only interrupted the movement of traffic, they also made communication with potential evacuees more difficult, since many did not have access to television or radio. In addition to lost power lines and hampered communications, numerous roads were closed at various times during the fire event. At least five interstate freeways were closed during some period of the incident (CDF 2004). Because of this, some local residents were advised to shelter-in-place because routes of egress were closed due to the fire or because fire conditions made it too dangerous to evacuate an area.

Matching Resources to Needs

Although there are several examples of how resources were matched to address needs during the 2007 California wildfire evacuations, one of the most important was the matching and application of communication resources during the event. Communication difficulties, between and across jurisdictions, levels of government, agencies, responder groups, and with the public are consistently cited as one of the areas most in need of improvement after major emergencies –

especially those involving evacuations where timing is critical and correct information can often mean the difference between life and death.

Communications with Responders

One of the major shortfalls identified during the 2003 wildfires was a lack of interoperable communications equipment among the first responder agencies. In the years after 2003, San Diego County officials worked to address this shortfall and generally acknowledged that communications among first responders was considered a major success during the 2007 wildfires. The overwhelming opinion was that communications were handled quite effectively from within and between the various responding agencies. San Diego County utilizes two different 800 megahertz (MHz) trunked systems: a regional system for San Diego and Imperial counties and a dedicated system for the city of San Diego. In 2007, the Department of Homeland Security ranked the San Diego Tactical Interoperable Communications Plan as one of the four highest scored out of 73 evaluated cities. While the system overall performed well, there were a few noted deficiencies. This included a shortage of 800 MHz radios among firefighting crews that may, at times, have slowed the deployment of firefighters and equipment at various times and locations. Another identified shortfall was the lack of tactical channels for unit-to-unit communications. This limitation led to overcrowding on the available channels and the delay of information exchange at time when the bands were filled.

Another example of effective tools in San Diego County were the web-based emergency management communication tools like WebEOC® software that made it possible for up to 500 agency representatives to have complete, instantaneous, and full situational awareness. The primary function of the WebEOC® platform is for local government to process resources requests through a single system and to provide situational awareness reports to allow those logged into the system to see what is going on throughout the disaster event. Since the tool is web-based, all local and state agencies, including CalTrans, were able to maintain situational awareness and respond to resource requests throughout the duration of the wildfires.

Communications with the Public

To educate the public, issue evacuation orders, and provide up-to-the-minute information on the wildfires, the city of San Diego employed a range of communication assets to ensure that the necessary information reached its citizenry. The city reported utilizing the following methods to communicate with the public:

- Door-to-door knocking by first responders
- Police and fire rescue vehicle sirens
- Police and fire rescue vehicle and helicopter lights

- Constant monitoring and information flow to media outlets for dissemination to the public
- Emergency alert system via television media
- AlertSanDiego mass notification system
- Community access phone system
- 211 information line
- Individual and community preparedness

One of the key areas identified for improvement following the 2003 wildfires, was the ability to directly alert the public of emergency information during periods of disasters. To address this need, San Diego invested in the AlertSanDiego system, a citizen call ring down system. The AlertSanDiego system was populated with listed and unlisted phone numbers provided by the counties 911 database. While the system was only designed to alert citizens through land-lines, citizens were also able to register their mobile devices and sign-up for text messaging at the counties website, ReadySanDiego.org.

Another strength of the AlertSanDiego system is its ability to designate areas through the creation of polygons on a county map to ring down just the area that has been selected on the map. This was an ideal system for conducting evacuations in this type of environment because once the fire departments identified an "evacuation box," AlertSanDiego was able to notify just those individuals physically located within the evacuation area. This minimized the number of phone calls to be made and avoided calling out an entire zip code or area code. Through this system, San Diego reported that it was able to issue approximately 12,000 calls an hour.

The county was also able to utilize the 211 call system to relay non-emergency information to the public. The 211 prefix was set aside by the Federal Communications Commission for the public to obtain non-emergency related information. During the 2007 wildfire, 211 received more than 120,000 calls and was staffed with more than 1,200 volunteers. By utilizing the 211 service, citizens in San Diego County were able to receive up-to-the-minute information about evacuations, shelters, road closures, volunteer and recover information, and services. More important to emergency officials, the system was useful to relay non-emergency related agency contact numbers, allowing the general population to contact these offices directly instead of utilizing emergency dispatchers to give out numbers or transfer calls to others.

Modal Integration/Coordination

Although some modes of transport other than personal, automobile-based exist, they were limited to busses for the elderly and nursing home residents. No transfers between modes were noted.

Regional/Interregional/Interstate Coordination

Overall, the 2007 evacuations were reported to have progressed fairly well, considering the extent of the areas affected and the number of people that were involved. A significant reason for the positive results was the coordination enhancements based on the lessons learned from and improvements made after the 2003 fires. One of these improvements was the enhancement in response coordination between the various jurisdictions and their individual agencies. Although much of this coordinated response was focused on fighting the fires, the coordination of evacuation activities was also a part of this.

Even though the 2007 wildfires were spread over two mutual aid regions and seven counties, similar to most locations, decisions to evacuate were made at the local level. The California Department of Forestry and Fire Protection provided overall command and developed mitigation strategies to fight and ultimately contain the fires. It employed several area commands, usually at the county level, which provided coordination and prioritized resources. In addition, the Incident Command System, which incorporated a local unified command, was established with local fire departments taking the lead in fighting fires within their areas. Typically, the decision to evacuate was the responsibility of the local Incident Commander or in some cases, local authorities, which were most often fire departments.

At various times during the fires, up to 15 major roadway routes were closed due to dangerous fire conditions. However, these closures did not appear to impact the evacuation. Most notably, all of the most heavily traveled highways of Interstates, 5, 8, and 15, were closed at different times. To address this situation, local officials worked with their Federal counterparts at the Camp Pendleton Marine Corps Base to permit public use of on-base roadways for evacuation traffic to access northbound of Interstate 5 in lieu of Interstate 15. One of the ways in which the California Department of Transportation (CalTrans) assisted with road closures was through the release of the CALTRANS COMMUTER ALERT that provided location and details about road closures throughout the seven county area. These road closures were also illustrated through geographic information systems (GIS) by providing detailed maps that depicted the road closures as well as the perimeters of the wildfires. Both San Diego and CalTrans provided mapping services to assist responders and the general population during this period.

CalTrans also had representation in the local emergency operations centers (EOCs), in addition to establishing its District Command Centers. Both local EOCs and the District Command Centers included key management and staff. CalTrans assisted with the coordination of emergency response, evacuations, and route closures with assistance from the California

Highway Patrol. CAL-TRANS also mobilized maintenance and construction crews to assist in route closures, traffic control, and field damage assessments (CalTrans, 2007).

Recovery

The reentry of evacuees into impacted areas after the fires was another important concern. San Diego County, like many counties throughout the U.S., does not have a formal plan for reentry following the containment of the wildfires. Officials noted that a managed and controlled reentry for the San Diego was considered to be practically impossible. While formal plans were not developed for reentry, a set of informal guidelines allowing reentry into certain areas were followed. The primary concern for reentry was public safety to ensure that areas were safe to re-occupy. Utility companies focused on securing utilities; however, this did not mean that all utilities were restored prior to reentry.

CalTrans Damage Assessment teams also certified the safety of state and federal roadways. The CalTrans Damage Assessment Teams addressed immediate safety needs for re-opening route segments. Its immediate priorities were slope stabilization; erosion control, guardrail, signage, culverts/drainage, and electrical requirements for call boxes; lighting, etc. CalTrans' efforts resulted in all route segments being re-opened within two weeks.

While a controlled reentry was not possible for the entire San Diego County, there were examples of isolated neighborhood-sized areas in which a controlled reentry was established. In these instances, a local assistance center was set up at the entry point to an area. This center included many different services to "help effected people get their lives re-started." In addition to managing access, these centers were also meant to provide security against looters, provide safety hazards within the area, and identify unscrupulous contractors. Before permitting reentry into an area, the fire department conducted assessments to check for natural gas, electrical, and other potential hazards. Once individuals obtained the necessary credentials, they were then required to check-in and were granted access only during daylight hours. This process was repeated daily until authorities allowed for a full reentry. San Diego officials also maximized the use of the reentry assistance centers by co-locating grief counselors to assist those who experienced difficult emotional issues as a result of the wildfires.

Case Study Key Findings

The Southern California wildfires of 2007 precipitated the largest evacuation in California history. Emergency response personnel were able to effectively manage the evacuation of this disaster by incorporating many of the lessons learned from the 2003 wildfires that burned over similar areas. These fires led to the development of several key preparedness and response measures, primarily management-related and some indirectly related to evacuation. Among the most significant measures were the incorporation of the incident command system through all levels of response, enhanced interoperable communications for first responders, and an effective

plan to communicate to the public San Diego officials. These measures helped minimize the loss of life and property.

Lessons Learned/Avoidable Failures

Following the 2003 fires, the governor of California formed the Blue Ribbon Commission to conduct a review and present recommendations to help make California less vulnerable to fires in the future (Campbell 2004). In addition to the Blue Ribbon Report, many after action reports and lessons learned documents have been published that also assess elements of the response to the fires. These reports provide a basis to assess the effectiveness of improvements that were integrated as a result of lessons learned. The intent was to determine how these lessons learned may have benefitted or improved the response in 2007 and whether such improvements might be beneficial to the Nuclear Regulatory Commission and/or FEMA emergency preparedness program.

In the development of after action reports and other studies related to the evacuations in 2003, many lessons were documented. Lessons learned, findings, and recommendations for the 2003 fires were identified in the Blue Ribbon Report (Campbell 2004) and include:

- There were no minimum statewide training standards.
- A comprehensive public awareness program was needed.
- Communications interoperability was essential for effective command and control during multi-agency, multi-disciplinary responses to major incidents.
- It was recommended that all EOCs dedicate a Public Information Officer or establish a joint information center.
- It was recommended that local governments improve public outreach and emergency evacuation education.

Agency after action reports and post-incident assessments also included lessons learned in core areas of training, preparedness, education, and communication (CDF 2005). Some of which include:

- Implementation of a joint information center was needed early in an incident to provide a unified message to the community, public, and media (Maxfield 2004).
- Development of a multijurisdictional evacuation plan was needed (Mutch 2007).
- Radio communication problems caused coordination problems between agencies and units in the field and prohibited effective situation awareness (Maxfield 2004).

- Cell phones can augment communications, but these systems become overloaded.
- There was a need to provide evacuation information Spanish as well as English (CDF 2004).
- Agencies that had trained together functioned more effectively as a unified team (Maxfield 2004).

In the wake of the 2003 fires, public education improvements included an increase in the number of Fire Safe Councils to more than 90 (CDF 2004). Fire Safe Councils primarily address pre-fire management such as fuel reduction and protection of communities and are a means of integrating community support (Campbell 2004). Information staff has been increased (CDF 2004) to provide additional individuals who are instrumental in the proactive education of the public, officials, and the media regarding the increased risk of wildfire (CDF 2004).

Communication with the public, including timely notification, is vital if an area is to be evacuated prior to the onset of the hazard. Multiple methods of communication with the public are usually attempted. In 2003, the Cedar fire moved quickly and evacuation notification for this fire was primarily by door-to-door contact or via loudspeakers on emergency vehicles. San Diego County normally would also use the emergency alert system, but it was deemed impractical at the time because the information would be inaccurate due to the swiftness of the fire and the late hour of the notification at 12:01 a.m. (CDF 2004). In 2007, the city of San Diego used all methods available to notify the public of the need for action. Methods used to notify residents in the path of the Witch Creek/Guejito fire included:

- Door-to-door;
- Police and fire sirens;
- Police and fire vehicle and helicopter lights;
- Media outlets;
- Emergency alert system;
- Reverse 911®;
- AlertSanDiego mass notification system; and
- Community access phone system.

In addition, the 211 information line was available with operators who had current knowledge of the incidents. San Diego County personnel said that the 211 system, although overwhelmed in

this response, was helpful in reducing calls into the 911 emergency system. The Reverse 911© system sent out almost 15,000 calls predawn on October 22, 2007, to notify residents of mandatory evacuations (AAR 2007). Because of the rapid spread of the Guejito fire, it was not possible to construct and launch a Reverse 911® session prior to arrival of the flames (AAR 2007). AlertSanDiego was also used and is similarly to the Reverse 911®; however, AlertSanDiego has additional benefits including the ability to dial numbers based on geographic location whereas the Reverse 911® dialed numbers in numerical order. A community access phone system was also available in San Diego to provide a direct information line to the public. During the Cedar fire of 2003, 12 lines were established for this system, whereas in 2007, 20 lines were available and operators answered more than 12,300 calls.

Summary/Conclusions

Although both the 2003 and 2007 Southern California wildfire events included evacuations, the 2003 fires only involved about 100,000 evacuees while the 2007 fires included more than 900,000 evacuees. A primary reason for this difference was the rapid spread of the 2007 fires. Fire departments made evacuation decisions based on the best information available, including from fire spotters that were located well ahead of the flames to monitor the spread. During both events officials ordered both mandatory and voluntary evacuations for areas that could be potentially affected. The evacuations in most areas began as staged events with voluntary and mandatory evacuation areas identified. Response personnel stated that most fires moved so quickly that the staging became more of a general evacuation.

At least five Interstate highways were closed for a period of time during the 2003 fires and two Interstates were closed during the 2007 evacuations. In each incident, the loss of these roadways affected the evacuation. CalTtrans worked with police to establish evacuation routes. This included use of traffic video information to help communicate evacuation congestion. To help alleviate unnecessary congestion, the mayor of San Diego asked that people who did not need to travel refrain from driving during the peak of the evacuations.

Following the 2003 California fires, state, city, and county agencies prepared assessments of lessons learned and needs to improve response and reduce risk in the future. In 2007, another series of fires occurred in California prompting the evacuation of almost ten times the number of residents evacuated in 2003. The evacuation of more than 900,000 residents was widely viewed as successful. The implementation of improvements developed from these lessons learned were clearly instrumental in supporting effective communication among responders and the public, facilitating massive evacuations, and sheltering thousands of evacuees. The insights from the study of these fires support that implementation of lessons learned can occur quickly and have beneficial impacts on response. In the review of the 2007 California fires, there were few new lessons learned. The need to plan for the evacuation of latchkey children became evident when the San Bernardino Sheriff's Department began receiving calls from parents. Another lesson learned, although obvious to the firefighters, was the need to be prepared to respond to wind

shifts and changes in direction of the hazard. Emergency planning for nuclear power plants contains no specific guidance for evacuation planning of latchkey children. This is addressed under the broad requirement that planning be in place for the public. With regard to the changing direction of the hazard, emergency preparedness around nuclear power plants includes deployment of plume trackers to identify the bounds of the plume. This action, as well as expanding the evacuation area when needed, is tested in large exercises.

The evacuation of pets was very proactive in the 2003 and 2007 fires. In 2007, the San Diego Sheriff's Department mounted patrol assisted with the evacuation of hundreds of horses using department horse trailers when needed. People were encouraged to evacuate their pets, and shelters in many instances accommodated these animals.

Individuals with Functional Needs Requiring Additional Assistance

In 2007, the population with functional needs requiring additional assistance that was evacuated was considerably larger than in 2003. Discussions with response personnel revealed that when necessary, and certainly not optimal, response personnel evacuated individuals in their patrol cars and even in fire engines if lives were at risk. In San Bernardino, the Sheriff's Department had to support the evacuation of latchkey children left at home while parents were at work. The children were later reunited with parents at evacuation logistics centers. Also in San Bernardino, the local community bus service for the mountain areas ran virtually non-stop to evacuate residents with functional needs requiring additional assistance. The service picked up people who were regular riders and also responded to requests when residents called for assistance.

In general, in San Diego, the areas that required evacuations were homeowners with vehicles. There were as many as 11 special facilities evacuated and the residents were taken to comparable facilities outside the evacuation zone or to shelters. There were no reports of lack of transportation resources to support these evacuations. Response personnel in both San Bernardino and San Diego knew of no reports where people were unable to evacuate due to a lack of means. However, an after action report identified that segments of the local population are underrepresented in the planning and preparedness process including individuals with functional needs requiring additional assistance, non-English speaking, transients, and the homeless (AAR 2007). There was also a lack of Spanish speaking translators (AAR 2007) reportedly available to support shelter facilities and provide general logistics and interaction with evacuees.

Shelter Facilities

The largest shelter used in the 2007 fires was QualComm stadium. Because this was a stadium, it was frequently compared to the Louisiana Superdome used as a shelter for Hurricane Katrina. Emergency response personnel very clearly pointed out that there was no basis for any type of comparison. The only common element was that both shelters were stadiums. The evacuees that sheltered at QualComm generally had their own vehicles and could come and go at will. Thus,

they frequented restaurants and shopped for basic supplies as needed. Donations of food, water, and necessities poured into Qualcomm almost immediately. In fact, the traffic from these donors contributed to the congestion around the stadium. Thus, there was really no common basis for a comparison to the Superdome. The city had in fact learned a lesson from Hurricane Katrina regarding the need to keep people entertained, and the city Parks and Recreation department brought in activities for children. The shelter was established before the Red Cross could support the facility and volunteers were needed. In many cases these included city workers and Community Emergency Response Team or CERT volunteers. CERT is a volunteer network of citizens in California that have limited training and are credentialed to support emergency response activities. The CERT teams assisted with many elements of the emergency response, most notably interacting with evacuees and supporting needs at shelters. The shelter program in California was very accepting of pets. Pet shelters were available, and pets were also accepted at many of the evacuee shelters including QualComm stadium.

2008 Louisiana Chemical Spill

Overview

On May 17, 2008, in Lafayette, Louisiana, about 125 miles west of New Orleans, emergency responders ordered an early-morning mandatory evacuation after six Burlington Northern Santa Fe (BNSF) rail cars collided. Two of the rail cars carrying hydrochloric acid and another carrying ethylene oxide were compromised and created a potentially explosive situation. The Incident Commander immediately ordered the evacuation which impacted nearly 3,500 residents in Lafayette.

