A Compendium of Best Practices and Lessons Learned for Improving Local Community Recovery from Disastrous Hazardous Materials Transportation Incidents

DETAILS

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HAZARDOUS MATERIALS COOPERATIVE RESEARCH PROGRAM

HMCRP REPORT 9

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HAZARDOUS MATERIALS COOPERATIVE RESEARCH PROGRAM

The safety, security, and environmental concerns associated with transportation of hazardous materials are growing in number and complexity. Hazardous materials are substances that are flammable, explosive, or toxic or that, if released, produce effects that would threaten human safety, health, the environment, or property. Hazardous materials are moved throughout the country by all modes of freight transportation, including ships, trucks, trains, airplanes, and pipelines.

The private sector and a diverse mix of government agencies at all levels are responsible for controlling the transport of hazardous materials and for ensuring that hazardous cargoes move without incident. This shared goal has spurred the creation of several venues for organizations with related interests to work together in preventing and responding to hazardous materials incidents. The freight transportation and chemical industries; government regulatory and enforcement agencies at the federal and state levels; and local emergency planners and responders routinely share information, resources, and expertise. Nevertheless, there has been a long-standing gap in the system for conducting hazardous materials safety and security research. Industry organizations and government agencies have their own research programs to support their mission needs. Collaborative research to address shared problems takes place occasionally, but mostly occurs on an ad hoc basis.

Acknowledging this gap in 2004, the U.S. DOT Office of Hazardous Materials Safety, the Federal Motor Carrier Safety Administration, the Federal Railroad Administration, and the U.S. Coast Guard pooled their resources for a study. Under the auspices of the Transportation Research Board (TRB), the National Research Council of the National Academies appointed a committee to examine the feasibility of creating a cooperative research program for hazardous materials transportation, similar in concept to the National Cooperative Highway Research Program (NCHRP) and the Transit Cooperative Research Program (TCRP). The committee concluded, in *TRB Special Report 283: Cooperative Research for Hazardous Materials Transportation: Defining the Need, Converging on Solutions,* that the need for cooperative research in this field is significant and growing, and the committee recommended establishing an ongoing program of cooperative research. In 2005, based in part on the findings of that report, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) authorized the Pipeline and Hazardous Materials Safety Administration (PHMSA) to contract with the National Academy of Sciences to conduct the Hazardous Materials Cooperative Research Program (HMCRP). The HMCRP is intended to complement other U.S. DOT research programs as a stakeholder-driven, problem-solving program, researching real-world, day-to-day operational issues with near- to mid-term time frames.

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FOREWORD

By William C. Rogers
Staff Officer
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HMCRP Report 9: A Compendium of Best Practices and Lessons Learned for Improving Local Community Recovery from Disastrous Hazardous Materials Transportation Incidents describes initiatives that can assist local communities in developing or improving their recovery planning and operations in response to hazardous materials transportation incidents. Recovery is defined as both short- and long-term efforts to rebuild and revitalize affected communities. Recovery planning should provide for a near-seamless transition from emergency response activities to recovery operations to de-briefing lessons learned and should include, but not be limited to, restoration of interrupted utility service, re-establishment of transportation routes, the provision of food and shelter to displaced persons, environmental restoration, business continuity, and economic rebuilding.

Federal health, safety, and environmental regulations address emergency response planning and preparations in the event of a hazardous materials release. However, little progress has been made to document actions and plans that address recovery from disastrous hazardous materials transportation incidents, particularly incidents that result in human casualties, extensive property or environmental damage, or severe social or economic disruptions. Recent examples of such disasters include the New Orleans, LA, barge spill in 2008; the derailment of chlorine tank cars in Graniteville, SC, in 2005; and the Baltimore, MD, tunnel fire in 2001.

Under HMCRP Project 11, ABSG Consulting, Inc., was asked to develop a compendium of best practices that can be used by local communities to plan for recovery from disastrous hazardous materials transportation incidents. To do so, the researchers (1) analyzed pertinent domestic and international examples (including review of after-action reports, lessons learned or observed, and best practices) from current practice, research findings, and other resources on disaster recovery; (2) identified procurement procedures, legal and environmental compliance requirements, and materials, labor, equipment, and expertise necessary to enable recovery; (3) on the basis of applicability and usefulness, identified best practices that could enhance local community planning for and recovery from disastrous hazardous materials transportation incidents; (4) identified institutional barriers to adopting the best practices and feasible solutions for overcoming them; (5) developed a detailed compendium of best practices; and (6) performed a gap analysis to compare recovery planning needs with the current state of the practice and proposed initiatives to address the gaps. The output of the research is a compendium of best practices, lessons learned, and proposed initiatives structured to assist local communities in developing or improving their recovery planning and operations as these relate to disastrous hazardous materials transportation incidents.

CONTENTS

Note: Many of the photographs, figures, and tables in this report have been converted from color to grayscale for printing. The electronic version of the report (posted on the Web at www.trb.org) retains the color versions.

SUMMARY

A Compendium of Best Practices and Lessons Learned for Improving Local Community Recovery from Disastrous Hazardous Materials Transportation Incidents

Several major disasters in the United States, including the Loma Prieta Earthquake (1989), Hurricane Andrew (1992), the 9/11 terrorist attacks (2001), and Hurricane Katrina (2005), have resulted in major changes to the way the United States and its citizens think about and approach response and recovery. From the development of local mitigation strategies to community long-term recovery plans, local governments throughout the United States have taken steps to improve their disaster planning, as well as response and recovery capabilities. Likewise, federal and state agencies have also improved their planning and preparedness based on lessons learned from man-made and natural disasters over the past several decades.

The goal of this project is to build on this progress by identifying best practices, lessons learned, and sound planning approaches aimed at restoring and revitalizing a community following a disastrous hazardous materials transportation incident. Understanding the challenges facing emergency managers and transportation officials in the short term, as well as the hurdles that city planning officials, economic development councils, and environmental specialists will face in long-term local recovery, are key to effectively addressing this goal. It is important to recognize that recovery from a disaster is a process largely independent of the incident itself. Whether resulting from natural or man-made causes, disaster recovery involves effective planning and mitigation efforts on the part of local, regional, and national entities in order to quickly reduce risk, address human impacts, recover from environmental damage, and restore stability in communities. To address these factors, this report takes a strategic approach to discussing the process of recovery that begins when the incident has been mitigated and the community starts to address the consequences of the incident. Topics addressed include the following:

- Federal roles and responsibilities in recovery;
- Resources available to assist communities with their recovery efforts;
- Best practices, lessons learned, background information, and examples related to community recovery planning, operations, and information sharing; and
- Gaps in information and guidance.

The output of the project is a compendium of best practices, lessons learned, and recommended initiatives structured to assist local communities in developing and/or improving their recovery planning and operations as these relate to disastrous hazardous materials transportation incidents.

CHAPTER 1

Introduction

The goal of this report is to identify best practices, lessons learned, and sound planning approaches aimed at **restoring** and **revitalizing** a community following a disastrous hazardous materials transportation incident as pictured in Figure 1-1. It is intended for use by the full range of public, private, and non-governmental organizations that play a role in community disaster recovery for urban, suburban and rural jurisdictions. Topics covered include the following:

- Federal roles and responsibilities in recovery;
- Resources available to assist communities with their recovery efforts;
- Best practices, lessons learned, background information, and examples related to community recovery planning, operations, and information sharing; and
- Gaps in information and guidance.

The information presented on these topics is based on data available in the public domain and gathered from (1) relevant state and local recovery planning documents; (2) federal statutes and recovery planning guidance; (3) after-action reports from real-world incidents and exercises; (4) domestic and international press materials; (5) academic studies; and (6) TRB publications. Best practices and lessons learned are presented as case studies. Most of these are from actual incident after-action reports, and the pertinent information is directly quoted to avoid injecting the opinions of the research team.

The objective of the research project as established by HMCRP is to develop a compendium of best practices that can be used by local communities to plan for recovery from disastrous hazardous materials transportation incidents. Recovery is defined as both short- and long-term efforts to rebuild and revitalize affected communities. Recovery planning must provide for a near-seamless transition from emergency response activities to recovery operations to debriefing lessons learned, including, but not limited to, restoration of interrupted utility services, reestablishment of transportation routes, the provision of food and shelter to displaced persons, environmental restoration, business continuity, and economic rebuilding.

1.1 Document Flow

This report has been designed to follow the typical flow of operations in relation to recovery from a hazardous materials transportation incident. Figure 1-2 presents this flow of operations in graphic form with reference to appropriate chapters of the report.

(SOURCE: http://www.sbcfire.org/hazmat/er.asp; photo credit: San Bernardino County Fire Department)

Figure 1-1. Hazardous materials transportation incident involving a freight train derailment.

1.2 Guiding Principles

Whether resulting from a hazardous materials transportation incident or a natural, technological, or man-made disaster, experience shows that the framework for a recovery process generally has four common elements. This report is organized to consider the following:

1. Mass care (including medical and mental health, sheltering and decontamination, short-term housing, and long-term housing);
2. Restoration of infrastructure (refers to both "hard" infrastructure such as roads and bridges, and "soft" infrastructure like mass transportation);
3. Environmental response and remediation (ranging from immediate/short-term concerns to long-term efforts to remove contaminants/pollutants from environmental media to protect ecological and human interests); and
4. Economic viability (economic conditions relating to tangibles like lost revenue from reduced taxes and job loss to intangibles such as lost business opportunities).

It is important to note that while these four elements are anticipated to be part of any recovery process, the level of effort and time required to implement each is highly dependent on the type and magnitude of the event. For example, components of mass care, such as temporary housing, have not been as predominant a need in the aftermath of past hazardous materials transportation incidents as has been the case for natural disasters such as Hurricane Katrina (2005) or, more recently, the earthquakes in Haiti (2010), New Zealand (2011), and Japan (2011). This report carefully addresses these nuances.

As shown in Figure 1-2, recovery operations are cyclic, in that planning begins pre-incident and looks at each of the four elements where risks are considered (i.e., mass care, restoration of infrastructure, environment response and remediation, and economic viability), existing programs are evaluated and updated, and mitigation measures are explored and implemented. As part of these preparedness activities, resources are identified, training is provided to personnel involved, and exercises are presented to test each part of the recovery plan. Once the incident

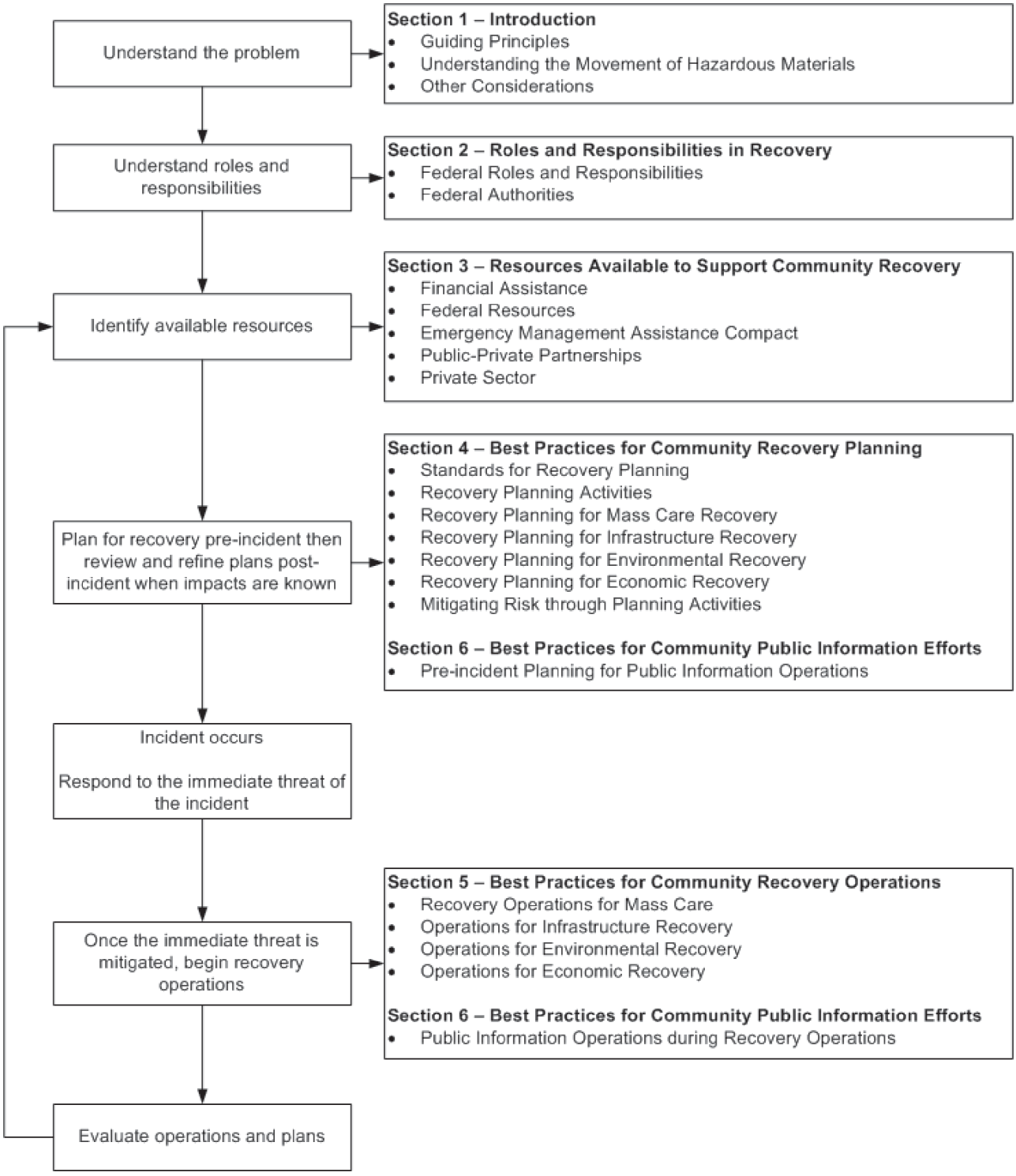


Figure 1-2. Document flow in relation to operations.

occurs and the details of casualties and damage are known, the specific requirements of the programs are identified and these programs are implemented. When the community has been restored to its pre-incident condition, the recovery organization can look to implementing mitigation measures that were identified during operations, as well as ensuring that the long-term economic recovery continues. These topics are discussed in more detail in Chapter 4 of this report.

Finally, although numerous short-term recovery initiatives have been required as a result of hazardous materials transportation incidents over the years, only a few appear to have resulted in the need for intermediate or long-term recovery actions. To ensure that useful information is provided to support both the short- and long-term aspects of community recovery, this report also examines relevant best practices and lessons learned from other types of domestic and international incidents.

1.3 Understanding the Movement of Hazardous Materials

The following subsections are presented as background to enhance the understanding of what materials most commonly move through our communities, risks posed, and potential costs of an incident.

1.3.1 Key Definitions

The following two definitions are particularly important to the context of this report:

- The U.S.DOT defines hazardous materials as "a substance or material capable of posing an unreasonable risk to health, safety, or property . . . ." See http://www.phmsa.dot.gov/hazmat/glossary#H.
- The Environmental Protection Agency (EPA) defines hazardous waste as "waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludges. They can be discarded commercial products, like cleaning fluids or pesticides, or the by-products of manufacturing processes." See http://www.epa.gov/osw/hazard/index.htm.

Since DOT is responsible for developing regulations and requirements for the safe transport of hazardous materials, they have defined what constitutes a hazardous material. This allows transporters to then find the appropriate requirements for the safe transport of the particular material. The EPA, however, is concerned with spills and releases. When there is a spill or release, the material in question is a hazardous waste.

This report also specifically addresses the concept of a disastrous hazardous materials transportation incident. The Merriam-Webster Dictionary defines disastrous as follows:

- 1. Attended by or causing suffering or disaster: Calamitous (a *disastrous* flood); 2. Terrible, horrendous (a *disastrous* score)." See http://www.merriam-webster.com/dictionary/disastrous.

However, this definition does not specifically quantify when a hazardous materials incident becomes disastrous. The available definition that comes closest to doing so is the Stafford Act definition of a major disaster, which states

> . . . 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 this 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.[1]

Table 1-1. Hazardous materials shipments by hazard class, 2007.

Hazard Class and Description	Value ($M)	Tons (K)	Ton-miles (M)	Average miles per shipment
Class 1, Explosives	11,754	3,047	911	738
Class 2, Gases	131,810	250,506	55,260	51
Class 3, Flammable Liquids	1,170,455	1,752,814	181,615	91
Class 4, Flammable Solids	4,067	20,408	5,547	309
Class 5, Oxidizers and Organic Peroxides	6,695	14,959	7,024	361
Class 6, Toxic (poison)	21,198	11,270	5,667	467
Class 7, Radioactive Materials	20,633	515	37	Not reported
Class 8, Corrosive Materials	51,475	114,441	44,395	208
Class 9, Miscellaneous Dangerous Goods	30,131	63,173	23,002	484
Total	**1,448,218**	**2,231,133**	**323,457**	**96**

(SOURCE: Duych, Ron; Ford, Chester; and Sanjani, Hossain, *Hazardous Materials Highlights – 2007 Commodity Flow Study*, Special Report, RITA Bureau of Transportation Statistics, U.S. Department of Transportation, January 2011)

In general terms, this could be interpreted to mean a hazardous materials incident becomes disastrous when the local community does not have sufficient, available resources to effectively respond to, and recover from, the incident and must obtain the needed resources from another entity or entities.

1.3.2 Modes of Transportation for Hazardous Materials[2]

Table 1-1 considers nine classes of hazardous materials and the quantities transported. This information is based on a U.S.DOT special report entitled *Hazardous Materials Highlights – 2007 Commodity Flow Survey* published by the Bureau of Transportation Statistics. This data indicates that Class 3 Flammable Liquids represent the largest volume and highest dollar value of hazardous material being shipped.

Table 1-2 presents the modes of transportation and the percentage of hazardous materials transported by each mode In 2007, the percentage of hazardous materials carried by truck was 53.9 percent – significantly more than any other mode. The results presented are based on a commodity flow study and a representative sampling of the modes of transportation. The percentages presented show the relative ranking of the various modes of transportation.

Table 1-2. Hazardous materials shipments by tonnage by mode, 2007.

Mode of Transportation	Percentage of Total Tonnage Carried
Highway (truck)	53.9
Pipeline	28.2
Maritime	6.7
Freight Rail	5.8
Multiple Modes	5.0
Other and Unknown Modes	0.4
Total	**100**

(SOURCE: Duych, Ron; Ford, Chester; and Sanjani, Hossain, *Hazardous Materials Highlights – 2007 Commodity Flow Study*, Special Report, RITA Bureau of Transportation Statistics, U.S. Department of Transportation, January 2011)

Table 1-3. Hazardous versus non-hazardous materials by mode of transportation, 2007.

Mode of Transportation	Tons			Ton-Miles		
	Total Tonnage (K)	% Hazardous	% Non-Hazardous	Total Ton-Miles (M)	% Hazardous	% Non-Hazardous
Highway	8,778,713	13.7	86.3	1,342,104	7.7	92.3
For-hire truck	4,075,136	12.1	87.9	1,055,646	6.0	94.0
Private truck	4,703,576	15.0	85.0	286,457	14.2	85.8
Rail	1,861,307	7.0	93.0	1,344,040	6.9	93.1
Maritime	403,639	37.1	62.9	157,314	23.6	76.4
Air (includes truck & air)	3,611	Not Reported	90.2	4,510	Not Reported	96.1
Pipeline	650,859	96.6	3.4	Not Reported	Not Reported	Not Reported
Multiple modes	573,729	19.4	80.6	416,642	10.3	89.7
Parcel, U.S.P.S. or Courier	33,900	0.7	99.3	27,961	0.5	99.5
Other multiple modes	113,841	49.8	50.2	46,402	37.3	62.7
Other and unknown modes	271,567	3.1	96.9	33,764	4.3	95.7
All modes	**12,543,425**	**17.8**	**82.2**	**3,344,658**	**9.7**	**90.3**

(SOURCE: Duych, Ron; Ford, Chester; and Sanjani, Hossain, *Hazardous Materials Highlights – 2007 Commodity Flow Study*, Special Report, RITA Bureau of Transportation Statistics, U.S. Department of Transportation, January 2011)

Table 1-3 presents hazardous materials versus non-hazardous materials in the terms of percentages by mode of transportation.

Together, these three tables demonstrate that

- Class 3 Flammable Liquids represent the greatest volume of hazardous material shipped in the United States;
- The most common form of transportation for hazardous materials is by truck at 53.9 percent; and
- Of all materials shipped in the United States, 17.8 percent are hazardous materials.

1.3.3 Annual Normalized Risk for Selected Hazardous Materials[3]

Table 1-4 presents the annual normalized risk associated with the transportation of several categories of hazardous materials and is based on the general categories of (1) toxic inhalation

Table 1-4. Total annual and normalized risk associated with transportation incidents.

Material		Total Amount of Annual Risk		Normalized Risk	
		Injuries per Year	Fatalities per Year	Injuries per million ton-miles	Fatalities per million ton-miles
All TIH materials	No sheltering or mitigation	846	16	0.11	0.0021
	With passive sheltering	85	2.3	0.011	0.00030
LP Gas		15	4.2	0.010	0.0028
Gasoline		21	11	0.0012	0.00064
Explosives		1.4	0.49	0.0018	0.00061

(SOURCE: Hwang, Steve T.; Brown, David F.; O'Steen, James K.; Policastro, Anthony J.; and Dunn, William E. *Risk Assessment for National Transportation of Selected Hazardous Materials*, Transportation Research Record 1763, Paper No. 01-2217, Transportation Research Board, 2001; the reference for the full document Brown, D.F., W.E. Dunn and A.J. Policastro, *A National Risk Assessment for Selected Hazardous Materials in Transportation*, Argonne National Laboratory, December 2000, ANL/DIS-01-1)

hazard (TIH), (2) Liquefied Petroleum Gas (LP gas), (3) gasoline, and (4) explosives. The data is based on the 2001 TRB study entitled *Risk Assessment for National Transportation of Selected Hazardous Materials.* This data was derived from commodity flow surveys taken in 1977 and 1993. The data gathered from these two years was combined to produce a data set of between 25 and 60 representative shipments for each hazardous material studied.

The risk data provided in Table 1-4 should be compared against previous risk assessments performed by the community to determine the appropriate context for that community. To aid in the development of risk assessments related to hazardous materials transportation incidents, the Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Hazardous Materials Safety (OHMS) has developed a framework for risk management as it relates to the transportation of hazardous materials. This product, designated as the Risk Management Self-Evaluation Framework (RMSEF), provides a basic framework for managing risk as part of the hazardous materials transportation process. RMSEF is intended as a tool for various hazardous materials transportation stakeholders (regulators, shippers, carriers, emergency response personnel, and others) to support the integration of risk management and assessment into planning and operations.[4]

1.3.4 Economic Effects of Selected Hazardous Materials Transportation Incidents[5]

To put these risks into context, it is helpful to consider the costs associated with previous incidents. A peer-reviewed journal article, entitled "Assessing the Economic Effect of Incidents Involving Truck Transport of Hazardous Materials," provides useful insights into the potential economic consequences associated with hazardous materials transportation incidents as follows:

- **Injuries and fatalities:** Estimated at the amount DOT would spend to avoid an injury or fatality associated with enhanced safety programs. Costs consisted of $200,000 for accident related injuries, $32,000 non-accident related injuries, and $2 million for fatalities.
- **Cleanup costs:** Costs for curbing and removing spilled material. Cleanup costs averaged $34,000 per enroute accident, $1,100 per enroute non-accident spill, and $600 for spills associated with unloading and loading.
- **Property damage:** Cost of repairing or replacing other vehicles and costs for public and private property (buildings, utilities, roadways, etc.). These costs averaged $5,900 for enroute accidents, $90 for enroute non-accidents, and $90 for loading and unloading.
- **Carrier damage:** Cost of repairing or replacing vehicle owned by the carrier. Costs averaged $36,000 per enroute accident, $130 per enroute non-accident, and $130 for loading and unloading.
- **Evacuation:** Approximately 8 percent of 498 incidents involving Class 3 materials resulted in evacuations, estimated at $1,000 per evacuee.
- **Product loss:** Quantity and value of Class 3 cargo lost. The average costs were $3,800 per spill, $130 per spill for non-accident related incidents, and $80 per spill for loading and unloading incidents.
- **Traffic incident delay:** Based on a 2-hour average duration; 12 hours for major incidents. Five percent of all incidents are classified as major. Average value of time (value of driver's time plus fuel consumption) used was $15/hour per person.
- **Environmental damage:** Costs after emergency cleanup at the site. The costs are estimated at $1,800 per incident.

1.4 Other Considerations

The following subsections address other foundational recovery terms and concepts that may influence or contribute to the success of a community's recovery effort.

1.4.1 Transportation Accident or Hazardous Materials Incident?

The terms *accident* and *incident* are often used interchangeably. For the purposes of this report, an accident is defined as any event that happens unexpectedly without a deliberate plan or cause (www.dictionary.com). An accident involving a vehicle transporting hazardous materials becomes a hazardous materials incident if the hazardous material leaks or is involved in a fire, or the potential exists for a release, fire, or other hazard.[6] Such incidents can occur during the loading, unloading, transportation, or temporary enroute storage of hazardous materials.

1.4.2 Overlaps between Response and Recovery

Consideration of the four phases of integrated emergency management (preparedness, mitigation, response, and recovery) results in a comprehensive program working continuously to improve a community's capabilities in an all-hazards approach. Each of these four phases may be addressed separately; however, all four are necessary for a comprehensive program. These phases build upon each other and have periods of overlap where one or more phases are being implemented in tandem.

Although this report focuses on recovery planning and operations, the preparedness, mitigation, and response phases all have the potential to reduce a community's vulnerability and thereby reduce the consequences of a natural, technological, or manmade incident, thus simplifying the recovery phase. Because the recovery phase overlaps with emergency response as operations transition, some direct mention of response is also necessary to ensure proper context. To develop this context, it was necessary to consider documents that differentiate between response and recovery. Although there are various interpretations and definitions of response, this report uses the following description provided in the National Response Framework (NRF) (http://www.fema.gov/pdf/emergency/nrf/nrf-core.pdf)as follows:

> The term *response* as used in this framework includes immediate actions to save lives, protect property and the environment, and meet basic human needs. *Response* also includes the execution of emergency plans and actions to support short-term recovery.

Further, the Environmental Protection Agency (EPA) states (http://www.epa.gov/region5superfund/eerb.html)

> Emergency response actions are quick, relatively low-cost activities that address substantial threats from hazardous substances. . . . While threats confronted by the emergency response program (Superfund Emergency Response) vary greatly in size, nature, and location, there is a common element in all cases—time. Prompt action is crucial.

Likewise, recovery has been characterized using a variety of terms and definitions. The National Disaster Recovery Framework (NDRF) defines recovery as follows:

> Those capabilities necessary to assist communities affected by an incident to recover effectively, including, but not limited to, rebuilding infrastructure systems; providing adequate interim and long-term housing for survivors; restoring health, social, and community services; promoting economic development; and restoring natural and cultural resources.[7]

Further, the NDRF[8] provides the following distinctions for characterizing the phases of recovery:

- **Short-term Recovery –** Phase of recovery that addresses the health and safety needs beyond rescue, the assessment of the scope of damages and needs, the restoration of basic infrastructure and the mobilization of recovery organizations and resources including restarting and/or restoring essential services for recovery decisionmaking.
- **Intermediate Recovery –** Phase of recovery that involves returning individuals and families, critical infrastructure and essential government or commercial services back to a functional, if not pre-disaster state. Such activities are often characterized by temporary actions that provide a bridge to permanent measures.
- **Long-term Recovery –** Phase of recovery that may continue for months to years and addresses complete redevelopment and revitalization of the damaged area, rebuilding or relocating damaged or destroyed social, economic, natural, and built environments, and a move toward self-sufficiency, sustainability, and resilience.