Response

State police walked door-to-door advising residents of the evacuation and recommended that they take enough supplies for a 48-hour period. There were no reports of assisted evacuations; however, among these mandatory evacuees were 161 residents of a nursing home who did need to be relocated to safety. This included 35 residents deemed too frail to travel who were taken to local hospitals to wait out the danger. The local American Red Cross chapter set up a shelter at the Carencro High School. The shelter was closed by Saturday evening as BNSF arranged for hotel accommodations for displaced residents.

The derailment also impacted many local businesses. The spill forced them to close during the derailment and subsequent clean-up. State police also reported that five people, including two railroad employees, were taken to the hospital and treated for eye and skin irritation.

The derailment also caused many major roads to be closed, including Interstate 10. The Ambassador Caffery Bridge remained closed until the Louisiana Department of Transportation and Development could inspect the bridge for damages. The bridge and highway were reopened Monday evening, after officials inspected the road and found no damages.

The derailment also impacted other rail lines and forced an Amtrak Sunset Limited from Los Angeles headed to New Orleans to detour, delaying its arrival about 1.5 hours. Air traffic was not permitted within the 1 mile radius and with a ceiling of 2,000 feet. No information was found regarding pets or livestock evacuations. Residents outside the immediate evacuation area were advised to remain in their homes and turn off their air conditioners to avoid contamination from the spilled chemicals.

Recovery

Once the situation was stabilized and the hydrochloric acid was contained, residents were allowed to return to their homes. This occurred within 24 hours of the initial event. All affected people were reimbursed for food and hotel expenses by BNSF.

The Governor's Office of Homeland Security and Emergency Preparedness activated the CRISIS Action Team and manned the Emergency Operations Center for the event. Also FEMA Region VI and the Denton Mobile Emergency Response Support Operations Center (MOC) monitored the situation and no requests for federal assistance were reported.

Summary/Conclusions

The Federal Railroad Administration (FRA) conducted a routine investigation into the train derailment since there was a release of hazardous materials. BNSF used lime to neutralize the acid and then workers removed the neutralized material and disposed of it in the proper manner. The FRA hoped to avoid this type of incident with the implementation in 2005 of a comprehensive safety plan for the nation’s railroad system. BNSF issued a written statement that said it was working with local and state officials and understood the inconvenience caused by the accident and wanted the public to know the safety of local residents is always its first priority. Crews neutralized the hazardous material near site of train derailment; and the incident was declared closed May 20, 2008.

2008 Hurricane Gustav

Overview

Hurricane Gustav landed in Louisiana on September 1, 2008, nearly 3 years after Hurricane Katrina devastated New Orleans in 2005. Thirty-four (34) parishes were declared a disaster area and 48 storm-related fatalities were attributed to the storm (CNN 2008; National Hurricane Center 2009). Prior to the landfall of Hurricane Gustav, nearly 2 million people evacuated from southeast Louisiana. The Gustav evacuation was unique in that the city of New Orleans, in partnership with neighboring Jefferson Parish and the state of Louisiana deployed, for the first time, the City Assisted Evacuation Plan (CAEP). The CAEP is a multimodal evacuation that accommodates carless tourists and residents, as well as vulnerable populations with specific and functional needs. The CAEP was in addition to the state's contra-flow plan for those with the ability to self-evacuate.

Case Setting/Description

Geographic Location

New Orleans is located south of Lake Pontchatrain, north of the mouth of the Mississippi River, in southeastern Louisiana near the Gulf of Mexico. The city is built on alluvial plain deposits from centuries of land creation along the Mississippi River delta. Most of the city is located below sea level and is protected by levees.

Type of Hazard

Hurricanes are large-scale hazards with large geographic impacts. They can result in wind gusts of more than 200 mph, flooding, heavy rain, power outages, and spin-off tornadoes. They are most common during hurricane season, which begins June 1 and lasts until November 30. The peak of hurricane season occurs in late July through early October. Hurricanes typically form over the Atlantic Ocean, although hurricanes also occur on the Pacific Ocean, and their path is forecasted with a "cone of uncertainty." Cities located within this possible landfall area typically have 48 to 72 hours to prepare, often allowing enough time for an evacuation. Hurricane activity varies from year to year. Moreover, the location of the landfall of hurricanes is fairly random; some cities might not experience a hurricane for decades and then receive two or more within a few years.

Timing

The city of New Orleans and surrounding metropolitan area began making preparations for evacuation a day or two before Hurricane Gustav hit Cuba, on August 30, 2008. After crossing Cuba, Gustav reentered the Gulf of Mexico on August 31st and strengthened with maximum sustained winds of 135 mph. The storm made landfall as a Category 2 with winds sustained

winds at 105 mph southwest of the city of New Orleans near Cocodrie, Louisiana at 9:30 a.m. on September 1, 2008.

Number of People Impacted/Type of Impact/Any Vulnerable Population Groups

Hurricane Gustav impacted the entire New Orleans and Baton Rouge metropolitan areas as well as rural areas across southeastern Louisiana, an area with more than 2 million residents.

Self-evacuees

With approximately 1.9 million people evacuating, Hurricane Gustav was one of the largest evacuations in U.S. history. Self-evacuation began on Saturday, August 30, 2008. The mayor of New Orleans issued a mandatory evacuation order beginning on August 31st and the bulk of residents fled the city on that day.

People with Functional Needs and Other Assisted Evacuees

Hurricane Gustav was unique because it was the first time the city of New Orleans, in partnership with suburban Jefferson Parish and the state of Louisiana deployed the CAEP, which served nearly 20,000 residents and 13,000 tourists. This multimodal plan included a component to evacuate anyone without access to automobiles, including tourists and those with specific and functional needs. Under the CAEP, preparation of staging areas began approximately 84 hours before the hurricane made landfall (August 29); however, evacuees did not start to utilize the plan until August 30, 2008.

Developed by the city's Office of Emergency Preparedness, the CAEP includes designated pick-up locations throughout New Orleans at various spots including senior centers and within neighborhoods. Paratransit residential pick-up service is provided to residents that cannot access a designated pick-up location. The CAEP also includes hotel pick-up locations for tourists with plane tickets. These tourists are taken to the Louis Armstrong International Airport to be sent home on the first available flight, as airlines work closely with local government to bring in extra plane capacity for the evacuation. Tourists without plane tickets are treated as part of the general public under the CAEP.

City buses are used to transport residents from general public pick-up locations to a staging area where evacuees are transferred onto coach buses provided by the state of Louisiana. The coach buses are used for long distance transport to shelters located across the state or beyond.

The senior center and paratransit component identifies persons who need medical resources (NMRs). During Gustav, NMRs were brought to the Union Passenger Terminal and evacuated on Amtrak destined for Memphis, Tennessee. In cases requiring a higher level of medical assistance, ambulances and helicopters were available to transport patients to local military and civilian airports for transfer to safer destinations.

Pet and Livestock Evacuation

Since pets are not allowed in American Red Cross shelters, the CAEP includes a pet evacuation plan. However, pets are transported to separate locations from those using the CAEP. The plan has capacity for up to 10,000 pets; however, during Gustav only 18 percent of those using the CAEP traveled with pets (Kiefer, Jenkins, and Laska 2009). The pet evacuation was coordinated with the Louisiana Society for the Prevention of Cruelty to Animals.

Information about any evacuation of livestock evacuations during Gustav is unknown.

Preparedness

Renne, Sanchez, and Peterson (2009) outline emergency preparedness in Louisiana as it relates to evacuation planning. This section summarizes the key findings.

Emergency preparedness in Louisiana occurs at multiple levels of government, and is a shared responsibility between parish governments and the state. The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) had developed the State of Louisiana Emergency Operations Plan of 2007, prior to Hurricane Gustav. The state plan serves to coordinate the activities of multiple state agencies to provide evacuation services from defined pick-up locations in each of the state's 64 parishes. It is the responsibility of each parish to transport persons needing evacuation assistance to these pick-up locations by implementing local plans, such as the CAEP (Renne, Sanchez, and Peterson 2009).

GOHSEP has the responsibility for directing emergency and/or disaster operations in the state of Louisiana by an executive order from the Governor. Part of this responsibility includes the development of the State of Louisiana Emergency Operations Plan. The plan's central purpose is to delineate a chain-of-command and designate responsibilities and tasks among various state, local and other entities.

Emergency management is divided in five phases in the plan: prevention, mitigation, preparedness, response, and recovery. Nearly a third of the State of Louisiana Emergency Operations Plan deals with risk assessment. The state's vulnerability has been assessed for each of a long list of natural, technological, and intentional acts and biological hazards. As expected, the state's vulnerability to hurricanes and storm surges is considered catastrophic.

In addition to risk assessment, the State of Louisiana Emergency Operations Plan designates a unified command structure that details the chain-of-command and the designation of responsibilities. This command structure is a reflection of the national policy guidance within the National Response Framework. GOHSEP is at the top of the organizational tree, managing four support functions: transportation, human services, emergency services, and infrastructure.

The first support function, ESF-1, Transportation, consists of the Department of Transportation and Development (DOTD) and is responsible for providing the transportation resources to evacuate people in need. The DOTD is able to coordinate private and volunteer transportation resources outside of the state's fleet of vehicles, and even National Guard assistance, to facilitate the evacuation effort. This includes provisions for transportation resources for at-risk populations as well. The ESF-1 has a designated coordinator who collaborates with other entities in developing evacuation plans and transportation resource inventories. Those entities include: (1) the Louisiana National Guard, (2) the Department of Agriculture and Forestry, (3) the Department of Corrections, (4) the Department of Education, (5) The Governor's Office of Elderly Affairs, (6) the Department of Health and Hospitals, (7) the Public Service Commission, (8) Louisiana's Board of Regents, (9) the Louisiana State Police, (10) the Department of Wildlife and Fisheries, and (11) volunteer organizations. Certain ESFs are more closely related to evacuation planning for the carless and for people with functional needs requiring additional assistance than others.

ESF-6, Mass Care, Housing, and Human Service Annex is responsible for sheltering and feeding programs. The Department of Health and Hospitals coordinates ESF-6 to provide medical assistance at the shelters. ESF-6 includes responsibility for collecting and providing information about the evacuees through the Disaster Welfare Information System. This system assists in reuniting family members separated during an emergency. ESF-8, Public Health and Medical Services Annex is primarily overseen by the Department of Health and Hospitals whose responsibility is "for public health, sanitation, medical and health assistance to Special Needs shelter operations" (LOP 2007, page ESF 8-1).

ESF-13, Public Safety is primarily controlled by the State Police and the Department of Justice. They have wide-ranging responsibility to protect public safety by, among other things, controlling evacuation traffic (Renne, Sanchez, and Peterson 2009).

At the local level, the CAEP was created after Hurricane Katrina, during which no plan was in place to evacuate carless and vulnerable residents and tourists with the exception of the Superdome as the shelter of last resort. In 2006, the city of New Orleans started putting the CAEP together. It currently includes more than 100 memoranda of understanding, which have to be updated each year.

Response

This section summarizes the response of the Gustav evacuation, which occurred from August 29 through 31, 2008, in which approximately 20,000 locals and 13,000 tourists evacuated using the CAEP and nearly 2 million self-evacuated by automobile.

The contraflow evacuation plan went into effect in the early morning hours of Sunday, August 31; hours after the mayor of New Orleans announced to the public that a mandatory evacuation

order would go into effect at midnight on August 31st. The contra-flow of the highways was led by the Louisiana State Police.

The CAEP began before the mandatory evacuation order. Figure 1 depicts the New Orleans CAEP timeline. It should be noted that this timeline is part of the 2006 plan, prior to Gustav. The times are approximate and minor teaks likely occurred. At 84 hours prior to hurricane landfall, the New Orleans Police Department, Louisiana State Police, and others began a process known as "leaning forward." At this same time, the New Orleans Regional Transit Authority (RTA) and the airport activated their hurricane plans. The Louisiana Department of Transportation and Development, which provides coach buses for the CAEP, also began their official process of organizing these transportation resources during this leaning forward phase.

The period from 60 hours to 54 hours prior to landfall is known as the "Make Ready" stage. At that time, the CAEP was officially launched and the RTA began the tourist-based portion of the CAEP by making trips from downtown to the airport.

The period from 54 hours to 30 hours prior to landfall is known as the "Execute CAEP" phase. This is the time when RTA buses, paratransit vehicles, and ambulances transported people from their neighborhoods and homes to the processing centers for transfer onto coach buses and trains to a safe destination out of the city.

Also during this period, the city communicated with emergency managers from the state of Louisiana, as well as other emergency managers from parishes across the region, to coordinate the automobile-based portion of the evacuation. At 50 hours prior to landfall the State Phase 1 evacuation was implemented, evacuating areas outside of levee protection. The State Phase 2 evacuation began at 40 hours prior to landfall, evacuating areas north of the Intercostal Canal and south/west of Interstate 10 and the Mississippi River.

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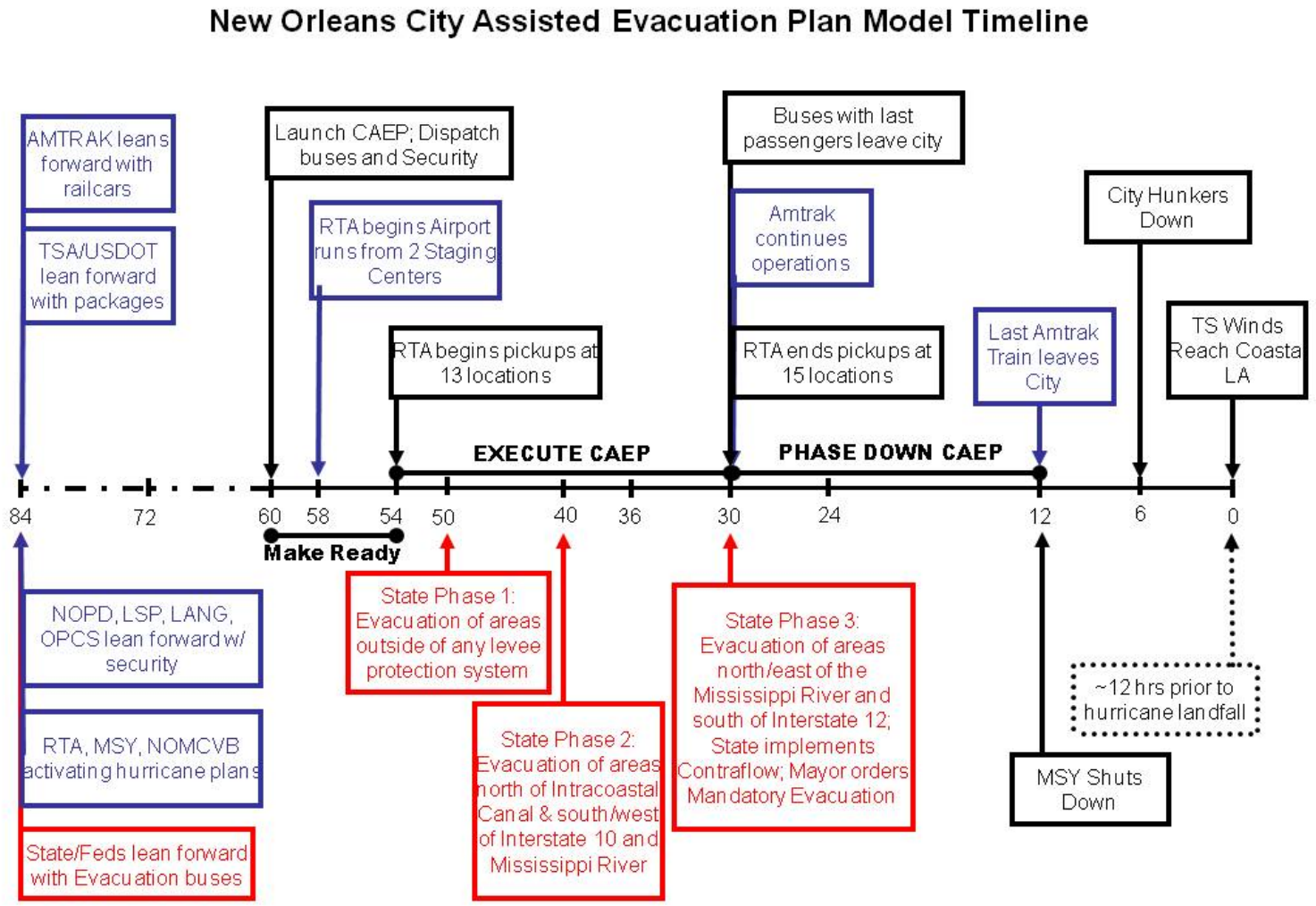

Note: This is only to be used as a guideline. It is thought to be a reasonable timeline; however, in practice, there may be more or less time available depending on the circumstances of the actual event.

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From 30 hours to 12 hours before landfall the CAEP enters the "Phase Down" approach. During this time, the RTA ended passenger pick-up and Amtrak and coach buses left the city with the last passengers. The State Phase 3 evacuation also began at 30 hours and included the evacuation of areas north/east of the Mississippi River and south of Interstate 12. The state implemented the contra-flow and the mayor's mandatory evacuation order went into effect.

The airport shut down at 12 hours prior to landfall. At 6 hours prior to landfall, the city of New Orleans hunkered down.

Matching Resources to Needs

Staff at the city of New Orleans, Office of Emergency Management, work year-round to continually update the CAEP. Prior to Gustav, the CAEP effort began in 2006 and was updated annually until it was activated in August 2008. The city continues to update the CAEP each year.

Resources for the CAEP were developed based on the needs of the population. The city staff worked with government agencies to collect and analyze data to assess the needs of the population. Due to the high numbers of tourists in New Orleans, the population that needs assistance fluctuates depending upon the week. Thus the city separated the tourist portion of the CAEP separately from the general population. It also left the evacuation of nursing homes within the domain of the State Department of Health and Hospitals.

Communications with Responders

The New Orleans Office of Emergency Management, Emergency Operations Center (EOC) was virtually non-existent during Hurricane Katrina. During Katrina, the staff operated out of a 1,500-square-foot room that was a tight fit for 20 people. During Hurricane Gustav, a new 10,000 square foot EOC was under construction and was utilized to bring many people together. However, at that time much of the advanced technical equipment was not yet installed. Nevertheless, officials and responders applied many lessons from Katrina that assisted with the evacuation, response, and recovery of Gustav.

Communications with the Public

The state of Louisiana and city of New Orleans communicates with the public in a number of ways. Information regarding contra-flow plans and the CAEP is distributed widely in hard copy. Maps, pamphlets, and other pertinent information are distributed in English, Spanish, and Vietnamese. Materials are disseminated in newspapers and at public buildings, including libraries, schools, post offices, clinics, and on buses. Materials are also made available in electronic form on the city's website: http://www.nola.gov/GOVERNMENT/Emergency-Prepardness/Emergency-Preparedness-Documents. The city also utilized a 311 system to register individuals for the CAEP.

Just prior to the evacuation of Hurricane Gustav, the topic of evacuation became the subject of many local and regional radio and television broadcasts. The mayor addressed the public the evening of Saturday, August 30, 2008, to issue the mandatory evacuation order.

Modal Integration/Coordination

One of the impressive aspects of the evacuation of Hurricane Gustav was the modal integration. As noted earlier in this case study, the evacuation included a substantial automobile-based evacuation that included the contra-flow of highways that served nearly 2 million evacuees.

While the CAEP served a much smaller percentage of the evacuees, the efforts were no less important because the CAEP served the most vulnerable segments of the population, including tourists, carless residents, and residents with specific and functional needs. To accomplish this, many modes were utilized including walking, local transit buses, coach buses, trains, ambulances and paratransit vans, automobiles, helicopters, and planes.

- Walking – carless residents utilizing the CAEP without specific and functional needs had to walk from their homes to one of the pick-up locations.

- Local Transit Buses – the RTA provided 40 buses continuing to serve normal routes with limited service prior to and during the early stages of the CAEP. At the same time, they also began serving each of the pick-up locations to transport evacuees to the processing centers for transfer to trains and coach buses.

- Coach Buses – the state of Louisiana was responsible for providing 100 coach buses to the New Orleans arena, the location of the transfer between the local transit buses.

- Trains – Amtrak provided transportation to those designated as needing the most medical attention. These evacuees were sent to Memphis, Tennessee. It should be noted that Jackson, Mississippi is 200 miles closer, but the city of New Orleans was not able to come to agreement with the city of Jackson to accept evacuees. Thus, evacuation capacity was limited because fewer roundtrips were possible to Memphis, which is located approximately 400 miles away, 200 miles further down the tracks from Jackson.

- Ambulances and Paratransit Vans – Residential pick-ups were coordinated by the 311 center and the Residential Evacuation Assistance Pickup (REAP) Operations Plan. The 311 Center functioned as the control center for these operations. The City of New Orleans promoted pre-registry with the 311 system, but evacuees needing residential assistance could have called 911 or 311 at the onset of the emergency. Call center operators screened the callers to determine their level of need. The information was then passed through the Area Commander who

dispatched a bus, ambulance, or other transportation appropriate for the specific need. Ambulances and paratransit vans were also a key mode for the evacuation of nursing homes, operated by the Department of Health and Hospitals.

- Automobiles – in addition to the majority of residents that self-evacuated, automobiles were also used by residents to transport themselves, friends and/or neighbors directly to the New Orleans Arena for transport on coach buses, to the Union Passenger Terminal for a ride on Amtrak, or to the airport for a flight out of town. Some locals have automobiles, but were not able to afford the long journey by self-evacuation. Others were concerned about the quality of their cars making a long-distance journey. Thus the city welcomed anyone who wanted to use the CAEP the ability to do so without charge.

- Helicopters – helicopters were utilized in limited instances to transport people with a high-degree of medical risk to safe locations or to the airport where they could be flown to other cities for specialized medical services.

- Planes – planes were a key component of the tourist component of the CAEP, which served 13,000 people during Gustav.

Regional/Interregional/Interstate Coordination

The evacuation of Gustav was aided by an extensive effort, which began years before the storm to coordinate across stakeholders to develop both automobile-based evacuation plans and the CAEP. The CAEP is updated annually based on information from stakeholders involved in the planning process. The key stakeholders involved in the CAEP include:

Local Government Agencies

- New Orleans Office of Homeland Security and Public Safety
- New Orleans Office of Emergency Preparedness
- New Orleans Police Department
- New Orleans Fire Department
- New Orleans Mayor's Office of Technology
- New Orleans Emergency Medical Services
- New Orleans Health Department
- New Orleans Council on Aging

- Other Orleans Parish Departments
- Jefferson Parish OEP
- Plaquemines Parish OEP
- St. Bernard Parish OEP
- Port Authority
- Harbor Police

State Agencies

- Louisiana Office of Homeland Security and Emergency Preparedness
- Louisiana Department of Transportation and Development
- Louisiana Department of Social Services
- Louisiana Department of Health and Hospitals
- Louisiana National Guard

Non Government Operated Entities

- AMTRAK
- Morial Convention Center (owned by the state)
- Union Passenger Terminal (owned by the city)
- Louis Armstrong Airport
- Regional Transit Authority
- Louisiana Society for the Prevention of Cruelty to Animals
- American Red Cross
- New Orleans Hotel and Lodging Association
- Lakefront Airport
- Citizens Emergency Response Team

Recovery

While the evacuation for Gustav, including the contra-flow plan and the CAEP went relatively smoothly, the reentry was more problematic. A lack of communication and ability to coordinate decisions across parishes in the impacted areas led to a breakdown in communications during the reentry process.

A key problem was that parishes south of the city of New Orleans announced that residents were allowed to return; however, the city of New Orleans did not want residents to return as quickly because officials wanted more time to assess damage to infrastructure before making an assessment if it was safe for residents to return. The issue was that the residents of parishes to the south had to drive through the city of New Orleans in order to get to their homes. At first, the state police set up roadblocks to check identification; however, that process created massive traffic jams on the highways and was soon abandoned. As a result, the city was forced to allow residents to return before it felt ready to accept them.

Some CAEP evacuees felt that they were held in shelters for too long. This resulted because the city was able to control the return of the CAEP evacuees; whereas, it was not able to control the return of those who drove. Considering that CAEP evacuees were aware that others were returning to New Orleans, they felt anxious to get home. However, city officials note that the delay for returning CAEP evacuees was based on the need to ensure that hospitals and other services were operational.

Case Study Key Findings

Kiefer, Jenkins, and Laska (2009) analyzed the CAEP for the New Orleans Office of Emergency Preparedness. General findings from the report are:

- Almost 75 percent of the evacuees were satisfied with their experience and would use CAEP again.
- Almost 70 percent of participants rated their re-entry experience as good or better.
- None of those surveyed expressed any concern about how their pets were sheltered and cared for.
- Over half the participants rated transportation out of the city as good or better.
- The study findings indicate that citizens are listening to their government officials, cooperating, and contributing to the effectiveness of the evacuation effort. Evacuation preparedness has improved significantly since Hurricane Katrina

Lessons Learned/Avoidable Failures

The report from Kiefer, Jenkins, and Laska (2009) details lessons of the CAEP. Barriers to a successful evacuation include:

- Many evacuees reported lacking adequate finances to evacuate, even with the CAEP. Clearly, some citizens thought they had to pay for their transportation, lodging, and food as a participant of the CAEP. This finding points to a need for the city to better communicate the array of services that it will provide to evacuees while under the care of their government.

- Others respondents reported that elderly family members who did not, would not, or could not evacuate served as a barrier to the respondent's own evacuation.

- Some citizens reported that they lacked confidence in the ability of their government to evacuate them from harm's way.

- The community groups and other public service organizations were under-utilized in registering citizens in the CAEP in the months before the hurricane stuck [sic].

- While overall there were positive evaluations of the ride out of the city, some evacuees reported negative experiences about the bus ride out of the area, particularly as a result of lack of driver training and preparation.

- In addition, some respondents reported negative experiences in shelters. The latter emerged from an almost universally reported feeling that those staffing the shelters "did not want them here." Evacuees, particularly the elderly, reported feeling unsafe at shelters.

- Respondents expressed concerns about being returned to their homes when their neighborhoods lacked full return of utilities and public services. Improvement with the re-entry process is needed through better coordination with local officials to know the condition of neighborhoods: electricity, food, medical services, and local transportation (required to get the evacuee from the re-entry drop-off point to their homes).

Improvements from Lessons Learned

Again, Keifer, Jenkins, and Laska (2009) illustrate the following improvements from the lessons learned:

- The challenging job of maintaining an accurate and up-to-date CAEP database of citizens needing evacuation assistance is critical to the success of the program. Since Hurricane Gustav, the RTA has arranged to take over the maintenance of

that database. The RTA's use of an automated system to contact and verify registrants is an important step to addressing what was a very personnel-intensive effort for the Office of Emergency Preparedness. This new capacity is a positive improvement in the program.

- We recommend that the city and state work collaboratively toward continued improvement of the CAEP by involving city, state, Federal, non-governmental, private sector, and academic organizations.

Summary/Conclusions

In summary, the evacuation of New Orleans for Hurricane Gustav demonstrates a multimodal approach for a large-scale disaster. While the bulk of the population were able to self-evacuate in automobiles via the roads and the contra-flow system, a small, but important percentage of residents without the means or ability to evacuate by car had a viable option – the CAEP. Not only does the Gustav evacuation represent a meaningful lesson learned from the Katrina experience, when no accommodations were in place for carless for vulnerable populations, it also represents a best practice case study for multimodal evacuation planning that all cities and regions can study. Credit is due to the city of New Orleans Office of Emergency Management, that starting in 2006, created an inclusive planning process that not only engaged various governments and agencies, but also other non-governmental stakeholders across the community.

Access and Functional Needs

The CAEP is a national model as it addresses a diverse set of strategies to evacuate carless people in the face of an emergency. The plan accommodates tourists, carless residents, and people in need of medical resources during an evacuation. The plan was created in the wake of Katrina, which did not accommodate carless or vulnerable groups. It was successful deployed in 2008, during the evacuation of Hurricane Gustav and serves as one of the few examples of a large-scale evacuation in the U.S. that was multimodal, proactive, and effective.

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2008 Hurricane Ike

Overview

Hurricanes Katrina and Rita in 2005 prompted careful examination and provided increased knowledge of large-scale evacuations, and inevitably shaped subsequent evacuation preparedness, mitigation, and response practices in the United States. The innumerable lessons learned from these experiences resulted in a more effective and efficient, but not flawless, evacuation in advance of Hurricane Ike in 2008.

Case Setting/Description

Hurricane Ike was a powerful storm, the third costliest hurricane to hit the U.S. in 150 years, ranking behind Hurricane Katrina in 2005 and Hurricane Andrew in 1992. Hurricane Ike caused an estimated $29.6 billion in damages in U.S. coastal and inland areas. For the 2008 Atlantic hurricane season, it was the ninth named storm, the fifth named hurricane, and the third major hurricane. Its size, strength, and storm surge combined to produce catastrophic effects.

Hurricane Ike resulted in the largest evacuation of Texans in state history. More than a million Texans moved to safe havens inland. However, thousands refused to leave their homes. In Galveston, officials estimated that 40 percent of the city's residents did not evacuate. As a result, evacuation efforts turned into rescue missions.

A mandatory evacuation order was issued for the west end of Galveston Island at 7:00 a.m. September 11, 2008, and for the entire city of Galveston at noon. On the same day, the Harris County (Houston, Texas) judge ordered evacuations of low-lying areas in the metropolitan area based on zip codes.

Geographic Location

Hurricane Ike impacted the entire city of Galveston. The city is located on Galveston Island, a barrier island in the Gulf of Mexico. Galveston County includes the city of Galveston as well as several mainland communities and is located within the Houston-Sugar Land-Baytown metropolitan area. Galveston lies about 50 miles southeast of the city of Houston.

Galveston Bay connects with the Houston Ship Channel. After sweeping across Galveston Island, Hurricane Ike traveled north up Galveston Bay and along the east side of Houston. As the fourth largest city in the U.S. and the largest city in Texas, Houston sits in a low lying gulf coastal plain; downtown sits only 50 feet above sea level. The size of Ike, its track over the shallow continental shelf in the Gulf, and the slow movement of the storm all combined to push surge water up and into Galveston Bay for almost a week. Ike's record-setting storm surge – the highest storm surge along the upper Texas coast since 1915 – resulted in significant flooding in

the Galveston area. Widespread and excessive rainfall also contributed to the flooding – an average of 6 to 8 inches of rain fell across Harris County.

Type of Hazard

Hurricane Ike started as a tropical disturbance near Africa at the end of August. It tracked over several Caribbean islands before moving into the Gulf of Mexico on September 9 as a Category 3 storm with sustained winds of 125 miles per hour (mph). As the storm moved northwest across the Gulf of Mexico, it developed a large wind field and intensified to a category 4 storm as it approached the U.S. coastline. It made landfall near Galveston as a strong Category 2 storm with wind speeds of 110 mph. Hurricane force winds extended 120 miles from the eye. As a result, the storm surge was projected to be 20 feet, the equivalent of a Category 4 hurricane. The Galveston sea wall stands at 17 feet. Because of the anticipated storm surge, the National Weather Service in the Houston/Galveston area issued a bulletin on September 11, warning residents along parts of the Texas coastline that they faced certain death if they did not evacuate.

Timing

Forecasters faced a high degree of uncertainty as they tried to determine where Hurricane Ike would make landfall, but by September 11, forecasters narrowed the projected path to between Galveston Island and Corpus Christi, Texas – approximately 200 miles of coastline.

Hurricane Ike was a notice event and made landfall over Galveston Island at 2:10 a.m. on Saturday, September 13, 2008, as a Category 2 hurricane with sustained winds of 110 mph. It left nearly 98 percent of area residents without power immediately after landfall and caused the largest power outage in Texas history.

Number of People Impacted/Type of Impact/Any Vulnerable Population Groups

Self-evacuees

Hurricane Ike impacted 12 to 15 counties along the Texas coast, leaving devastation in its path. About 1.2 million people fled the Texas coast in advance of Hurricane Ike. Officials estimate as many as 140,000 chose not to evacuate. In Galveston, for example, officials estimated that 40 percent of the city's 57,000 resident did not leave. Officials interviewed for this case study speculated that people did not want to leave because they experienced or heard about bad experiences during the Hurricane Rita evacuation or they did not believe a Category 2 storm could be dangerous.

For self-evacuees, evacuation routes were publicized well in advance of the storm. The Galveston area had three designated evacuation routes, all led into the metropolitan Houston area. After Hurricane Rita, officials decided to allow local residents to take county roads or other side routes rather than to force them onto the evacuation highways. This helped relieve congestion on the evacuation routes, according to the county emergency management office.

Assisted-evacuees

During Hurricane Ike, 1,600 people were moved out of the city of Galveston. Citizens who had enrolled in the 211 registry were asked to wait at the curb to be picked up at their residences. Those who were mobility challenged (could walk, but could not make it to the curb by themselves) were transported by a "handi-van," a smaller, ADA-accessible van. Transit operators were trained to assist patrons on and off the bus if needed.

On the mainland, residents who needed assistance to leave (both carless and access and functional needs populations) were picked up at their residences and taken to embarkation points where Texas state officials made about 1,000 buses available. For those who were mobility challenged, each municipality had its own plan for picking up these individuals, using a variety of available vehicles, such as school buses, island buses, senior center vans, ambulances, etc.

People who had specialized medical needs were identified in advance and transported by Galveston EMS or other ambulance services. The University of Texas Medical Branch at Galveston (UTMB) and the Galveston Emergency Medical Services (EMS) cared for assisted evacuees with special medical needs (e.g., individuals who could not board an accessible vehicle). These people were triaged by UTMB to determine their medical conditions and needs (e.g., medications required).

UTMB and Galveston EMS had coordinating agreements with other ambulance services (out of Houston) that assisted with moving people. Galveston EMS took individuals to a staging location and those individuals were transferred to the Houston ambulances and then transported off the island. (This did not include nursing homes, which in Texas are required to have their own evacuation plans.)

There were also memoranda of understanding (MOUs) between Galveston and other municipalities for providing ambulances staged at particular locations. Island Transit, the public transit agency that serves Galveston County communities, provided transportation assistance to ambulatory individuals with walkers and other assistive devices. The transit agency set aside specific vehicles for assisted evacuees. Island Transit had agreements in place with the Galveston Independent School District (GISD), which provided three to four vehicles to transport wheelchair-bound citizens. The school buses were equipped so that everyone could take their equipment with them.

Issues with Pets/Companion Animals

Assisted evacuees with pets or companion animals were allowed to take their pets with them. Each community had its own plan on whether to allow animals to travel with their owners to the embarkation points.

Island Transit set up a specific vehicle for pets and companion animals because they were not allowed on the buses with the general public. Island Transit removed seats from one or two buses to make room for animals in cages. There were cages at the pickup location and transit personnel tagged the cages with the owners' names and contact information. The "animal bus" followed the island bus carrying the owners. The transit operations manager was responsible for returning the pets to their owners once the buses reached Austin, Texas.

Texas employed a mass notification process in which residents registered through a 211-telephone system. Individuals were asked to register for evacuation assistance by calling the state's 211-number. The state relayed the individuals' registration information to their home counties, which in turn, distributed the information to municipalities. The information was loaded into a city/county system.

Two days before landfall, everyone on the 211 registry was called and asked if they needed help to evacuate. Many said they would shelter-in-place. Twenty-four hours before Ike hit, people who had chosen to stay started calling the Galveston County Emergency Operations Center (EOC) for help to evacuate. EMS personnel along with the Coast Guard and state military personnel attempted to evacuate these people until conditions became too dangerous. An estimated 700 people were transported to safety.

Preparedness

In Texas, each city has its own emergency plan. County emergency management's role is to coordinate those plans into a smooth, effective evacuation of the general population and those who need assistance, including medical special needs. State transportation officials also have evacuation plans.

Island Transit follows the city of Galveston evacuation plan. The plan is specific to each agency that participates. Updates to the plan have been made as different events have occurred. According to local officials, the plan worked very well during Hurricane Ike.

Island Transit receives citizen information that is maintained in a special needs registry by the department of emergency management. For evacuation planning, the director of transportation divides the city of Galveston into four sections and assigns a specific number of buses to each section. The bus operators are provided with a list of addresses during evacuations. (See the response section for more information about the registry system.)