This report utilizes these descriptions and explanations with the understanding that early aspects of recovery will overlap with response activities.

1.4.3 Challenges in Determining the Beginning of the Recovery Phase

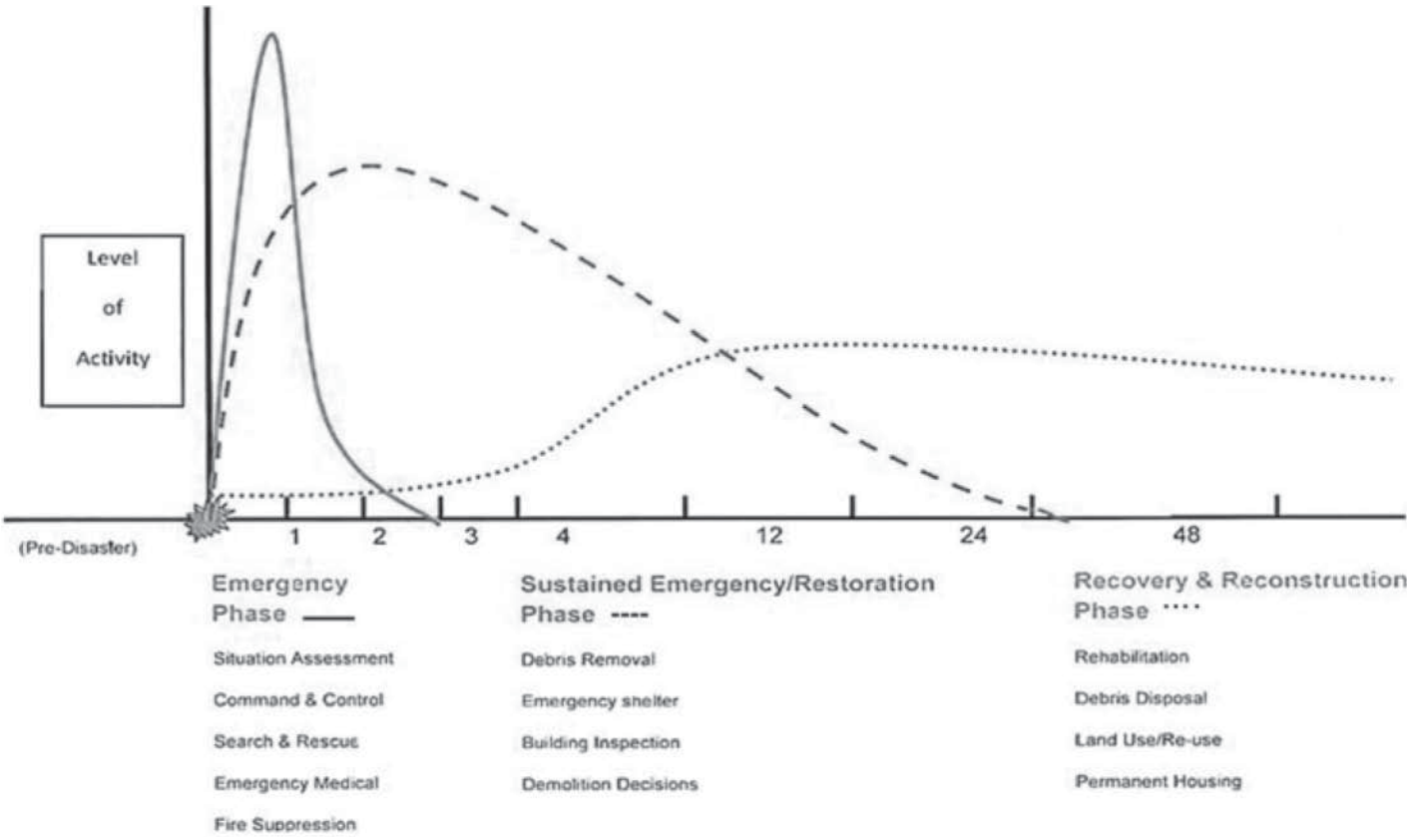
Whether addressing recovery from the standpoint of a hazardous materials transportation incident or another type of catastrophe, choosing a precise start and end point is difficult. Even key resources, such as the NRF, Government Accountability Office (GAO) documentation on response and recovery, American Red Cross resources, and the NDRF, do not provide guidance on a starting point for recovery. In fact, the NDRF states

> Recovery begins with pre-disaster preparedness and includes a wide range of planning activities. The NDRF clarifies the roles and responsibilities for stakeholders in recovery, both pre- and post-disaster. It recognizes that recovery is a continuum and that there is opportunity within recovery. It also recognizes that when a disaster occurs, it impacts some segments of the population more than others.[9]

Although the actual starting point for recovery cannot be easily pinpointed or tied to a particular action, initial recovery begins when the immediate threat of the incident has been mitigated and work begins to remediate the consequences of the incident. This point occurs during the transition from response to recovery, and the activities that occur during this transition period are considered by many to be primarily response related. However, the specific activities addressed in this report (e.g., medical needs, evacuation, sheltering, and decontamination) can have an impact on the recovery of the affected community and are included for this reason.

1.4.4 The Recovery Timeline

Recovery operations following a hazardous materials transportation incident can take anywhere from a few days to many years depending on the severity of the incident and the materials involved. Figure 1-3 presents the response and recovery phases as a timeline and illustrates how each ramps up and has a time period that overlaps with, or transitions into, other phases. The model presented is from the Tennessee Emergency Management Agency. Here, the *Emergency Phase* equates to *response;* the *Sustained Emergency/Restoration Phase* represents the *short-term recovery;* and the *Recovery & Reconstruction Phase* is synonymous with intermediate and long-term recovery. The timeline is presented in weeks. However, depending upon the incident, it can be extended into months or even years.



(SOURCE: Baird, Malcolm E., Ph.D., P.E., *The Recovery Phase of Emergency Management*, Vanderbilt Center for Transportation Research (VECTOR), for Intermodal Freight Transportation Institute (ITFI) University of Memphis, January 2010, page 14, http://www.vanderbilt.edu/vector/research/recoveryphase.pdf)

Figure 1-3. Recovery timeline.

CHAPTER 2

Roles and Responsibilities in Recovery

2.1 Overview

The purpose of this section is to identify roles and responsibilities, along with processes, procedures, and compliance requirements related to community recovery from a hazardous materials transportation incident. This information is presented to assist local communities in developing the authorities and references section of their recovery plans. The primary focus is on federal agency roles and responsibilities because these apply to all incidents. At the state and local levels, the roles and responsibilities of specific agencies will need to be defined during the planning process and ideally should be compatible with those presented here for federal agencies.

As a community is impacted by the consequences of a hazardous materials transportation incident, the local governing jurisdiction(s) will be the first to respond, begin containment, and implement safety measures at the incident site. As a part of that response, there is the potential for significant involvement from industry and the responsible party. These industry resources also bring access to a significant amount of technical knowledge, specialized equipment, and other resources that will be required by the incident. However, unlike other types of disasters that are managed by local government, hazardous materials incidents may ultimately become the responsibility of the federal government. Furthermore, depending on the nature of the materials involved, federal agencies may take a lead role in response, cleanup, and the transitional phase into recovery.

These federal processes and procedures identify and explain the roles and responsibilities of local communities in sustaining recovery operations until the community has been restored to its pre-incident condition. Also, federal policies and regulations provide requirements, as well as guidance, ranging from specific details on how to manage the cleanup and disposal of contaminated materials to highlighting key resources that state and local entities can access in the event of a hazardous materials transportation incident that exceeds the capacity and capabilities of the region.[10]

Many states have also mirrored the federal laws and, in some cases, added their own procedures to those required at the national level. This section reviews the federal laws that guide planning and recovery operations and applies to all jurisdictions. State, local, and tribal recovery plans state the authorities that empower the jurisdiction to develop plans and conduct operations. Typically, the authorities and references section of a plan will list the federal laws, state statutes, local ordinances, appropriate regulations, policies, and executive orders for this purpose. In the pages that follow, the overarching federal laws that guide recovery planning and operations are presented to assist communities in developing this element of their plans.

2.2 Federal Roles and Responsibilities in Hazardous Materials Incidents

As stated by the EPA's National Response Team (NRT), all significant oil discharges or hazardous substance releases must be reported (by local government or the responsible party) to the National Response Center (NRC). Many inland responses are effectively handled without any direct involvement by the federal government. Others require federal assistance when the incident exceeds state and local capabilities. In other words, the federal government acts as a "safety net" for state, local, tribal, and private-party responders.[11]

EPA is the lead agency if the incident occurs on land. The United States Coast Guard (USCG) assumes this role if the incident occurs on the water. For incidents involving highways, rail lines, pipelines, and aircraft, the department of transportation will play a key role. In the case of a hazardous materials transportation incident, Emergency Support Function (ESF) 10 – Oil and Hazardous Materials Response will be activated and a federal on-scene coordinator (FOSC), generally from either the EPA or USCG, will be assigned. The FOSC, a state representative, the local community incident commander, and the responsible party will form a unified command at the site to provide command and control for response and cleanup operations. At the local emergency operations center (EOC), a similar command structure is established to manage response and recovery operations, track the progress of response and resource deployment, and begin identification and prioritization of community needs and issues for transitioning into recovery.

2.3 Federal Statutory Authorities

There are five laws in particular that provide guidance for dealing with hazardous materials. They are the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Oil Pollution Act (OPA), Superfund Amendments and Reauthorization Act (SARA), and the Emergency Planning and Community Right-to-Know Act (EPCRA, also known as SARA Title III). The Hazardous Materials Transportation Uniform Safety Act of 1990 (HMTUSA) and Resource Conservation and Recovery Act (RCRA) also have elements that are applicable to hazardous materials transportation incidents. Other laws that are applicable to specific hazardous materials that may impact the environment and/or public health and welfare include, but are not limited to, the following:

- Clean Water Act (CWA);
- Clean Air Act (CAA);
- Safe Drinking Water Act (SDWA);
- Toxic Substances Control Act (TSCA);
- National Environmental Policy Act (NEPA);
- Migratory Bird Treaty Act (MBTA);
- Fish and Wildlife Coordination Act (FWCA);
- Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); and
- Endangered Species Act (ESA).

This report presents information on the five primary laws, supplemented with additional information about HMTUSA, RCRA, and the Robert T. Stafford Relief and Emergency Assistance Act (Stafford Act) as they relate to the focus of this report.

The significant processes and procedures that are required by NCP, CERCLA, OPA, SARA, and EPCRA include

- Notification of the NRC by local government or the responsible party in the event of a transportation incident involving a spill of hazardous materials;

- Development of Hazardous Materials Response Plans and training of staff through Local Emergency Planning Committees (LEPCs) and State Emergency Response Commissions (SERCs);
- The requirement for EPA to negotiate a settlement with the responsible parties following an incident; and
- The development of a restoration plan that includes public participation by those involved in the recovery effort.

In the following discussion of each major law, numerous references are made to hazardous materials waste sites, as well as closed and abandoned waste sites (especially as the discussion applies to CERCLA, SARA, and EPCRA). Although the laws are primarily aimed at these types of sites, the principles apply to hazardous materials transportation incidents, as well. As stated in the CERCLA/Superfund Orientation Manual, Superfund removal actions have occurred in response to transportation-related incidents that include

> . . . any release or potential release of hazardous substances due to a transportation situation, accident, or malfunction. (Local authorities usually respond to hazardous releases resulting from transportation-related incidents. The Superfund Program also has the authority to respond, if necessary, under the removal program to such emergencies.) [12]

These pieces of legislation provide federal agencies with the authority to respond and take action related to releases or threatened releases of hazardous materials that pose a threat to human health and the environment. The implementation of these laws is seen in the federal government's response to incidents such as the Exxon *Valdez* oil spill in Alaska (1989) and the British Petroleum (BP) *Deepwater Horizon* oil spill in the Gulf of Mexico (2010). Additionally, the parts of the laws relating to the financial liability of responsible parties and the establishment of trust funds to pay in the case where a responsible party cannot be identified are also applicable to transportation incidents involving hazardous materials.

2.3.1 National Oil and Hazardous Substances Pollution Contingency Plan

This plan is described as follows:

> The National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan or NCP, is the federal government's blueprint for responding to both oil spills and hazardous substance releases. The NCP is the result of efforts to develop a national response capability and promote overall coordination among the hierarchy of responders and contingency plans. The NCP also established the National Priorities List.[13]

The Plan

- Requires the NRC, which acts as the central clearinghouse for all pollution incident reporting, be notified through a toll-free telephone number of any discharge or release of a hazardous substance;
- Authorizes the pre-designated on-scene coordinator to direct all federal, state, and private response activities at the site of a discharge;
- Establishes the unified command structure for managing responses to discharges;
- Identifies the responsibilities of federal agencies that may be involved during response planning and implementation to provide assistance; and
- Authorizes the lead agency (EPA on land and USCG on water) to initiate appropriate removal action in the event of a hazardous substance release.

First established in 1968, the NCP (40 CFR, Part 300) is the federal framework within the Code of Federal Regulations (CFR) for responding to both accidental and intentional (includ-

ing terrorist-related)[14] releases of hazardous materials, including radioactive materials and oil spills.[15] Although the most recent and widely publicized application of the NCP was in response to the *Deepwater Horizon* oil spill in 2010,[16] the NCP was developed more than 4 decades ago in reaction to the 1967 *Torrey Canyon* supertanker accident off the coast of England.[17] The coordinated approach set forth in the NCP was originally culled from lessons learned following this incident.[18]

NCP's scope has expanded as required by various laws (with the latest revision in 1994), including the following:[19]

- CWA revisions that added a framework for responding to hazardous substance spills as well as oil discharges;
- Superfund, which was passed in 1980 following well-publicized chemical contamination incidents including Love Canal in New York (1978) and Valley of the Drums in Kentucky (1979). The law broadened NCP to encompass release to any environmental media (air, water, land);[20] and
- Revisions based on oil spill provisions (after the Exxon *Valdez* oil spill in Alaska in 1989) following the OPA.

Specifically, as it relates to funding response and recovery, the application of CERCLA and OPA funds for site remediation are governed by the NCP.[21] Additionally, actions required under NCP are binding and enforceable through the authorities within OPA and CWA. A significant component of the NCP was the establishment of the National Response System (NRS), which has handled more than 30,000 hazardous chemical releases, oil discharges, and other toxic spills in the United States to date.

Representative response and recovery efforts that have been led or supported by the NRS include the following:

- Anthrax incidents in public and government buildings (2001);
- September 11 terrorist attacks (2001);
- Space shuttle *Columbia* disaster (2003);
- Hurricane Katrina (2005);
- Exxon *Valdez* oil spill (1989); and
- *Deepwater Horizon* oil spill (2010).[22]

Aspects of the NRS that are relevant not only to hazardous materials incident response but also extend through recovery include[23]

- **National Response Team (NRT):** The NRT is an interagency planning, policy, and coordination organization that provides technical advice and access to resources and equipment. Following spills of national significance (SONS), the NRT is tasked with coordinating efforts of the U.S. Department of Homeland Security (DHS) and the Incident Advisory Council (IAC).[24] Other roles include planning for and coordination of major discharges of oil or hazardous waste, guidance to Regional Response Teams (RRTs), coordination of national-level preparedness planning and response, and facilitating research geared toward enhancing response activities. The EPA serves as the lead agency for the NRT (40 CFR Part 300.110).
- **Federal On-Scene Coordinator (FOSC):** As part of planning and preparedness, it is the responsibility of EPA and USCG to pre-designate regional FOSCs. Specifically, USCG must provide FOSCs for oil and/or hazardous materials releases in the water or within/near coastal zones, while EPA is responsible for FOSCs related to releases on land (40 CFR Part 300.120). In some cases, DOD or DOE may be responsible for providing FOSCs. The FOSC directs all federal, state, and private response activities at the site of a discharge per 40 CFR

Part 300.135(a) and is required to submit reports to the RRT or NRT on all removal actions taken at an incident site (40 CFR Part 300.170, 40 CFR Part 300.175).

- **Regional Response Teams (RRTs):** RRTs include a standing team of federal, state, and local representatives, and an incident-specific team (40 CFR Part 300. 115). There are 13 RRTs that are co-chaired year-round by EPA and USCG. However, during an incident, the agency providing the FOSC is responsible for chairing the RRT. Although called "response" teams, RRTs do not respond to the incident. Instead, they serve in a support role to the FOSC for accessing and deploying regional resources.[25] Additionally, RRTs develop Regional Contingency Plans (RCPs) to define and communicate the members' roles, outline complex disaster coordination capacities, and specify funding mechanisms required during hazardous materials disasters. (Note: RCPs should not duplicate Area Contingency Plans, LEPC plans, or the NRF; however, they should leverage elements of these other plans.)[26]

Other teams available to the FOSCs under the National Response System with tasks that encompass response as well as recovery include Area Committees (ACs); Joint Response Teams (with neighboring countries and regulated industry); and the following EPA, USCG, and Occupational Safety and Health Administration (OSHA) special teams: [27]

- **EPA:** Environmental Response Team (ERT), Radiological Emergency Response Team (RERT), National Counter Terrorism Evidence Response Team (NCERT), National Decontamination Team (NDT);
- **USCG Special Teams:** National Strike Force (NSF), Public Information Assist Team (PIAT); and
- **OSHA:** Specialized Response Teams.

Additionally, the NCP identifies the statutory authorities of 15 federal agencies involved during response and recovery planning and implementation. Although other statutes and regulations provide further specification of federal roles and responsibilities, Table 2-1 summarizes the federal agency responsibilities designated under the NCP that relate to potential recovery planning and/or operations following a hazardous materials transportation incident.

The NCP also established the National Priorities List (NPL), which identifies and prioritizes potentially significant locations throughout the United States and its territories that may be vulnerable to known or threatened releases of hazardous substances, pollutants, or contaminants. The NPL is primarily a guide to EPA in determining which sites warrant further investigation. Sites are first proposed for the NPL in the *Federal Register*. EPA then accepts public comments on the sites, responds to the comments, and places those sites that continue to meet the requirements for listing onto the NPL.

2.3.2 Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA also enabled the revision of the National Contingency Plan (NCP).[28]

The purpose of CERCLA is to address threats to human health or the environment resulting from releases or potential releases of hazardous substances. As stated in the EPA's CERCLA/Superfund Orientation Manual, the enactment of CERCLA provided the federal government " . . . authority to take direct action or force the responsible party to respond to emergencies involving uncontrolled releases of hazardous substances." CERCLA conferred this authority to

Table 2-1. Federal agency responsibilities as designated by the NCP.

Federal Agency	Federal Roles Designated under 40 CFR Part 300.175
Environmental Protection Agency (EPA)	EPA chairs the NRT and co-chairs the standing RRTs. EPA provides OSCs for all inland areas for which an Area Contingency Plan (ACP) is required under the CWA. EPA supplies Remedial Project Managers (RPMs) for remedial actions and generally provides the Scientific Support Coordinator (SSC) for responses in the inland zone. EPA possesses expertise on human health and ecological effects, risk assessment methods, and environmental pollution control techniques, as well as legal expertise on the interpretation of CERCLA and other environmental statutes. Additionally, EPA may contract with states to implement response actions.
United States Coast Guard (USCG)	U.S. Coast Guard is responsible for providing the NRT vice chair, co-chair for standing RRTs, and pre-designated OSCs for the coastal zones. The USCG maintains continuously manned facilities; provides expertise in domestic and international fields of port safety and security, maritime law enforcement, ship navigation and construction; and mans, operates, and oversees the safety of vessels and marine facilities. Additionally, USCG may contract with states to implement response actions.
Federal Emergency Management Agency (FEMA)	FEMA offers guidance and technical assistance in hazardous materials, chemical, and radiological emergency preparedness activities (planning, training, and exercising).
Department of Defense (DOD)	DOD may take "all action necessary" when a release occurs on, and/or the sole source of the release is from, any facility or vessel under DOD jurisdiction, custody, or control. DOD may also provide locally deployed U.S. Navy oil spill equipment and other requested assistance. In particular: the United States Army Corps of Engineers (USACE) and the U.S. Navy Supervisor of Salvage (SUPSALV) can provide specific expertise and/or equipment during response and recovery.
Department of Energy (DOE)	DOE may provide OSCs in cases that involve any facility or vessel under its jurisdiction, custody, or control. The DOE Radiological Assistance Program Regional Offices can provide assistance for incidents that qualify for DOE radiological advice and assistance (including incidents involving sources, by-product, or special nuclear material or other ionizing radiation sources).
United States Department of Agriculture (USDA)	USDA provides scientific and technical expertise relevant to natural resources including soil, water, wildlife, and vegetation that have been impacted by emergencies caused by various factors including hazardous materials and/or fires. Selected components within USDA have specific areas of expertise. Those agencies include • Forest Service, • Agriculture Research Service (ARS), • Soil Conservation Service (SCS), • Animal and Plant Health Inspection Service (APHIS), and • Food Safety and Inspection Service (FSIS).
Department of Commerce (DOC) through the National Oceanic and Atmospheric Administration (NOAA)	NOAA provides scientific expertise during response and contingency planning in coastal and marine areas, including hazard assessments, trajectory modeling, and information on the sensitivity of coastal environments to oil and hazardous materials. NOAA also provides information on cleanup and mitigation methods specific to marine weather patterns and conditions as well as living resources (e.g., endangered species, marine mammals, and National Marine Sanctuary ecosystems).
Department of Health and Human Services (DHHS)	DHHS provides support related to assessment, preservation and protection of human health and helps ensure the availability of essential human services. DHHS components have specific areas of expertise, including • U.S. Public Health Service, as it relates to hazardous materials emergencies, primary resources are from Agency for Toxic Substances and Disease Registry (ATSDR) and the Centers for Disease Control and Prevention (CDC). CDC takes the lead during oil releases regulated under the CWA and OPA, while ATSDR takes the lead during hazardous materials releases under CERCLA. • Food and Drug Administration, • Health Resources and Services Administration, • Indian Health Service, • National Institutes of Health, and • National Institutes for Environmental Health Sciences (NIEHS). (Under Section 126 of SARA, NIEHS is given statutory authority for supporting development of curricula and model training programs for waste workers and chemical emergency responders. Under HMTUSA, NIEHS administers the Hazmat Employee Training Program to prepare curricula and training for hazardous materials transportation workers.)

(continued on next page)

Table 2-1. (Continued).

Federal Agency	Federal Roles Designated under 40 CFR Part 300.175
Department of the Interior (DOI)	DOI Regional Environmental Officers (REOs) are the designated members of RRTs. DOI land managers have jurisdiction and expertise related to the national park system, national wildlife refuges and fish hatcheries, public lands, and several water projects. Selected components within DOI have specific areas of expertise including • U.S. Fish and Wildlife Service (USFWS), • National Biological Survey, • U.S. Geological Survey (USGS), • Bureau of Land Management (BLM), • Bureau of Mines, Office of Surface Mining, • National Park Service (NPS), and • Bureau of Indian Affairs (BIA).
Department of Justice (DOJ)	DOJ can supply expertise on legal issues and, in addition, DOJ represents the federal government in litigation relating to releases or discharges.
Department of Labor (DOL) through the Occupational Safety and Health Administration (OSHA) and state operating plans	When requested, OSHA provides advice and consultation to EPA and other response agencies regarding hazards to persons engaged in response activities. OSHA may also take necessary action to assure that response personnel employees are properly protected.
Department of Transportation (DOT)	DOT possesses expertise related to hazardous materials transportation (including oil) by all modes of transportation. Through PHMSA, DOT offers expertise in the requirements for hazardous materials packaging, handling, and transport, and establishes oil discharge contingency planning requirements for pipelines, transport by rail and containers, or bulk transport.
Department of State (DOS)	DOS supports international joint contingency planning, helps coordinate responses that cross international boundaries or involve a foreign vessel, and supports foreign requests for assistance.
Nuclear Regulatory Commission (NRC)	In accordance with the NRC Incident Response Plan (NUREG0728), NRC assures that the public health and environment are protected and adequate recovery operations are instituted in the event of releases under its jurisdiction. NRC communicates any significant actual or potential releases to EPA.
General Services Administration (GSA)	GSA supplies logistic and telecommunications support to federal agencies and can aid state and local governments, as directed by other federal agencies, during disaster response and recovery.

(SOURCE: 40 CFR Part 300.170, 40 CFR Part 300.175)

the President who, in turn, issued Executive Order 12316 delegating primary responsibility to the EPA for managing activities under CERCLA. These activities include the following:[29]

- Site identification of potential or previous hazardous materials releases that pose a serious threat to human health, welfare, or the environment;
- Taking action to remedy such releases; and
- Ensuring that parties responsible for releases pay for the cleanup activities.

Related to the cleanup of hazardous materials, CERCLA established the following:

- Requirements related to closed and abandoned hazardous waste sites;
- That the persons responsible for releases at these sites were liable; and
- A trust fund to pay for cleanup when no responsible party can be identified.

Response provisions under CERCLA focus on protecting human health and the environment while authorities provided within the law allow for assessment and restoration of natural

resources damaged as the result of a hazardous substance release.[30] Specifically, as it pertains to recovery from hazardous materials transportation incidents, CERCLA's provisions related to releases are applicable (while those provisions involving abandoned waste sites are not and are omitted from discussion in this report), including provisions specific to the liability of responsible parties and the establishment of a trust fund for remediation. CERCLA's remedial actions entail a feasibility study, a design phase, and a remediation phase.[31] Within this context, CERCLA authorizes

- **Short-term removals:** Remedial actions to address releases or threatened releases requiring prompt response; and
- **Long-term remedial response:** Actions that permanently and significantly reduce the dangers associated with releases that are serious, however, not considered immediately life threatening. (Note: Long-term remediation applies only to sites listed on the NPL.)

2.3.3 The Oil Pollution Act of 1990

The Oil Pollution Act (OPA) of 1990 streamlined and strengthened EPA's ability to prevent and respond to catastrophic oil spills. A trust fund financed by a tax on oil is available to clean up spills when the responsible party is incapable or unwilling to do so. OPA requires oil storage facilities and vessels to submit plans detailing how they will respond to large discharges. EPA has published regulations for aboveground storage facilities; the Coast Guard has done so for oil tankers. OPA also requires the development of Area Contingency Plans to prepare and plan for oil spill response on a regional scale.[32]

Established in the wake of the Exxon *Valdez* (1989) disaster, OPA included requirements for double-hulled tankers, escort tugs, and other safety measures; financial, civil, and criminal provisions, including fines and prison terms; and the creation of the Oil Spill Liability Trust Fund (OSLTF). Specifically, OPA requires entities identified as "responsible parties" following oil spills to cover all cleanup costs, including compensation for government efforts, economic damages incurred by residents and victims, and local business losses. Compensation may address lost wages, property damages, and harm to the local ecosystem. The 1990 legislation capped the liability of responsible parties as follows:[33]

1. **Tank vessels:** The greater of $1,200 per gross ton or $10 million for vessels larger than 3,000 gross tons, or $2 million for vessels of 3,000 gross tons or less;
2. **Other vessels:** $600 per gross ton or $500,000, whichever is greater;
3. **Offshore facilities (except a deepwater port):** The total of all removal costs plus $75 million; and
4. **Onshore facilities and deepwater ports:** $350 million.