The Texas Department of Transportation (TxDOT) regional offices have planned exercises with local partners and the DOT has its own internal statewide exercises. Through exercises with the state police, the DOT has been able to change its contraflow procedure to cut implementation time in half.

As part of its disaster preparedness plan, the Houston Office of Emergency Management increased its level of readiness before Hurricane Ike took aim at Galveston and Houston. When it became apparent that the storm would make landfall at Galveston, the Emergency Operations Center was activated. WebEOC was deployed for communicating among departments and agencies in southeast Texas.

Response

Matching Resources to Needs

Resource Management

The city of Galveston EOC operates on a WebEOC system. Galveston County has a county-based 211 system/call center. All calls received through the 211 system are relayed to the EOCs in the individual municipalities (there are eight municipalities within Galveston County). WebEOC allows officials in southeast Texas to share resources and support one another, provide information about hospital availability, evacuation data, points of distribution, and other information.

During Ike, TxDOT managed its "close in" resources that included cones, barriers, messaging, signals, and roadway clearance. Farther out along the evacuation routes, TxDOT also planned the location of "facility" resources, such as porta potties, drinking water, and rest areas. It had a pre-determined network of priority distribution points along evacuation routes for fuel. As part of this effort, the state established a fuel team after Hurricane Rita. This team was part of the state operation system in Austin pushing fuel into areas at risk. The fuel team worked with a private vendor to ensure fuel was available in affected areas.

Personnel

All of Island Transit's operators went to Austin during the Hurricane Ike evacuation. The operators assisted medical staff with distributing water to evacuees and other functions. Medical staff members were on each bus. One transit dispatcher sat in the city EOC and handled all transportation-related issues.

The director of transportation was in the field assisting with the evacuation effort and picking up any individuals who had not left Galveston when the evacuation order was issued (e.g., homeless residents). The director of transportation for Island Transit was responsible for getting people from their residences to the collection sites and from the collection sites onto buses heading out of Galveston.

Public Information

Every year before hurricane season begins, Island Transit holds public meetings and hurricane town hall meetings to inform Galveston citizens about available resources, answer questions, and

encourage residents to make plans with family members. These meetings are held to try to minimize the numbers of people that have to be moved and to encourage people to plan for moving themselves. Island Transit also provides literature on the buses and relies on the media to communicate information to the public prior to an event. Information about pet evacuation is provided repeatedly during hurricane season.

Galveston County conducts a year-round education campaign that provides similar information about personal preparedness, evacuation routes and procedures, and other essential information.

During Hurricane Ike, the Houston mayor and county judge made repeated announcements through mass media and other electronic communication urging residents to stay home if they were not in the evacuation areas. Dynamic message boards were also used to relay information to the public.

Vehicles/Inventory of Assets

Island Transit is a small transit agency. Its fleet includes fixed-route buses and demand response vehicles that are used by people who cannot access public transportation (e.g., people who are disabled and who are elderly). All buses are ADA-accessible.

GISD vehicles are used primarily to transport people who are disabled (e.g., people who are in wheelchairs) for longer distances. Island Transit only works with GISD during emergency events; there is an agreement in place with GISD to use its vehicles during emergencies, such as Ike.

The city of Galveston office of emergency management is responsible for maintaining an inventory of assets annually. The inventory is categorized by municipality and includes information, such as the number and types of vehicles available, capacity, and fuel type. Agencies, such as GISD, Houston Metro, and others are called annually to ensure resource availability has not changed.

Registry

Texas has a registry system to help local officials anticipate the number and characteristics of residents who need assistance to evacuate. Before Ike, every person on the registry was called to ask if he or she needed help to evacuate. It is interesting to note that in some instances, people were angry when called because relatives had put the family member on the 211 registry without the person's knowledge. After Rita, many people wanted to be on the registry even though they did not need assistance to evacuate.

The city of Galveston maintains a special needs registry that is kept up-to-date annually by the office of emergency management. The city utilizes volunteers from the hospitals and other service agencies to conduct assessments every year prior to hurricane season. The assessments determine citizens' locations and medical needs. A Citizens Advisory Group consisting of public

and private sector agencies is responsible for getting people to register. At each planning meeting, the Citizens Advisory Group reports on how many people registered. The Human Resources Director organizes and oversees this group.

Every year, Island Transit advertises the special needs registry through public meetings and other means. The number of people who register is compared to the number from the previous year. During Hurricane Rita, approximately 3,500 people were moved off the island and a list of evacuees was created and maintained. During Hurricane Ike, only about 1,600 people evacuated. Officials cross-referenced names on the Hurricane Rita evacuation list and contacted individuals to ensure they were evacuating.

Agreements

After Hurricane Rita, an agreement was formed with Wal-Mart for restoration of its facility and services so that city employees could obtain items needed for the recovery process (e.g., rubber gloves, boots, cleaning supplies). The agreement also included a protocol for reimbursement. The agreement was critical to the Hurricane Ike recovery because it helped to prevent responders from becoming sick from contaminated work areas. The agreement was a need that was identified as a result of the Rita experience.

In addition, an agreement was in place with the San Luis Hotel, which housed all city staff, first responders, and some media – anyone in the emergency management cluster – who were required to stay on the island for evacuation response during Ike. The agreement included provisions for providing three meals a day.

Issues with Vulnerable Populations

During Hurricane Ike, people were hesitant to evacuate (due to negative evacuation experiences encountered in Hurricane Rita). Island Transit's director of transportation, along with law enforcement and fire personnel, scanned the community and talked with citizens, such as people who were homeless and people who were elderly, to persuade them to evacuate. These officials were the only members of the evacuation team available to make a last attempt to get people to evacuate, pick up them up, and take them to staging areas. As people agreed to evacuate, the director of transportation took them to a local high school where they could get on state buses to transport them out of Galveston. Many chose not to evacuate. The Galveston County emergency management coordinator estimated that more than 700 people were rescued during the last 24-hours before the eye made landfall.

In addition, language barriers were addressed at the staging points. Many of the city employees were bilingual and worked at the staging points. These employees assisted English-as-a-second language citizens to the shelters to assist them with communication.

Institutional Evacuations

During Hurricane Ike, every institutional facility implemented its evacuation plan and did not require additional assistance. The state of Texas requires nursing homes, hospitals, and other types of care facilities to have an emergency evacuation plan. The city will only assist them if needed.

There was one facility during Hurricane Rita that did not have an evacuation plan. Island Transit provided 10 buses to assist the facility's evacuation. Following Rita, the city required the facility to prepare an evacuation plan, which was in place during Hurricane Ike. The mayor and emergency management agency met with the facility to ensure it had a plan in place. The Galveston County emergency management coordinator reviews the facilities' emergency evacuation plans and keeps the mayor informed about the status of those plans.

Community-based Organizations

The Galveston area United Way took $50,000 from its general fund to purchase gas cards to give to its partner agencies that served people who had a vehicle, but not enough money to buy gas to evacuate. In addition, vehicles from senior centers were used to pick up people from their homes and take them to embarkation points.

The city of Galveston calls on volunteers from the hospitals and other service agencies to conduct assessments every year prior to hurricane season. The assessments determine citizens' locations and medical needs.

Modal Integration/Coordination

Multiple modes of transportation were used to evacuate special medical needs and people with access and functional needs. Each municipality had its own evacuation plan. These plans called for using available vehicles to move people to embarkation points where they transferred to a state-provided coach. The coach took passengers to shelters in designated host cities: San Antonio, Dallas, and Austin. Communities used a variety of vehicles to pick up individuals and transport them to the embarkation points, such as vans, ambulances, school buses, city buses, fire vehicles, etc. The county emergency management office's role was to coordinate the city plans.

During Hurricane Rita, a commuter rail train was sent to Galveston but not utilized, because no one could verify where evacuees would be taken. For the Ike evacuation, Houston Metro and the state provided buses to transport evacuees out of Galveston, but no rail transport was utilized.

Regional/Interregional/Interstate Coordination

Regional coordination occurred during the planning phase and post-event in after action reviews. A review of the Hurricane Rita evacuation led to changes in the order in which municipalities were evacuated during Hurricane Ike. For example, during Hurricane Rita, the contraflow lanes did not work for the coastal communities because evacuees were met with significant traffic

congestion before even leaving Galveston. This created a need to set a precedent as to which geographical areas moved first within the region.

The Harris County Office of Homeland Security and Emergency Management (HCOHSEM) and its regional partners, including Galveston Emergency Management, developed a zip-code-based evacuation map designed for a regional evacuation. This collaborative multi-county, multijurisdictional project applied the lessons learned from the traffic conditions associated with previous events and identified evacuation areas by a simple-to-understand zip code system.

During Hurricane Rita, the order in which people were told to evacuate was by zip code. Opinions varied on how well the zip code-based evacuation system worked. For example, some of the cities had two to three zip codes, but the numbers were not staggered in numerical order and people were confused as to when it was their turn to evacuate.

As a result of the Rita experience, the order of evacuation during Ike was reorganized by city. The cities expected to be the most impacted by the storm surge were the first to evacuate. Local officials were responsible for ordering the evacuation in each municipality. Residents in the coastal areas were able to evacuate without getting stuck on congested roadways.

The zip code-based evacuation was used on a limited basis in Galveston County. The first to receive evacuation orders were people living in coastal areas that encompasses the zip codes on Galveston Island, Bolivar Peninsula, and portions of coastal Brazoria County including Freeport and Surfside. At the other end of the scale, residents in zip codes far removed from coastal areas and Galveston Bay were advised to stay in their homes.

TxDOT's role during an evacuation is to keep the primary evacuation routes opened. Examples of state coordination with regional, county, and municipal agencies during Hurricane Ike included:

- TxDOT set up contraflow lanes to help move people inland, away from the surge zones.
- TxD0T dispatched courtesy patrols with water and limited amounts of fuel along evacuation routes.
- TranStar and TxDOT had a network of cameras in place along the 50 miles from Galveston to Houston and along major evacuation routes to San Antonio and Dallas. This allowed TxDOT officials to see the whole system accurately in real time to gauge traffic flow and congestion. TxDOT headquarters in Austin and the state highway patrol headquarters had access to these images. Elected officials used the unfiltered information from the cameras in making decisions about initiating contraflow.

Recovery

There were many lessons learned during the recovery and re-entry phases. Officials could not allow residents to return until critical safety issues had been addressed and corrected, such as restoration of power, sewage systems, and water systems. It took two days for the water to recede in Galveston, and once it did, some homes still were not accessible. Citizens needed rubber gloves and boots and other supplies before returning home because raw sewage had invaded the homes.

Businesses, such as Wal-Mart, were allowed re-entry because its services were needed for clean-up efforts. Citizens did not return to their homes until a week-and-a-half after the storm. They were stuck on the highways trying to get into Galveston, but the Department of Public Safety (DPS) barricaded the exits and turned people away until city services were restored.

The timing of re-entry was coordinated between the mayor of Galveston, DPS, public works, emergency management, Centerpoint Energy, and other agencies that had a role in the recovery process. Meetings were held daily to determine the status of recovery efforts and the timing for re-entry. Each agency involved was responsible for providing a daily status report.

From a transportation perspective, Island Transit played a key role in transporting city employees (e.g., public works staff members) who were needed for recovery efforts to and from Galveston. Island Transit ran buses (escorted by law enforcement) to and from an area Wal-Mart parking lot, which was used as a pick up and drop off location to transport city employees daily. City employees were responsible for showing up at the pick up location during the designated times the buses were running, and the city agencies were responsible for communicating those times to employees. Employees were not allowed to drive personal vehicles into Galveston.

The issue of re-entry into the Galveston area was challenging, officials said. Homeowners wanted to know what had happened to their property and put pressure on officials to allow them to return before the area was habitable. As a result, a “look and leave” day was set up to allow people to re-enter during daylight hours and then leave before dusk. Officials said people poured onto the highways to return, creating major traffic jams. Many people were unable to reach their homes before sunset and had to turn around. This program did not work well, officials said.

Once citizens were allowed to return to Galveston, Island Transit’s responsibilities shifted to providing shuttle services to access assistance provided by the American Red Cross (ARC) and the Salvation Army. Island Transit met with the ARC and Salvation Army to notify them that transportation services would be established. Citizens could utilize Island Transit services for transport to medical appointments and to Wal-Mart. Pick up locations were at the ARC centers. Only two Island Transit personnel were available to provide transit services because other operators travelled with the state buses. In addition, 24 vehicles were lost in the storm.

Another complication involved elderly and poor Galveston Island residents, many of whom had lived in Section 8 housing that was completely destroyed by Ike and the surge. When these residents returned, they had no place to live. They were provided housing vouchers. Some moved to the mainland coastal area and others further inland.

Preparedness

Lessons learned from Hurricane Rita led to improved response during Ike. The state was part of the plan to provide evacuation transportation during Hurricane Rita, but the state did not perform according to the plan. There were agreements with the state to bring in buses during Hurricane Rita, but there was an outcry for vehicles during the event, resulting in transportation shortages. Officials were uncertain of where the storm would impact the Texas coast and the buses were staged in the wrong places, preventing the state from getting buses to Galveston. Island Transit had utilized all of its vehicles and there were not enough resources to move everyone. Island Transit called on Houston Metro, which provided additional buses to move the 3,500 evacuees.

When Hurricane Ike was in the Gulf, the state moved the equipment in early and staged it at Greyhound Park, located nearby Galveston. When Island Transit called, the state sent 30 to 40 buses to Galveston in a short amount of time. Island Transit vehicles were only used to move people who were hesitant to evacuate.

The shortage of vehicles during Hurricane Rita made it difficult to track evacuees. Buses were not where they were planned to be and people were scattered. During Ike, however, each evacuee was required to complete paperwork at the boarding point and then received a colored wristband, which helped to keep families together and track the people on each bus. The colors of the wristbands corresponded to specific vehicle numbers, which were documented on the evacuees' paperwork. This process was successful in tracking evacuees.

During the Hurricane Rita evacuation, there was no triage system and people with mental disabilities were put on general public buses. In one instance, the convoy had to be stopped and the police were called to assist because of particular issues that arose on the bus and compromised the safety of other passengers. After Rita, staff members from Galveston Mental Health became part of the city's emergency management team. In the planning phase, the mental health agency was designated as the entity responsible for staffing the triage site and arranging transportation for individuals with mental disabilities.

During the Hurricane Ike evacuation, the Galveston Mental Health agency set up a triage site at the collection site to assess evacuees' medical needs. Mental health staff members were on site to direct people with mental disabilities to designated vehicles.

After the 2005 hurricane experiences, counties and municipalities worked with state authorities to make significant changes based on their previous experiences. These included:

-Suspending road construction in outlying district to avoid long traffic jams.

-Forming a contract between TxDOT and wrecker companies to keep the roads clear during an evacuation.

-Widening, striping, and signing shoulders to be used as third lanes.

-Conducting an education campaign to encourage people to keep their gasoline tanks full before a storm is expected.

-Posting messages on variable message signs to remind people to put fuel in their tanks.

-Refining interagency traffic control plans to include information about cones, barriers, and officers.

-Appointing a fuel team to push fuel into affected areas, using existing gas stations for distribution.

-Putting global positioning systems (GPS) on all state buses.

-Employing a statewide tracking system that uses armbands with UPC codes, allowing emergency personnel to load individual passenger information into a database.

Case Study Key Findings

Lessons Learned

-Make it convenient for people to evacuate. Allow local residents to take county roads or other side routes they know rather than force them onto the evacuation highways.

-Activate a phased evacuation plan even before information is available about the exact location of a hurricane's landfall.

-Use zip codes to describe evacuation areas for phased evacuations. Allow each city to organize its zip code plan.

-Do a better job of convincing people to leave. Use new tools, such as social media, public information web sites, and mass notification systems that can blast messages by landline phone, text, e-mail, or mobile phone.

-Involve businesses and community organizations in planning, response, and recovery.

-Suspend construction on all evacuation routes, even those far removed from the impact area.

-Have contracts and agreements in place before an incident or weather event with various transportation providers, fuel distributors, wreckers and tow trucks, and other vendors. Arrange for businesses, such as Wal-Mart, to reopen after the storm to supply cleaning supplies for rescue and recovery personnel. Also, contract with a local hotel or motel to house emergency personnel who do not evacuate.

-Have state officials provide motor coaches at embarkation points to evacuate people who need assistance; keep local transit vehicles in the community.

-Arrange for pets to be evacuated with their owners.

-Keep shoulders of evacuation routes clear. Before storm season, widen, stripe, and sign shoulders to be evacu-lanes.

-Conduct emergency preparedness education all year; sponsor community preparedness meetings.

-Deploy state DOT personnel to the affected area as quickly as possible.

-Place camera systems along evacuation routes to provide real-time information that allows elected and appointed officials to make decisions based on knowledge.

-Designate metropolitan areas as host cities. Smaller cities are not equipped to handle large numbers of evacuees and can run out of supplies.

-Create a fuel team to be in charge of pushing fuel supplies into affected areas.

-Use message boards and other outreach changes to remind drivers four or five days before an expected storm to keep their fuel tanks full.

-Build good working relationships with other public agencies and private sector organizations through everyday activities and exercises.

-Track evacuees through paperwork and a wristband system.

-Form an agreement with businesses that provide critical services and goods, such as Wal-Mart, for restoration of facilities and services.

-Coordinate with key agencies, such as the mental health agency and involve them in the planning process.

-Require institutional facilities to have evacuation plans that are reviewed by emergency management.

-Maintain and annually update an inventory of assets on a local basis.

Avoidable Failures

- Galveston Island only evacuates for Category 3 storms and above. Prior to Ike's landfall, forecasters were unable to predict the severity of the storm, where it was going to hit, and the window of time to evacuate was very narrow. The evacuation call was made less than 24 hours before landfall. Because of the late evacuation call, Island Transit lost 24 buses in the storm. Buses were deployed in increments

of 10 in order to prevent causing traffic issues. The first 10 buses did not leave Galveston until every person was loaded on the buses, and all 10 buses travelled together as one convoy with a police escort. There was time only to deploy 10 buses. Transit operators drove buses to Austin, leaving one staff member to move the remaining buses to higher ground. There was not enough time to move all the buses, but if the call to evacuate had been made 24 hours in advance, the situation could have been avoided.

- The "look and leave" day did not work as planned. People returning along evacuation routes created traffic jams.

- Contraflow is expensive and dangerous, state officials said. It creates risk for citizens otherwise out of a storm's path. It requires personnel (state troopers, local police) who could be working on response and recovery in the affected areas.

Summary/Conclusions

No two evacuations or any other emergency incident are the same. Lessons learned in Hurricanes Katrina and Rita in 2005 certainly helped southeast Texas be better prepared to evacuate large numbers of people out of the path of one of the most powerful storms to ravage the Texas coastline. But no one anticipated the devastating storm surge that accompanied Ike. Ike was a Category 2 storm when it made landfall, but its size and other factors created a storm surge equal to a Category 4 hurricane. Unlike Rita, which was a wind event, Ike's greatest damage came from its 20 foot surge of water across Galveston Island and up and into Galveston Bay where it poured into the city of Houston for days.

In the years between Rita and Ike, county, city, and state officials all worked together to develop better systems for evacuation. Most of these worked as expected, such as phased evacuations by zip codes; planning in advance for evacuation of people with access and functional needs and those without cars; and ongoing education campaigns about preparedness. The lessons learned from the 2005 hurricane season helped provide residents and visitors in southeast Texas a safer and more convenient evacuation during Ike.

2010 Philadelphia and Surrounding Areas Blizzard

Overview

Case Setting/Description

Geographic Location

Philadelphia, Pennsylvania and the surrounding areas

Type of Hazard

Blizzard/heavy snow

Timing

Number of People Impacted/Type of Impact/Any Vulnerable Population Groups

People were advised to stay home, not go out on the roads, and have adequate supplies on hand. No data was collected on self-evacuees and no assisted evacuations occurred. By February 13th, three storm-related fatalities were reported in Pennsylvania.

Livestock warnings were issued for blizzard conditions and extreme temperatures for appropriate areas.

Preparedness

No exercises had been held for blizzard/snowstorm in the city or in the region. Most city services were shut down. The Office of Emergency Management and Public Works Department were open to handle plowing. Power outages were widespread, especially in Montgomery, Bucks and Delaware counties.

Response

Matching Resources to Needs

Highways and roads were primarily shut down due to snow conditions until plowing could be accomplished. The Pennsylvania Department of Transportation banned motorcycles, recreation vehicles, and commercial traffic on Interstates 380 and 84, with the exception of school buses and tow trucks responding to accidents. There was also a tractor-trailer ban on the Pennsylvania Turnpike's Northeast Extension. Interstates 76 and 676 were also closed for a little more than 36 hours. Only one major artery (Interstate 95) was able to be kept open in Philadelphia.

- SEPTA bus transit service (including paratransit) was not available due to the storm. Some trolley lines were available and all underground service continued through the event.

- National Guard forces rescued dozens of high school students on a ski trip in Susquehanna County in northeastern Pennsylvania when their buses got stuck on Route 374. The 70 students and chaperones were taken to a Red Cross center in Uniondale, and no injuries were reported

- For those persons receiving Meals on Wheels, several days of food was delivered as far as possible in areas where it could be provided.

- Media outlets in Spanish and other languages received public information.

Modal Integration/Coordination

No evacuation could be accomplished due to weather conditions.

Regional/Interregional/Interstate Coordination

There was no transportation-related coordination, since transportation was very limited or not possible. Utilities, especially power, to support the restoration effort were needed and those vehicles got priority as well as emergency vehicles and plows. Multiple motor vehicle accidents were also a factor blocking roads and highways. Trucks got stuck on Interstate 81 near Scranton, and part of Interstate 84 was closed at the Pennsylvania-New York state line due to a jackknifed tractor-trailer.

Recovery

Since no one was evacuated, reentry was not an issue. Lack of plows was identified as the biggest problem. There were not enough plows for emergency routes, much less other streets.

2010 Tennessee Floods

Overview

Historical record rain fell on the city of Nashville, Tennessee and the surrounding cities and counties on May 1 and 2, 2010. Tennessee Governor Phil Bredesen requested an expedited major disaster declaration due to severe storms, flooding, straight-line winds, and tornadoes during the period of April 30 to May 18, 2010. Due to the flooding from the severe storms, on May 4, 2010, the President declared a major disaster under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121-5207 (the Stafford Act).

Case Setting/Description

The flooding and power outages were experienced across middle and west Tennessee. As a result of the extreme weather conditions, Tennessee suffered 26 confirmed fatalities mainly due to associated tornadoes, flooded homes, and roadways. Most of the roadway fatalities were the result of hydroplaning, attempting flooded roadways, etc. and other outdoor incidents. Most reported deaths involved people getting swept away in cars and not using proper judgment.

Numerous nursing homes, apartment complexes, and residences were evacuated due to rapidly rising waters and flash flooding. Data regarding types of vehicles used and numbers of people evacuated could not be obtained at the time this report was completed. Water rescues and helicopter extractions were performed as flood waters continue to rush over hundreds of roads through cities, towns, and neighborhoods. Many residents lost all of their possessions as homes were destroyed or sustained major damage.

Twenty-one counties received disaster declarations. Carroll, Crockett, Decatur, Fayette, Gibson, Hardeman, Haywood, Henderson, Houston, Madison, and Obion counties were included in the original declaration. On May 6th, Cheatham, Davidson, Dyer, Hickman, McNairy, Montgomery, Perry, Shelby, Tipton, and Williamson counties were added to the list.

Response

National Guard soldiers from the 1176th Transportation Company were deployed in middle Tennessee to assist local emergency management agencies in rescue operations. The Smyrna-based unit was alerted and soldiers dispatched throughout Williamson and Sumner counties to help rescue citizens stranded in their homes following record flooding and rains.

The National Guard spent the first night in the Franklin area going door-to-door, searching for people needing evacuation from their homes using Light Medium Tactical Vehicles (LMTVs). LMTVs are cargo trucks with a 2.5-ton carrying capacity with a high-wheel base capable of fording flooded areas where normal vehicles cannot go. The LMTVs would drive through flooded areas to reach homes and businesses that local rescue agencies could not reach. Once loaded into the LMTVs, the Guardsmen transported the citizens to safe areas. Another team of

five vehicles from the 1176th aided the Sumner County Emergency Management Agency rescue operations in Gallatin. This team transported people rescued from their homes to the Gallatin Civic Center where the American Red Cross established a temporary shelter. This shelter housed adults, children, and pets. The 1176th was credited for rescuing more than 240 people.

Nearly 1,500 guests at the Gaylord Opryland Resort, located alongside the Cumberland River, were also forced to leave the hotel. They were taken by bus to a high school located on higher ground. Overall bus service in Nashville was suspended because the system's headquarters were severely flooded. Electric power was cut off to downtown buildings leaving some 14,000 customers without power in Nashville. One of the city's two water treatment plants was also submerged, which prompted the mayor of Nashville to ask residents to cut their water use in half. The residents were also told to only use the water for drinking and cooking. They were further asked to refrain from flushing toilets; thereby avoiding the risk of contaminating the city's drinking water.

Rainfall amounts across western and middle Tennessee totaled 10 to 15 inches, with areas to the south and west of greater Nashville, along the Interstate 40 corridor, receiving 18 to 20 inches. This resulted in a quick rise of the Cumberland River and its tributaries. The swollen river crested at 51.86 feet on Monday evening, May 3rd. The governor further declared 52 of Tennessee's 95 counties as disaster areas.

Approximately 56 Nashville schools were damaged by either water or wind from the storms. The Schermerhorn Symphony Center and numerous buildings downtown near the Cumberland River had lower-level flooding as well. Nashville's country music landmark, the Grand Ole Opry House, was also flooded. The Trousdale County Jail was evacuated, and people from that jail were transported to Wilson County. The American Red Cross in Nashville sheltered about 2,000 people across Tennessee with about 1,200 of them in Nashville. The Meadows Nursing Home residents were among those rescued in west Nashville. Both Lipscomb University and the Bellevue Jewish Community Center were opened to shelter flood victims.

Tennessee reported the evacuation of a nursing home which had approximately 110 people. This home had individuals who were able to function on their own; therefore, the home was easy to evacuate. They evacuated all but the last 25 or so before water became an issue. There were no reported lack of boats and or buses, but there was no mass evacuation. All residents were able to be relocated and everyone self-evacuated as they saw the water rising.

The Tennessee Department of Agriculture reported severe damage to the state's crops and livestock. Actual numbers and statistics had not been released when this case study was completed.

FEMA sent a liaison officer to the state and opened a regional coordination center in Atlanta to provide support to ongoing operations in Tennessee. FEMA Administrator Craig Fugate also visited the state and along with Governor Bredesen toured areas of the state.

Case Study Key Findings

Lessons Learned/Avoidable Failures

The May 2010 Tennessee floods were 1,000-year flood events. In the Service Assessment Report for the event, river forecasters for the National Weather Service (NWS) said they underestimated the flood level that the Cumberland River would reach during the floods because they relied on inaccurate data from the U.S. Army Corps of Engineers (USACE). They also noted that the enormity of unprecedented two-day rainfall amounts and lack of public awareness of the potential impacts of the forecast river levels were all contributing factors. The assessment also noted that communication between the NWS and USACE was not effective during the event. As a result, the NWS will engage in additional interactions and exercises with USACE and the U.S. Geological Survey. Additionally, high-resolution flood maps are being developed for the Nashville area that will show down to the street level where flooding is expected.

It was also reported that many people did not respond to NWS warnings because the products were not tone-alerted via the Emergency Alert System. Individuals reported that the notices were not worded to adequately reflect the urgency of the situation and that the warnings were not specific enough for residents to believe the flooding would impact their location; therefore, some people failed to receive warnings, or chose to disregard the warnings. All agencies are focused on getting the word out to residents in clear and concise language that conveys the threat and communicates the urgency for action.

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Appendix C: Glossary of Terms

A

Access and Functional Needs Populations
Populations whose members may have additional needs before, during, and after an incident in functional areas, including but not limited to: maintaining independence, communication, transportation, supervision, and medical care. Individuals in need of additional response assistance may include those who have disabilities; who live in institutionalized settings; who are elderly; who are children; who are from diverse cultures; who have limited English proficiency or are non-English speaking; or who are transportation disadvantaged. See also "Vulnerable Populations." (Definition adopted from the National Response Framework (NRF) definition)

Accessible
Having the legally required features and/or qualities that ensure easy entrance, participation, and usability of places, programs, services, and activities by individuals with a wide variety of disabilities. (NIMS definition)

After Action Report (AAR)
AARs assemble critical data regarding evacuation performance in the aftermath of an exercise or event (including evacuations), including the findings and recommendations gathered from debriefing sessions with relevant agencies and staff; a narrative of the events; critical successes and failures during the exercise or event itself; and lessons learned and agreed-upon methods to address performance gaps. The evaluation and improvement of mission and task performances that take place with AARs are the final steps of the Preparedness Cycle and crucial to informing risk assessments, managing vulnerabilities, allocating resources, and informing the other elements of the Cycle. AARs are also referred to as Corrective Action Reports, especially when referring to actual events.

All-Hazards Approach
An all-hazards approach is a conceptual and management approach that uses the same set of management arrangements to deal with all types of hazards (e.g., natural, man-made, complex).

Americans with Disabilities Act (ADA)
Passed in 1990, the ADA is civil rights legislation that protects individuals with disabilities. It guarantees equal opportunity for individuals with disabilities in public accommodations, employment, transportation, state and local government services, and telecommunications. An individual is defined by the ADA as someone with a disability if they: (1) have a physical or mental impairment that substantially limits a major life activity; (2) have a record of such an impairment; and/or (3) are regarded as having such an impairment.

Area Agency on Aging (AAA)
AAAs are regional agencies (more than 600 nationwide) responsible for the Older Americans Act programs at the local level. The AAAs contract for transportation, nutrition, and other services. Each has an advisory council. AAAs are a national network supported by The National Association of Area Agencies on Aging (N4A).

Assistive Device
Assistive devices are tools, equipment, or products that can help people perform tasks associated with daily living and/or manage specific medical conditions or disabilities. Assistive devices can include hearing aids, computer programs, and simpler devices, such as a "reacher."

C

Catastrophic Incident
Any natural or man-made incident, including terrorism, that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions. A catastrophic incident could result in sustained regional or national impacts over a prolonged time period; almost immediately exceeds resources normally available to state, territorial, local, tribal, and private-sector authorities in the affected area; and significantly interrupts governmental operations and emergency services to such an extent that national security could be threatened. (All Hazards Consortium, draft definition)

Cognitive Disabilities
Cognitive and developmental disabilities include disorders that may affect a person's ability to listen, think, speak, read, write, do math, or follow instructions. It includes people with dyslexia, an extreme difficulty in reading, and attention deficit hyperactivity disorder (ADHD), which is an inability to focus on necessary tasks. Many cognitive disabilities are based in physiological or biological processes within the individual, such as a genetic disorder or a traumatic brain injury. Other cognitive disabilities may be based in the chemistry or structure of a person's brain and may require assistance with aspects of daily life.

Community-based Organization (CBO)
CBOs are nonprofit organizations that operate within a local community, are often run on a voluntary basis, and are self funding. CBOs vary in terms of size and organizational structure. Some are formally incorporated with a written constitution and a board of directors, while others are much smaller and more informal. See also "Faith-based Organization (FBO)" and "Nongovernmental Organization (NGO)."

Community Emergency Management Plan (CEMP)
CEMPs provide policies, authorities, concepts of operations, legal constraints, responsibilities, and emergency functions to be performed in order to create an integrated approach to the management of emergency programs and activities for all emergency phases (mitigation, preparedness, response, and recovery), for all types of emergencies and disasters, and for all levels of government and the private sector. (Definition adapted from: http://www.davislogic.com/CEMP.htm#Definition)

Comprehensive Preparedness Guide 101, Volume 2 (CPG 101)
CPG 101 provides general guidelines on developing Emergency Operations Plans (EOPs). It promotes a common understanding of the fundamentals of planning and decision making to help emergency planners examine a hazard and produce integrated, coordinated, and synchronized plans. This guide helps emergency managers in state, territorial, local, and tribal governments in their efforts to develop and maintain a viable all-hazard EOP. (Definition from FEMA document: "Guidance on Planning for Integration of Functional Needs Support Services in General Population Shelters")

Contraflow
Contraflow is a form of reversible traffic operation in which one or more travel lanes of a divided highway are used for the movement of traffic in the opposing direction. Since 1999, contraflow has been used to evacuate regions of the southeastern US under threat from hurricanes, and is now considered as a potential preparedness measure for other mass-scale hazards. Contraflow segments are most common and practical on freeways because they are the highest capacity roadways, are designed to facilitate high speed operation, and do not incorporate at-grade intersections that can interrupt flow or permit unrestricted access into the reversed section.

Convener Agencies for Multimodal Evacuation (CAME)
A CAME is one or more designated agencies which performs the vital task of leading the forum in which emergency operations plans can be discussed and coordinated with other agencies and jurisdictions in the region. It is important that the CAME be regional and multijurisdictional in scope, be able to address multiple modes of transportation, and have the ability to coordinate and plan across multiple agencies representing local, regional and state levels. CAME candidates include state emergency management agencies, state transportation agencies, regional transit agencies, MPOs, COGs, Regional Transit Security Working Groups (RTSWGs-established and required through the Transportation Security Administration - TSA), Urban Area Strategic Initiatives (UASIs), or powerful municipal departments in regions willing to work in a regional manner. CAME is a term that was developed in conjunction with this report and is not a universally recognized acronym.

Council of Governments (COG)
The COG is a voluntary association of local governments that operates as a planning body. The COG collects and disseminates information, reviews applications for funding, and provides services for its member governments.

D

Department of Homeland Security (DHS)
The Department of Homeland Security's mission is to lead the unified national effort to secure the country, preserve citizens' freedoms, and prepare for and respond to all hazards and disasters. Homeland Security leverages resources within Federal, state, and local governments and coordinates the transition of multiple agencies and programs into a single, integrated agency focused on protecting the American people and their homeland. More than 87,000 different governmental jurisdictions at the Federal, state, and local level have homeland security responsibilities. The comprehensive national strategy seeks to develop a complementary system connecting all levels of government without duplicating effort.

Department of Transportation (DOT)
The United States Department of Transportation (DOT) was established by an act of Congress on October 15, 1966. The top priorities of the DOT are to keep the traveling public safe and secure, increase their mobility, and have the U.S. transportation system contribute to the nation's economic growth. The DOT comprises 12 operating administrations and bureaus. All states, as well as many counties and cities, have their own DOT as well, although some are known by other names.

Disability
A disability is a physical or mental impairment that substantially limits one or more of a person's major life activities. There are many definitions for "disability," some of which are narrow, others of which are broad. For example, a person with a visual impairment correctable by contact lenses could be considered disabled in some circumstances but not in others.

Disaster Planning Cycle
See "Emergency Planning Cycle."

Durable Medical Equipment (DME)
Durable medical equipment is medical equipment that a person needs to function on a daily basis, such as oxygen tanks, wheelchairs, orthotics, and prosthetics.

Dynamic Message Sign (DMS)
A DMS is a traffic control device used in conjunction with traffic management systems to communicate real-time traffic information about roadway or adverse weather conditions and special events. It is also referred to as a variable message sign (VMS), a changeable message sign (CMS), or an electronic message sign.

E

Emergency
An emergency is a sudden, urgent, often unexpected occurrence or occasion requiring immediate action or an urgent need for assistance or relief. Also see "Incident."

Emergency Alert System (EAS) / Emergency Broadcast System
The EAS is designed to provide the President with a means to address the American people in the event of a national emergency. Beginning in 1963, the President permitted state and local emergency information to be transmitted using the system. Since then, local emergency management personnel have used the EAS to relay local emergency messages via broadcast stations, cable, and wireless cable systems. In October 2005, the Federal Communications Commission expanded the EAS rules to require EAS participation by digital television broadcasters, digital cable television providers, digital broadcast radio, digital audio radio service, and direct broadcast satellite systems.