To assist in paying for oil spill cleanups and damages in cases where responsible parties are not identified or cannot pay, OPA established the OSLTF. Originally created by Congress in 1986, the fund did not have authority to use the money or collect necessary revenue until after the passage of OPA 4 years later. In addition to enabling OSLTF, OPA consolidated the liability and compensation requirements of other federal statutes including the following:[34]

- Federal Water Pollution Control Act (FWPCA),
- Deepwater Port Act,
- Trans-Alaska Pipeline System (TAPS) Authorization Act, and
- Outer Continental Shelf Lands Act.

By consolidating these statutes, as well as enforcing taxes on the petroleum industry, available funds increased to $1 billion and, in 2005, passage of the Energy Policy Act increased the size of the fund to $2.7 billion. As a result of CERCLA and OPA, natural resource damages (NRD) are among the significant recovery components addressed under federal statute. Both statutes define NRD, provide authority for natural resources damage assessments (NRDAs), and designate roles for EPA, USCG, and Natural Resource Trustees. The term *Natural Resource Trustee* is characterized in

CERCLA and OPA as those designated with responsibility for the protection of natural resources based on the understanding that no individual or entity "owns" a natural resource. As such, CERCLA and OPA provide authority for National Resource Trustees to ensure restoration of affected natural resources through NRDAs and the restoration of impacted resources caused by a release or discharge of hazardous materials. National Resource Trustees may be federal, state, or tribal officials, as well as officials from foreign governments (under OPA).[35]

By statute, the process of natural resource recovery is divided into the following three phases:[36]

- **Pre-assessment phase:** Prior to conducting an NRDA, natural resource injuries are investigated in order to determine if an NRDA is required.
- **Restoration planning phase:** This phase includes NRDA either through Department of the Interior (DOI) methodologies (per 43 CFR Part 11) to assess damages that fall within CERCLA parameters or through the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) methodologies (per 15 CFR Part 990) to assess damages under OPA. Additionally, this phase involves developing detailed restoration plans and includes planning for compensation of victims.
- **Restoration phase:** Responsible parties implement and/or fund the restoration plan.

Although damages to natural resources have also resulted in direct economic losses and disrupted business activities (particularly related to industries and businesses that rely upon local natural resources), Natural Resource Trustees do not have authority related to economic losses caused by natural resource damages, such as the closure of fishing grounds, port operations, or loss of tourism-related businesses. This authority is further discussed within the context of CERCLA and OPA liability, compensation, and claims policies for potentially responsible parties (PRPs) and responsible parties.[37]

2.3.4 Superfund Amendments and Reauthorization Act

The Superfund Amendments and Reauthorization Act (SARA) amended the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) on October 17, 1986. SARA reflected EPA's experience in administering the complex Superfund program during its first 6 years, and made several important changes and additions to the program. SARA (1) stressed the importance of permanent remedies and innovative treatment technologies in cleaning up hazardous waste sites; (2) required Superfund actions to consider the standards and requirements found in other and federal environmental laws and regulations; (3) provided new enforcement authorities and settlement tools; (4) increased state involvement in every phase of the Superfund program; (5) increased the focus on human health problems posed by hazardous waste sites; (6) encouraged greater citizen participation in making decisions on how sites should be cleaned up; and (7) increased the size of the trust fund to $8.5 billion. SARA also required EPA to revise the Hazard Ranking System (HRS) to ensure that it accurately assessed the relative degree of risk to human health and the environment posed by uncontrolled hazardous waste sites that may be placed on the NPL.[38]

In addition to increasing the Superfund trust fund to $8.5 billion, SARA added other improvements to the program that had a significant impact on every major action and authority. SARA strengthened the power of the following:[39]

- **Removal actions** – Short-term removal limits financed by the Trust Fund were raised to $2 million per year per incident, and all removal actions are required to be consistent with long-term remedial actions.
- **Remedial actions** – New cleanup goals and schedules were established, including the completion of preliminary assessments of sites, and deadlines were set for remedial work at priority sites. A preference was established for remedies that reduce the toxicity mobility or reduce the volume of waste through treatment as a primary function. Remedies selected must be cost-

effective and utilize permanent solutions where practicable. The statute established off-site land disposal without treatment as the least-preferred alternative.

- **Enforcement authorities** – EPA's use of settlement tools was increased to obtain agreements with potential responsible parties to pay for and/or perform cleanup activities. Criminal penalties were increased for failure to report releases, and it is a criminal offense to provide false or misleading information regarding releases.
- **State involvement** – EPA was required to coordinate with the state during all phases of a response.
- **Public participation** – Public participation in the planning for Superfund actions was required. Technical assistance grants are authorized to allow citizens to hire experts to explain the complexities of hazardous substance problems and the Superfund program at NPL sites. Records, as well as information documenting site information and response activity decisions, are made accessible to the public.
- **Research, development, and training** – A research and development program was initiated to encourage coordinated and comprehensive research and development. Training programs for research and response were expanded.

2.3.5 The Emergency Planning and Community Right-to-Know Act

The Emergency Planning and Community Right-to-Know Act (EPCRA), also known as SARA Title III, was enacted in October 1986. This law provides an infrastructure at the state and local levels to plan for chemical emergencies. Facilities that store, use, or release certain chemicals may be subject to various reporting requirements. Reported information is then made publicly available so that interested parties may become informed about potentially dangerous chemicals in their community. EPCRA requirements include (1) emergency planning notification (EPCRA §302); (2) emergency release notification (EPCRA §304); (3) hazardous chemical inventory reporting (EPCRA §§311/312); and (4) Toxics Release Inventory (TRI) reporting (EPCRA §313). EPCRA §§301-312 are administered by EPA's Office of Emergency Management (OEM). EPA's Office of Information Analysis and Access (OIAA) implements the EPCRA §313 program.[40]

One of the significant results of EPCRA was the establishment of LEPCs and SERCs to plan for the emergency response to, and recovery from, hazardous materials incidents. The LEPCs may develop community stand-alone hazardous materials incident response plans or assist with other hazardous materials management.

2.3.6 Hazardous Materials Transportation Uniform Safety Act of 1990

The Hazardous Materials Transportation Uniform Safety Act of 1990 (HMTUSA), Section 117, evolved from the emergency preparedness proposal developed by DOT, FEMA, EPA, DOL, and DOE during the legislative process to reauthorize the Hazardous Materials Transportation Act of 1975. The requirements of the HMTUSA were designed to allow the federal government to provide national direction and guidance to enhance hazardous materials emergency preparedness activities at the state and local levels. This is accomplished by ensuring comprehensive, integrated and coordinated planning, training, and technical assistance programs. Section 117, Public Sector Training and Planning, was specifically crafted to build upon and enhance the existing framework and working relationships established within CERCLA/Superfund for the NRT, RRTs, and the Title III State Emergency Response Commissions.[41]

HMTUSA required that grant money be provided to LEPCs for

- Planning grants to develop, improve, and implement SARA Title III local emergency response plans and to determine the need for regional hazardous materials emergency response teams.
- Training grants for training of public-sector employees in hazardous materials response. This grant could be used for training to respond to hazardous material waste sites and other training activities.

These grants are based on a 75 percent federal cost share and are managed by the Hazardous Materials Emergency Preparedness (HMEP) grant program, PHMSA, U.S. DOT.

2.3.7 Resource Conservation and Recovery Act (RCRA)

> Overall requirements for debris management resulting from disasters/hazardous materials incidents fall under the Resource Conservation and Recovery Act (RCRA), 1976. RCRA gives EPA the authority to control hazardous waste from "cradle to grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. The federal Hazardous and Solid Waste Amendments (HSWA) are the 1984 amendments to RCRA that focused on waste minimization and phasing out land disposal of hazardous waste, as well as corrective action for releases. Some of the other mandates of this law include increased enforcement authority for EPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program.[42]

From a hazardous materials incident or natural disaster perspective, RCRA provides the guidance and requirements for dealing with debris generated by the incident. When dealing with natural disasters, FEMA has addressed the problems attendant to managing the quantity of debris that can be generated by a flood, hurricane, earthquake, or other type of disastrous event through development of the Public Assistance Debris Management Guide, FEMA 325.

Following a transportation incident involving hazardous materials, appropriate debris disposal is a critical concern. RCRA requires that a debris storage and reduction site, also called a debris management site, be established to separate the various types of debris generated by the incident. For debris that has been contaminated, RCRA provides procedures for decontaminating that debris, packaging it, and disposing of it. FEMA 325 provides this information for use both in planning and operations.

RCRA requirements include the following:

- Establishing a storage and reduction site,
- Decontaminating debris at the storage and reduction site, and
- To the extent possible, recycling debris.

2.3.8 Robert T. Stafford Relief and Emergency Assistance Act

> The foremost federal legislation relating to disaster response and recovery is the Robert T. Stafford Relief and Emergency Assistance Act. The Stafford Act, 42 U.S.C. §5121 et seq. as amended, authorizes financial and other forms of assistance to state and local governments and certain private nonprofit organizations to support response, recovery and mitigation efforts following presidentially declared major disasters and emergencies. The Stafford Act describes the declaration process, the types and extent of assistance that may be provided, and fundamental eligibility requirements.[43]

As a rule, the Stafford Act does not apply to hazardous materials incidents because these are the responsibility of another federal agency (EPA for a land-based incident; USCG if on water). As noted in Section 206.226(a)(1) of 44 CFR, "generally, disaster assistance will not be made available under the Stafford Act when another federal agency has specific authority to restore facilities damaged or destroyed by an event which is declared a major disaster."

However, the President of the United States has the discretion to declare a disastrous hazardous materials transportation incident either an emergency or a major disaster, provided the responsible federal agency and/or the responsible party has fully expended their available funds. Because of this potential, this report also addresses the Stafford Act.

The following definitions of emergency and major disaster are taken directly from the Stafford Act, Section 102, Definitions.[44]

> (1) *Emergency* means any occasion or instance for which, in the determination of the President, federal assistance is needed to supplement state and local efforts and capabilities to save lives and to protect

property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.

(2) *Major disaster* means 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 this 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.

Under the declaration process, a state requests a declaration of major disaster or emergency through FEMA. FEMA reviews the impacts and available state and local resources and then makes a recommendation to the President. The President can then either act on, or decline to act on, a recommendation to declare from FEMA.

The level of assistance that can be provided through FEMA during a *major disaster* is described in Section 403 of the Stafford Act. This covers (1) emergency work to preserve public health and safety during a disaster; (2) debris operations, including demolition of unsafe structures that pose a threat to public health and safety; (3) the provision of temporary facilities for schools and community essential services; (4) technical advice to state and local governments on disaster management and control; and (5) provision of rescue, care, shelter, and essential needs. The level of assistance that can be provided through FEMA during an emergency is described in Section 502 of the Stafford Act and allows the President to authorize assistance to provide technical and advisory assistance to states and local governments affected by the emergency, remove debris, and provide assistance to individuals and businesses. Sections 403 and 502 of the Stafford Act are applicable only during a presidentially declared major disaster or emergency. The presidential declaration will define the types and levels of assistance that are authorized.

CHAPTER 3

Resources Available to Support Community Recovery

3.1 Overview

Restoring, rebuilding, and revitalizing the areas impacted by a hazardous materials transportation incident like that shown in Figure 3-1 can require the commitment of substantial resources. An array of federal, non-profit, and private-sector resources exist in whole and/or in part to support these efforts. When developing recovery plans, it is important to have an understanding of the resources that are available to support their implementation. This section of the report is intended to address that by providing background information on the various types of public- and private-sector resources that are available to help meet community recovery needs, regardless of the hazard.

3.2 Financial Assistance for Recovery

As a local community plans for a potential hazardous materials transportation incident, there are often concerns about who will be responsible for the costs. This is especially true during a time of shrinking government budgets. This section looks at the avenues of financial recovery open to the community for cost reimbursement relative to response, cleanup, and recovery.

3.2.1 Negotiations and Settlement Actions

As previously mentioned, CERCLA established the policy that holds entities deemed responsible for hazardous materials releases liable for the costs associated with cleanup and restoration. CERCLA also created a trust fund (Superfund) to assist with cleanup and restoration costs when the responsible parties cannot be identified. The CERCLA/Superfund Orientation Manual[45] defines the process of negotiations that EPA must engage in to establish the responsible party and financial obligation for remedial actions. EPA must first identify and attempt to compel potentially responsible parties to conduct, and/or pay for, the cleanup wherever possible.

The following two approaches to settlement are available to EPA:

- **Administrative Orders on Consent (AOCs)** — AOCs are binding agreements between EPA and potential responsible parties. AOCs become effective upon the signature of the potential responsible party and the EPA Regional Administrator.
- **Consent Decrees (CDs)** — CDs are similar to AOCs, with the exception that CDs are a judicial action requiring they be filed in court, published in the *Federal Register* for public comment, and then approved by a judge before becoming final. CDs provide site information and the names of the parties bound by the decree; describe the roles and responsibilities of the bound parties; set forth performance standards that must be met with stipulated penalties for not

(SOURCE: http://www.fema.gov/hazard/hurricane/2005katrina/ slideshow/ page1.fema?id=1; Photo Credit: FEMA/George Armstrong: FEMA News Photo)

Figure 3-1. Recovery efforts in Gulfport, Mississippi.

complying with those standards; detail the financial agreements in relation to financial assurances and reimbursement of costs; and address liability issues with respect to indemnification and insurance, covenants not to sue, and re-openers.

If settlements are not achieved, two enforcement options are available to EPA as follows:

- **Unilateral Administrative Orders (UAOs)** — UAOs are most commonly used to require potentially responsible parties to conduct cleanup activities when negotiations fail. In removal situations where time is limited, UAOs may be issued without prior negotiation. Potentially responsible parties may face statutory penalties of $25,000 per day and costly litigation if they do not comply with the terms of a UAO. If the potentially responsible party is not cooperative, UAO issuance sets the stage for EPA to recover up to three times its response costs.
- **Litigation/Judgments** — If a potentially responsible party refuses EPA or another potentially responsible party access to the site, pursuant to CERCLA Section 104(e), EPA may seek a court order to obtain site access. Also, if EPA and the potentially responsible parties fail to reach an agreement that the potentially responsible parties will finance or conduct the cleanup, EPA may use CERCLA Section 106 authorities to order cleanup or CERCLA Section 107 to recover its response costs.

There are three important settlement tools that EPA may use to facilitate settlements with potentially responsible parties as follows:

- **Mixed Funding Settlements** — These are settlements where EPA reaches agreement with less than all potentially responsible parties for less than 100 percent of the response costs. Also EPA agrees to use trust fund money for some, or all, of the short fall. Under this process, EPA then later seeks to recover the costs of that portion of the cleanup from the responsible parties. Additionally, under a mixed funding settlement, a potentially responsible party can agree to a settlement where that party provides cleanup services in lieu of funding.
- **De Minimis Settlements** — These are settlements that have been determined to be only a minor portion of the total response costs at the site, practicable, and in the public interest. These settlements are used if the hazardous substances contributed by the potentially responsible parties are minimal in amount and toxicity in comparison to other hazardous substances at the site.

- **Non-Binding Allocations of Responsibility (NBARs)** — These are allocations of the costs for response among the potentially responsible parties at a facility and are based primarily on the volume of hazardous substances contributed by the potentially responsible parties, although other factors, (e.g., toxicity and mobility of the hazardous substances and relative treatment costs) may be considered.

The objective of the negotiation process is to have either 100 percent of the cleanup costs paid by the potentially responsible parties, or a commitment that they will perform the entire response operation at the site. When there is a partial settlement, it is very important to litigate against non-settlers as soon as possible. In most cases, this is a cost recovery action. If negotiations with the potentially responsible parties are not successful, EPA may choose to perform the work and seek to recover its costs later. To recover its costs, EPA usually issues a demand letter, and if the potentially responsible parties do not reimburse EPA's costs, EPA then refers a judicial action to the DOJ to pursue the case. If a total of $500,000 or less in response costs is incurred at a site or facility, EPA may settle with the potentially responsible parties directly using an administrative order. If more than $500,000 in response costs is incurred at a site, written approval of the U.S. Attorney General is required for the EPA to settle the case administratively.

The process of identifying responsible parties can often involve multiple investigators and lengthy legal battles. In the event of a hazardous materials transportation incident, the findings published by the NTSB are among the factors that can impact the bottom line for responsible parties. NTSB and other investigative agencies rarely issue findings rapidly. Ideally, this should not be a hindrance to the assignment of the responsible party and the implementation of remediation and recovery actions.

As an example, following the July 18, 2001, Howard Street Tunnel train derailment in Baltimore, MD, initial complexities included the determination of whether the derailment was caused by a water main break or the water main break was caused by the train derailment and subsequent fire. Beyond the City of Baltimore and CSX (the train operators), potential litigants ranged from the manufacturer of the train cars involved in the accident to the firm that designed the water main above the tunnel.[46]

Ultimately, the NTSB findings (reported 3 years later) were inconclusive as to the cause, stating in the official accident brief that "convincing evidence to explain the derailment of the CSX freight train" could not be identified.[47] Still, CSX Transportation was held responsible for a significant portion of short-term losses incurred by impacted businesses.[48] Longer term response and cleanup activity payments made by CSX have included lawsuits filed by those suffering personal injury.

The long-term challenge associated with responsible parties' financing of recovery operations is underscored by recent news regarding litigation related to recovery efforts that have been ongoing with the Exxon Mobil Corporation for more than 20 years. The company, identified as the responsible party for the Exxon *Valdez* oil spill, has been involved in lengthy legal battles related to criminal and punitive damages. In 1991, Exxon Mobil paid approximately $900 million in a civil settlement. Despite this, federal and state officials filed a $92 million dollar claim in 2006 that was brought to court in March 2011. Although the U.S. District Court ultimately ruled against the claim, this exemplifies the type of long-term litigation that may result from major hazardous materials transportation incidents.[49]

3.2.2 Superfund

CERCLA (also known as the Superfund and discussed in Chapter 2 previously) established the Hazardous Substance Response Trust Fund from a tax on crude oil and 42 commercially used chem-

icals. Should the case exist where a responsible party cannot be identified or the responsible party cannot pay the cleanup costs, EPA can reimburse local governments for costs through the Trust Fund up to $2 million per year per incident. There are three ways to access the Trust Fund as follows[50]

- By the FOSC, through enabling cleanup actions;
- Through the claims process where claims can be made by any person other than the U.S. government, states, and political subdivisions thereof, except to the extent the claimant is otherwise compensated for the loss or states and political subdivisions if they are potentially responsible parties (only response actions that EPA has preauthorized are eligible for reimbursement through the claims process); and
- Through the Local Government Reimbursement (LGR) Program.

The LGR Program was established to assist local governments and federally recognized tribal nations in covering the costs of emergency responses to hazardous materials incidents. States are not eligible for reimbursement under the LGR Program.

Among other things, local governments have been reimbursed for releases from transportation accidents, illegally dumped waste, tire fires, and contamination from illegal drug labs. Incidents involving releases of oil or oil-related products are not covered unless the oil product has been mixed with another type of hazardous material (see Section 3.2.3). Local governments can be reimbursed up to $25,000 per incident for costs that they may incur while performing temporary emergency response measures. In the past, reimbursement has been provided for (1) disposable materials and supplies, (2) rental or leasing of equipment, (3) special technical and laboratory services, (4) evacuation services, (5) decontamination of equipment, (6) overtime pay for employees, and (7) replacement of equipment lost or destroyed.[51]

3.2.3 Oil Spill Liability Trust Fund (OSLTF)[52]

The OSLTF was created in 1986 and is managed by the USCG's National Pollution Funds Center (NPFC). However, it wasn't until the passage of the OPA in 1990 that authorization was granted for the collection of funds for its maintenance. The OSLTF is now a billion dollar fund used for cleanup costs not directly paid by the responsible party. The fund is also used to pay costs to respond to "mystery spills" for which the source has not been identified.

There are two funds within the OSLTF as follows:

- **Emergency Fund:** Available to FOSCs for response to oil spills and to federal natural resource trustees to initiate natural resource damage assessments.
- **Principal Fund Balance:** Used to pay claims and to fund federal agencies to administer the provisions of OPA along with supporting research and development.

Acceptable uses of the OSLTF include the following:

- **Federal Removal Costs:** Payments to cleanup contractors, government personnel overtime, equipment, testing to identify the type and source of oil, disposal of recovered oil and oily debris, and preparation of cost documentation.
- **Claims:** Costs and damages specified in OPA include uncompensated removal costs, natural resource damages, real/personal property, loss of profits, loss of subsistence use of natural resources, loss of government revenues, increased costs of government services, and claims from responsible parties asserting a defense to liability.

There are also limitations to accessing the OSLTF, which include the following:

- The spill or threatened spill must be in or on navigable U.S. waters, adjoining shorelines, or Exclusive Economic Zones (EEZs);

- The spill or threatened spill must be oil (includes petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil) and it cannot include any substance listed or designated as a hazardous substance under CERCLA; and
- The maximum amount from the OSLTF is $1 billion per incident or the balance in the OSLTF, whichever is less.

The NPFC has several responsibilities related to recovering from oil spills including providing timely funding, initiating Natural Resource Damage Assessments (NRDAs), compensating claimants, recovering costs owed by the responsible parties, and certifying the financial responsibility of vessel owners and operators. As it pertains to the role of the EPA, activities may include the following: [53]

- Communicating with the USCG district to obtain a federal project number (FPN) for response and ongoing recovery and with the EPA regional budget office to obtain an account number;
- Obtaining USCG approval for expenditure ceilings;
- Initiating remedial action contracting mechanisms such as Emergency Response Cleanup Services (ERCS) contracts and Basic Ordering Agreements (BOAs);
- Utilizing the NCP's federal support structure to obtain assistance from other federal agencies; and
- Tracking progress and costs of remediation. (If the cleanup period is 30 days or less, cost documentation must be submitted within 30 days of completion; however, for incidents that result in cleanup activities that exceed 30 days, cost documentation packages must be created every 45 days.)

In addition to EPA's ability to access OSLTF, states can access the fund in three ways as follows:

- Direct access,
- Pollution Removal Funding Authorization (PRFA), or
- Claims to the NPFC.

OPA also stipulates that the President, upon the request of a state Governor, may obligate OSLTF monies through the NPFC for payments less than $250,000 for removal costs consistent with the NCP required for the immediate oil release removal or for mitigation of a substantial release threat.[54] Claimants have 3 years within which to make damage claims, and 6 years "after the date of completion of all removal actions" to make a claim for removal costs.[55] In terms of short- and long-term recovery, the types of claims available under the NPFC include

- Real and personal property damages including boat damage;
- Loss of profits and earning capacity;
- Loss of government revenue or increased public services (state and local governments only); and
- Natural resources damages (natural resource trustees only) and loss of subsistence use of natural resources.

Since the *Deepwater Horizon* oil spill in 2010, OPA's liability cap has been called into question as a result of the extent of the disaster in the Gulf of Mexico. Various legislators have sought to raise the cap through a variety of means, including a failed proposal to increase the cap to $10 billion.[56] As of the publication of this report, discussion is ongoing in Congress regarding liability limits. Technically, OPA requires the President to issue regulations at least every 3 years to adjust the cap; however, there is no "per incident" provision that would take into account extreme disasters such as *Deepwater Horizon.*

In June 2010, the President announced that British Petroleum had established a $20 billion fund that will be processed by an independent claims facility to cover economic damage claims from people and businesses that suffered from the *Deepwater Horizon* oil spill.[57] As a result of this $20 billion fund, the NPFC has adjusted its claims process to reflect British Petroleum's obligations. According to NPFC documentation, individuals, businesses, and local governments must

first file with British Petroleum before they file through OSLTF (although states may continue to file directly with NPFC). Only if British Petroleum denies the claim, or if the claim goes unsettled for more than 90 days, may claims then be made with NFPC.[58]

3.2.4 Stafford Act

If the situation were to arise where the President declares that an incident is a major disaster or emergency, the following programs may be activated to assist with recovery efforts (see Chapter 2 for a discussion of Stafford Act activation requirements and applicability). The President also determines which programs will be made available and to what extent:

- **Public Assistance Program (Section 406 of the Stafford Act)** – These are grants to state and local governments, tribal nations, and certain private non-profit organizations to assist with response costs, emergency work, and repairs to facilities damaged by the disaster. Grants are provided on a cost-sharing basis, with the federal share not less than 75 percent of eligible costs, and are paid as reimbursements.
- **Individual Assistance Program (Section 408 of the Stafford Act)** – This program provides financial assistance to individuals, private businesses, and certain private non-profit organizations through a "needs met" process. The major provisions include low-interest loans from the Small Business Administration (interest is based on the ability to repay the loan), access to approximately 30 federally administered grant programs, and short- and long-term housing assistance.
- **Hazard Mitigation Grant Program (Section 404 of the Stafford Act)** – These are post-disaster mitigation grants available to all eligible public assistance applicants throughout the state in which the disaster is declared. Grant funding is allocated using a sliding scale formula based on a percentage of the estimated total federal assistance under the Stafford Act. Applicants with a FEMA-approved state or tribal standard mitigation plan may receive (1) up to 15 percent of the first $2 billion of the estimated aggregate amount of disaster assistance, (2) up to 10 percent for the next portion of the estimated aggregate amount more than $2 billion and up to $10 billion, and (3) 7.5 percent for the next portion of the estimated aggregate amount more than $10 billion and up to $35.333 billion. Applicants with a FEMA-approved state or tribal enhanced mitigation plan are eligible for HMGP funding not to exceed 20 percent of the estimated total federal assistance under the Stafford Act, up to $35.333 billion of such assistance, excluding administrative costs authorized for the disaster.

Because of the duplication of benefits clause in Section 312 of the Stafford Act, and further discussed in Section 206.226(a)(1) of 44 CFR, Stafford Act funding will not reimburse costs that are eligible for payment through another federal program or agency or are covered by a financial mechanism (such as insurance or private donations).

3.3 Other Resources Available to Support Recovery Efforts

Emergency and disaster response is immediately initiated at the local level. Typically, during the response phase to any potentially catastrophic event, a locality performs an assessment of the situation as it unfolds and while the jurisdiction is responding. The jurisdiction is then able to project use and maximization of its resources to determine the need for escalation to a higher level of government to secure and coordinate additional resources to adequately meet and alleviate the threatening situation.

When a community has exhausted its available resources, including supplemental resources through mutual aid agreements, compacts, or contracts, the community can apply for assistance

to the state through its county. It is assumed that local communities understand what additional resources are available to them through mutual aid within their state and, therefore, these are not specifically discussed in this report.

When more resources are required than are available through the state, the local community can request (through the state) that FEMA, the federal coordinating agency under the NRF, activate various NRF ESFs or NDRF Recovery Support Functions (RSFs), which then provide resources from select federal agencies to assist with the incident.

FEMA's National Response Resource Center indicates that ESFs are "used by the federal government and many state governments as the primary mechanism at the operational level to organize and provide assistance. ESFs align categories of resources and provide strategic objectives for their use. ESFs utilize standardized resource management concepts such as typing, inventorying, and tracking to facilitate the dispatch, deployment, and recovery of resources before, during, and after an incident" (http://www.fema.gov/emergency/nrf/glossary.htm#E).

The NDRF explains that the six RSFs " . . . bring together federal departments and agencies – including those not active in emergency response – to collaborate and focus on recovery needs. The RSFs are organized into six manageable components and through the RSFs relevant stakeholders and experts are brought together during steady-state planning and, when activated, post-disaster to identify and resolve recovery challenges."[59]

This section of the report provides background information on the various types of federal and private resources that are available to meet the response and recovery needs of a community regardless of hazard.

3.3.1 Federal Support

The NRF and NDRF identify ESFs and RSFs that are available to state and local governments to assist in response and recovery operations. As noted previously, for hazardous materials transportation incidents, ESF #10 is the overarching authority and designates a FOSC from either the EPA or USCG (depending on the location of the incident). The FOSC's role is defined as " . . . the federal official responsible for monitoring or directing responses to all oil spills and hazardous substance releases reported to the federal government" (http://www.epa.gov/oem/content/nrs/nrsosc.htm).

Hazardous materials incidents are one of three types of incidents wherein federal authorities may take a leading role in response and recovery operations (the others are the law enforcement response to a terrorist attack and response to a nuclear incident). For community planning purposes, it is helpful to identify available assistance and resources and how these may be utilized as defined in the federal ESFs and RSFs. Table 3-1 provides an overview of applicable ESFs and RSFs and identifies the responsible federal agency for that function.

3.3.2 Emergency Management Assistance Compact[61]

The Emergency Management Assistance Compact (EMAC) is a national inter-state mutual aid agreement that enables states to share resources during times of disaster. EMAC is administered by the National Emergency Management Association (NEMA). EMAC is first and foremost a state-to-state compact; however, FEMA and EMAC leadership have a long-standing agreement in which NEMA, through the National Coordination Group (NCG), facilitates requests to deploy a team to coordinate EMAC activities with federal personnel when requested. Requesting and deploying resources is at the discretion of the impacted (requesting) state allowing them the ability to pick what they need and for what price. The responding (assisting) state only has to offer assistance if they have the resources and can deploy them.

Table 3-1. ESF and RSF resources.

Resource	Description
NRF Emergency Support Functions	
ESF #3 – Public Works and Engineering: Coordinating Agency – U.S. Army Corps of Engineers	• Pre- and post-incident assessments of public works and infrastructure; • Executing emergency contract support for life-saving and life-sustaining services; • Providing technical assistance to include engineering expertise, construction management, and contracting and real estate services; and • Providing emergency repair of damaged public infrastructure and critical facilities.
ESF #6 – Mass Care, Emergency Assistance, Housing, and Human Services: Coordinating Agency – Federal Emergency Management Agency	**Mass Care:** • Sheltering; • Feeding operations; • Emergency first aid; • Bulk distribution of emergency items; and • Collecting and providing information on victims to families. **Emergency Assistance:** • Support of evacuations (registration and tracking of evacuees); • Reunification of families; • Provision of aid and services to special needs populations; • Evacuation, sheltering, and other emergency services for household pets and service animals; • Support to specialized shelters; • Support to medical shelters; • Nonconventional shelter management; • Coordination of donated goods and services; and • Coordination of voluntary agency assistance. **Housing** (most of these services fall under the Stafford Act and may not be available following a hazardous materials transportation incident): • Rental assistance; • Repair; • Loan assistance; • Replacement; • Factory-built housing; • Semi-permanent and permanent construction; • Referrals; • Identification and provision of accessible housing; and • Access to other sources of housing assistance. **Human Services** (most of these services fall under the Stafford Act and may not be available following a hazardous materials transportation incident): • Implementation of disaster assistance programs to help disaster victims recover their non-housing losses; programs to replace destroyed personal property; • Help to obtain disaster loans, food stamps, crisis counseling, disaster unemployment, disaster legal services; and • Support and services for special needs populations.
ESF #8 – Public Health and Medical Services: Coordinating Agency – Department of Health and Human Services	• Assessment of public health/medical needs; • Health surveillance; • Medical care personnel; • Health/medical/veterinary equipment and supplies; • Patient evacuation; • Patient care; • Safety and security of drugs, biologics, and medical devices; • Blood and blood products; • Food safety and security; • Agriculture safety and security; • All-hazard public health and medical consultation, technical assistance, and support; • Behavioral health care; • Public health and medical information; • Potable water/wastewater and solid waste disposal; • Mass fatality management, victim identification, and decontaminating remains; and • Veterinary medical support.

(continued on next page)

Table 3-1. (Continued).

Resource	Description
ESF #10 – Oil and Hazardous Materials Response: Coordinating Agency – Environmental Protection Agency	• Actions to prevent, minimize, or mitigate a release; • Efforts to detect and assess the extent of contamination (including sampling and analysis and environmental monitoring); • Actions to stabilize the release and prevent the spread of contamination; • Analysis of options for environmental cleanup and waste disposal; • Implementation of environmental cleanup; and • Storage, treatment, and disposal of oil and hazardous materials.
ESF #14 – Long-Term Community Recovery: Coordinating Agency – Federal Emergency Management Agency	The NDRF replaces the NRF Emergency Support Function #14 (ESF #14) - Long-Term Community Recovery.[60] Key ESF #14 concepts are expanded in the NDRF and include recovery-specific leadership, organizational structure, planning guidance, and other components needed to coordinate continuing recovery support to individuals, businesses, and communities.
NDRF Recovery Support Functions	
Community Planning and Capacity Building: Coordinating Agency – Federal Emergency Management Agency Primary Agencies – Federal Emergency Management Agency and Department of Health and Human Services	Supporting and building recovery capacities and community planning resources of local, state and tribal governments needed to effectively plan for, manage, and implement disaster recovery activities in large, unique, or catastrophic incidents. • Assists states in developing a pre- and post-disaster support for their communities. • Provides an emphasis on hazard mitigation throughout pre- and post-disaster recovery planning and implementation. • Serves as a mechanism for the integration of non-governmental and private-sector resources into public-sector recovery planning processes.
Economic Development: Coordinating Agency – Department of Commerce Primary Agencies – Federal Emergency Management Agency, Department of Commerce, Department of Labor, Small Business Administration, Department of Treasury, U.S. Department of Agriculture	Integrate the expertise of federal government to help local, state, and tribal governments and the private sector sustain and/or rebuild businesses and employment and develop economic opportunities that result in sustainable and economically resilient communities after large-scale and catastrophic incidents.
Health, Social, and Community Services: Coordinating Agency – Department of Health and Human Services Primary Agencies – Corporation for National and Community Service, Department of Homeland Security (Federal Emergency Management Agency, National Protection Programs Directorate, and Office for Civil Rights and Civil Liberties), Department of Interior, Department of Justice, Department of Labor, Education Department, Environmental Protection Agency, Department of Veterans Affairs	The Health and Social Services RSF mission is for the federal government to assist locally led recovery efforts in the restoration of the public health, health care, and social services networks to promote the resilience, health, and well-being of affected individuals and communities.
Housing: Coordinating Agency – Department of Housing and Urban Development Primary Agencies – Federal Emergency Management Agency, Department of Justice. Department of Housing and Urban Development, U.S. Department of Agriculture	Address pre- and post-disaster housing issues and coordinate and facilitate the delivery of federal resources and activities to assist local, state, and tribal governments in the rehabilitation and reconstruction of destroyed and damaged housing, whenever feasible, and development of other new accessible, permanent housing options.

Table 3-1. (Continued).

Resource	Description
Infrastructure Systems: Coordinating Agency – U.S. Army Corps of Engineers. Primary Agencies – Department of Homeland Security (Federal Emergency Management Agency and National Protection Programs Directorate), U.S. Army Corps of Engineers, Department of Energy, Department of Transportation	Facilitate the integration of the capabilities of the federal government to support local, state, and tribal governments and other infrastructure owners and operators in their efforts to achieve recovery goals relating to the public engineering of the nation's infrastructure systems.
Natural and Cultural Resources: Coordinating Agency – Department of the Interior. Primary Agencies – Federal Emergency Management Agency, Department of Interior, Environmental Protection Agency	Integrate federal assets and capabilities to help state, tribal governments, and communities address long-term environmental and cultural resource recovery needs after large-scale and catastrophic incidents.

(SOURCES: National Response Framework Resource Center, Federal Emergency Management Agency, http://www.fema.gov/emergency/nrf/glossary.htm#E and National Disaster Recovery Framework, September 2011, Federal Emergency Management Agency, http://www.fema.gov/recoveryframework/)

EMAC complements the federal disaster response system by providing timely and cost-effective relief to requesting states from assisting states who understand the needs of communities struggling to preserve life, the economy, and the environment. EMAC can be used for traditional emergency management assistance for incident management either in lieu of federal assistance, or in conjunction with it, and provides another source of assistance. More information on EMAC is available on the EMAC website (http://www.emacweb.org/).

3.3.3 Public-Private Partnerships

The private sector also plays an essential role in protecting critical infrastructure and implementing plans to restore normal commercial activities. Private-sector organizations, ranging from local businesses to nationwide chains, are instrumental to improving the quality of life for individuals impacted by a disaster, as well as enhancing the pace at which communities recover. The private sector shares a common need with communities to restore, as well as revitalize, impacted areas as quickly as possible. Rapidly returning to pre-incident conditions allows business to return to normal operating conditions quickly, thereby reducing the impact of any losses. Similarly, re-opening businesses in affected areas allows communities to more effectively target public resources on areas of remaining need.

Homeland Security Presidential Directive 5 (HSPD-5): Management of Domestic Incidents states

> The federal government recognizes the role that the private and non-governmental sectors play in preventing, preparing for, responding to, and recovering from terrorist attacks, major disasters, and other emergencies. The secretary [Department of Homeland Security] will coordinate with the private and non-governmental sectors to ensure adequate planning, equipment, training, and exercise activities and to promote partnerships to address incident management capabilities.[62]

Within this context, public-private partnerships have demonstrated their value in homeland security and emergency response capability by helping to fill gaps neither government nor industry acting alone could address. Public-private partnerships also require a level of trust that is built at the local level. These relationships grow and are strengthened as partners work together to achieve a common goal. Such partnerships make it possible for business and government leaders to work together for the welfare of their communities on an ongoing basis across many initiatives.[63]

FEMA maintains a listing of successful models for public-private partnerships on their website. Table 3-2 highlights some of the examples provided on that site.

Additional, successful programs encouraging public-private partnerships are described in "Contingency Planning Advances through Public & Private Partnerships" and include the following:[64]

- **Public-Private Partnerships 2000** (PPP 2000). A cooperative effort of the 19 agencies comprising the Subcommittee on Natural Disaster Reduction, part of the National Science and Technology Council's Committee on the Environment and Natural Resources, as well as other

Table 3-2. Model public-private partnerships highlighted by FEMA.

Model	Description of the Partnership
National Level Citizen Corps	**Background:** Citizen Corps is the grassroots movement to strengthen community safety and preparedness through increased civic engagement. Citizen Corps is administered by the Federal Emergency Management Agency but implemented locally. Citizen Corps strives to bring together government and community leaders and engage the public in all-hazards emergency preparedness. **Requirements for Success:** • A commitment from elected officials and government leadership to participate in two-way interaction with the community; • Input and participation from civic leaders from all sectors; • Outreach through trusted organizations and networks to all segments of the community; • Shared responsibility and mutual benefit for participants; • Participating organizations contribute to common goals while retaining their own missions; • Resources to build and sustain engagement; • Clearly stated common goals and measurable annual objectives. **Goals and Objectives:** • Engaging the whole community in collaborative community planning and capacity building; • Integration of community resources; • Outreach and localized preparedness education and training; and • Emergency communications to all population segments. **Resources:** A seat in the Emergency Operations Center; resources to help prepare for, respond to, and recover from disasters; web resources; grants; and tools and templates.
State Level California Business and Utility Operations Center (BUOC)	**Background:** The impact of the September 11 terrorist attacks and Hurricane Katrina demonstrated the need to better integrate the private-sector resources with public-sector emergency services. The need to respond rapidly, ensure the safety of all Californians; provide necessary emergency water, shelter, food and clothing; and to ensure the viability of economic recovery requires collective resources and efforts of public and private entities. Cal EMA and the BUOC members worked together to develop a strategy and operational plan to foster this critical partnership. The BUOC Activation Guidelines assist business and government to communicate, collaborate, and take the actions necessary to mitigate the effects of emergencies in California. **Requirements for Success:** • Provide trained, knowledgeable staff to support Cal EMA during times of disaster needs; and • Cal EMA will share situational awareness information and training opportunities. **Goals and Objectives:** • Continuity of community. BUOC will help facilitate continuity of community following disasters and may include maintenance of critical infrastructure such as transportation, power, food, water, shelter, health care, and telecommunications; • Enhanced situational awareness. BUOC will provide a greater degree of situational awareness to all parties. Situational awareness plays a key role in supporting informed decisionmaking and avoiding duplication or conflict in efforts by the private-sector and government; • Increased information flow. BUOC will provide an increased bi-directional flow of information relating to activities, policies, and other efforts affecting critical community resources; • Improved private-sector support. The private sector has significant capability and willingness to provide supplies, services, and assistance to government. Through the BUOC, the private sector can provide this support more efficiently and effectively; and • Development of close partnerships. Both the private sector and the government have the opportunity to develop trusted relationships and become true partners in the emergency response and recovery efforts. **Resources:** A seat in the Emergency Operations Centers; resources to help prepare for, respond to, and recover from disasters; Web resources; tools and templates, and BUOC guidelines.

Table 3-2. (Continued).

Model	Description of the Partnership
County Level **Miami-Dade, FL** **Business Recovery Program (BRP)**	**Background:** The Miami-Dade County BRP is a public-private collaboration designed to ensure private-sector emergency preparedness, response, recovery, and mitigation. The BRP is open to any organization and currently is composed of businesses, non-profits, and educational institutions. The Miami-Dade BRP is a county-led initiative with close support from Florida International University, whose team is continually developing unique tools, including the Business Continuity Information Network (BCIN), to facilitate the development of the program and achievement of its goals. BCIN is a Web-based service where public and private organizations can gather to share critical information and resources as well as support continuity efforts before, during, and after a disaster. **Requirements for Success:** The need to have member organizations representing diverse segments of the community who take an active role in driving the group toward achieving its goals. **Goals and Objectives:** • Developing symbiotic relationships where businesses benefit by being able to open their doors quickly after a disaster; • Building a disaster-resilient private sector; • Facilitating the timely exchange of information and resources; • Creating and maintaining a perpetual network of private- and public-sector participants. **Resources:** A seat in the Emergency Operations Center; resources to help prepare for, respond to, and recover from disasters; Web resources; tools and templates; and Business Continuity Information Network.
Regional Level **Kansas City Power and Light** **(KCP&L)**	**Background:** In 2006 KCP&L approached the City of Kansas City to do a joint exercise testing communication and team building with KCP&L funding the exercise. In 2008, another drill was conducted with Johnson County EM, City of Overland Park, KS, City of Olathe, KS, and WaterOne (local water utility). KCP&L covers an 18,000-square-mile, 47-county region in Eastern Kansas (250,000 customers) and Western Missouri (600,000 customers). **Requirements for success:** Keeping focused on the desire to improve response to a major incident. **Goals and Objectives:** • Testing and developing communication channels; • Regional overview of city and county EOPs and how KCP&L's plan fits; • Developing long-term relationships in the region; and • Building relationships with key emergency management personnel. **Resources:** A seat in the Emergency Operations Center; resources to help prepare for, respond to, and recover from disasters; and Web resources.
City Level **Chicago, IL** **The Critical Infrastructure Resiliency Task Force (CIRTF)**	**Background:** The CIRTF expands upon existing programs by combining public-sector organizations (fire, police, emergency management) with private-sector representatives (utilities, building owners, financial firms, etc.). The group includes senior-level operational representatives from each agency or institution. The purpose of the group is to fast-track solutions to common issues affecting both the private and public sector. The primary focus of the group is on infrastructure and interconnected systems. Active partners include the Mayor's Office, the Chicago Fire Department, the Chicago Police Department, the Chicago Office of Emergency Management and Communications (OEMC), the Building Owners and Managers Association (BOMA), Chicago FIRST, AT&T, Commonwealth Edison, and Peoples Gas. **Requirements for Success:** • Joint participation and buy-in of both public-sector and private-sector representatives; and • Participants have an operational background with their organizations, and the authority to make substantive decisions. **Goals and Objectives:** • Promoting high-level contacts between the public and private sectors; • Assessing and recognizing critical infrastructure and interconnected systems; • Identifying and developing redundancies within critical systems; and • Exercising and training to consistently raise standards of preparedness. **Resources:** Resources to help prepare for, respond to, and recover from disasters; tools and templates; and joint training and exercises.

(continued on next page)

Table 3-2. (Continued).

Model	Description of the Partnership
Event Specific Florida	**Background:** Florida's more than 18 million residents and visitors face hurricanes and other natural disasters. Innovative emergency managers augmented standard (broadcast) emergency communication by also delivering specific, localized messages to the public via digital billboards. Digital billboards operated by the private sector display static images that do not scroll or flash. Under Florida law, these static images may change every 6 seconds. Digital billboards allow emergency managers to reach motorists at no cost to the public. The Florida Outdoor Advertising Association (FOAA) volunteers to post emergency messages on donated digital billboards as a public service. FOAA is a member of the state Emergency Response Team. In an emergency, Florida Division of Emergency Management (FDEM) contacts FOAA to request digital billboard postings and to provide information for the alert such as geographic area and timeframe. After sign-off by FDEM, FOAA inserts an alert message into a pre-approved template and notifies participating member companies in the affected area, or statewide, if necessary. Participating billboard companies track display times and locations to quantify the scope of the communication. **Requirements for Success:** • Digital billboard inventory; • Willingness of digital billboard operators to donate space for emergency messages and provide timely postings; • Protocols for uniform operation such as templates for messages; • Designated staff in government and the private sector to manage the partnership; and • Speedy, effective communication between state emergency officials and private billboard operators. **Goals and Objectives:** • Enhance the state Emergency Response Team's ability to communicate critical information quickly to Floridians during disasters; • Use the latest technology to communicate emergency information to mobile residents and visitors outside the home; and • Cultivate public/private partnerships. **Resources:** FOAA has the ability to provide information through its website, and to provide tools and templates to create the alert notification messages on the billboards quickly and easily.

(SOURCE: "Public-Private Partnership Models," Federal Emergency Management Agency website, http://www.fema.gov/privatesector/ppp_models.shtm)

private-sector organizations. The goal is to "seek new and innovative opportunities for government and non-profit, private-sector organizations to work together to reduce vulnerability to, and losses from, natural hazards in communities across the nation."

- **The Institute for Business & Home Safety** (IBHS). IBHS showcases states to demonstrate the benefits of taking specific, creative steps at the state government level to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters.
- **The Florida Alliance for Safe Homes** (FLASH). The insurance industry, the State of Florida, the federal government, and national nonprofit organizations have formed a statewide public awareness and education campaign for Floridians.
- **The New York State Joint Loss Reduction Partnership Project.** This partnership includes the Contingency Planning Exchange (CPE), FEMA, a representative of the state's business leadership, along with key federal, state, and local government officials under the leadership of the state emergency management office. Initiatives include leveraging the expertise of many companies based in New York concerning actions necessary to make the state's businesses disaster resistant.
- **International Association of Emergency Managers** (IAEM). Actively pursues partnerships that advance coordination and support between public and private organizations and constituencies worldwide.
- **Disaster Recovery Business Alliance** (DRBA). A nationwide initiative to unite public and private sectors, one municipality at a time.
- **National and independent contingency planning organizations,** with public- and private-sector members, participate in disaster mitigation and continuity of operations educational workshops, mentoring, training, and exercises.
- **Community Emergency Operations Centers** arrange for private-sector liaison representatives to have a presence in times of emergency for better communications and resources.

Developing public-private partnerships is a proven approach to improving disaster resilience for both the community and private-sector businesses. An example of one city's deliberate efforts to proactively cultivate this type of relationship follows in the next section.

3.3.4 The Howard Street Tunnel Incident and Subsequent Recovery Efforts

Public-private partnerships can develop through the planning process or as a result of actual response and recovery operations. Organizations working on the cleanup associated with a hazardous materials incident may forge partnerships based on cooperation and a better understanding of the role each plays. One example of this is the aftermath of the Howard Street Tunnel fire in Baltimore, MD.

On July 18, 2001, a CSX train passing through the Howard Street Tunnel derailed resulting in the release of several types of toxic chemicals and a large fire. In addition, a large water main above the tunnel ruptured. This incident significantly disrupted freight and commuter rail traffic, slowed Internet service, and closed surrounding businesses for 6 days.[65]

As a follow-up to this incident, a joint inspection was performed by CSX and the City of Baltimore. Although no specific cause of the incident was ever established, CSX committed to more frequent tunnel inspections, expedited rail replacement and increased infrared probes to detect hidden track flaws, improved drainage, and installed new pumps. CSX also indicated they would share information directly with the city about hazardous cargo moving through the tunnel (previously, city officials had to wait for notification from the state). In turn, the City of Baltimore's Office of Emergency Management began exploring the potential for using a Homeland Security grant to purchase an 800-megahertz radio transmitter to install in the tunnel and a portable ventilation system. In a statement to WBAL TV, Mayor Stephanie Rawlings-Blake said " . . . CSX has been a really great partner working with us. They are doing work improving the drainage and, through the tunnel, they are also going above and beyond when it comes to the safety checks." [66]

This is an example of a partnership that can develop during an incident and continue afterwards to the benefit of both parties. In this case, the net benefit to the surrounding community was a safer tunnel and more timely notification of hazardous cargo movements.

3.3.5 Private-Sector Resources

Numerous private-sector resources are also available to assist local communities with their planning, response, and recovery operations following a hazardous materials transportation incident. Three examples of these resources include the following:

- **CHEMTREC** – This is a round-the-clock resource for response operations for incidents involving hazardous materials and dangerous goods. CHEMTREC can provide chemical and response specialists, public emergency services, and private contractors to assist in the cleanup operations (http://www.chemtrec.com/).
- **TRANSCAER®** (Transportation Community Awareness and Emergency Response) – This is a voluntary national outreach effort that provides assistance to communities to prepare for, and respond to, a possible hazardous materials transportation incident by promoting safe transportation and handling of hazardous materials, educating and assisting communities near major transportation routes about hazardous materials, and assisting with community emergency response planning for hazardous material transportation incidents. These resources consist of volunteer representatives from the chemical manufacturing, transportation, distributor, and emergency response industries, as well as the government (http://www.transcaer.com/).

- **Responsible Party** – The responsible party needs to be involved in the operations immediately after the incident. They become a part of the unified command and have access to technical expertise on the product(s) involved, as well as to contractors and consultants to ensure a complete cleanup is accomplished.

Additional resources to consider are contractors, consultants, and professional organizations. Industry-related professional organizations have access to member organizations that can bring technical expertise, specialized equipment, and other resources that may be required. Many of these private-sector entities are available to provide assistance with recovery planning and operations, as well as for development of appropriate public education materials and information campaigns.

CHAPTER 4

Best Practices for Community Recovery Planning

4.1 Overview

Advance planning is critical to effective disaster recovery. Examining recovery efforts from previous domestic and international disasters resulting from hazardous materials incidents, as well as other causal factors, affords a wide variety of best practices and lessons learned that can be applied as communities seek not only to recover, but also to build resiliency by undertaking recovery planning initiatives.

This section provides information related to best practices and lessons learned to support recovery planning processes in general; however, it specifically considers factors unique to the potential ramifications of a hazardous materials transportation incident. As used in this report, the term "best practice" is defined as a superior or innovative method contributing to improved performance or providing a successful solution to an operational dilemma. A best practice, by its nature, implies cumulative and applicable knowledge regarding "what works" in varying situations and contexts based on past experience, lessons learned, and the continuing process of improvement through identification and analysis of shortfalls or gaps, successive approximations, peer review and feedback, and successful applications under diverse circumstances with uniform outcomes.

Recovery planning activities take place pre-incident (as a key component of community preparedness and mitigation efforts), as well as post-incident. The American Planning Association (APA) states

> unexpected contingencies can always arise in the aftermath of a disaster, no matter how good the pre-disaster planning, in large part because no plan developed in the pre-disaster period can anticipate the precise nature of the next disaster.[67]

Although both the act and the end-product of recovery planning are vital, the need for innovation and adaptability is also imperative.[68] Particularly as they relate to hazardous materials transportation incidents, such innovation and adaptability are essential due to the many short- and long-term variables related to the nature of particular hazardous materials, along with the element of surprise inherent to accidents involving the transportation of hazardous materials. It is also important to keep in mind that there is great diversity in the U.S. within each community, ranging from population density and complexity of infrastructure, to environmental, cultural, symbolic, and historic features that make a difference in the recovery planning processes and recovery prioritization. For example, restoration of historic properties (along with the accompanying array of preservation and building code issues) may be paramount to recovery planning in a community like Williamsburg, VA, but not a top priority in other communities.

Much of the planning guidance presented in this section is from the National Disaster Recovery Framework. An additional resource for planning in relation to a hazardous materials transportation

incident can be found on the DOT website (http://www.ops.fhwa.dot.gov/publications/publications.htm#eto). Topics range from evacuation route planning to emergency transportation operations and traffic incident management.

4.2 Standards for Recovery Planning

There are two primary standards used in emergency management planning as follows:

- National Fire Protection Association (NFPA) 1600; and
- The Emergency Management Accreditation Program (EMAP) standard, which supports the NFPA 1600 Standard.

NFPA 1600 provides guidance on the development of emergency plans for both government and private-sector businesses and includes a framework of considerations for a comprehensive recovery plan.

NFPA 1600 provides a common criteria set for disaster, emergency management, and business continuity programs. NFPA 1600 also details recommendations for the various stages of such programs, including development, implementation, assessment, and maintenance. First conceived 20 years ago, NFPA 1600 was designed to address disaster preparation, response, and recovery. DHS has adopted NFPA 1600 as a national preparedness standard. Furthermore, NFPA 1600 is designated as a qualified anti-terrorism technology (QATT) and is certified as an approved product for homeland security through the Support Anti-Terrorism by Fostering Effective Technologies Act of 2002 (SAFETY Act).[69]

Among the specific sections of NFPA 1600 that reference recovery and planning, highlighted suggestions include utilizing an all-hazards approach and applying risk management principles. Specifically, NFPA 1600 recognizes risk assessment as a means to identify strategies for prevention and mitigation, as well as the basis for informing response, continuity, and recovery planning.[70] Although previous editions of NFPA 1600 provided more details relative to short- and long-term recovery, the 2010 edition addresses recovery more broadly. Key recommendations for inclusion as elements of recovery plans include the following:

- Critical infrastructure;
- Telecommunications and cyber systems;
- Distribution systems/networks for essential goods;
- Transportation systems, networks, and infrastructure;
- Facilities;
- Psychosocial services;
- Health services; and
- Continuity of operations.[71]

Highlighted short-term recovery planning objectives recommended by NFPA 1600 are similarly broad. Goals and objectives listed in the context of building short-term recovery plans include

- Vital personnel, systems, operations, records, and equipment;
- Restoration and mitigation priorities;
- Acceptable levels of downtime prior to minimum restoration; and
- Minimum functions, services, and resources required.