Emergency Management (EM)
The broad class of agencies or people involved in the practice of managing all kinds of emergencies and other incidents. Emergency response is a subset of emergency management.

Emergency Management Agency (EMA)
An EMA may also be known as an Office of Emergency Management (OEM), as an Office of Emergency Services (OES), or by a similar name. It is generally described as a state or local government agency that provides support to the local community in response to an emergency situation.

Emergency Management Assistance Compact (EMAC)
A national interstate mutual-aid agreement that enables states to share resources during times of disaster. EMAC

has grown to become the nation's system for providing mutual aid through operational procedures and protocols that have been validated through experience. EMAC is administered by NEMA, the National Emergency Management Association, headquartered in Lexington, KY. EMAC acts as a complement to the federal disaster response system, providing timely and cost-effective relief to states requesting assistance from assisting member states. (Adapted from FEMA-EMAC, 2007)

Emergency Medical Services (EMS)
EMS are types of emergency services dedicated to providing out-of-hospital acute medical care and/or transport to definitive care for patients with illnesses and injuries, which the patient or the medical practitioner believes constitutes a medical emergency.

Emergency Operations Center (EOC)
The EOC provides needed centralized management when a major emergency or disaster strikes. The EOC is an established location/facility in which local and state staff and officials can receive information pertaining to an incident and from which they can provide direction, coordination, and support to emergency operations. This is also where the decision makers and support agencies will report to manage the evacuation. National Incident Management System (NIMS) defines the EOC as, “The physical location at which the coordination of information and resources to support incident management (on-scene operations) activities normally takes place. An EOC may be a temporary facility or may be located in a more central or permanently established facility, perhaps at a higher level of organization within a jurisdiction. EOCs may be organized by major functional disciplines (e.g., fire, law enforcement, medical services), by jurisdiction (e.g., Federal, state, regional, tribal, city, county), or by some combination thereof.”

Emergency Planning Cycle
The emergency planning cycle includes four basic elements bracketing a disaster: mitigation, preparedness, [disaster], response, recovery, cycling back to mitigation and preparedness. The circle graphic to the right illustrates this cycle. See also "Preparedness Planning Cycle."

Emergency Responder / Management Personnel
Includes Federal, state, territorial, tribal, sub-state regional, and local governments, private-sector organizations, critical infrastructure owners and operators, nongovernmental organizations (NGOs), and all other organizations and individuals who assume an emergency management role. These represent a broader community than first responders. See also "First Responder." (See Section 2 (6), Homeland Security Act of 2002, Pub. L. 107-296, 116 Stat. 2135 (2002)) (NIMS, 2008)

Emergency Response
The planned and actual response by multiple agencies to incidents that can include acts of terrorism, wildland and urban fires, floods, hazardous material spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, war-related disasters, public health and medical emergencies. Traffic incidents are assumed to be included. (Adapted from (NIMS, 2008))

Emergency Support Function (ESF)
The Federal government groups most of its resources and capabilities, and those of certain private-sector and nongovernmental organizations, under ESFs. ESFs align categories of resources and provide strategic objectives for their use. They use standardized resource management concepts such as typing, inventory, and tracking to facilitate the dispatch, deployment, and recovery of resources before, during, and after an incident. Support agencies are assigned based on the availability of resources in a given functional area. ESFs provide the greatest possible access to federal department and agency resources regardless of which agency has those resources. See Tool 1.3 for more detail and discussion.

Emergency Transportation Operations (ETO)
A coordinated, performance-oriented, all-hazard approach to support the development of a formal program for the improved management of traffic incidents, natural disasters, security events, and other emergencies on the highway system. Focuses on an enhanced role for state departments of transportation as participants with the public safety community in an interagency process. (Adapted from NCHRP Report 525, Volume 6, 2005)

Evacuation
The organized, phased, and supervised movement of people away from a dangerous or potentially dangerous area due to an emergency or other major event. Local governments typically have the primary responsibility for ordering an evacuation if one is necessary.

Evacuation Operations Team (EOT)
EOTs are a multi-disciplinary, multijurisdictional group of specialists that are called on to plan, organize, and execute tactical evacuation operations and usually become the region's Core Planning Team for evacuation planning, response and reentry. The teams typically include police, fire and emergency medical personnel, highway workers, public information specialists, public transit representatives, emergency managers, mass care specialists, political decision makers, and others as appropriate. The team periodically trains and exercises the team and team members may be from public, private, or volunteer sectors. (Definition adapted from the FHWA report: "Using Highways During Evacuation Operations for Events with Advance Notice- Evacuation Planning and Preparedness Process from the Transportation Perspective")

F

Faith-based Organization (FBO)
FBOs are organizations based on religious beliefs or connected with an organized faith community. These organizations typically deliver a variety of human services, such as caring for the infirm and elderly, advocating justice for people who are oppressed, humanitarian aid, and international development efforts.

Federal Emergency Management Agency (FEMA)
FEMA is the federal agency charged with building and supporting the nation's emergency management system. On March 1, 2003, FEMA became part of the U.S. Department of Homeland Security (DHS). FEMA's mission is to support American citizens and first responders to ensure that the U.S. works together to build, sustain, and improve capability to prepare for, protect against, respond to, recover from, and mitigate all hazards. FEMA provides funding for mitigation and training, and reimbursements for response and recovery efforts. The Office of Disability Integration and Coordination, with a representative in each FEMA field office, is part of FEMA.

Federal Highway Administration (FHWA)
FHWA is a major agency of the U.S. Department of Transportation (DOT). FHWA is charged with the broad responsibility of ensuring that America's roads and highways continue to be the safest and most technologically up-to-date. This federal agency provides technical and financial support to state, local, and tribal governments to support construction, improvement, and preservation of America's highway system. FHWA is headquartered in Washington, D.C., with division offices in every state, the District of Columbia, and Puerto Rico.

Federal Transit Administration (FTA)
FTA is one of 11 operating administrations within the U.S. Department of Transportation (DOT), located in Washington, D.C., with 10 regional offices across the nation. As authorized by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users of 2005 (SAFETEA-LU), the FTA provides stewardship of combined formula and discretionary programs to support a variety of locally planned, constructed, and operated public transportation systems throughout the United States. Transportation systems typically include buses, paratransit (see definition), subways, light rail, commuter rail, streetcars, monorail, passenger ferryboats, inclined railways, or people movers.

First Responder
A first responder is the first responding unit to arrive at an incident scene. This term has traditionally been used to describe public safety emergency responders who have duties related to preservation of life and property. As transportation agencies become more actively involved in traffic incident response and take active roles in Incident Command (as partners in Unified Command), they are becoming accepted as first responders for traffic incidents. For example, service patrols may be first on the scene of an incident and many are trained to provide traffic control to stabilize the scene and to provide emergency first aid. Some service patrols are also permitted limited use of emergency lights and sirens to get to an incident.

Fixed Route
A fixed route refers to where transit service vehicles run on regular, pre-designated, pre-scheduled routes with little or no deviation.

Fusion Center
Centers that integrate various streams of information and intelligence, including that flowing from the Federal government, state, territorial, tribal, and local, governments, as well as the private sector, providing a more accurate picture of risks to people, economic infrastructure, and communities that can be developed and translated into protective (e.g., preventative or responsive) actions. The ultimate goal of fusion is to prevent man-made (terrorist) attacks and to respond to natural disasters and manmade threats quickly and efficiently should they occur. Note that Fusion Centers are referred to differently in the various states. FHWA has also prepared a guidebook for Fusion Center/TMC/EOC linkages/integration.

I

Incident Command System (ICS)
ICS is a standardized, on-scene, all-hazards incident management approach used by all levels of government, many nongovernmental organizations, and the private sector. ICS is the combination of facilities, equipment, personnel,

procedures, and communications operating within a common organizational structure, designed to aid in the management of resources during incidents. ICS is the command and control protocol at a highway incident scene. It is the operational component or core of NIMS.

Incident

In emergency management vocabulary, this is an event that has the potential to result in unintended harm or damage. Incidents are natural or manmade occurrences or events and can include major disasters, emergencies, terrorist attacks, terrorist threats, civil unrest, wildland and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, tsunamis, war-related disasters, public health and medical emergencies, and other occurrences requiring an emergency response including traffic incidents. (NIMS, 2008) Also see "Catastrophic Incident."

Interagency Coordination

The synchronization and integration of activities, responsibilities, and command and control structures of different government agencies to ensure that the resources of an organization are used most efficiently in pursuit of the specified objectives. In addition to interagency coordination, it is also essential to have coordination and good communication among jurisdictions, service providers, other area plans, and stakeholders. (Definition adopted from: www.businessdictionary.com)

L

Latchkey Children

Children (usually 5-12 years old) who must spend part of the day unsupervised at home while their parents are at work. The Census estimates in 2000 indicated about 14 percent of children or about 10 million children were unsupervised on average for an hour a day, but the time and frequency vary widely, including varying with the age of the child.

Limited English Proficiency (LEP)

Individuals who do not speak English as their primary language and who have a limited ability to read, speak, write, or understand English can be limited English proficient, or "LEP." These individuals may be entitled to language assistance with respect to a particular type or service, benefit, or encounter.

M

Major Disaster

Any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought) or, regardless of cause, any fire, flood, or explosion in any part of the United States, which in the determination of the president causes damage of sufficient severity and magnitude to warrant major disaster assistance under the Robert T. Stafford Disaster Relief and Emergency Assistance Act to supplement the efforts and available resources of states, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby. (Stafford Act) Many guides actually treat catastrophic events as a more severe event than a major disaster.

Mandatory Evacuation
The term implies that individuals do not have a choice of whether or not to evacuate because the government will not be able to protect them and provide relief if they remain. It generally conveys a higher level of urgency. (Adapted from US House of Representatives document: "A Failure of Initiative")

Medical Needs Shelters (MNS)
All shelters must be accessible to people with access and functional needs. A medical needs shelter (MNS) is a location that offers greater medical assistance than basic first aid, but not to the level of acute care. This type of shelter may be reserved for a relocation of a nursing home in the event of a disaster. It will be assumed that the staff of the facility will accompany the patients and be the primary caregivers of medical care to them. Supplies and equipment will also be the responsibility of the evacuated facility. Due to the nature of the MNS, limiting occupants to just those of the evacuated facility should be given consideration.

Memorandum of Understanding (MOU) / Memorandum of Agreement (MOA)
A document that outlines the intentions of two or more different agencies or jurisdictions to work together, on a continuing and lasting basis, toward maximum cooperation and mutual assistance in the areas of disaster response and emergency preparedness. The documents typically confirm a mutual aid agreement for reciprocal emergency aid in case of emergencies too extensive to be dealt with effectively unassisted. MOUs and MOAs are also developed between a local agency and outside organizations or private companies in order to ensure that the necessary resources are available in the event of an emergency.

Metropolitan Planning Organization (MPO)
An MPO is an agency designated by law with the lead responsibility for developing transportation plans and programs within an urbanized area. MPOs are established by agreement of the Governor(s) and units of local government representing at least 75 percent of the population in the urbanized area. An MPO can also be a Council of Governments. See also “Council of Governments (COG)."

N

National Cooperative Highway Research Program (NCHRP)
Managed by the Cooperative Research Programs of the TRB and sponsored by state departments of transportation, the NCHRP conducts research in problem areas that affect highway planning, design, construction, operation, and maintenance nationwide.

National Incident Management System (NIMS)
NIMS is a system used in the United States, and established by the Department of Homeland Security (DHS), to coordinate emergency preparedness and incident management among various Federal, state, tribal, territorial, and local agencies. NIMS provides the template for the management of incidents. Also see "Incident Command System (ICS)" and the FHWA report titled "Simplified Guide to the Incident Command System (ICS) for Transportation Professionals.”

National Planning Scenarios
The National Preparedness Guidelines, developed by DHS, contain fifteen scenarios that form the basis for

coordinated federal planning, training, exercises, and grant investments. The fifteen all-hazards planning scenarios (the National Planning Scenarios or Scenarios) were developed for use in national, Federal, state, and local homeland security preparedness activities. The Scenarios are planning tools and are representative of the range of potential terrorist attacks and natural disasters and the related impacts that face our nation. The objective was to develop a minimum number of credible scenarios in order to establish the range of response requirements to facilitate preparedness planning. See also "Scenarios." (Definition adapted from: "National Planning Scenarios: Executive Summaries" and "Fitting the Pieces Together: Improving Transportation Security Planning in the Delaware Valley")

National Preparedness Guidelines
These guidelines define what it means for the Nation to be prepared by providing a vision for preparedness, establishing national priorities, and identifying target capabilities. The guidelines adopt a Capabilities-Based Planning process supported by three planning tools: the National Planning Scenarios, Target Capabilities List (TCL), and Universal Task List (UTL). The Guidelines serve as a framework to guide operational readiness planning, priority-setting, and program implementation at all levels of government. (Definition from DHS document titled: "Target Capabilities List: A Companion to the National Preparedness Guidelines")

National Response Framework (NRF)
NRF is part of the National Strategy for Homeland Security that presents the guiding principles enabling all levels of domestic response partners to prepare for and provide a unified national response to disasters and emergencies. NRF provides the structure and mechanisms for national-level policy for incident management. The NRF can be accessed on the U.S. Department of Homeland Security (DHS) website.

Nongovernmental Organization (NGO)
NGOs are non-profit entities formed as an association that are based on the interests of their members, individuals, or institutions, and that are not created by government but may work cooperatively with government. Such organizations serve a public purpose, not a private benefit.

P

Paratransit
Paratransit is the family of transportation services that serves the mobility impaired or transportation disadvantaged. Examples of paratransit include taxis, carpools, vanpools, minibuses, jitneys, demand responsive bus services, and specialized bus services.

People with Medical Conditions
Many people throughout the United States may have one or more existing medical conditions, some more severe than others. People with medical conditions are individuals who have one or more medical diagnoses that may or may not interfere with activities of daily living. They may need assistance during an emergency evacuation. If a person with a medical condition becomes debilitated, limited, or otherwise impaired, that person may be protected under the Americans with Disabilities Act (ADA). See Tool 3.2.

People with Mobility Disabilities
Mobility disabilities are the physical challenges that can range from difficulty moving to the need to use

assistive devices such as canes, walkers, wheelchairs, or scooters. A person with mobility disabilities may have a condition that requires him/her to remain in bed or need similar conveyances, and may require additional assistance in an evacuation. That assistance could range from a low-floor bus to accommodate a person with a walker, to a lift equipped bus, paratransit, or other vehicle, to an ambulance or similar specialized vehicle.

People with No Access to a Vehicle

People with no access to a vehicle are individuals and families that do not have a car and generally rely on public transportation on a daily basis. Individuals and families may not have a car for several reasons, including economic factors, geographic location (i.e., people who live in urban environments may not own a vehicle), health conditions (e.g., those with physical disabilities, some of the very elderly), environmental conscientiousness, and lack of a license.

Preparedness Planning Cycle

The Preparedness Planning Cycle is a subset of the Emergency Planning Cycle. Preparedness is achieved and maintained through a continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action. Ongoing preparedness efforts among all those involved in emergency management and incident response activities ensure coordination during times of crisis. Moreover, preparedness facilitates efficient and effective emergency management and incident response activities. The cycle involves several phases, as illustrated in the graphic to the right. See "Emergency Planning Cycle."

Presidential Disaster Declaration

There are several types of responses governments can take in emergency situations. Local and state governments may declare a state of emergency within their jurisdiction, but only the Federal government may declare a presidential disaster declaration or a federal state of emergency. When local and state governments become overwhelmed by an emergency, the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §§ 5121-5206, establishes a process for a state governor to request assistance from the Federal government and obtain a Presidential disaster declaration. The process defines the type and scope of assistance available from the Federal government and sets the conditions for obtaining that assistance. FEMA, now part of the DHS, is the federal agency then tasked with coordinating the response. (Definition adapted from FEMA document titled: "A Guide to the Disaster Declaration Process and Federal Disaster Assistance")

Private Sector

The private sector is the part of the economy that is both run for private profit and is not controlled by the state. Also see “Voluntary Sector.”

Public Assisted Evacuation Plan (PAEP)

A PAEP is a plan for how to implement an effective government assisted evacuation of the general public. Typically a PAEP uses a timeline to set forth key phases and milestones for evacuation response that should be planned for ahead of time. See Tool 4.1.2.

R

Re-entry
The phase of the evacuation process that involves the ingress of evacuees once conditions are safe and infrastructure (roads, utilities, and housing) and support services (such as law enforcement, stores, schools, and clinics) are up and running. This phase involves coordination between local, county, and state agencies in order to ensure a safe and orderly return of evacuees.

Regional Emergency Assistance Compact (REAC)
A regional mutual aid compact in which multiple states and/or regional governing agencies create an agreement to assist each other in emergency situations. A REAC is essentially a regional Emergency Management Assistance Compact (EMAC). Also see "Emergency Management Assistance Compact (EMAC)."

Regional Transit Security Working Group (RTSWG)
RTSWGs support region-wide planning to address National Preparedness Goals, including improvements to specific response capabilities and communications, and to identify and fill gaps in regional transit security planning. These groups develop a Regional Transit Security Strategy (RTSS) in coordination with local and regional transit agencies and the local or state EMA. These working groups are established and required through the Transportation Security Administration (TSA) and required of any municipality receiving Transit Security Grant Program funds, which are administered by DHS.

Registry
In emergency services vocabulary, a registry is a voluntary listing of disabled or vulnerable special needs populations. Registries are considered an essential part of preparedness in some communities and regions, but are often controversial for many reasons. Community communication and outreach, networks, multiple means of communication, and well-prepared communities may replace the perceived need for registries.

Resource Typing
Resource typing is categorizing, by capability, the resources requested, deployed, and used in incidents. Measurable standards identifying resource capabilities and performance levels serve as the basis for categories. Resource users at all levels use these standards to identify and inventory resources and apply for reimbursement. Resource kinds may be divided into subcategories to define more precisely the capabilities needed to meet specific requirements. (FEMA)

Risk Management / Risk Assessment
Risk management is the identification and assessment of the threats and hazards that could impact a jurisdiction. The risk assessment is the process of collecting and identifying information about possible threats and hazards and then assigning values to each for the purpose of determining those that have the highest priorities so that plans for action can be developed for addressing them. The jurisdiction can then catalog everything from specific asset vulnerabilities to staffing levels for emergency personnel.