NFPA 1600 identifies long-term recovery planning goals primarily in terms of management activities (e.g., coordination, funding, volunteer and contractual resources, etc.), as well as long-term mitigation. According to NFPA 1600, long-term recovery planning should also be informed by existing community strategic plans.

Various agencies at the federal and state levels, as well as private-sector and non-profit organizations, have developed guidance for creating and implementing emergency plans, business continuity programs, and other guidance that is valuable in terms of deriving recovery planning policies and procedures. Emergency plans at all levels address some basics of recovery from hazardous materials incidents within the context of their responsibilities and ESF #10 – Oil and Hazardous Materials Response.

4.3 Samples of Recovery Planning

There are multiple ways of developing plans for hazardous materials incidents; however, the two primary types of plans are area hazardous materials plans (stand-alone plans) and an all-hazards basic plan with annexes. The basic plan covers such topics as authorities and references, a concept of operations, the organizational structure, and identification and analysis of hazards. The basic plan is supplemented with annexes that can consist of the operational functions of the organization (usually based on the National Incident Management System [NIMS], to address command/management, operations, planning, logistics, and finance); an annex for each hazard addressed in the hazard identification and analysis; an annex for each department in the jurisdiction; or an annex for each of the emergency support functions that are a part of the NRF. The method used to develop a plan (whether stand alone or basic) is typically determined by the local authority and based on need(s), past planning practices, compatibility with other plans, legal requirements, and subjective preferences.

There are two approaches commonly followed in developing recovery plans. The first is to develop a recovery section for the community's emergency operations plan (basic plan) that outlines recovery information applicable to all hazards. An outline of the recovery plan for the County of San Diego, California, is presented as an example of this type of overarching recovery plan. The second approach (known as hazard-specific planning) is to develop a stand-alone hazardous materials plan that includes a recovery component. The plan outline from Contra Costa County, California, provides an example of that type of planning activity.

Sample Recovery Plan

San Diego County Emergency Services Organization and County of San Diego – Recovery Plan, County of San Diego, CA, URS Corporation, April 2007 (www.llis.gov)

The following represents an outline of the topics covered in the referenced plan and is taken directly from that document. For the full contents of the Recovery Plan, see Appendix C of this report.

1. **Relationship to Response Operations**
2. **Short-term Recovery Operations**
3. **Long-term Recovery Operations**
4. **Debris Removal and Management**
   - Overview
   - Recycling
   - Debris Clearance
   - Curbside Debris Removal
   - Private Property Debris Removal
   - Demolition
   - Direct Federal Assistance
5. **Economic Recovery**

Sample Hazardous Materials Plan

Contra Costa County Hazardous Materials Area Plan, County of Contra Costa, CA, William Walker, MD, Health Services Director; Randall L. Sawyer, Hazardous Materials Division Director; and Michael P. Wedl, Hazardous Materials Specialist, December 2005

The following represents an outline of the topics covered in the referenced plan and is taken directly from that document. For the full contents of the Recovery Plan, see Appendix C of this report.

SHELTER-IN-PLACE & EVACUATION PLANS

The following procedures have been developed to safeguard the public affected by a hazardous materials incident:

1. Determine the properties of the hazardous materials involved, including toxicity, physical, chemical, fire, explosion, quantity, concentration, vapor pressure, density, and potential health effects . . .

CLEAN-UP

1. Overall operations for returning the incident scene to a normal condition are the responsibility of the IC. It is the policy of Contra Costa County that the IC identify and encourage the responsible party to take prompt remedial action . . .

EMERGENCY FUNDING ACCESS

1. Local funds may be accessed through CCHS-HazMat on incidents when an imminent threat to human health or the environment exists and no responsible parties have been identified or will not assume financial responsibility for cleanup costs . . .

When developing recovery plans, consideration might be given to the creation of a Recovery Office charged with the responsibility of overseeing all recovery operations. The case study in this section highlights the lessons learned from a tabletop exercise on disaster recovery involving Rebuild Iowa, the Recovery Office within the State of Iowa.

This exercise was based on scenarios covering the progression of a flood disaster well into long-term recovery. The scenario begins on April 8, 2022, with 2 weeks of rain and flooding throughout central Iowa. Twenty-five counties are named in a Presidential Declaration of Major Disaster. The second scenario occurs 3 days later, with 67 counties now named in the disaster. In addition, the flooding has impacted two urban centers and destroyed many acres of cropland. Fifty people have also been killed and/or injured, and another 60,000 have been displaced from their homes. A special meeting has been called by the Governor to (1) discuss the status of the storms and on-going response efforts and (2) assess the state's capacity to address long-term recovery.

Though the recommendations are aimed at a state agency, the concept and idea of a Recovery Office may also be appropriate for other levels of government.

Case Study

Iowa Disaster Recovery Tabletop Exercise After Action Report/Improvement Plan, Rebuild Iowa & Iowa Homeland Security & Emergency Management Division, August 2010 (www.llis.gov)

The information presented in this case study is taken directly from the referenced document.

1. The State of Iowa lacks a formal, permanent system designed to coordinate long-term recovery following a major disaster.

Recommendation: The State of Iowa needs to formulate and adopt a scalable, flexible state disaster recovery framework.

2. Immediately following a major disaster, there needs to be a group charged with the responsibility to set recovery goals and oversee progress toward meeting those goals.

Case Study (Continued).
Iowa Disaster Recovery Tabletop Exercise After Action Report/Improvement Plan, Rebuild Iowa & Iowa Homeland Security & Emergency Management Division, August 2010 (www.llis.gov)

Recommendation: A State Recovery Council comprised of state and local leaders should be established to collect, analyze, and share damage assessment data, seek input from those impacted by disaster, set recovery goals and expectations, and monitor and report recovery progress.

3. While Iowa is well-versed in disaster response planning and preparedness, Iowa needs to improve long-term recovery preparedness and planning.

Recommendation: A State Recovery Coordinator position needs to be created to lead recovery planning and preparedness efforts and serve as the Recovery Coordinating Officer during major disaster events.

Recommendation: The State of Iowa needs to create a system to collect and share comprehensive, standardized damage assessment data to be used to inform decisions and track recovery progress.

4. A lack of coordinated communication and messaging causes time delays, confusion, frustration, and overall inefficiencies in recovery efforts.

Recommendation: A centralized communication team must gather and disburse information about damage assessments, funding, programs, and progress to ensure a highly coordinated message at the local, state, and federal level, and to minimize delay times and maximize efficiencies.

5. The State of Iowa does not have a disaster emergency fund with resources readily available for allocation to disaster recovery programs.

Recommendation: The State of Iowa should finance an emergency disaster fund so that resources are available to fund long-term disaster recovery programs.

To implement these recommendations it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation

- To create a new agency or department would, most likely, require some form of legislative action. In today's climate of cutting and shrinking budgets, legislation creating a new department/office would most likely fail.

Possible Resolution to the Implementation Barriers

1. A short-term option would be to create a recovery division with the emergency management agency and re-direct staff to perform the functions of establishing the division. Once funding becomes available, the jurisdiction and the agency could decide if the recovery office would remain with the emergency management agency or be moved to a new department/agency.

The planning guidance presented in this section highlights a best practice from the United Nations Environment Programme that addresses response planning in relation to hazardous materials. The 10 steps presented are equally applicable to the recovery planning process. The steps presented also compare favorably to the planning concepts included in the NDRF.

Planning Guidance
TransAPELL Guidance for Dangerous Goods Transport Emergency Planning in a Local Community, United Nations Environment Programme, 2000 (http://www.unep.fr/shared/publications/pdf/2679-TransApellEN.PDF)

The information presented in this case study is taken directly from the referenced document.
Ten steps are defined as general best practices.

1. Identify the emergency response participants and establish their roles, resources, and concerns.
2. Evaluate the risks and hazards that may result in emergency situations in the community.

(continued on next page)

Planning Guidance (Continued).
TransAPELL Guidance for Dangerous Goods Transport Emergency Planning in a Local Community, United Nations Environment Programme, 2000 (http://www.unep.fr/shared/publications/pdf/2679-TransApellEN.PDF)

3. Have participants review their own emergency plan for adequacy relative to a coordinated response.
4. Identify the required response tasks not covered by existing plans.
5. Match these tasks to the resources available from the identified participants.
6. Make the changes necessary to improve existing plans, integrate them into an overall community plan, and gain agreement.
7. Commit the integrated community plan to writing and obtain approval from local government.
8. Educate participating groups about the integrated plan and ensure that all emergency responders are trained.
9. Establish procedures for periodic testing, review, and updating of the plan.
10. Educate the general community about the integrated plan.

To implement these guidelines it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation
1. These are guidelines outlining the process for developing plans. There are really no barriers to their implementation. However, the barrier to planning in general would be funding to pay for the plan development.
2. Resistance from already over-burdened staff.
3. Lack of public participation.

Possible Resolution to Implementation Barriers
1. Some grant funding is available to LEPCs for planning through the HMEP grant program and various other federal grant programs (see Appendix E for more detailed information on this issue).
2. Mandates to develop the plans from the local governing body can help overcome resistance.
3. Implementing town hall meetings, websites, and/or disaster fairs can increase public participation in the planning process.

4.4 Recovery Planning Activities

The NDRF defines disaster recovery roles for federal, state, local, and tribal governments, non-profits, the private sector, and individual citizens in an effort to outline and supplement an effective coordinating structure for disaster recovery programs; identify shortfalls, gaps, and duplication in recovery programs and funding; and create measurable performance standards for federal support of state and local recovery efforts.

4.4.1 Pre-Incident Recovery Planning

The NDRF identifies the following key elements in pre-incident planning for recovery:[72]

- Establish clear leadership, coordination, and decision-making structures at the state, local, and tribal levels;
- Develop pre-disaster partnerships to ensure engagement of all potential resources through the following methods:
  - Identify and engage stakeholders, including the general public, community leaders, and the private sector;
  - Organize connections to, and interface with, federal, state, local, and tribal governments;
  - Ensure participation of populations that have historically been underserved during the recovery process, including individuals with disabilities and others with access and functional needs, children, and those who are elderly;

- Test and evaluate pre-disaster plans through seminars, workshops, and exercises;
- Build partnerships between neighborhoods and local government agencies that form the basis for pre- and post-multihazard assessments and support for mitigation actions;
- Integrate pre-disaster recovery planning (e.g., response, land use, and hazard mitigation planning) with other appropriate community planning (e.g., comprehensive accessibility design and capital improvement planning);
- Identify limitations in community recovery capacity and the means to address those limitations;
- Incorporate sustainable development, including environmental, historic preservation, and financial elements, into recovery planning guidelines;
- Develop an accessible public information campaign that addresses the concerns of the public and an array of possible scenarios;
- Prepare pre-disaster Memoranda of Understanding as a way to establish early partnership, planning initiatives and expectations with stakeholders, community faith-based organizations, nonprofit groups, and private-sector entities;
- Develop and implement recovery training and education as a tool for building recovery capacity and making it available to all other stakeholders; and
- Identify resource requirements and conduct acquisition planning.

The NDRF establishes state or tribal Disaster Recovery Coordinators and Local Disaster Recovery Managers (SDRCs, TDRCs, and LDRMs), with the primary role of organizing, coordinating, and advancing the recovery process. The Federal Disaster Recovery Coordinator is the primary interface with the SDRC, TDRC, and LDRM during large-scale disasters or catastrophic incidents when a federal role may be required.[73]

Pre-incident planning activities include the following:

- Identifying the LDRM and establishing roles and responsibilities for recovery staff;
- Establishing general priorities to restore vital services to the community; and
- Laying the groundwork for assistance and programs that will be implemented after an incident.

Pre-incident recovery planning is not necessarily incident specific, nor does it need to be a stand-alone effort. Once the LDRM has been appointed, a planning team can be established. Suggested members of the planning team include the following:

- Elected officials;
- Emergency planners;
- Community planning department;
- Legal counsel;
- Public works;
- Members of the medical community;
- Local businesses;
- Non-governmental organizations;
- Community-based organizations;
- Faith-based organizations;
- Members of the general public;
- Individuals with economic development expertise; and
- Technical specialists to address specific issues.

Lessons from various communities caution against actions that may lead to short-term decisions that adversely impact a community's ability to attain long-term post-incident goals.[74] Due to public pressure to return a community to its pre-event condition as quickly as possible, public policy and decision makers may succumb to expedient, short-term recovery fixes that may not be in keeping with the community's vision and may even preclude opportunities to rebuild

a safer and better community for the future. According to FEMA, successfully avoiding such undesirable outcomes requires "identifying in advance those decisions that will need to be made after a disaster that are most likely to have long-term repercussions . . . "[75]

Some short-term decisions that affect long-term goals include, but are not limited to, the following:[76]

- The location of temporary housing, which often becomes more permanent than was originally intended;
- The siting of temporary business locations, which begin with the aim of allowing local businesses to continue to operate, but may become de facto long-term relocations;
- The selection of sites for dumping disaster debris;
- Road closures and re-openings;
- Bridge closures and re-openings;
- Restoration of critical infrastructure that might otherwise have been suitable for relocation; and
- Permitting the reoccupation of homes that have suffered substantial damage.

Although this report is specific to recovery from a hazardous materials transportation accident, basic pre-incident and post-incident planning principles are universal, regardless of incident cause, and can, therefore, be applied as circumstances require. Integrating recovery into a community's plan facilitates fulfillment of future planning endeavors and can aid in strengthening public unity and support within a community.

4.4.2 Post-Incident Recovery Planning

Post-incident planning activities are based on the full direct and indirect impacts of the incident. This planning typically addresses the following four issues:

- Long-term medical care for victims and responders;
- Decontamination plans for infrastructure;
- Environmental restoration plans; and
- Long-term community recovery plans.

To determine recovery needs, a full assessment of the impacts of the incident should be developed. The assessment should include direct costs (actual documented costs to the community for response, physical damage, etc.), as well as indirect costs (estimated loss of revenue, loss of business opportunities, etc.). The development of this assessment begins at the start of the incident through the collection of data from the emergency operations center and the local business community. While the assessment is being completed, a recovery planning team should be established for this planning effort. Ideally, the same people who were involved in the pre-incident planning should be included in the post-incident planning. Realistically, this may not always be possible, but representatives from the same disciplines, agencies, and organizations should be involved. Suggested members of the planning team therefore include the following:

- Elected officials;
- Emergency planners;
- Community planning department;
- Legal counsel;
- Public works;
- Members of the medical community;
- Local businesses;
- Non-governmental organizations;
- Community-based organizations;

- Faith-based organizations;
- Members of the general public;
- Individuals with economic development expertise; and
- Technical specialists to address specific issues.

After reviewing numerous state and local plans, the Government Accountability Office has identified three key characteristics of successful state and local government recovery plans developed in the post-incident period, including the following:

- Identifying clear recovery goals;
- Detailing information to facilitate recovery implementation; and
- Establishing plans in a timely manner.[77]

The overall purpose of the recovery plan is to provide clear, specific, and timely guidance to achieve not only a quick return to pre-incident conditions, but to strengthen communities by fostering sustainable recovery. Ideas and goals for a community's future vision may already be established in a community's comprehensive/general plan, annual reports, urban planning guidance, or may be available through community association meeting minutes.

During this time, specific approaches are developed to achieve the following:

- Address the short-term medical needs of victims and responders;
- Implement long-term medical care programs;
- Initiate short- and long-term housing programs;
- Implement decontamination operations of the infrastructure;
- Implement operations to clean up the environment; and
- Look at the long-term issues of rebuilding and revitalizing the community.

Post-incident recovery planning builds on the groundwork laid during pre-incident planning to fully identify the priorities and approaches to recovery based on the actual impacts from the incident.

The NDRF notes the following elements as key in the post-disaster planning process:[78]

- Organizing recovery priorities and tasks through the use of a planning process to
  - Evaluate the conditions and needs after a disaster;
  - Assess risk;
  - Set goals and objectives;
  - Identify opportunities to build-in future resilience through mitigation; and
  - Identify specific projects in areas of critical importance to the community's overall recovery;
- Using a community-driven and locally managed process, designed to promote local decision-making and ownership of the recovery planning and implementation effort;
- Working collaboratively with all groups of people affected by the disaster to promote inclusive and accessible outreach to their communities and address issues relevant to them;
- Ensuring inclusion and encouraging participation of individuals and communities that may require alternative and/or additional outreach support (e.g., racial/ethnic communities, individuals with limited English proficiency, and people with disabilities);
- Incorporating considerations that include the concept of "growing smarter" as long-term recovery progresses, including compliance with standards for sustainable and accessible design, alteration, and construction;
- Integrating multihazard considerations into mitigation and preparedness activities;
- Building partnerships among local agencies, jurisdictions, and state, tribal, and federal governments;
- Providing well-defined activities and outcomes – including schedules and milestones;

(SOURCE: Personal photographs; Photo credit: Audra G. Kunf, CEM)

Figure 4-1. Community meeting Hallam, Nebraska.

- Developing tools and metrics for evaluating progress against set goals, objectives, and milestones; and
- Identifying resource requirements and conducting acquisition planning.

FEMA has found that a good way of encouraging community involvement in the post-incident recovery planning process is through a series of structured "town hall" meetings (see Figure 4-1). These typically are brainstorming sessions wherein the public is free to provide ideas and have them considered by all.

This approach is easier to implement and manage with small, urban or rural communities. However, it is fairly easy to adapt for large, diverse communities. A reasonable approach is to break the community into readily identifiable districts (e.g., city council districts) and hold multiple meetings. The planning team can then consolidate the information collected.

It will be during these meetings that elected officials present their vision for the recovery efforts and establish their priorities. The community can then provide feedback. This same process can also be used to address specific initiatives aimed at sustaining the recovery potentially beyond the point of simply restoring pre-incident conditions. Additionally, the community's legal counsel needs to be involved to address liability issues and the legal issues related to the ability of the community to implement the projects and programs identified.

4.4.3 Additional Planning Resources

Another resource available to local community planning efforts is the National Planning Scenarios. There are 15 all-hazards scenarios available for use in local community planning activities. The scenarios are tools representing disasters ranging from potential terrorist attacks to natural disasters and their related impacts.

The National Incident Management System (NIMS) is also a valuable reference source for preparedness. As stated in a NIMS document

> Preparedness is a foundational step in emergency management and incident response; therefore, the concepts and principles that form the basis for preparedness are an integration of the concepts and principles of all NIMS components.

A significant component of this approach is for local communities, other government agencies, and the private sector to evaluate their capabilities to prepare for, mitigate against, respond to, and recover from all incidents no matter what their cause. Such a capability analysis will identify short falls in planning and resources that will allow a focused approach to preparedness and planning for an incident.

Homeland Security Presidential Directive (HSPD) 20 also needs to be considered as a part of pre-incident planning. This policy establishes "National Essential Functions, prescribes continuity requirements for all executive departments and agencies, and provides guidance for state, local, territorial, and tribal governments, and private-sector organizations in order to ensure a comprehensive and integrated national continuity program that will enhance the credibility of our national security posture and enable a more rapid and effective response to and recovery from a national emergency."[79]

As mentioned in Section 3.3.5, resources are also available to local communities through industry organizations that can provide technical knowledge and specialized equipment to assist communities with their planning efforts, as well as with response and recovery operations. In addition to industry resources, the *DOT Resource Guide for Hazardous Materials* has useful information to assist in planning for hazardous materials transportation incidents.

4.5 Recovery Planning for Mass Care

Typically, the local community will be in the lead for mass care. The determination of whether there is an evacuation or shelter-in-place order will be made by the Unified Command. It will be similar for most decontamination operations. Should there be a shelter-in-place order from the Unified Command, it is possible that the local community will take the lead for any evacuation once the shelter-in-place order is lifted.

4.5.1 Pre-Incident Planning for Mass Care

This element of recovery planning addresses

- Evacuation potentially following shelter-in-place;
- Decontamination of people;
- Sheltering;
- Short- and long-term medical care for victims and responders; and
- Interim housing.

While past hazardous materials transportation incidents have not required as great a focus on all of these issues as some other types of disasters, each incident is unique, and so all aspects of the recovery process are fully addressed in this report.

Evacuation, Decontamination and Sheltering. The decision whether or not to evacuate is not solely dependent on the need for decontamination. It is possible that decontamination will not be required, but individuals will need to be evacuated because of exposure to airborne contaminants or damage to their homes or utilities such that minimum health and safety conditions cannot be met. In this case, a rapid safety assessment process should be implemented before the decision is made. The safety assessment is simply a review of the infrastructure within the impacted area to determine if the roads and utilities are safe enough to continue operation and if the buildings are safe for continued occupancy.

Establishing and implementing decontamination operations include options for establishing decontamination operations at a local hospital or outside the hot zone (contaminated area) and should include cooperative tracking of hospital and emergency medical service staff. Actual

(SOURCE: http://www.fema.gov/photolibrary/; Photo credit: FEMA/Patsy Lynch: FEMA News Photo)

Figure 4-2. Flood shelter in Fargo, North Dakota.

decontamination criteria will be established following the incident when the specifics of the hazardous materials are known and the techniques for effective decontamination can be identified and implemented.

During pre-incident planning, consideration can be given to the requirements for decontaminating individuals in the field outside the hot zone, including the physical size of the decontamination area, identifying transportation resources for moving individuals, determinations of whether individuals will be transported out of the hot zone with community resources or be allowed to drive their personal vehicles, and determining whether or not personal vehicles will need to be decontaminated. The option of establishing decontamination operations at local hospitals will require many of the same pre-incident planning options as for decontaminating in the field outside the hot zone.

Shelter operations (see Figure 4-2) historically have been conducted by non-governmental organizations working closely with the local community. Additional support can be provided by the state and if necessary from the federal government through ESF #6 – Mass Care, Emergency Assistance, Housing, and Human Services.

Local officials and non-governmental organizations should anticipate shelter requirements based on the[80]

- Nature and magnitude of the incident;
- Complexity of individual and household needs;
- Number of displaced persons;
- Community characteristics; and
- Available shelter options.

Additionally, these factors drive logistical requirements for commodities and support services. While urban areas typically have a greater number of facilities that can serve as shelters, they may also face the need to shelter very large numbers of people. Rural areas tend to have fewer structures that are appropriate as shelters and rely more on the social network of friends, family and community groups, with shelters typically established at local schools, religious facilities or National Guard Armories.

Sheltering can appear to be as simple as locating a suitable facility and opening the doors to disaster victims. However, the process becomes increasingly difficult when the full range of

individual and household needs must be met. Consideration must be given to individuals with special needs (seniors, those who are infirm, children); people with disabilities and the equipment they require; service animals; household pets; and need for triage to determine if medical care is required. Additionally, the buildings selected should have some form of cooking facilities and must be ADA compliant. Consideration needs to be given to specialized shelters that may be required. These include:

- **Medical Support Shelters** – Shelters for individuals who have medical issues requiring care beyond the capability of a general population shelter. These shelters provide a variety of medical services, ranging from extensive first aid, to medical assessment and monitoring, to primary care services.
- **Functional Needs Shelters or Units** – Serve individuals with functional needs who require additional support. These are individuals who are normally able to live independently, but may face a challenge in a general population shelter.
- **Household Pet Shelters** – Specialized shelters to meet the needs of people with household pets. These shelters require extensive planning and specialized equipment and staff, such as kennels for boarding and transporting, veterinarians and veterinarian technicians, fans for air circulation, feeding supplies, and supplies for parasite control. Additional considerations include sanitation and exercise requirements for the animals.

When looking at evacuation and sheltering operations for hazardous materials transportation incidents, the process and procedures are similar to those for other types of incidents, emergencies, or disasters. Planning for shelter operations ensures that the specific issues associated with hazardous materials transportation incidents are also addressed.

As evacuation plans are reviewed or developed, consideration should be given to addressing how and when individuals and local businesses will be allowed to re-enter the impacted area after they and/or the area have been decontaminated. Many of the issues addressed in the evacuation will also need to be addressed in the re-entry plan. Issues to be addressed include, but are not limited to (1) transportation needs for individuals without cars; (2) how individuals will be able to retrieve their vehicles if they were left to be decontaminated; and (3) what transportation will be needed to return individuals to hospitals and nursing homes. Re-entry plans should also include a security component to ensure only individuals with a legitimate need are allowed into the area (e.g., residents, business owners, employees, etc.)

Medical Needs. Short-term medical care will encompass

- **Establishment of Casualty Collection Points** – In cases where decontamination of the victims will not be necessary, a casualty collection point can be established somewhere in the cold zone (area that is free of contamination) where medical triage of individuals can take place. Those requiring additional medical treatment can be transported to the appropriate medical facility from this location.
- **Triage and Establishment of Reception Centers** – Activities include medical triage and registration of victims. Pre-incident planning activities can include establishing layouts for the set-up of decontamination areas; space layouts and processes for the registration of victims; identifying the information needed and developing appropriate forms and signs for the collection of the information; having signs and forms translated into the predominant languages spoken within the community; and pre-identifying potential staffing requirements and resources.
- **Establishment of Decontamination Operations** – Activities include options for establishing decontamination operations at a local hospital or outside the hot zone (contaminated area). If operations are at a local hospital, activities include providing transportation for victims to minimize the spread of contamination and may include cooperative tracking of hospital and emergency medical service staff.

Typically, these three activities are initiated outdoors. When establishing these locations, inclement weather and the comfort of the victims, as well as staff, should be considered and addressed. Beyond the obvious necessity for adequate sanitation, protection from the elements and hydration should also be provided.

The following case study highlights best practices in the use of staging areas for local dispensing sites providing prophylaxis using the Strategic National Stockpile (SNS). This best practice is a compilation of several documents relating to the SNS and provides recommendations on the use of segmented dispensing sites aimed at better controlling the flow of patients and vehicles. The concept involves splitting dispensing site functions into multiple and distinct physical locations.

Case Study

Strategic National Stockpile Distribution Planning: Using Staging Sites to Segment Dispensing Processes, Lessons Learned Information Sharing (www.llis.gov)

The information presented in this case study is taken directly from the referenced document.

Local dispensing sites may encounter a surge of a large number of individuals and vehicles during a mass prophylaxis event. Local SNS planners may wish to consider segmenting dispensing sites to help cope with these surges and better manage the flow of patients.

Staging Site Advantages and Disadvantages

Segmented sites offer several advantages. These include:

- Reduced traffic congestion at non-segmented dispensing sites;
- Eliminating parking concerns at dispensing sites;
- Ensuring that patients can reach the dispensing sites;
- Improving security and controlling unruly patients by regulating patient flow to dispensing sites;
- Controlling the number of patients arriving at the dispensing sites; and
- Educating the public about the incident and dispensing operations while on the bus.

Segmented sites can also pose several distinct challenges, including:

- Arranging for transportation between the staging site and the dispensing site(s);
- Pre-planning, securing, and rehearsing travel routes between sites;
- Increased number of security personnel to cover both the staging site and the dispensing sites;
- Possible increase in number of staff required to operate staging sites;
- Forcing people to start at the staging site—and not travel directly to the dispensing facilities; and
- Increased coordination challenges given the increased number of facilities.

Staging Site Functions

Staging sites can be employed in a variety of manners to relieve congestion at dispensing sites. For example, a staging site can be used for staff to initially screen patients, triage them, and provide initial information. The staff at a separate physical facility could dispense pharmaceuticals to the non-symptomatic patients who are transported to the dispensing facility after completing screening and triage. Symptomatic patients are transported to a hospital or other treatment facility.

A staging site can serve one or more dispensing sites. If a staging site serves no other purpose than to initially greet patients, provide some information, and control the flow of patients to the dispensing site, the staging site is often referred to as a "queuing site."

- Centers for Disease Control and Prevention officials stated that the New Hampshire Department of Health and Human Services has successfully modeled the use of queuing sites for SNS distribution on computer software. This is an option available to assist planners.
- Los Angeles County has a checklist for deciding on specific dispensing and vaccination sites. The document focuses on issues of accessibility, physical characteristics, and functionality of specific sites.
- During the DC Postal Anthrax Incident in 2001, postal workers were taken by bus to DC General Hospital from their worksite at the start/end of their shifts. This practice minimized parking and traffic difficulties.

Staging Facility Requirements
Using staging sites to manage patient loads at operating dispensing sites requires that planners pre-select a sufficiently large gathering point with adequate access for ground transportation to and from dispensing sites. One example of a good staging site is a local shopping mall. At minimum, potential staging sites should have the following characteristics:

- Accessible by public transportation;
- Able to hold a large number of people, dependent on the population and number of dispensing sites of the jurisdiction;
- Ample parking for people arriving at the site in their own vehicles; and
- Basic facilities, including potable water, toilets, and seating.

Public Information Requirements
Rather than directing individuals to allocated dispensing sites, officials will need to ensure the public is directed to the staging sites and, from there, transported to a dispensing site. Individuals should also be told of the best modes of transport to get to the staging site and directions for its location.

Transportation Requirements
SNS planners will be required to organize transport between the staging and dispensing sites. In order to arrange for the use of staging sites, local planners will need sufficient resources to arrange for extra support, including personnel, drivers, and vehicles. Local bus companies or school buses could be used as a potential resource because they have the required personnel, drivers, and vehicles.

Triage at Staging Sites
In the event of a communicable disease, it may be decided that staging sites should not be used because of the possibility of cross-contamination while patients are on the bus. Local planners could consider setting up triage operations at the staging sites. This would immediately identify any symptomatic patients, reduce the burden of operations at the dispensing sites, and speed up the patient flow once patients arrive at the dispensing sites.

To implement this best practice it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation:

1. The establishment of staging areas requires the identification and use of multiple facilities in the community. Suitable resources may not be available.
2. Funding for the planning operation will be an issue and is an extension of the barrier to planning.
3. Private hospital may be resistant to cooperative planning and training.

Possible Resolution to Implementation Barriers:

1. Develop public-private partnerships with industrial complexes where multi-purpose rooms would be available to serve as staging areas (this concept could also include schools, colleges/universities, community centers, etc.);
2. Use of grant funding available to LEPCs for planning through the HMEP grant program and various other federal grant programs (see Appendix E for more detailed information on this issue); and
3. Develop mutual aid agreements between the community and the private hospitals.

Long-term medical care for victims and responders should be included in post-incident recovery planning when the medical community has been able to determine if long-term care will be required and what it will entail. Pre-incident planning activities may focus primarily on identifying available resources within the community to provide any required long-term care, establishing reciprocal care agreements and procedures with other medical facilities to absorb long-term patients, and researching grant/funding opportunities. A more detailed discussion is included in Section 4.5.1.

(SOURCE: http://www.fema.gov/about/photolibrary/; Photo credit: FEMA/Mark Wolfe: FEMA News Photo)

Figure 4-3. Interim housing in Pascagoula, Mississippi.

Interim Housing. There is no legal mandate for government (either local or state) to provide emergency/interim housing for displaced residents (see Figure 4-3). However, precedent to do so has been established through numerous emergencies and disasters. Addressing the issue of providing interim housing in plans and post-event actions has therefore become common practice.

Without pre-established plans and agreements, clear expectations and a prescribed timeline for the duration of this support, motivation to find more permanent living accommodations or expend the effort to return to the impacted area can be lacking. Further, although the costs of interim housing may be reimbursable under provisions of a federally declared disaster, many hazardous materials transportation emergencies may not qualify. Key principles related to the provision of interim housing include:[81]

- **Effective interim housing starts with setting clear expectations** – To prepare communities for disasters, local and state officials should address interim housing as part of their public information campaigns. Messages can be developed in advance describing how the public can obtain housing assistance, what to expect, and what actions they can take ahead of time. As challenges arise, all involved must strive to raise issues quickly, be flexible, and work collaboratively to resolve them.
- **Interim housing extends well beyond simply providing a structure** – Interim housing is much more than just the process and mechanics required for providing physical structures. It must also include restoration of private-sector infrastructure, such as grocery stores, banks, gas stations, and healthcare facilities, along with the other social support services that can make temporary circumstances work for people who are struggling to recover from a disaster and rebuild their lives.
- **Interim housing must be safe, secure, and accessible** – The most fundamental requirement for interim disaster housing is to provide a safe and secure environment where victims can live while they recover from the event and seek permanent housing. Local public safety officials are responsible for providing support services for victims living in interim housing units within their jurisdictions. When community sites are built to house victims, local police, fire, and emergency medical services may have to assume additional workload. This must be factored into temporary housing plans.
- **Interim housing is temporary** – The intent is to provide temporary housing for those displaced by the incident while permanent housing is arranged. In creating temporary housing

plans, officials must balance the intensive effort to supply temporary housing with the need to immediately start developing plans for restoring permanent housing.

Pre-incident planning for interim housing typically involves input from the community's housing authority. Primary pre-incident planning activities are intended to ensure that the local housing authority always has a current list of available properties for short- or long-term occupancy. At this point in the planning process, working with local real estate companies, property management companies, and hotel associations can establish partnerships that will be helpful if a large number of properties are required for interim housing.

Other activities can include establishing a tracking process for those who need to evacuate. This tracking system should follow the evacuee from evacuation to the point when they can return to their home or new permanent housing and include current contact information. Tracking becomes very important when evacuees leave the area for interim housing. Consideration also needs to be given to ensuring that sheltering facilities are available for domestic pets and livestock on a short- and long-term basis.

4.5.2 Post-Incident Planning for Mass Care

The development of this section of the plan can begin during the emergency response and short-term phase of recovery. Once the medical community knows the impact of the incident on the medical and mental health of the victims and responders, determinations can be made on the necessity and types of long-term care that will be required. This element of the plan addresses how the community will secure the resources necessary to meet the identified long-term care needs. If the community lacks resources, the plan also identifies where these can be obtained. Some examples include:

- **Public-Private Partnerships** – In this case, the community works with medical providers within the community or in neighboring communities to secure the medical resources necessary to provide the care needed.
- **Mutual Aid Agreements with Surrounding Communities** – If one or more of the surrounding communities have the available resources to provide the necessary long-term care, a community may enter into mutual aid agreements that will allow the community's victims to take advantage of the services provided.
- **Grant Applications** – Financing the expense of long-term care needs will always be a challenge. These expenses can be minimized or eliminated through grant funding to provide for the long-term care needs of victims and responders. Local governments and communities can work with the medical community to apply for and secure the necessary grant funding.

The January 2005, Graniteville, SC, train accident is reported to be the second largest chlorine spill to date in the United States (see Figure 4-4).

In researching the long-term health needs of victims in the wake of this incident, Dr. Erik Svendsen found the following:[82]

- More than 850 people sought medical care following the train accident.
- Nine people died and the area was evacuated of thousands of others. An area health registry has 958 enrollees with 259 screenings done in 2005 and an additional 81 in 2007.
- The registry identified 256 more injured people bringing the total number of victims to 1,384.
- Fifty-five percent of the people seen during the first round of screenings were recommended for additional follow-up medical care for at least one condition.
- Over half of the people screened during the first round tested positive for some type of decreased lung function.

(SOURCE: http://www.hazmatteam.com/; Photo credit: Aiken County Hazardous Materials Team)

Figure 4-4. Train derailment in Graniteville, South Carolina.

- Just over 26 percent of those screened during the first round had some form of inflammation in their airways.
- Nearly a third of those checked in the first round showed evidence of possible conditions such as asthma.
- Three people who claimed to be non-smokers had airway blockages that could have been caused by emphysema.
- Just over 26 percent of those screened in the first round had a significant loss of lung function but did not know it.
- Nearly 41 percent of the people screened showed evidence of post-traumatic stress disorder, an emotional disorder that can linger for years.
- An additional eight people have died from various causes since the event: four from cardiovascular disease, two from emphysema, one from pneumonia, and one suicide. Chlorine injury is not listed as a contributor in any of these deaths.

Svendsen further notes that the South Carolina Department of Health and Environmental Control (DHEC) continues to monitor the aftereffects of the accident through the Graniteville Recovery and Chlorine Epidemiology project, or GRACE.

4.6 Recovery Planning for Infrastructure

The responsibilities for infrastructure will be shared between the Unified Command and the local community. The lead for any decontamination that is required will be the Unified Command. Unified Command will complete the final decontamination plan. The physical repair and restoration of infrastructure will be lead by the local community.

4.6.1 Pre-Incident Planning for Infrastructure Recovery

Infrastructure relates to the built environment and includes such items as roads, bridges, utilities, buildings, rail lines, etc., and the systems that use them, such as mass transportation. Pre-incident planning activities in this area often focus on identifying the transportation resources available to the community that can be activated following an incident to help keep traffic flowing; addressing alternate routes and how that information will be communicated to the public

(covered in Section 4.3.2); beginning the outline of a decontamination plan should decontamination of the infrastructure be required by the incident; and debris management.

During pre-incident planning, consideration should be given to identifying the methods of communicating alternate routes for traffic to the impacted community (see Section 4.3.2 for discussion of the San Francisco Bay Area 511.org website). Additional methods of communication include, but are not limited to, the media (radio, television), reverse 9-1-1 systems, door-to-door notifications, internet, cell phones, and public address systems on emergency services vehicles. Also, identifying available resources for route marking and monitoring can be very helpful.

Pre-incident planning for infrastructure recovery addresses worst-case scenarios as they relate to location and subjective evaluation. For example, a caustic release in or near an industrial or manufacturing area may not have the same risk value as a chemical fire in a residential neighborhood. It is up to the community's planners to determine what scenarios relating to hazardous materials transportation incidents are the most relevant, what infrastructure would be affected, and which parts of that infrastructure are critical to the success and well being of the community. The National Planning Scenarios represent resources available to local communities to help guide this type of planning (http://publicintelligence.net/national-planning-scenarios-version-21-3-2006-final-draft/).

Projecting worst-case scenario results will help determine and prioritize critical facilities, routes, and utilities. Once these are identified, the community can enact preparedness and mitigation measures to protect and strengthen their infrastructure from potential harm. As discussed previously, preparedness and mitigation are on-going activities that can help to decrease the consequences of an incident, ease response, and speed recovery. Besides identifying and prioritizing critical facilities, other examples of pre-incident planning for infrastructure recovery include:

- Ensuring accessibility to emergency equipment and supplies by:
  - Periodically checking water lines for flow and water pressure;
  - Stockpiling and pre-positioning materials like sand, precast concrete berms, and tarps;
  - Developing and maintaining a resource list; and
  - Developing agreements or contracts to ensure that critical items such as fuel are delivered in a timely manner.
- Training staff.
- Having appropriate contracting authorities in place.

Pre-Incident Transportation Planning. Transportation is often an issue following a hazardous materials transportation incident. The community may need to increase the number of transportation resources operating within their locality to provide alternatives to commuters. Additionally, if there are a large number of casualties, ambulances and potentially busses will be needed to move victims from casualty collection points or decontamination areas to appropriate medical facilities. Because of the potential need for multiple forms of transportation, consideration must be given to establishing transportation staging areas. Transportation for individuals without personal vehicles and those with mobility issues also should be considered.

Pre-incident planning is a good time for local community transportation agencies to develop general priorities for the re-establishment of arterials, local streets and mass transportation systems. The goals for this process are to efficiently and rapidly get people and traffic moving again. The priorities are generally based on a number of factors including, but not limited to, opening routes for emergency vehicles and facilities (e.g., fire, law enforcement, hospitals, etc.), getting the business district open and functioning, and movement of the largest number of people that will achieve the goal of "getting back to normal." Having these priorities established prior to the incident and understanding the goals or the re-establishment of routes allows for more rapid

implementation during the recovery process. At that time, it will be easy to adjust priorities based on actual impacts. During this process, the local community will also need to coordinate closely with regional and state transportation agencies.

Pre-Incident Planning for Infrastructure Decontamination. If it is determined that decontamination of infrastructure will be required, a decontamination plan will need to be developed. Typically, decontamination plans are done post-incident when the hazardous materials involved are clearly known and the appropriate decontamination techniques can be identified. Section 4.5.2 presents a best practice on the development of a post-incident decontamination plan. Using applicable portions of this or a similar plan as the basis for creating an outline in advance represents another potential best practice, as many pre-incident planning elements and issues are universal. This can include the identification of personnel who will be involved in the decontamination operation, the training that will be required, and the types of personal protective equipment that will be needed. Communities can contact the EPA regional offices for technical assistance on this topic. The EPA can also provide guidance on training, equipment, and other available resources.

Pre-Incident Planning for Debris Operations. One of the most significant pre-incident planning activities is the development of a comprehensive debris management plan. Developing a debris management plan includes (1) pre-designation of debris storage and reduction sites; (2) identification of routes to and from the storage and reduction sites; (3) segregation of debris by type; (4) establishing position descriptions and responsibilities for debris monitors; (5) procedures for reducing the volume of debris; (6) determination of when government may be required to enter private property for debris removal; (7) determination of when right-of-entry agreements between the government and the property owner are required; and (8) identification of resources for recycling the debris.

To complete a full debris management plan, communities need to decide if they wish to pre-bid contracts for debris removal. This process ensures that communities will have the required resources to effectively and efficiently remove debris from the community and deliver it to the storage and reduction sites. Usually, these contracts are bid on a unit price basis with a price that is based on the cost to pick up and move debris on a dollar per cubic yard basis. Typically, the contract is for a fixed period of time, with a built-in escalation in the unit price for the subsequent years of the contract.

FEMA has been encouraging communities to develop debris management plans for some time. In 2008, the agency implemented a pilot program within the Public Assistance Program to provide incentives to communities that developed debris management plans and pre-bid debris removal contracts. To be eligible for these incentives, communities had to submit their plans to FEMA for approval and have contracts in place. The incentives were then included in the development of the community's debris project worksheets. The pilot program was in place for just over a year. During that time, a number of communities took advantage and now have FEMA-approved debris management plans with contracts in place.

Although the FEMA 325 publication, *Public Assistance Debris Management Guide,* focuses primarily on debris generated from major natural hazards, such as earthquakes, floods, and hurricanes, it does provide basic guidance for any type of debris management. However, transportation accidents involving hazardous materials present some unique problems in debris management that are only marginally addressed in the FEMA 325 publication.

The main issue is the pickup and disposal of contaminated materials. For communities located on waterways or along the coastal areas where there is a large amount of vessel traffic, consideration needs to be given to the pickup and disposal of contaminated sand and soil. This is especially true for incidents that involve the release of oil or nuclear material. In such cases,

the contaminated materials often must be picked up and placed in appropriate containers for shipment to a long-term hazardous materials storage site. The removal of contaminated sand and soil can be a very labor-intensive and expensive process for a community. Attention also needs to be devoted to safety and protection of debris removal workers. In some cases, collection materials and equipment may also become contaminated and require special handling. Planning assistance for such operations is available through the EPA regional offices and the local commands of the USCG.

For those communities located on coastlines, waterways, or within port areas, another consideration for the debris management plan will be salvage operations to address marine-related incidents. When the community is developing the debris management plan there should be close coordination with the appropriate USCG Captain of the Port and the U.S. Army Corps of Engineers (USACE) to determine roles and responsibilities for salvage operations. The community's debris management plan should clearly indicate who is in the lead for which parts of the debris removal operation. Typically, USCG has the authority to order immediate implementation of salvage operations in the navigable waterways and will monitor those activities. USACE has the authority to order immediate implementation of salvage operations when the vessel is impacting a facility under their control, such as a levee, and will monitor those operations.

Other considerations for a hazardous materials transportation incident include:

- **Resources –** Communities must decide who will pick up contaminated debris. If the community determines they want to use their sanitation department to accomplish this, consideration will need to be given to the training of these individuals in the handling of hazardous materials.
- **Materials –** There will likely be a significant amount of debris following a hazardous materials transportation incident. A large percentage of this debris will be the captured decontamination materials. However, other significant amounts of debris can be generated within retail stores with contaminated inventory that may be cost prohibitive to decontaminate. In addition, supplies and inventory from manufacturing concerns may be prohibitive to decontaminate and will also add to the amount of debris. Finally, foodstuffs from homes, stores and restaurants may also contribute to the magnitude of the debris problem. In most cases, these materials will need to be securely packaged for shipping to a long-term hazardous materials storage area.
- **Environment –** If the debris storage and reduction site is pre-defined, measures to protect the environment will need to be incorporated into the design of the site. These measures can include impervious moisture barriers to cover the ground; berms around debris piles; protective measures to contain any materials that spill or leak; locations and procedures for taking contaminated debris from the trucks and loading it into appropriate containers; and determining the requirements and locations of available long-term hazardous materials storage areas.

4.6.2 Post-Incident Planning for Infrastructure Recovery

Soon after the incident, responders will have identified any hazardous materials involved. Once identified, decisions can be made on the need for decontamination, how best to accomplish this task, the extent of decontamination required, and associated parameters (i.e., "how clean is clean"). The following sample plan relates specifically to an attack using a radiological dispersion device (RDD); however, the concepts presented relating to the development of a decontamination plan are applicable and may be considered a best practice in planning for any incident that requires decontamination.

Sample Plan
Radiological Incident Response: Decontamination of Buildings and Public Sites, Lessons Learned Information Sharing (www.llis.gov)

The following represents an outline of the topics covered in the referenced plan and is taken directly from that document.

For the full text of the plan, see Appendix D of this report.

Developing a Site Decontamination Plan for an Urban Area

Publicly Accepted Level of Contamination

Decontamination Plans
Emergency managers should consider the following aspects when establishing site decontamination plans specifically tailored to metropolitan areas:

- Contamination distribution
- Contamination location
- Contamination type
- Decontamination or demolition

Recovery Manager and Technical Working Groups

Responsibilities during Cleanup and Site Restoration

Public-Private Partnerships during Cleanup and Site Restoration

Decontamination Techniques

Decontamination of Food and Water

Identification of a Short-Term Storage Site for Contaminated Waste

- Site geography and structure
- Transportation
- Security and safety

Long-Term Monitoring

- Establishing, maintaining, and regularly updating a register for long-term monitoring of victims and on-site emergency response personnel
- Establishing mechanisms for long-term monitoring of soil, food, water, and livestock

To implement these concepts it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation
Lack of expertise in the community could be a barrier to developing decontamination plans.

Possible Resolution to Implementation Barriers
There are federal resources that are available to provide technical assistance in developing decontamination plans involving radioactive materials. These resources include EPA, Office of Air and Radiation, Radiation Protection Division's Center for Remediation Technology; Department of Health and Human Services, Food and Drug Administration, Center for Devices and Radiological Health; Department of the Army; and Centers for Disease Control (CDC), National Center for Environmental Health, Division of Environmental Hazards and Health Effects, Radiation Studies Branch. For other types of incidents not involving radioactive materials, decontamination assistance can be provided by EPA and their National Decontamination Team, Occupational Safety and Health Administration (OSHA), CDC, and the military.

4.7 Recovery Planning for the Environment

Most environmental restoration efforts will be under the lead of the Unified Command. However, the local community can begin the environmental restoration plan during the pre-incident planning period. In this manner, the community can ensure that all the land and water areas that are of importance are included in the restoration plan. Following the incident, the Unified Command will take the lead in the completion of the environmental restoration plan.

4.7.1 Pre-Incident Planning for Environmental Remediation

As with the decontamination plan previously discussed, an environmental recovery plan plays an important role in recovery operations by defining the magnitude of the operation, clearly presenting what needs to be cleaned and restored, and developing the standard for "how clean is clean," covering the natural resources of air, water, and soil and incorporating standards for capturing and cleaning wildlife of all kinds. Pre-incident planning activities for environmental recovery include developing good quality maps that clearly define protected and sensitive environmental areas, the wildlife living within them, soil types, flora and fauna and water condition. These maps should show areas that are federally designated as protected lands and areas that are vital to the community from a recreational, business, and economic standpoint. Another area for pre-incident planning includes the advance identification of resources and the training that will be required for cleanup operations. As an example, the plan should identify which of the community's agencies or departments will have lead authority and which will provide support.

As with other facets of recovery, the activities of environmental remediation need to be prioritized so the proper resources are provided to the operation. This part of the recovery will involve the FOSC, state and local government agencies, non-governmental organizations, business-related organizations, and the general public, which can also be identified as groups that can provide labor and other vital resources.

4.7.2 Post-Incident Planning for Environmental Remediation

Shortly after the response to the incident begins and the hazardous materials have been identified, planning begins on how to restore the environment. The development of environmental remediation plans includes involvement of federal, state, and local community representatives, plus local business and the general public. These plans need to cover not just federally protected lands and waterways, but all lands and waterways in the community impacted by the incident. One of the first steps in developing the restoration plan is to incorporate the federal standards on cleanup covering the natural resources including air, soil, and water, as well as wildlife of all kinds. Based on these standards, information then needs to be communicated to the general public characterizing this within the context of "how clean is clean." With this criterion established, detailed restoration plans can then be developed to address all aspects of the environmental cleanup activities. The case study below presents an outline of the environmental restoration plan developed by the Exxon Valdez Oil Spill Trustee Council and may be considered a best practice in post-incident planning for environmental recovery.

On March 24, 1989, the oil tanker T/V Exxon *Valdez* ran aground in Prince William Sound, Alaska, and in the process, spilled almost 11 million gallons of crude oil being transported from the North Slope area of Alaska. This plan provides long-term guidance for restoring the resources and services damaged by the oil spill that contaminated nearly 600 miles of Alaska's coastline.

Case Study

Exxon Valdez Oil Spill Restoration Plan, Exxon Valdez Oil Spill Trustee Council, November 1994 (http://www.fakr.noaa.gov/oil/eis/1994RestorationPlan.pdf)

The information presented in this case study is taken directly from the referenced document.

Mission and Policies

Public participation is not a once-a-year government activity limited to commenting on draft documents. Rather, to the greatest extent possible, individual projects should integrate the affected and knowledgeable public in planning, design, implementation, and review. Some projects have a more easily identifiable public, for example those designed to affect services or the resources that support them. However, incorporating public preferences and information into any project is likely to improve its cost-effectiveness, take advantage of available knowledge, and help ensure that the restoration program is understood and accepted by the public.

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Case Study (Continued).
Exxon Valdez Oil Spill Restoration Plan, Exxon Valdez Oil Spill Trustee Council, November 1994 (http://www.fakr.noaa.gov/oil/eis/1994RestorationPlan.pdf)

Categories of Restoration Actions
Injury: This is a description of the effects of the oil spill.

- Mortality
- Sub-Lethal Effects
- Degradation of Habitat (alteration or contamination of flora, fauna, and the physical components of the habitat)

Goals, Objectives, and Strategies
The restoration plan is based on established goals, objectives, and strategies that will guide the restoration activities. In the plan, goals, objectives, and strategies are developed for the entire restoration process followed by goals, objectives, and strategies for each species, biota, and wilderness area impacted by the event. The following is the general outline of the goals, objectives, and strategies:

Goal: The end toward which restoration is directed
Objectives: Measurable outcomes of restoration
Strategies: Plans of action

- Biological Resources
- Recovering Resources
- Resources Not Recovering
- Recovery Unknown
- Other Resources
- Services

Then, for each species, biota, or wilderness area:

- Objectives and Strategies by Resource and Service
- Injury and Recovery
- Recovery Objective
- Restoration Strategy
- Monitor Recovery
- Appendices
- Summary of Results of Injury Assessment Studies
- Trustee Council Resolution to Proceed with the Habitat Protection Program

To implement this plan it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation
Since development of a restoration plan is required as part of response operations under the NCP and CERCLA, there are no foreseeable barriers. Technical assistance is also available from federal and state agencies to assist in the development of the plan.

4.8 Recovery Planning for the Economy

Economic recovery will be lead by the local community. Ideally, the post-incident planning team will include one or more representatives from the responsible party's organization. Funding, either partial or full, for this element of recovery may or may not be included in the negotiated settlement with EPA.

4.8.1 Pre-Incident Planning for Economic Recovery

The faster a community can restore functionality to its businesses, the faster recovery will occur, thus lessening the total financial impact on the community. The use of innovative pro-

grams to provide rapid assistance to businesses will be necessary to minimize loss of revenue, even if that level of assistance is only to provide support in finding vacant space into which businesses can move temporarily.

Additionally, it is incumbent on local business to address business continuity issues before an incident occurs. One of the biggest considerations for businesses in developing continuity plans is to ask the question *what will happen if I cannot resume business for some weeks or months following an incident? What will be the impact on my supply chain? Will I be able to receive the raw materials I need to stay in business?* Just like a community, business owners/operators need to examine their risk exposure and implement sound risk management principles, such as insurance, continuity planning, and/or strengthening of their facilities to withstand the hazards to which they are exposed. However, communities cannot force businesses to plan for disastrous situations.

To help address this issue, FEMA established a Private Sector Division in 2007 to cultivate public-private collaboration and networking in support of the different roles the private sector plays in emergency management. One resource developed by this division is the Voluntary Private Sector Preparedness and Accreditation Program (PS-Prep). Additional information on this program and other resources for business and private-sector preparedness and planning can be found at http://www.fema.gov/privatesector/preparedness/.

An important relationship to build during the pre-incident planning stages for economic recovery is between the economic development officials and community elected officials at each level of government. To develop viable programs to revitalize a community's economy requires the commitment of these officials to work together. Many of the programs developed will require the "buy in" and support of the elected officials for them to be implemented. Building these relationships during the planning stage helps ensure that economic recovery operations will be effective. One method for cementing these relationships is to ensure that elected officials and economic development officials are involved in the planning process and take part in any associated training and exercises. Further, this process will help to identify "champions" who can carry the community's needs to the various government entities that can provide the necessary support. Typically, these champions are the elected officials.

The following case study is from the City and State of New York following the 9/11 terrorist attacks on the World Trade Center (2001). It is being presented in the pre-incident planning section because this is generally considered the time to lay the groundwork in developing such programs. In this best practice, the City of New York's Economic Development Corporation (EDC), along with the State of New York's Empire State Development Corporation (ESD), used various financial organizations to implement this effort with funding from the State of New York.

Case Study

Economic Recovery from the 9/11 Disaster: Lessons From New York State's Response in Lower Manhattan, Karl Seidman, Massachusetts Institute of Technology and Beth Siegel, Mt. Auburn Associates, Applied Research in Economic Development, vol. 5, issue 2, October 2008, The complete text version of this article is available online at www.usm.edu/aredjournal

The information presented in this case study is taken directly from the referenced document.

Within days of the 9/11 attack, the Strategic Business Division of ESD was assisting 150 large companies to find available space within the city. ESD staff also established a walk-in center in midtown to assist small companies dislocated by the attack, businesses facing sudden financial crises, or both. To complement the ESD's walk-in center EDC staff also opened a walk-in center.