S

Scenarios
Scenarios, outlines or models of an expected or supposed sequence of events, are an important element in emergency planning. They allow emergency managers, transportation managers, and other key players to think through and practice all the stages of an actual disaster, including coordination, actions, and resource needs. The process, the relationships developed, and the decisions on frameworks and strategies for control and operations explored in scenarios will generally lead to better outcomes in actual disasters. See "National Planning Scenarios."

Service Animal
A service animal is defined under the Americans with Disabilities Act (ADA) as “a guide dog, signal dog, or other animal individually trained to provide assistance to an individual with a disability.” Service animals assist people with disabilities in various activities, such as sight (dog guides) and hearing (hearing dogs). Often, a service animal enables a person with a disability to live independently. Trained and certified service animals must be allowed to accompany an individual in a taxi, public transport vehicle, or other mode of transportation to a public shelter or any other location; a service animal is not a pet.

Shadow Evacuation
An evacuation in which people who are not in danger (and who have not been advised to evacuate), choose to evacuate and cause an unnecessary burden on the area's transportation infrastructure. A shadow evacuation can subsequently overburden area infrastructure to the point that truly at risk individuals cannot evacuate as directed.

Shelters
A temporary facility which provides housing and basic services until persons can return home or obtain temporary or permanent housing elsewhere. (Definition from FEMA document: "Guidance on Planning for Integration of Functional Needs Support Services in General Population Shelters")

Sheltering-in-Place
In some situations, the most effective approach to protecting populations is to strongly encourage or force people to stay where they are while taking steps to increase safety (e.g., closing outside vents and sealing doors), such as during chemical spills or air-born related disasters. In other cases, sheltering-in-place is part of an evacuation strategy, where individuals who are not in imminent danger are advised to stay where they are to allow truly at risk individuals to evacuate as well as to prevent a shadow evacuation. (Part of definition adapted from: "Fitting the Pieces Together: Improving Transportation Security Planning in the Delaware Valley")

Sign Language Interpreter
A sign language interpreter is a person who has been trained to use a system of conventional symbols or gestures made with the hands and body to help people communicate who are deaf or hard of hearing, or have speech impairments. There are different types of sign language interpreters: Tactile, Oral, Signed English, and others, as well as American Sign Language (ASL).

Special Event
While special events can by some definitions include emergencies, this report generally uses the term to mean a planned (or unplanned) gathering of a large amount of people. A planned special event is usually described as those activities that have a known location, scheduled time(s) of occurrence, and similar associated operating

characteristics. Special events typically involve increased traffic congestion and require the direct attention of transportation agencies. (Planned special events can include sporting events, concerts, festivals, conventions, parades, fireworks displays, races, sporting games, rallies, seasonal festivals, milestone celebrations, etc.)

Special Needs Populations
No singular definition of the term “special needs” exists, although the term is widely used within the disaster services and emergency management fields. The National Response Framework employs the preferred term "populations with access and functional needs," while CPG 101 emphasizes "whole community planning." See "Access and Functional Needs Populations."

T

Target Capabilities List (TCL)
The National Preparedness Guidelines, a statement of the core preparedness goal for the United States, defines 37 specific capabilities that communities, the private sector, and all levels of government should collectively possess in order to respond effectively to disasters. The TCL serves as a reference document as well as a planning, assessment, and training tool. (Portions of definition from: "Fitting the Pieces Together: Improving Transportation Security Planning in the Delaware Valley")

Traffic Management Center or Transportation Management Center (TMC)
The TMC or Traffic Operations Center (TOC) is the hub of a transportation management system where information about the transportation network is collected and combined with other operational and control data to manage the transportation network and produce traveler information. It is the focal point for communicating transportation-related information to the media and the motoring public. It is a place where agencies can coordinate their responses to transportation situations and conditions. The TMC links various elements of Intelligent Transportation Systems (ITS), such as variable message signs, closed-circuit video equipment, and roadside count stations. These ITS elements enable decision makers to identify and react to an incident in a timely manner based on real-time data. Many EOCs coordinate with TMCs (and fusion centers, if available) to bring together the best possible situational awareness.

Transit Cooperative Research Program (TCRP)
TCRP is a program for carrying out practical research that yields near-term results for expanding public transportation system services and improving their efficiency. Through research, TCRP seeks to solve operational transportation problems, adopt useful technologies from related industries, and find ways for the transportation industry to be innovative. TCRP is funded by the public through the Federal Transit Administration and is governed by an independent board — the TCRP Oversight and Project Selection (TOPS) Committee.

Transportation Demand Management (TDM)
Transportation Demand Management (TDM) is any action or set of actions designed to influence the intensity, timing, and distribution of transportation demand, in order to reduce traffic congestion or enhance mobility. Transportation demand management is also sometimes referred to as traffic demand management or travel demand management. (Part of this definition was adopted from the FHWA document: "The Transportation Planning Process: Key Issues.")

Transportation Disadvantaged
Transportation disadvantaged populations include individuals who do not have access to personal transportation for reasons of health, disability, level of income, or other reasons. Florida statutes define it as, "Persons who because of physical or mental disability, income status, or age are unable to transport themselves or to purchase transportation and are, therefore, dependent upon others to obtain access to health care, employment, education, shopping, social activities, or other life-sustaining activities, or children who are handicapped or high-risk or at-risk." Also see "Access and Functional Needs Populations."

Transportation Research Board (TRB)
The TRB is one of six major divisions of the National Research Council— a private, nonprofit institution that is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities. The mission of TRB is to promote innovation and progress in transportation through research. (from TRB website: http://www.trb.org/AboutTRB/AboutTRB.aspx)

U

Urban Area Security Initiative (UASI)
FEMA grant program to plan for and enhance regional emergency preparedness capabilities related to national security in the highest risk urban areas. UASI funding is typically used in providing planning, training, and other support activities for emergency managers and first responders to prevent, protect against, respond to, and recover from acts of terrorism.

Unified Command
An application of ICS used when there is more than one agency involved with an incident in a single jurisdiction or when incidents cross political jurisdictions. Agencies work together through the designated members of the Unified Command (UC), often the senior person from agencies and/or disciplines participating in the UC, to establish a common set of objectives and strategies and a single Incident Action Plan (IAP). (NIMS, 2008)

V

Variable Message Signs (VMS)
See "Dynamic Message Signs (DMS)."

Videophone (VP)
A VP is a telephone with a video screen that is capable of bi-directional video and audio transmissions for communication between people in real time. VPs are particularly useful to the deaf and speech-impaired who can use them with American Sign Language to facilitate communication.

Voluntary Evacuation
Voluntary evacuation is a type of evacuation where people choose to move from a perceived area of danger to an area of safety either on their own or under the direction of government. People are not required to evacuate

under such circumstances, so no penalty is issued for failing to follow a voluntary evacuation. (Definition adapted from: http://definitions.uslegal.com)

Voluntary Organizations Active in Disaster (VOAD)
National VOAD is a nonprofit membership organization founded in 1970 in response to Hurricane Camille in the Gulf Coast. Members of National VOAD include national nonprofit organizations, whose missions include programs either in disaster preparedness, response, and/or recovery.

Vulnerable Populations
Vulnerable populations include those who are made especially vulnerable by their financial circumstances, place of residence, health, age, personal characteristics, functional or developmental status, ability to communicate effectively, and presence of chronic illness or disability. Examples include elderly, people with disabilities, and young children. See "Access and Functional Needs Populations."

W

Whole Community Planning
Planning that engages the whole community by using a process that represents the actual population in the community and involves community leaders, the private sector, and all community stakeholders. FEMA's CPG 101 emphasizes that this type of planning yields the most realistic and complete plans.
(Image from CitizenCorps website: http://www.citizencorps.gov/about/principles.shtm)

Note: Given the similarity in the topic areas and the need to keep definitions uniform, most definitions in this glossary were reproduced from the "TCRP Report 150: Communication with Vulnerable Populations: A Transportation and Emergency Management Toolkit," and additional definitions were adopted from the "NCHRP Report 525: Surface Transportation Security, Volume 16, A Guide to Emergency Response Planning at State Transportation Agencies." Several other documents were used as sources including FEMA's "Guidance on Planning for Integration of Functional Needs Support Services in General Population Shelters" (2006); the Delaware Valley Regional Planning Commission's "Fitting the Pieces Together: Improving Transportation Security Planning in the Delaware Valley" (2010); FEMA's "National Incident Management System" (2008); and the individual references also noted with various other terms in this Glossary.

Appendix D: Anticipated Research Results- Outreach and Implementation Plan

Objective

Identify a plan for outreach and presentation materials for emergency management and transportation agencies to use in order to create awareness of the toolkit.

Products Expected from the Research

Guidebook with operations plan templates and priority actions for each phase of emergencies to bridge the gap between needs for evacuation services and suppliers, while integrating the modes. See task descriptions, in particular Task 7 and Task 9. Also, Final Report with full documentation for those seeking the "foundations".

Audience or Market for the Product

Emergency managers and planners, transportation operations leaders, transportation providers and potentially outreach specialists and community representatives. See task descriptions and outreach plan, below.

Assessments of Impediments to Successful Implementation

The work plan identifies a solid research plan, with experts in both practical and theoretical integration of modes and making the connections with persons in need of transportation, through a variety of means. The study plan is workable, and the anticipated operations templates and guidebook are achievable within the desired timeframe. The approach, which calls for internal vetting, interviews, workshops, and case studies to ensure that the Guide meets the needs and expectations of end users, should provide a reasonable "sounding board." The team intends to keep the Guide as brief and directed to "how to" as possible – a "guidebook in a box", so to speak – with the full document and other resources as backup.

However, even the most compelling and useful guidebook, with all the outreach possible, may not claim the attention of those who most need to see it and use it; or if they do look at it, they may fail to act on it. For example, if transportation managers and emergency managers in some states or communities do not take the initiative to ensure that relational and institutional frameworks and agreements are in place among transportation providers, they are likely to find themselves lacking in resources and information in a major emergency. Likewise, if they do not identify a local, regional or state "champion", and if they do not dedicate the limited staff time necessary to establish and maintain community liaisons, those states or communities may, for at least a time, lack a cohesive community network, that addresses the "demand" side and is more fully addressed in the companion effort, TCRP A-33, *Communication with Vulnerable Populations: A Transportation and Emergency Management Toolkit*. Continuity, institution-building, relationship-building and trust-building are key components of the effort.

Institutions and Individuals Who Might Take Leadership in Applying the Research Product

See Task 9 description and below. We anticipate that emergency managers and transportation managers will see and acknowledge the need and the common-sense practicality of the approach. In many communities, a "natural" institutional "home" and/or "champion" is expected to be grateful for the help, and to "run with it". In other communities, it may be necessary for community activists, advocates and

persons with functional transportation needs to begin working with the emergency and transportation managers "from the ground up", as noted in the section on Community and Advocate Outreach, below.

Activities Necessary for Successful Implementation

See task descriptions and discussion above and below.

Criteria for Judging Progress and Consequences of Implementation

Widespread dissemination across transportation and emergency planning organizations, with community outreach plans in place.

Follow-up surveys with State DOTs, EMAs, and MPOs are recommended at one-year, two-year and five-year intervals to see 1) if the Guide has been received and read; 2) if recommendations have been acted upon in developing MOUs and institutional and community relationships; 3) if plans have been tested in inclusive tabletops and/or exercises ; 4) if any emergency events have occurred in which the plans have been implemented; and 5) how well the plan worked (or didn't), and what steps are in place to improve any problems detected.

Applicability of Results to Practice

As described throughout the technical approach, in particular in Tasks 2 through 5, 7 and 9, the study team is very focused on delivering a practical and useful Guide for transportation and emergency managers, to serve in many cases as a companion guide to TCRP A-33, *Communication with Vulnerable Populations*. We know that, in most cases, "smaller is better", and in addition to the full report and succinct Guide, may develop pocket guides for even wider distribution (if feasible and recommended by users). Our team is committed to action, as is demonstrated in our collective histories, and we are passionate about the importance of this project, and the need for widespread, practical advice that can be acted upon with the limited resources available to most transportation and emergency managers.

Expected audience: See Task Descriptions and Outreach Plan, below.

Outreach Plan Background

While NCHRP products are developed to be useful to practitioners, they are not always utilized in their day-to-day work. There are many reasons why practitioners at transportation agencies may not utilize NCHRP products, but one of the more common complaints is that they did not know the product existed. Another reason involves a lack of practical "how to use" instructions regarding the use of the product. The Berger Team assembled for this contract represents not only emergency management and transportation practitioners with "in-the-field" experience and research expertise, but also connections to numerous venues of outreach to emergency management agencies and transportation agencies that will provide immediate, credible access to many professional organizations to which practitioners commonly look for the latest tools and techniques. We will distribute pre-approved fliers and other information about the project at conferences and other venues which we attend as part of our regular business. We will offer to make presentations as part of committee and member duties (for example, TRB committees often include brief presentations, outside the normal "paper" process). Our team collectively includes access to the following contacts and resources to bring to this task. We would not expect or commit to attending all conferences, but would submit information such as display fliers to as many as possible, and for those team members are already attending (or hosting), we would "get the word out" via pre-approved

fliers, individual conversations, committee member advisories, panel discussions and eventually paper presentations.

Emergency Management and Transportation

Team members Brian Wolshon and John Renne organized the First Annual Emergency Evacuation Conference in New Orleans in February, 2010. The conference is organized by the Stephenson Disaster Management Institute and the Gulf Coast Research Center for Evacuation and Transportation Resiliency, both at Louisiana State University and the University of New Orleans. The second biennial conference is scheduled in New Orleans in 2012.

The website address is http://www.nationalevacuationconference.org/

Special topics of discussion at the conference included:

- Addressing the challenges faced by special needs populations during disasters
- Improvements in evacuation planning and modeling
- National evacuation policy development

Additional venues for outreach include:

- FEMA and FEMA-sponsored workshops, in particular a developing relationship with Marcie Roth, Senior Advisor on Disability Issues for FEMA and Doc Lumpkins. Anticipate FEMA comments on the Guide and Draft Final Report
- Access to the Lessons Learned Information Sharing (LLIS)
- Access to the EMFORUM (see sidebar)
- All-Hazards Consortium (mid-Atlantic)
- Association Meetings – National Emergency Management Association (NEMA) and others
- International Association of Emergency Managers
- Florida Governor's Hurricane Conference (attendance is >2,000) partners include state EM, local EMs, the American Red Cross, The National Weather Service
- Local states' emergency management association annual meetings
- Florida hosts a large "people with disabilities" conference in Orlando every June.
- Suggest League of Cities; County Association meetings
- The National Association of Regional Councils convened a Transportation and Evacuation Planning Workshop on Monday, June 1, 2009 in Denver, CO as part of its 43rd Annual Conference. It is anticipated that a presentation on the Guide would be a welcome addition to a future Workshop.
- All-Hazards Forum- Denver

Access to the EMFORUM

The EMForum was established in 1998 as a primary outreach tool of the Emergency Information Infrastructure Project (EIIP). A web-based forum on topics of interest to Emergency Managers and others is held twice a month, usually on Wednesdays. Depending on the topic, 40 to 100 or more will be on the line. Transcripts are archived and referenced regularly, ranging from 500 to 2,500 downloads per topic. Recently, the live recordings have been archived, and are being downloaded in increasing numbers. The EMForum maintains an active list of over 3,000, but its outreach goes far beyond that through its partner lists of over 200 organizations. The EMForum has hosted previous events on special needs and vulnerable populations, and usually can schedule an event with two to three months' notice. We have been in contact with the organizers who are pleased to bring new topics such as this to their audience.

Access to TRB Committees, Task Force and Subcommittees.

The Berger Team collectively includes the following:

- Chairman/founder and two additional long-time active members (since 2003) of the Emergency Evacuation Subcommittee
- Active members of the Environmental Justice Committee
- Active member of the Intermodal Passenger Transfer Facilities Committee
- Active member of the Intercity Passenger Rail Committee
- One active member of the Public Involvement Committee.

These individuals all have influence over workshop topics for the annual meeting as well as conference sessions and themes for "calls for papers". Over 10,000 transportation professionals attend the annual TRB conference and therefore this provides a remarkable opportunity for outreach and dissemination. The Emergency Evacuation Subcommittee supports an annual poster session or full paper session that can be utilized to focus on strategies to evaluate multifaceted aspects of evacuation and consequently inform practitioners and academics of the availability of the guidebook.

Access to the Association Metropolitan Planning Organizations (AMPO)

The Berger Team includes a member of AMPO's technical committee, with access to reach out to all MPOs through AMPO dissemination channels.

- **APTA Safety and Security Committees** (there are several) will want to be involved. Also, APTA has a strategic partnership with TRB that can be tapped. A particular emphasis during Phase II will be working with the APTA and FEMA Resource Typing Committees, to try to advance the typing of transportation resources dedicated to moving people. (Currently only ambulances are typed.)
- **The Center for Urban Transportation Research (CUTR)** will also provide an excellent means of dissemination; the Team has several good contacts within CUTR

The FTA uses the *Volpe Center* in Cambridge, MA to disseminate its literature and programs on safety, security and emergency preparedness

All of the above-described venues can be utilized to ensure that "the word" gets out about the availability of the toolkit. Not only can these venues be used for outreach and dissemination, but opportunities exist to provide the "how to use" instructions sought by practitioners. Many of our project team members are asked to organize workshops and conference sessions, and to be presenters. Our project team can leverage their access and credibility with these organizations to promote opportunities for peer-to-peer learning and information exchange. Also, FHWA could sponsor a webinar on the topic to promote awareness of the availability of the toolkit.