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Case Study (Continued).
Economic Recovery from the 9/11 Disaster: Lessons From New York State's Response in Lower Manhattan, Karl Seidman, Massachusetts Institute of Technology and Beth Siegel, Mt. Auburn Associates, Applied Research in Economic Development, vol. 5, issue 2, October 2008, The complete text version of this article is available online at www.usm.edu/aredjournal

Three inventive loan or grant programs were established early in the recovery before federal money was available. They included the following:

- A Bridge Loan Program, backed by $50 million in state and city funding, was jointly created by ESD and New York City's EDC to provide businesses with access to credit quickly. Local banks originated the concept to address expected time delays in receiving SBA loan approvals.
- To aid these retailers and provide cash quickly before the approaching holiday season, ESD established the Retail Recovery Grant (RRG) program. The program used a simple one-page application and grant formula (3 days of lost revenue up to a $10,000 maximum grant) and limited eligibility to firms with fewer than 500 employees located on or south of Houston Street on 9/11.
- New York City's EDC established a comparable grant program to assist small non-retail firms. New York City's Lower Manhattan Grant Program (LMGP) launched on November 6 with $5 million in city funds and provided grants of up to $10,000 to non-retail businesses and nonprofit organizations with 50 or fewer workers that had also applied for disaster assistance loans from the SBA (which was waived for companies directly displaced from the World Trade Center [WTC] buildings). Grant funds could be used to reopen businesses or to defray the cost of relocating from the WTC area to elsewhere in New York City.

As part of the long-term recovery strategy, ESD established two overarching goals:

1. To retain the major employers that were critical to the downtown's long-term stability, and
2. To get financial assistance into the hands of cash-strapped small businesses quickly to ensure their survival. There was genuine fear that anchor companies, particularly in the financial services industry, would leave the area.

In support of ESD's goals, funds were devoted to loss compensation to firms and businesses ($401 million) and to retention and attraction ($250 million). ESD's draft Action Plan for the longer term recovery proposed the following three additional programs:

- Business Recovery Grant Program (BRG). The BRG program was developed when it became clear that SBA disaster loans and private insurance would not sufficiently compensate many non-retail businesses for their economic losses. It was designed as an entitlement grant to compensate businesses for economic losses from physical damage to property, business interruption, or loss of customers. Grant levels were based on a specified numbers of days of lost business revenue that varied according to a firm's location in one of four zones of impact established by the New York City Office of Emergency Management.
- Business Recovery Loan Program (BRLP). The BRLP was developed to fill a financing gap for creditworthy smaller firms that did not qualify for SBA disaster loans or otherwise lacked access to credit. The program used intermediaries, both community-based financial institutions and nonprofits, to provide low-cost working capital loans of up to $250,000.
- Job Creation and Retention Program (JCRP). The JCRP provided a financial incentive for large firms to remain in, or relocate to, Lower Manhattan south of Canal Street. This program allocated funds on a per-job basis in order to retain firms at risk of relocating outside of Lower Manhattan. Decisions on whether to provide assistance and how much to offer were made on a case-by-case basis, jointly with EDC staff, based on an assessment of the economic value of the project to the city, the risk of employment loss, and the location of the facility.

To implement these approaches it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation
For those communities and states that potentially could fund such operations, they will need legal authority for providing government funds to private businesses.

Possible Resolution to Implementation Barriers
Communities and states could work with legal counsel to explore their ability to legally fund such operations. Where legal authorities do not exist, legislative action could be taken to develop the appropriate authorities.

Communities could work with their local chambers of commerce to develop a reserve fund to serve as a program similar to community business interruption insurance. In this case, businesses without business interruption would pay into the system and be able to file claims against the reserve following an incident. For businesses that carry business interruption insurance, they could possibly draw on this fund as a low-interest loan until such time as they receive their insurance settlement.

4.8.2 Post-Incident Planning for Economic Recovery

From the perspective of long-term recovery, addressing economic development includes the identification of actions that must be taken by the community to implement the program. Some issues to consider include the following:

- **Legal Authority** – Legal counsel would need to review the community charter/articles of incorporation to ensure that elected officials have the authority necessary. If the authority does not exist, what is the process for creating it?
- **Zoning** – City Planners will need to review the community's comprehensive plan/general plan to determine the requirements for increasing business and industry. Are the zoning regulations conducive to encouraging new business and industry? If not, what has to be done to change the requirements?
- **Available Property** – City Planners would need to identify appropriate areas in the community for new businesses and industries. Do such vacant areas exist? What processes are necessary to establish the appropriate areas?
- **Infrastructure** – Public Works will need to determine if the existing infrastructure (roads, bridges, utilities, etc.) within the community has the necessary capacity to carry the additional load of increased business and industry. What improvements will be necessary? What environmental requirements need to be implemented?

4.8.3 Post-Incident Planning for Sustained Community Recovery

Effective long-term community recovery planning is a process that ideally works with the public to identify their vision of the community and where they would like to be as a community in the future. Based on this vision, projects and programs are identified to include potential funding sources to sustain recovery and revitalize the community. Long-term community recovery (LTCR) plans will direct the long-term recovery operation and will incorporate the community's vision for the future with approaches to revitalize the community commensurate with the community's vision. The development of this plan begins as soon as the full impact of the incident has been determined and reported. As the NDRF indicates, this plan will be community-driven and locally managed. Useful guidance in the development of an LTCR plan is provided in FEMA's *Long-Term Community Recovery Planning Process – A Self Help Guide.*[83]

Planning Guidance
Long-Term Community Recovery Planning Process – A Self Help Guide (FEMA, 2005)

The guidance summarized here is taken from the referenced document.
Produced by FEMA, this self-help guide for communities provides a step-by-step approach to developing, implementing, and updating Long-Term Community Recovery (LTCR) Plans in an easy-to-digest format that supplements guidance with real-world case studies. The step-by-step approach detailed in this document includes the following 13 steps:

1. Assess the need for LTCR
2. Select a leader and outline the LTCR program
3. Secure outside support
4. Establish a public information campaign
5. Build consensus
6. Identify LTCR issues and opportunities
7. Articulate vision and set goals
8. Identify, evaluate, and prioritize LTCR projects
9. Develop a community recovery plan
10. Choose project champions
11. Prepare an LTCR funding strategy
12. Implement the plan
13. Update the plan

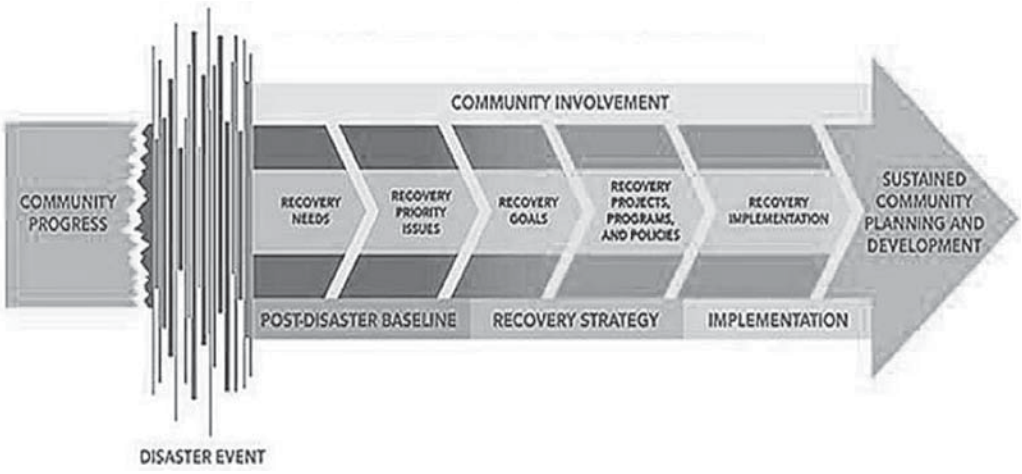
Additionally, this document provides a user-friendly LTCR Planning Process Checklist and detailed information about additional resources for information related to community recovery.

4.8.4 Hurricane Katrina – Louisiana's Long-Term Community Recovery Planning Experience

Following Hurricane Katrina (2005), FEMA activated its newly formed ESF #14 – Long-Term Community Recovery capability and deployed multiple planning teams to work in 27 heavily affected parishes (note: the National Disaster Recovery Framework has replaced ESF #14; however, some of the information from past activations of the ESF is valuable in looking at post-incident planning for revitalizing the community). These planning teams were composed of FEMA staff, other federal agency planners, FEMA Technical Assistance Contractors, and local hires. The information and plans developed by these teams were provided to the Louisiana Recovery Authority, which then developed their program and interactive website called *Louisiana Speaks* (http://www.louisianaspeaks-parishplans.org/) to document the processes followed and track the progress of the identified long-term recovery projects. The following information is a brief overview of the process that the ESF #14 planning teams followed. The full text can be viewed at http://www.louisianaspeaks-parishplans.org/PlanningProcessRecovery Strategy.cfm.

The process followed by the ESF #14 teams was very much a community-driven approach and is depicted in Figure 4-5. The LTCR planning process used a step-by-step method to identify, evaluate, and prioritize needs, define projects, and develop implementation strategies.

- **RECOVERY NEEDS:** Planning professionals, in partnership with local community leadership and citizens, assess community damage and recovery capability to determine the impact of disaster-related destruction. Defining disaster-related impacts and needs creates a community baseline.
- **RECOVERY PRIORITY ISSUES:** After identifying recovery needs, LTCR professionals work with community members to prioritize needs. Recovery needs can be complicated by other



(SOURCE: http://www.louisianaspeaks-parishplans.org/PlanningProcess_Homepage.cfm)

Figure 4-5. Community-driven approach to recovery.

issues that require consideration. Louisiana residents who participated in Open House events agreed on several of the following key issues:
  – Better hurricane protection and levees,
  – Development of new housing, and
  – Restoration of coastal areas.
- **RECOVERY GOALS:** Establishing a community vision and goals is an important step in the LTCR process and provides a structured framework, helping to guide recovery policies and the development of recovery programs and projects. Recovery vision and goals are developed through public input.
- **RECOVERY PROJECTS, PROGRAMS, AND POLICIES:** Clearly defined recovery projects, programs, and policies aid communities in leveraging external funds (from foundations, philanthropists, and other funding sources) and as a base from which to apply for government funds (e.g., Community Development Block Grants). Projects are ranked according to recovery value (high, moderate, low, or community interest). Recovery values are objective and determined by applying an evaluation methodology that includes a determination of how well each meets stated goals and its relationship to the overall recovery effort.
- **RECOVERY IMPLEMENTATION STRATEGIES AND FUNDING SOURCES:** The final stage in the process involves the development of an implementation strategy that outlines funding resources and processes to accomplish recovery projects. Using a strategic recovery timeline (SRT), communities can plan how projects will be completed and track progress.

4.9 Mitigating Risk through Planning Activities

To meet specific community needs, various planning guidance recommends the inclusion of risk management principles, such as hazard identification and analysis, vulnerability assessment, and impact analysis, as a means to identify, assess, and prioritize resources and investments. Furthermore, in developing a valuable roadmap for implementing, coordinating, documenting, and communicating recovery goals, decisions, and priorities, the involvement of stakeholders from across a broad spectrum of disciplines is recognized as fundamental. An integrated and collaborative approach toward recovery planning helps communities not only develop partnerships and mutual aid agreements[84] but also create an organizational culture aimed at achieving unity of effort within government, the community, non-governmental organizations (NGOs), and the private sector.[85]

Risk is generally defined as the product of an event's likelihood and the consequences if it were to take place. The more information that is available for the assessment, the more factors that can be employed to more accurately represent the risk. For example, vulnerability is often evaluated as part of the probability because vulnerability represents whether the event will be successful or will fully realize the potential consequences. Communities that are prepared and are working to manage hazards before they occur will have less vulnerability than those jurisdictions that are not. The results of this analysis provide the background and information necessary to arrive at fiscally sound, effective, and performance-driven solutions to reduce a community's risk exposure.

Mitigation is the process of performing actions to prevent, reduce, remove, or avoid the negative impacts of incidents. There are two types of mitigation actions: (1) structural actions, which use a technological approach such as building flood levees, or (2) non-structural actions, such as land use planning, legislation, sanctions, or insurance. At a minimum, mitigation measures must be technically feasible, cost-effective, and environmentally sound. Examples of potential mitigation measures relating to hazardous materials transportation incidents include the following:

- **Prevention:** enforcing safety provisions and regulations regarding hazardous materials transport;
- **Reduction:** regulating quantities and types of hazardous materials allowed in, or near, a single area; encouraging improvements to containment measures;
- **Removal:** prohibition of certain substances through legislation forestalling public exposure; and
- **Avoidance:** creating alternate routes for hazardous materials transport away from populated or sensitive areas.

Although mitigation opportunities may become evident during any phase of emergency management, risk mitigation associated with hazardous materials transportation accidents is usually accomplished during pre-incident planning. Examples of several relevant mitigation programs and activities are presented in the following subsections.

4.9.1 Designated Hazardous Materials Transportation Routes

Establishing a designated route for trucks carrying hazardous materials through a community is one proven way of minimizing the potential impacts of a transportation incident on that community. Generally, these routes should be located away from the population and business centers and be clearly marked. A subset of establishing a designated route includes prohibiting flammable and explosive materials in tunnels where possible. If there is no other available route through the community than through one or more tunnels, then consideration should be given to restricting the times at which carriers may use the tunnels.

The Federal Motor Carrier Safety Regulations (FMCSRs) contain specific requirements for states to follow in presenting required or preferred routes for hazardous materials. Different criteria apply to designating routes for radioactive (49 CFR 397.101 to 103) and non-radioactive (49 CFR 397.61 to 77) materials, and these include a number of factors that must be considered before specifying a routing designation. If a local jurisdiction wishes to designate hazardous materials routes, the state is still responsible for ensuring that the federal guidelines are followed and that FMCSA is notified of the resulting designations. Improperly designated routes are subject to federal preemption. Further, there is a federal preemption of routing restrictions for rail carriers (49 CFR 172.822). In addition to the FMCSR requirements, there also needs to be coordination with the state department of transportation, which is responsible for managing the national highway system within their state, to avoid preemption.

The planning team responsible for developing such routes and criteria would include the following:

1. Elected officials;
2. Emergency management agency;
3. Public works/road department;
4. Fire department;
5. State department of transportation;
6. Representatives from the trucking companies hauling the hazardous materials;
7. Representatives from the business community; and
8. Representatives from the public.

Although potentially creating additional transit time for the haulers, there is a positive impact to the community in that exposure of the population and business centers to the consequences of a transportation accident is reduced. Another positive effect of designated routes is that the community can establish alternate routes that can be placed into operation rapidly following an accident. Rapidly implementing alternate routes, and providing that information to the public, potentially reduces the economic impact of an incident. With this information, commuters can plan their routes and time of travel in advance to minimize the negative results of the altered commute and its impact on productivity in the workplace.

4.9.2 Public Information on Alternate Routes and Alternate Transportation Resources

Commute times can increase dramatically when alternate routes are required because of transportation accidents. As commute times increase, there is potential for lost productivity from the commuter workforce, which can be reflected in lost revenue to businesses. Well-advertised alternate routes and transit options allow commuters to plan their commute to reduce travel times as much as practicable. Based on past experience, the San Francisco Bay Area has implemented a system they call "511" that includes pre-recorded phone messages that can be received by telephoning 5-1-1 or by accessing an Internet website (www.511.org) that provides a wide variety of commute information such as details regarding the emergency, areas and routes affected, alternate routes and travel conditions, and other modes of transportation available.

On Sunday, April 29, 2007, a tanker truck carrying 8,600 gallons of unleaded gasoline overturned on a connector and exploded causing the collapse of two on-ramps associated with Interstate 580 and the San Francisco Bay Bridge.[86] This accident adversely impacted commute routes for some 80,000 vehicles each day. To address traffic disruption, the San Francisco Bay Area implemented plans jointly developed by multiple jurisdictions following the 1989 Loma Prieta Earthquake. In accordance with this plan, additional ferries were added to the daily schedules and Bay Area Rapid Transit (BART) added additional cars to their trains during peak hours. Within hours of the incident, announcements were available on the 511 system website, in conjunction with announcements on the 5-1-1 phone system, to provide information on the ferries, BART, and carpooling, plus a map of the area showing where the collapses occurred and the associated alternate routes. This information allowed commuters to better plan their Monday morning commute and adjust their travel times and work hours to minimize the disruption caused by the explosion and subsequent bridge collapses.

Today, 511 systems are operational in nearly every state (http://www.deploy511.org/deployment-stats.html) and provide a ready resource for use during hazardous materials transportation incidents. Generally, liability concerns limit the information provided to the presence of an incident and possibly the expected duration of the incident. Weather and construction

information are also generally provided by 511 systems. The San Francisco Bay Bridge incident has been an exception for 511 systems in providing alternate routes for motorists. An alternative for localized disruptions is Highway Advisory Radio (HAR), whereby a radio transmitter is positioned near the disruption and variable message signs are used to inform motorists to tune their radios to the station broadcasting the recorded message.

The liability concerns mentioned previously can be overcome through coordination and communication between state department of transportation personnel and local traffic engineers prior to the announcement of the alternate route. This allows the local community to take appropriate actions, such as changing the timing of traffic signals, to ensure safe driving conditions. Additionally, other liability concerns can be addressed through the use of disclaimer statements like "these alternate routes may prove to be inadequate due to unknown travel and safety conditions" or "there may be lengthy travel times when using these alternate routes".

4.9.3 Addressing Procurement Policies to Allow Expedited Repair Work

During the pre-incident planning period, a community's Public Works/Road Department can review procurement procedures to determine their ability to enter into contracts for the repair of infrastructure, especially major arteries, which are geared to expedited design and construction processes. There are several types of contracts that have been developed specifically for expedited construction, as follows:

- **Design-Build Contracts:** This type of contract places the contractor and the design engineer on the same team. As the engineer is designing the project and preparing construction drawings, the contractor is developing and refining cost estimates and developing materials lists. Permitting agencies also play an active role in this type of contract by working with the engineers during design to ensure necessary permitting issues are considered as the design progresses. Before the engineer has completed the construction documents, the contractor has activated the staging site and is bringing in necessary supplies and personnel. As soon as the construction drawings are complete (and in some cases before they are complete) the contractor begins work. Design-build contracts have been used for infrastructure work for many years and have a reasonably successful track record.
- **Incentive/Penalty Contracts:** Under this type of contract, the contractor is offered a monetary incentive for every day the project is completed ahead of schedule. There is also a monetary penalty for every day the contractor is late completing the project. An example of this type of contract was the repair work to the San Francisco Bay Bridge on-ramps damaged by the gasoline tanker truck accident discussed in the previous section. The contractor's winning bid was $876,075 to repair the damage to the connector. The bid was estimated to cover approximately one-third of the total cost of the work, but the firm counted on making up the shortfall with an incentive of $200,000 per day for every day before the scheduled completion of June 27, 2007. On Thursday, May 24, 2007, the work was completed and the ramps were opened to traffic.[87] The contractor earned a substantial bonus and the total repair cost including the bonus was below official repair estimates.
- **Sole Source Contracts:** A sole source contract allows the department to contract directly with a known contractor without going through the bidding process. This can significantly reduce the time to complete repairs. However, many jurisdictions place significant restrictions on the use of this process.

These types of procurement policies need to be reviewed with legal counsel, and if the policies do not currently exist, they would need to be developed and put into place prior to the occurrence of an incident.

4.9.4 Encourage Planning, Training, and Exercising with Pipeline Owners and Operators

Pipelines represent a unique issue for local communities because typically they are owned and operated by utility companies or private industry. As such, the community has little oversight in relation to their operations and maintenance. The recent explosions of natural gas pipelines in San Bruno, California, on September 9, 2010, and Allentown, Pennsylvania, on February 9, 2011, highlight the risk to local communities. Despite this, there are still activities and actions that can be pursued to ensure that the owner and/or operators of the pipelines and the local community are fully prepared for an incident, as follows:

- Verify that maps showing the existing pipelines are current. These maps should clearly show where emergency shutoff valves are located and how they operate. This information should be shared with the local fire department that will typically be first on scene following an incident to enable them to be able to quickly stop the flow of material, enhance their response, and reduce impacts to the community.
- Verify locations of the pipelines with existing comprehensive plans/general plans to ensure that proper zoning restrictions are in place for future development along the pipeline right of ways. If necessary, changes can be made to the plan to address situations that could impact the community following an incident.
- Local fire service and the pipeline operators should train and exercise together so each party knows the full capabilities of the other and they are used to working cooperatively.
- Ensure 24-hour contact information is available for essential personnel from the operators.
- Ensure that owner/operators are included in community training and exercises.
- Encourage owner/operators to hold training and conduct exercises on a regular schedule.

As a result of the explosion and fire in San Bruno, California, Pacific Gas & Electric (PG&E) created a pilot program with the cities of San Francisco and Fremont, with San Bruno to be added in the near future. Under this program, PG&E will provide fire departments with electronic copies of their pipeline infrastructure. This access should provide the fire departments with the information they need when responding to an incident in the vicinity of a pipeline.[88] (Note: The general concepts presented here for pipelines also apply to railroads.)

4.10 Summary of Case Studies

Table 4-1 provides a summary of the recovery planning case studies presented in order of their appearance in this section.

Table 4-1. Summary of recovery planning case studies.

Lessons Learned/Best Practices	Summary
Case Study: *Iowa Disaster Recovery Tabletop Exercise After Action Report/Improvement Plan*, Rebuild Iowa & Iowa Homeland Security & Emergency Management Division, August 2010 (www.llis.gov)	• Adopt a scalable, flexible state Disaster Recovery Framework. • A state Recovery Council should be established. • A state Recovery Coordinator position needs to be created. • Create a system to collect and share comprehensive, standardized damage assessment data. • A centralized communication team must gather and disburse information. • Finance an emergency disaster fund so that resources are available to fund long-term disaster recovery programs.

(continued on next page)

Table 4-1. (Continued).

Lessons Learned/Best Practices	Summary
Case Study: *Strategic National Stockpile Distribution Planning: Using Staging Sites to Segment Dispensing Processes*, Lessons Learned Information Sharing (www.llis.gov)	Provides information on: • Staging Site Advantages and Disadvantages • Staging Site Functions • Staging Facility Requirements • Public Information Requirements • Transportation Requirements • Triage at Staging Sites
Case Study: *Economic Recovery from the 9/11 Disaster: Lessons from New York State's Response in Lower Manhattan*, Karl Seidman, Massachusetts Institute of Technology, and Beth Siegel, Mt. Auburn Associates, *Applied Research in Economic Development,* vol. 5, issue 2, October 2008. The complete text version of this article is available online at www.usm.edu/aredjournal	Describes three inventive loan or grant programs established early in the recovery before federal money was available. • Bridge Loan Program to address expected time delays in receiving SBA loan approvals. • Retail Recovery Grant (RRG) Program to provide 3 days of lost revenue. • Lower Manhattan Grant Program (LMGP) to provide grants to non-retail businesses and nonprofit organizations. As part of the long-term recovery strategy, three additional programs were implemented. • Business Recovery Grant Program (BRG), an entitlement grant to compensate businesses for economic losses. • Business Recovery Loan Program (BRLP) to fill a financing gap for credit-worthy small firms that did not qualify for SBA disaster loans. • Job Creation and Retention Program (JCRP), a financial incentive for large firms to remain in, or relocate to, Lower Manhattan.
Case Study: *Exxon Valdez Oil Spill Restoration Plan*, Exxon Valdez Oil Spill Trustee Council, November 1994 (http://www.fakr.noaa.gov/oil/eis/1994RestorationPlan.pdf)	Presents steps in developing an environmental restoration plan including: • Mission and Policies • Categories of Restoration Actions • Goals, Objectives, and Strategies • Strategies o Biological Resources o Recovering Resources o Resources Not Recovering o Recovery Unknown o Other Resources o Services Then for each species, biota, or wilderness area: • Objectives and Strategies by Resource and Service • Injury and Recovery • Recovery Objective • Restoration Strategy • Monitor Recovery • Appendices

CHAPTER 5

Best Practices for Community Recovery Operations

5.1 Overview

Recovery from a disastrous hazardous materials transportation incident presents a number of challenges that need to be addressed in a timely fashion. The response to the incident, mitigation of the causative spill, and cleanup—including decontamination of the environment and infrastructure (if required), falls under the authority of Unified Command, which consists of the FOSC and state/local officials. Recovery from the consequences of the incident includes the following:

- Short- and long-term care for individuals, pets, and livestock;
- Repair of physical damages; and
- Revitalization of the community, as well as its economy.

These activities fall under the authority of the local community with assistance from state and federal officials and programs. However, close coordination and communication between these groups is necessary to ensure the overall recovery progress is efficient and effective.

The following findings from a recent GAO study on recovery assistance provided by FEMA apply to recovery operations in general. Although not all-inclusive, these points are proven considerations for long-term assistance planning.

Findings

Disaster Recovery—FEMA's Long-Term Assistance was Helpful to State and Local Governments but had Some Limitations (GAO-10-404), GAO, March 2010. (http://www.gao.gov/products/GAO-10-404)

The summary presented here is taken from the referenced document.

After analysis of after-action reports for the 2007 Greensburg tornado, 2008 Iowa floods, and Hurricane Ike in 2008, GAO recommended that FEMA should increase the effectiveness of the timing and level-of-recovery assistance to meet local and state-level capacity and needs. Additionally, GAO recommended that FEMA should evaluate the level of authority necessary for coordinating federal agencies with a role in the recovery process.

General discussion regarding the DHS role in recovery highlights the fact that the three broad DHS capabilities in the recovery mission area are all-hazards. Specifically, these are

1. Conduct damage and safety assessments in public and private structures;
2. Restore transportation, communication, utilities, and other essential services; and
3. Implement short-term and long-term economic and community recovery practices.

The report also sought perspectives from responders and recovery personnel to determine perspectives about the extent to which recovery differs between terrorist events and natural or accidental disasters.

The following case study further highlights the importance of communication and coordination and presents some of the lessons learned from Aiken County's recovery operations following the 2005 Graniteville, South Carolina, train derailment. This derailment was caused by a Norfolk Southern train hitting a parked train at the Avondale Mills Textile Plant. The result of the incident was the release of approximately 80 tons of chlorine gas, the evacuation of 5,500 citizens, medical assistance for 529 people, and the deaths of 9 people.

Case Study

After-Action Report Graniteville Train Wreck – January 2005, Aiken County Government (www.llis.gov)

The information presented in this case study is taken directly from the referenced document.

OBJECTIVE: RECOVERY

Perform recovery activities.

1: Develop a recovery plan outline that identifies appropriate recovery strategies.

STRENGTH

- EPA led recovery effort to re-open schools and area businesses. Coordination occurred through UCP [Unified Command Post]. A school rep was onsite for all entries.
- County finance office implemented [an] hour code to assist in tracking costs.

IMPROVEMENT ITEM

- Not all agencies attended Critical Incident Stress Debriefings (CISD). This needs to be added to recovery plan checklist.
- EOC [Emergency Operations Center] had some difficulty obtaining some resources due to weekend hours. Commercial disaster recovery resource books may be useful in the EOC, as well as emergency contacts for local suppliers.
- County Damage Assessment Official was initially left out of planning loop for re-entry.
- All support agencies (Salvation Army, Red Cross, DSS, etc.) were not kept informed of recovery status. Although daily status meetings were held at the UCP, the information was not communicated with the EOC.