Community and Advocate Outreach

In addition to soliciting advice and input during the development of the Guide, once the Guide is complete, we will send email announcements to a full range of agencies involved with the aged and with persons with disabilities. The purpose of the announcement will be to alert the organizations and their

constituents to the existence of this resource. If they desire, as an extension of their personal preparedness efforts and in coordination with local agencies, they and their constituents can begin to inquire as to the progress of their local transportation and emergency plan, and where feasible (health permitting), volunteer to participate in planning and exercises. Such grass-roots efforts are likely to increase the effectiveness and impetus for action for the local transportation or emergency management plan "champion" or assigned lead agency. Representative organizations with broad-based constituencies include, but are not limited to:

- **CDC/Public Health** (The public health community has recognized transportation has a huge issue.) The **CDC Healthy Aging Program** (HAP) has a website (http://www.cdc.gov/aging/). HAP issued two critical issue briefs in 2007 on disaster planning for older adults (CDC's Disaster Planning Goal: Protect Vulnerable Older Adults and Disaster Planning Tips for Older Adults and their Families). Notice of the toolkit could also be placed on the **CDC Public Health and Aging Listserv**. Likewise **CDC's Prevention Research Centers Healthy Aging Network** (PRC-HAN) and through key CDC partners (e.g., **National Assn of Chronic Disease Directors**, **National Assn of City & County Health Officials**).
- **AoA/Aging Network** Contacts with the U.S. **Administration on Aging** can encourage AoA to help disseminate information about the toolkit through its website, electronic mailing lists and newsletter.
- **Administration on Aging**, *Emergency Assistance Guide 2006*, http://www.aoa.gov/PRESS/preparedness/preparedness.asp#guide
- **AARP Public Policy Institute**. *We Can Do Better: Lessons Learned for Protecting Older Persons in Disasters*, http://assets.aarp.org/rgcenter/il/better.pdf
- **National Association of Area Agencies on Aging** (a network of the 600+ local agencies authorized to carry out the Older Americans Act and protect older adults). Previous conference: July 19-22, 2009, Minneapolis, MN, http://www.n4a.org/training-events/annual-conference/. Call for sessions includes: *Improving the Aging Services Network's Emergency Preparedness and Disaster Response.*
- **American Society on Aging/National Council on Aging** (about 4,000 aging services providers attend their annual conference), next conference is March 16-20, 2010.
- **American Geriatrics Society** (group of geriatricians with broad interests in older adults). Next conference: April 2010.
- **Community Transportation Association of America**. Previous conference: May 31-June 5, 2009, http://web1.ctaa.org/webmodules/webarticles/anmviewer.asp?a=922 There were workshops on emergency management/evacuation.
- **Alzheimer's Association** has interest in protecting older adults during disasters. Public Policy Forums held in mid-March conf. in DC, http://www.alz.org/news_and_events_upcoming_events.asp#conferences

- **Nursing Home and Other Senior Residences** (since Katrina, they have been particularly sensitized to the disaster transportation issues)
- **American Association of Homes and Services for the Aging** (an association of people running nursing homes and continuing care retirement communities, all of which need evacuation plans for their older residents). Next conference: mid-April 2010; *Updating Your Disaster Plan*, http://www.aahsa.org/qualityfirst/resources/governance_accountability/security_emergency_management/documents/Updating_Disaster_Plan.pdf
- **American Health Care Association.** *Planning for a Pandemic/Epidemic Disaster: Caring for Persons with Cognitive Impairment*, http://www.ahca.org/flu/pandemic_dementia_care.pdf
- **Assisted Living Federation of America**, *Disaster Planning Guide & Toolkit*, http://www.alfa.org/i4a/pages/Index.cfm?pageID=3648

- **National Long-Term Care Ombudsman Resource Center,** *The Role of Long-Term Care Ombudsmen in Nursing Home Closures and Natural Disasters,* http://www.ltcombudsman.org//uploads/OmbinNHclosures.pdf
- **NCCNHR** (National Consumer Voice for Quality Long-Term Care), *Emergency Preparedness: Questions Consumers Should Ask,* http://www.nccnhr.org/public/245_1268_12002.cfm

Federal:

- *Nursing Home Emergency Preparedness and Response during Recent Hurricanes,* http://oig.hhs.gov/oei/reports/oei-06-06-00020.pdf
- *Disaster Preparedness: Limitations in Federal Evacuation Assistance for Health Facilities Should be Addressed*, http://www.gao.gov/new.items/d06826.pdf

Disability Community:

- **American Red Cross** *Preparing for Disaster for People with Disabilities and other Special Needs*, http://www.redcross.org/services/disaster/0,1082,0_603_,00.html
- **Project Action (In association with Easter Seals)**
- Dept. of Education, **National Institute on Disability and Rehabilitation Research,** *Emergency Management Research and People With Disabilities: A Resource Guide,* http://www.ed.gov/rschstat/research/pubs/guide-emergency-management-pwd.pdf
- **HHS Office on Disability**, ODinfo@hhs.gov.
- **National Center for Accessible Transportation** at Oregon State University
- **Interagency Committee on Disability Research**, http://www.icdr.us/
- **National Council on Disability**, http://www.ncd.gov/
- **National Organization on Disability**, Hilary Styron, StyronH@nod.org, Telephone: 202-293-5960; 202-293-5968 (TTY), www.nod.org; News Articles on Disability and Emergency Preparedness, http://www.nod.org/index.cfm?fuseaction=feature.showFeature&FeatureID=1142&C:\CFusion8\verity\Data\dummy.txt

Other Resources:

- **Administration on Aging**, *Emergency Preparedness Manual*
- **CDC**, http://www.bt.cdc.gov/
- **Center for Disability Issues and the Health Professions,** Western University of Health Sciences, *Evacuation Preparedness Guide*, http://www.cdihp.org/evacuation/toc.html
- **Corporation for National and Community Service,** Disaster Preparedness and Response, http://www.nationalservice.gov/about/focus_areas/disaster.asp
- **Deaflink – national organization for remote ASL services**
- **DisabilityPreparedness.gov**
- **DOT Emergency Transportation site,** Emergency Preparedness and Individuals with Disabilities, http://www.dotcr.ost.dot.gov/asp/emergencyprep.asp
- **FEMA** Comprehensive Preparedness Guide 301 For Special Needs Populations, http://www.fema.gov/news/newsrelease.fema?id=45435
- **HHS Office of Disability, Aging, and Long-Term Care Policy (DALTCP)** is charged with developing, analyzing, evaluating, and coordinating HHS policies and programs which support the independence, productivity, health, and long-term care needs of children, working age adults, and older persons with disabilities. http://aspe.hhs.gov/_/office_specific/daltcp.cfm

- **HHS** has *Community Planning Toolkit for State Emergency Preparedness Managers* with section on transportation – Includes individuals who cannot drive due to the presence of a disability or who do not have a vehicle and will require transportation support for successful evacuation. Support may include making accessible vehicles available (e.g., lift and/or ramp equipped or vehicle suitable for transporting individuals who use oxygen), or knowledge of how/where to access mass transportation to assist in evacuation, http://www.hhs.gov/od/disabilitytoolkit/index.html

- **Medline**, www.nlm.nih.gov/medlineplus/disasterpreparationandrecovery.html
- **National Center for Disaster Preparedness**, Mailman School of Public Health, Columbia University, *Emergency Preparedness: Addressing the Needs of People with Disabilities* (p. 19 on emergency transportation), http://www.ncdp.mailman.columbia.edu/files/DISABILITIES.pdf
- **National Fire Protection Association**, Emergency Evacuation Planning Guide for People with Disabilities, http://www.nfpa.org/assets/files/PDF/Forms/EvacuationGuide.pdf
- **National Library of Medicine,** Special Populations: Emergency and Disaster Preparedness http://sis.nlm.nih.gov/outreach/specialpopulationsanddisasters.html
- **Ready America website**, http://www.ready.gov/america/getakit/seniors.html
- **Rehabilitation Engineering Research Center on Accessible Public Transportation http://www.rercapt.org/**
- **State Independent Living Centers and Centers for Independent Living – in each state and in many communities throughout the country, some variation in names – excellent resources as liaisons to other organizations**
- **"United We Ride" CCAM initiative and resources, such as State Human Service Transportation Coordinating Councils Overview and State Profiles, unitedweride.gov**
- **U.S. Access Board** Resources on Emergency Evacuation and Disaster Preparedness http://www.access-board.gov/evac.htm
- **World Institute on Disability**, http://www.wid.org/

In addition to the venues of outreach and dissemination described, the Berger Team will reach out to appropriate sections of the Environmental Protection Agency (EPA) and the Centers for Disease Control (CDC), as both of these agencies have taken leadership roles in developing guidance materials on reaching out to underserved populations. The Office of Environmental Justice within EPA is a logical starting point for outreach opportunities. The project team also welcomes recommendations from the Project Panel.

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Appendix E: Comparison of Original and Revised Outlines

Table E-1 compares the original outline and tools with the revised outline and tools. Most of the tools in the original outline have been included, often with amendments to increase their utility for transportation purposes. Additional tools have been created as well. The table shows the biggest changes were to first consider the "needs" – the population groups needing evacuation – as part of Step 2, and to identify the resources to support evacuation in Step 4, rather than combine the information gathering into Step 2, as in the original outline. Determining Goals and Objectives formed a new chapter, that was implicit in some of the tools and checklists that were developed. The CPG 101 framework preserved the intentions of the original outline, while serving as a more familiar touchstone to emergency managers and other partners, who will be participating with transportation managers in the planning. In most cases emergency managers at state, regional or local levels, will likely be leading the overall coordination and planning for the many functional areas that participate in an evacuation exercise or event; it is essential for them to be "on board" and cognizant of transportation's resources, assets and constraints.

TABLE E-1. Comparison between Original and Revised Outlines, with Cross-reference for Tools

	Original Outline	**Revised Outline**
Introduction	Description of problem Legal mandates How guide addresses problem	Disaster declarations Guide focus Guide organization
Chapter 1/ Step 1	**Get Started** Overview of Emergency Mgt. Terms and Cycles	**Form a Collaborative Planning Team** 1.1 Identify likely interagency and interregional partners 1.2 Engage the whole community in planning
Tools	1.1 Preliminary risk assessment (now Tool 2.1) 1.2 Evacuation needs discussion guide (now Tool 2.6) 1.3 Potential community partners (now Tool 1.4) 1.4 Primary entities and modes involved in evacuation (now Tool 3.3)	Tool 1.1 Network contact database Tool 1.2 Potential frameworks for convener agencies Tool 1.3 Introduction to Emergency Support Functions (ESFs) and transportation roles & interactions (new) Tool 1.4 Potential community partners
Chapter 2/ Step 2	**Gather Information – Identify Needs and Resources** 2.1 Gather contacts and data on	**Understand the Situation** 2.1. Gather information on potential risks/ hazards that may require

	Original Outline	Revised Outline
	transportation resources to support evacuation 2.2 Gather information on potential sites for gathering people for mass transport 2.3 Gather contacts and data on potential destinations for evacuees 2.4 Check progress so far	evacuation 2.2. Gather contacts and data on people that may need evacuation 2.3. Plan and convene a regional workshop
Tools	2.1 Flowchart and text (flowchart in body of new step 4, text abandoned) 2.2 EE Estimated # of evacuees (still Tool 2.2 but expanded) 2.3 IF Institutional facilities (still Tool 2.3, expanded) 2.4 AE Assisted evacuees – non-institutional (still Tool 2.4, expanded) 2.5 Examples of Resources (now Tool 4.2.1) 2.6 TR Transportation related resource database templates (evacuation routes, fuel/food vendors) (now part of Tool 4.2.3) 2.7 TA Transportation Assistance (mass transportation modes, operators database) (now grouped in Tool 4.2.4) 2.8 Transit inventory tool (now grouped in Tool 4.2.4) 2.9, 2.10 Variable message signs, dynamic message signs (combined, now grouped as part of Tool 4.2.3) 2.11 Public works equipment (now part of Tool 4.2.3) 2.12 Reception/ pick up locations (modified to intermodal facilities, now grouped with Tool 4.2.4) 2.13 Hotel/motel database – deleted – far removed from transportation responsibilities	Tool 2.1 Preliminary risk assessment Tool 2.2 EE Estimated # of evacuees Tool 2.3 IF Institutional facilities Tool 2.4 AE Assisted evacuees – non-institutional Tool 2.5 LA Livestock and other animals (new) Tool 2.6 Evacuation needs discussion guide

	Original Outline	Revised Outline
	2.14 Public shelter database – substantially revised to reflect information important to transportation (now Tool 4.2.5), to coordinate with ESF6 who maintains full shelter information 2.15 Receiving facilities database deleted- same basic information as Institutional Facilities and others from source jurisdictions. Coordination between facilities is not a primary transportation mission or responsibility, but transportation assistance may be required. 2.16 Evacuation Management checklist (now Tool 4.2.6 Resource inventory checklist, with more comprehensive checklist for all functions in Tool 5.2)	
Chapter 3/ Step 3	**Design the Evacuation Plan** Major elements: Hazard analysis Vulnerability analysis Behavioral analysis Transportation analysis Transit and other assisted transportation analysis Shelter analysis Decision making	**Determine Goals and Objectives** 3.1 Determine operational priorities 3.1.1 Develop/ consider scenarios 3.1.2 Identify potential traffic, transit, intermodal and interjurisdictional challenges and opportunities presented by the scenario 3.1.3 Convene at least one collaborative workshop on operational priorities 3.2 Establish goals and objectives
Tools	3.1 "Workshop in a Box" (now a resource identified for all tasks, included at conclusion of Guide) 3.2 Partners to help match resources to needs (same as Tool 1.3, new Tool 1.4) 3.3 Sample evacuation timeline (now Tool 4.1.2)	Tool 3.1 Discussion guide on goals and objectives- "thought starters" (new) Tool 3.2 Transportation coordination spectrum of considerations for access & functional needs populations Tool 3.3 Primary entities and modes involved in evacuation Tool 3.4 Transportation operations

	Original Outline	Revised Outline
	3.4 Transportation coordination spectrum of considerations for access and functional needs populations (now Tool 3.2) 3.5 Transportation coordination checklist (now Tool 3.4) 3.6 Transportation communications (now Tool 4.3)	coordination checklists
Chapter 4/ Step 4	**Test, Exercise, Assess and Revise the Plan** 4.1 Develop inclusive evacuation exercise planning team 4.2 Decide on type and scope 4.3 Develop exercise scenario(s) 4.4 Establish date, time, location, issue invitations 4.5 "Walk through" in advance, especially if complex 4.6 Conduct exercise 4.7 Debrief 4.8 Document the exercise	**Plan Development** 4.1 Develop and analyze courses of action 4.1.1 Establish the timeline 4.1.2 Depict scenarios, identify decision points and operational tasks 4.2 Identify resources 4.3 Identify information and intelligence needs
Tools	4.1 Introduction to exercises (now Tool 6.3) 4.2 Participant review form (now Tool 6.4) 4.3 Facilitator review form (now Tool 6.5) 4.4 Sample after action report (now Tool 6.2)	Tool 4.0 Discussion guide- "thought starters" (new) Tool 4.1.1 Real Time Evacuation Planning Model (RTEPM) (new) Tool 4.1.2 Public Assisted Evacuation Plan Timeline for Notice Events Tool 4.2.1 Examples of Resources Tool 4.2.2 Overview of FEMA resource typing for transportation resources (new) Tool 4.2.3 TR Transportation related resource database templates – compilation- evacuation routes, fuel/food vendors, variable message signs, public works equipment Tool 4.2.4 TA Transportation Assistance – compilation- intermodal facilities, mass transportation modes,

	Original Outline	Revised Outline
		vehicle fleet information, staff Tool 4.2.5 Public shelters transportation reference Tool 4.2.6 Resource inventory checklist Tool 4.3 Checklist for interagency communications and information sharing between transportation agencies, emergency management, and others
Chapter 5/ Step 5	**Formalize, Sustain and Improve the Plan** 5.1 Schedule regular meetings 5.2 Include community partners in planning, exercises 5.3 Include community partners in public outreach 5.4 Expand the community network 5.5 Use small incidents to practice coordination and deployment 5.6 Use large planned events to practice regional coordination and strategies 5.7 Develop agreements with partner agencies	**Plan Preparation, Review and Approval** 5.1 Writing the plan 5.2 Review the plan 5.3 Approve and maintain the plan 5.4 Disseminate the plan
Tools	Tool 5.1 Sample MOU with transit agency as convener (now Tool 5.3) Tool 5.2 Sample agreement with MPO as convener (now Tool 5.4)	Tool 5.1 Multijurisdictional multimodal evacuation coordination template outline (new) Tool 5.2 Multijurisdictional multimodal evacuation planning checklists (new) Tool 5.3 Sample MOU with transit agency as convener Tool 5.4 Sample agreement with MPO as convener
Step 6		**Plan Implementation and Maintenance** 6.1 After action reporting 6.2 Updating the plan 6.3 Training, testing and exercising
Tools		**Tool 6.1 After action reporting- real**

	Original Outline	Revised Outline
		events – FEMA guidance Tool 6.2 After action/ corrective action report survey template Tool 6.3 Overview description of drills, simulations and exercises Tool 6.4 Participant feedback form Tool 6.5 Facilitator report form Tool 6.6 Summary of the full after action report template (new)
Resource		**Evacuation Workshop Planning 101 "Workshop in a Box"**
		Useful resources and direct references
		Glossary (to be added- included in this report)
		Appendix A: FEMA Target Capabilities List for Citizen Evacuation and Shelter in Place (new) **Appendix B:** Alaska Evacuation Plan Template (possibly substitute urls for multiple plans) (new)

Endnotes

[1] Summarized from DHS website

[2] Federal Emergency Management Policy Changes After Hurricane Katrina: A Summary of Statutory Provisions November 15, 2006

[3] Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, and Related Authorities *FEMA 592, June*

[4] 2008 Nationwide Survey of Local Emergency Planning Committees

[5] http://ops.fhwa.dot.gov/eto_tim_pse/about/index.htm

[6] National Incident Management System, December 2008, Homeland Security

[7] Developing and Maintaining Emergency Operations Plans, November 2010, Comprehensive Preparedness Guide (CPG) 101, Version 2.0, FEMA

[8] Target Capabilities List - A companion to the National Preparedness Guidelines, United States Department of Homeland Security, September 2007

[9] Evacuee Support Planning Guide FEMA P-760/Catalog No. 09049-2 July 2009, FEMA

[x] Catastrophic Incident Annex, November 2008, Department of Homeland Security (DHS)/Federal Emergency Management Agency (FEMA)