LESSONS LEARNED

- Joint training between EOC personnel and CP [Command Post] responders is needed. Agencies need to understand each other's roles and capabilities.
- Hurricane responders are excellent at communicating during crises, and that may be a good benchmark.
- SCEMD [South Carolina Emergency Management Department] is developing the concept of a County EOC team (comprised of multiple county personnel) as well as an "Incident Response Support Team" to assist CP personnel with various activities (facility needs, communication needs, etc.).
- Reverse 911 may be useful for personnel recall (predesignated call groups) and training on the Reverse 911 process is needed.
- 211 being added to phone priority list should be considered. Lessons Learned from other 211s is that some local governments release non-essential personnel to support 211 calls during times of crisis.
- EOC PIO [Public Information Officer] suggests meetings with local agency PIOs to discuss lessons learned and preparedness for future incidents.

5.2 Recovery Operations for Mass Care

Mass care is the element of recovery that focuses on the needs of the victims, including domestic pets and livestock. There are five components to mass care, as follows:

1. Decontamination;
2. Evacuation;

3. Sheltering;
4. Medical care; and
5. Temporary housing.

Of these, medical care and temporary housing are the only two operations that continue through long-term recovery. As noted previously, past hazardous materials transportation incidents have not required as great a focus on all of these issues as in some other types of disasters; however, each incident is unique and the needs for each component will be determined at the time, based on the specific incident.

5.2.1 Decontamination, Evacuation, and Sheltering

Early in the recovery process, and before the end of the response phase, critical decisions will often need to be made about public safety requirements like the efficacy of evacuation vs. sheltering in place; the ability of all residents to evacuate; and addressing those individuals who are sheltering in place regardless of a determination to evacuate. Many kinds of hazardous materials may require some level of personal decontamination; if decontamination is warranted, then evacuation will likely be required. However, even if decontamination of individuals is not required, decontamination of the area may be required and evacuation may still be in order. Decontamination, evacuation, and sheltering operations will all occur within the stabilization (short-term) recovery phase of the operation.

Figure 5-1 shows the decision points in this process, including which positions have the authority to make sheltering/evacuation decisions and which positions have input into the decision-making process.

Decontamination of Individuals. The decision whether decontamination of individuals will be required and what decontamination method to use can be a difficult one. Ultimately, the Unified Command will be responsible for the decision with input from others such as the policy group, chief health/medical officer, and legal counsel. Technical assistance should be available locally from the community's hazardous materials team. If additional assistance is required, or the community does not have a hazardous materials team, assistance can often also be obtained

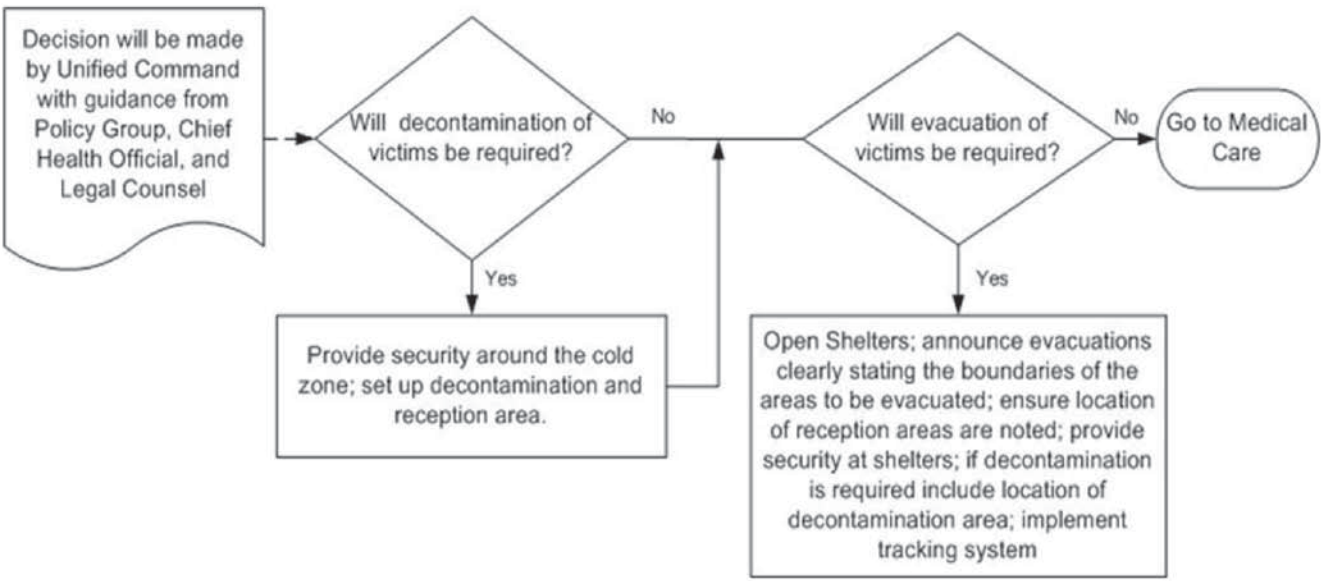


Figure 5-1. Decision points for decontamination, evacuation, and sheltering.

from sources like the state National Guard, or through a request to the FOSC. Technical assistance can also come from the EPA's National Decontamination Team, Occupational Safety Health Administration (OSHA), or the military.

During the response phase of the operation, the boundaries of the "hot zone" (the area of contamination) and the "cold zone" (area that is free of contamination) are identified. The delineation of these zones is intended to limit the spread of contamination by containing the hazardous material(s) and to assist in identifying who—and what—needs to be decontaminated (see Figure 5-2). At this point, the Public Works Department can mark the cold zone with barricades or some other method that clearly identifies the boundaries of the safe and contaminated areas. To ensure that individuals do not cross this boundary and potentially spread contamination (and increase the size of the hot zone), security will need to be established along the perimeter, and the security personnel need to be provided with the appropriate level of personal protective equipment.

With security in place, the location for the reception and decontamination center can then be determined. Basically, there are two choices for this:

- Outside the hot zone at a convenient location; or
- At a local hospital.

If the decontamination procedures are simple, such as receiving a thorough wash down, the best location for the reception and decontamination area will usually be within the cold zone at a location easily accessible to affected individuals. For decontamination activities that will be using other chemicals or those that will require prophylaxis, the reception and decontamination area could be established at the closest hospital. If this is the case, the community will need to provide transportation to minimize the potential for spreading the contamination. A transportation staging area will need to be established and announcements made to the individuals in the hot zone telling them where the staging area is located. If such a transportation program is implemented, the local community will also need to be prepared for the equipment being used to become contaminated. Following the operation, such equipment may be able to be decontaminated or may have to be considered a loss.

A decision will also need to be made regarding personal vehicles. If space is available, those leaving the hot zone could drive along a pre-designated route to the reception and decontami-

(SOURCE: http://www.fema.gov/photolibrary; Photo credit: FEMA/Bob McMillan: FEMA News Photo)

Figure 5-2. Decontamination procedures in New Orleans, Louisiana.

nation area where they would leave their vehicles to be decontaminated once the people and animals have exited them. Another issue in this process will be the decontamination of domestic pets and livestock. The pet and livestock decontamination processes are usually similar to human decontamination; however, additional personnel comfortable working with animals will be required to ensure animal welfare and use of the proper procedures. If the operation occurs in the cold zone, domestic pets can often stay with their owners, who may be encouraged to participate in their pets' decontamination. Livestock will have to be penned once they have been decontaminated. These types of considerations will often be factors in determining the location of the reception and decontamination center. Again, the potential exists that transportation will be needed to move the individuals, pets, and livestock to an appropriate area for decontamination.

Decontamination area layouts vary from simply using an elevated ladder on a fire engine with a hose and large nozzle, to systems that feature portable showers and multiple stations for the decontamination process. The type of system used will depend on the type of decontamination procedures required. If additional equipment beyond what the community has available is required, it can often be obtained from the state National Guard or the military. Requests for military assistance will need to be coordinated through the FOSC. Additional considerations that will affect where decontamination occurs include weather conditions, the need for collection and disposal of contaminated garments and provision of replacement clothing. This is addressed more fully in Section 5.3.1.

Finally, consideration should be given to establishing a reception center at the decontamination site. The primary purpose of the reception center is to register and track those individuals who must be decontaminated. This tracking process can assist the community later as part of the process for locating missing family members, itemizing costs that may be reimbursable, and tracking patients within the hospital and the care they receive. To increase the efficiency of the center, directional signs and data collection forms should be translated into all of the languages spoken within the community and, if possible, translators should be available on site.

Evacuation. Once the decision to evacuate has been made, the community can follow their existing procedures to announce and implement the process. There are several automated systems available to get the evacuation information to individuals in the affected area. The most common is the reverse 9-1-1 system, which uses a database of phone numbers and addresses in combination with a Geographic Information System (GIS) system to automatically dial certain numbers based on selected addresses to deliver a pre-recorded message. When announcing the evacuation order, it is critical to ensure that clear directions are provided so there is no confusion in the recipient's mind as to what actions to take. If additional resources are required, a request can be made for the activation of ESF #6 – Mass Care, Emergency Assistance, Housing, and Human Services. In areas of ethnic diversity, these messages may also need to be available in languages other than English.

The following case study highlights additional lessons learned from the Graniteville, South Carolina, train accident, which presents an example of evacuation versus shelter in place.

Case Study

State Response to the Graniteville Train Derailment: Lessons Learned, Team Visionary Collective under the Mentorship of Ron Fisher, May 27, 2006 (www.llis.gov)

The information presented in this case study is taken directly from the referenced document.

Representatives from fire, law enforcement, and emergency services met and actively discussed evacuation versus shelter in place. The decision was made that residents within a 1-mile radius to the crash should

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Case Study (Continued).
State Response to the Graniteville Train Derailment: Lessons Learned, Team Visionary Collective under the Mentorship of Ron Fisher, May 27, 2006 (www.llis.gov)

evacuate, while those within the 1- to 2-mile zone should shelter in place or stay in whatever building or home in which they were located. Compounding the situation, considerable confusion existed regarding one's location in respect to the 1-mile radius zone. According to Mitchell et al., residents did not know if the evacuation message was applicable to them personally, and many suggested that street names and other local sites should be given as reference points in the future as opposed to a vague 1-mile radius. As a result, 59 [percent] of residents living in the 1- to 2-mile zone evacuated as opposed to staying home and maintaining the curfew. This resulted in an "evacuation shadow," where more people than necessary were on the roads, which not only affected traffic congestion but also availability of hotels and shelters.

Lesson Learned: Resident evacuation within limited distances should require identification of affected areas by street name, zip code, and geographic markers.

Recommendation: To prevent future confusion about residents who should evacuate or shelter in place, city officials will not refer to the area as 1 mile or 2 miles from the hazardous site. Many people did not know where their homes fell in relation to the site. Thus, we recommend that all instructions will be more specific and reference by street name. For example, "all people living north of 10th Street should evacuate their homes and head south down Main Street." Giving more specific instructions should minimize confusion and reduce risk.

To implement this recommendation, it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation

1. Lack of readily available maps to be used by the command post and the Emergency Operations Center to specifically define the area to be evacuated and the route out of the area.
2. Advance preparation of public announcements cannot include unknown directional specifics. Depending on the geographic size of a jurisdiction, pre-identifying appropriate evacuation routes and safe areas may be too complex.

Possible Resolution to Implementation Barriers

1. With the widespread use of GIS in most communities, maps of the impacted area are readily available to officials in the Emergency Operations Center or at the command post. These maps can be created to show the area requiring evacuation and the routes out of the area. The maps can then be used to make the appropriate announcements and can even be provided to the media for their use in reporting the information.
2. Public service announcements can be pre-scripted to include basic evacuation information (when to go, what to take, how to secure a residence, preparing pets, requesting additional assistance for seniors, disabled, etc.) with blanks to be filled in as incident specifics become known. Pre-scripted public service announcements may be compiled according to incident type and information to be disseminated, providing a library of resources to be used as required.

Assistance may need to be provided to the individuals that are being evacuated. This assistance includes, but is not limited to, door-to-door announcement of the evacuation; security staff to provide direction as people are evacuating and to ensure they follow the identified route out of the affected area; staff to assist the elderly, children, or the infirm in departing the impacted area; and reminders to evacuees to take pets with them as they leave. If individuals are allowed to take their personal vehicles, appropriate directions out of the area can be provided by traffic control officers stationed at main intersections. In areas of dangerous contamination, community-provided transportation may be the best way to ensure the safety of the evacuees and reduce the potential for spreading the contamination. An additional concern to be addressed is providing security for the evacuated area.

The following case study, also from the Graniteville, South Carolina, incident, provides useful information addressing this concern.

Case Study

State Response to the Graniteville Train Derailment: Lessons Learned, Team Visionary Collective under the Mentorship of Ron Fisher, May 27, 2006 (www.llis.gov)

The information presented in this case study is taken directly from the referenced document.

. . . the problem the Sheriff's Office faced was to protect the surrounding areas. The [Sheriff's] Office was able to control access to the crash quickly and early through traffic control points based on major intersections and information received from 911 distress calls within the first 15 minutes. The placement of roadblocks was reevaluated within the first 30 minutes and determined to be adequate based on wind direction and hazmat input. However, while the Sheriff's Office was able to prevent more residents from entering the crash area, those already nearby were not as lucky. According to a report by the Aiken Department of Public Safety, as the first responders rushed to the scene they quickly realized that some of the residents fleeing the gas in the dark were actually blindly running into the contaminated area instead of away from it.

An ongoing assessment is examining the public health impact associated with exposure to chlorine gas. Those exposed are being interviewed about their symptoms, the location and duration of the exposures, and demographic information necessary for monitoring any long-term health effects and psychosocial consequences (Centers for Disease Control and Prevention, 2005).

Lesson Learned: In the event of natural or other disasters in residential areas, door-to-door evacuation campaigns should be enacted immediately to guarantee that all residents are informed and are safe—especially when events occur after nightfall. Communication via mass media about the areas of immediate threat should be clear and concise.

Recommendation: The Sheriff's Department was able to quickly place roadblocks that prevented people from entering the hazardous area. People within the roadblock vicinity were not properly ushered to safety. Many people accidentally went toward the crash scene as they tried to escape the area. Thus, we recommend that all future accidents involving hazardous materials should have reflective arrows pointing toward the direction of safety so that people do not travel toward the scene of the accident.

To implement this recommendation, it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation

1. Having sufficient officers available to provide the necessary security and direct traffic flow.

Possible Resolution to Implementation Barriers

1. Additional resources may be available locally from security contractors, mutual aid agreements with neighboring jurisdictions, and the state National Guard.

Tracking of evacuees is also vital to the family locator process. The tracking systems used for evacuees, hospitals, and temporary housing need to be compatible so that the data can be merged to provide a summary report tracking everyone from evacuation until they can return to their homes. For evacuees who leave the area to stay with family or friends, it will be imperative to track their whereabouts so that accurate information is available to the family locator process and to provide evacuees notice when housing is available within the community.

Sheltering. Sheltering operations will follow, for the most part, the process implemented for other types of disaster situations. Local communities need to ensure that

- Adequate facilities (with food service and sanitation) are provided;
- The facility can handle the needs of service animals;

- A process is established to handle domestic pets; and
- A screening process for possible contamination is implemented.

This screening process is an important element, especially if decontamination of individuals is required. Screening individuals as they enter the shelter ensures that no contamination is brought in and can also help to identify those individuals who still need to be decontaminated.

Tracking of evacuees is an important operation at the shelter. When individuals sign in at a shelter, they will also need to sign out when leaving, indicating where they are seeking other shelter (i.e., with family, friends, or a hotel). This sign-out process should include collecting the address where they will be staying along with a phone number so that local officials can keep in touch to inform them when it is safe to return to their homes and businesses.

5.2.2 Medical Needs

Medical services may need to be provided very early in the response. Casualty collection points may need to be identified and set up in safe areas to provide immediate treatment for victims and responders. Adequate transportation to hospitals will be needed, and decisions will need to be made regarding the need for mass prophylaxis. Local hospitals may be overwhelmed and surrounding communities may be asked to provide assistance.

Figure 5-3 shows the decision points, including which positions have the authority to make medical decisions, and which positions have input into the decision-making process.

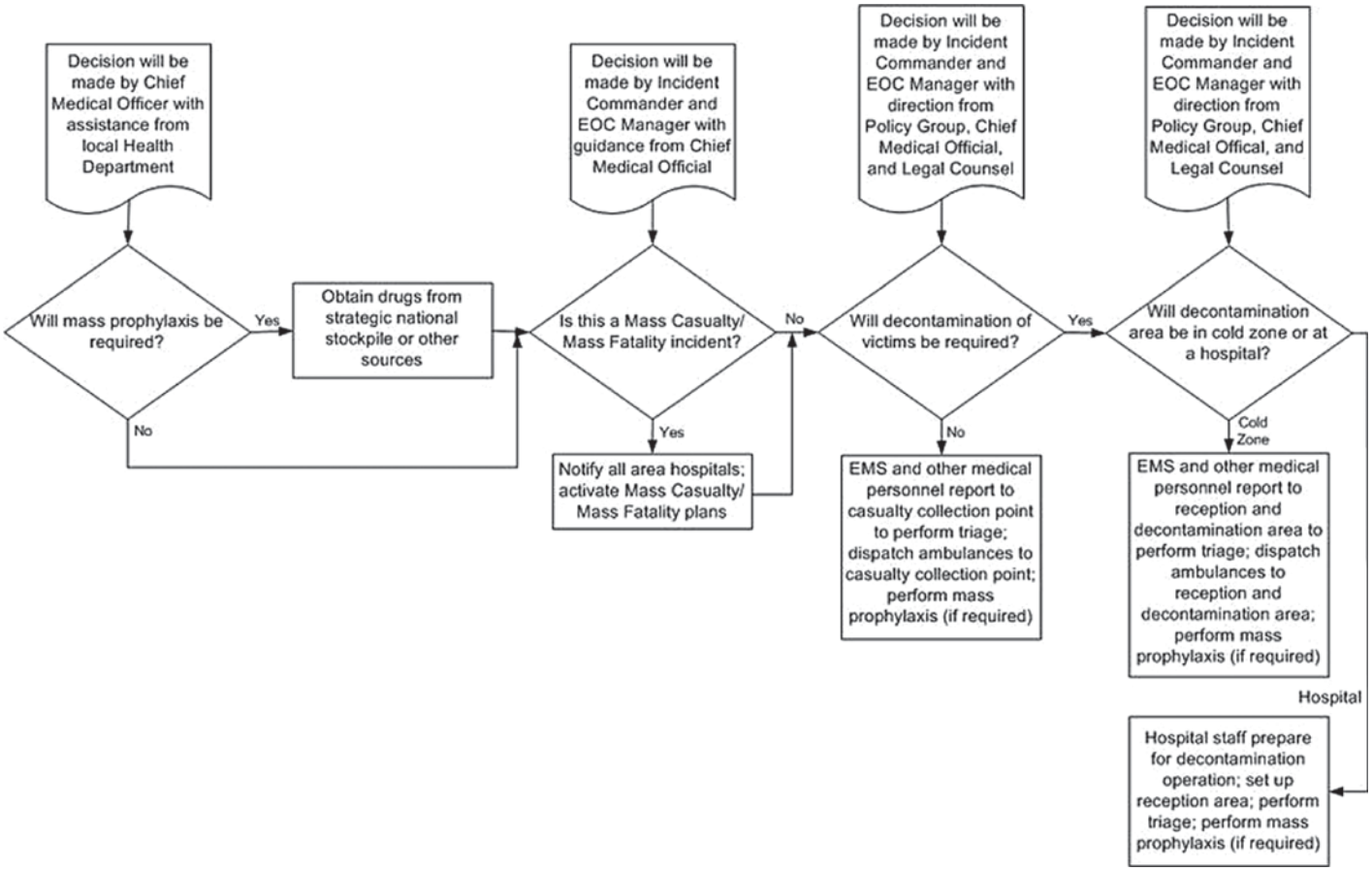

Figure 5-3. Decision points for medical treatment.

In the short term, the medical treatment component will likely be an intense operation, especially if it is determined that the event is a mass casualty and/or mass fatality event. Available resources will often be significantly taxed, and many communities will need additional assistance. Such resources are available through ESF #8 – Health and Medical Services. Through ESF #8, DHHS can activate the National Disaster Medical System (NDMS). The components of NDMS that apply to a hazardous materials transportation incident could include the following:[89]

- **Disaster Medical Assistance Teams (DMATs):** DMATs provide primary and acute care, triage of mass casualties, initial resuscitation and stabilization, advanced life support and preparation of the sick or injured for evacuation. The basic deployment configuration of a DMAT consists of 35 persons, including physicians, nurses, medical technicians, and ancillary support personnel. They can be mobilized within 6 hours of notification and are capable of arriving at a disaster site within 48 hours. They are designed to sustain operations for 72 hours without external support. DMATs are also responsible for establishing an initial (electronic) medical record for each patient, including assigning patient-unique identifiers to facilitate tracking throughout the NDMS.
- **Disaster Mortuary Operational Response Team (DMORT):** DMORTs work under the guidance of local authorities by providing technical assistance and personnel to recover, identify, and process deceased victims. Teams are composed of funeral directors, medical examiners, coroners, pathologists, forensic anthropologists, medical records technicians and transcribers, fingerprint specialists, forensic odontologists, dental assistants, X-ray technicians, and other personnel. DHHS also maintains Disaster Portable Morgue Units (DPMUs) that can be used by DMORTs to establish a stand-alone morgue operation if necessary.

The following case study highlights further lessons learned from the Graniteville, South Carolina, train accident on the medical operations associated with a transportation incident involving hazardous materials.

Case Study

After-Action Report Graniteville Train Wreck – January 2005, Aiken County Government (www.llis.gov)

The information presented in this case study is taken directly from the referenced document.

OBJECTIVE: MEDICAL

Demonstrate the ability to provide appropriate medical care for injured personnel.

1: First responders provide proper first aid care for injured personnel.

STRENGTH

- ACEMS [Aiken County Emergency Medical Services] utilized PPE [personal protective equipment] from Aiken County COBRA [Chemical, Ordinance, Biological, Radiological] team, which allowed EMS personnel to re-enter scene for rapid rescue.

2: Demonstrate command and control of the medical emergency.

IMPROVEMENT ITEM

- ACEMS attempted to medically monitor other responders, but they were entering incident area without EMS coordination.
- Triage tags were not utilized, although they were available.
- The on-duty EMS supervisor must relinquish control of outside incidents and focus on major incident being responded to.

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Case Study (Continued).
After-Action Report Graniteville Train Wreck – January 2005, Aiken County Government (www.llis.gov)

3: EMS personnel provide proper emergency medical care for injured and/or contaminated personnel.

STRENGTH

- ACEMS supported three separate decon sites with medical monitoring.
- Due to overwhelming number of calls for assistance being received from Graniteville area, decision was made to enter with Level-B suits by Hazmat technician-level EMS personnel.
- Decision to not transport patients prior to decon was made by ACEMS Shift Supervisor.

IMPROVEMENT ITEM

- EMS entry into the hot zone was coordinated through ACSO [Aiken County Sheriff's Office] Dispatch who contacted the EMS supervisor at USCA [University of South Carolina—Aiken]. No coordination with GVWFD [Graniteville-Vaucluse-Warrenville Fire Department].

4: Demonstrate effective communications.

STRENGTH

- Local hospitals were contacted early on by EMS supervisor informing them of patient potential.

IMPROVEMENT ITEM

- Mass casualty plan not implemented initially due to communications difficulties.
- Communication of patient status at decon was not well coordinated with Red Cross shelter representatives. Persons at shelters were registered, but if they were sent to the hospital or left with friends/family, their status was unknown.

To implement these improvement items it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation

1. Lack of funds for planning, training, and exercises to address the specific needs of a mass casualty incident.
2. Lack of experienced personnel to develop mass casualty plans including procedures for controlling and coordinating access of responders and medical personnel.

Possible Resolution to Implementation Barriers

1. Some grant funding is available to LEPCs for planning, training, and exercises through the HMEP grant program and various other federal grant programs (see Appendix E for more detailed information on this issue).
2. Technical assistance for developing mass casualty plans and procedures is available to local communities through the FEMA regional offices. This technical assistance can include representatives from other federal agencies, such as HHS, with experience in mass casualty operations.

Events involving mass fatalities present unique issues, such as identification of bodies, decontamination of remains and family notification. Through ESF #8, assistance can be provided by the DMORTs. While not a hazardous materials transportation incident, the following case study highlights useful best practices from the Station Club fire in Warwick, Rhode Island, (2003) that could be applied to victim identification in any type of incident.

Case Study

Mortuary Services: Victim Identification and Record Creation During a Mass Casualty Incident, Lessons Learned Information Sharing (www.llis.gov)

The information presented in this case study is taken directly from the referenced document.

The fire that destroyed the Station Club in Warwick, Rhode Island, on February 20, 2003, resulted in the death of 100 individuals. Most of the victims were burned beyond recognition. As part of the recovery process, personnel from the Office of the Medical Examiner (OME) were in charge of victim identification and record creation. Because of the insufficient numbers of OME personnel qualified for this task, DMORT [Disaster Mortuary Operational Response Team] personnel deployed at the Rhode Island State Morgue offered to assist with the process.

OME personnel relied on information given in the missing person reports to facilitate the victim identification process. Information recorded on the missing person report was not as complete or germane as that needed to identify the badly disfigured victims. As a result, some families had to be asked on three or four separate occasions for additional personal information. DMORT personnel relied on information given in the DMORT VIP [Victim Identification Process] form. The VIP form requested information that was often not requested on the missing persons form. The VIP form proved much more helpful in expediting the victim identification process.

The Rhode Island Station Club Fire After-Action Report recommends that medical examiners should consider using the DMORT VIP form from the outset of a mass casualty incident in order to expedite the victim identification and record creation process.

To implement this best practice it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation

1. Lack of trained local resource.

Possible Resolution to Implementation Barriers

1. Some grant funding is available to LEPCs for planning, training, and exercises through the HMEP grant program and various other federal grant programs (see Appendix E for more detailed information on this issue).
2. Technical assistance for developing mass casualty plans and procedures is available to local communities through the FEMA regional offices. This technical assistance can include representatives from other federal agencies, such as HHS, with experience in mass casualty operations.

As soon as medical personnel can determine the needs for long-term medical and behavioral care for victims and responders, the programs and mutual aid assistance identified in pre-incident planning for long-term care can be implemented. Grant applications to support clinical long-term care can be submitted to appropriate agencies for funds to sustain the long-term care operations. The costs to the community for long-term care will need to be considered in the negotiated settlement with the potential responsible parties.

5.2.3 Interim Housing

Problems with interim housing following Hurricane Katrina (2005) led to the development of the National Disaster Housing Strategy (NDHS). The Post-Katrina Emergency Management Reform Act of 2006 (PKEMRA – Public Law 109-295) established the requirement for FEMA to

develop the NDHS, and also assigned new authorities for the agency to offer disaster case management services, established a Disabilities Coordinator position at FEMA, authorized a rental repair program, and expanded the authority for permanent construction.[90]

Interim housing encompasses sheltering, temporary housing, and permanent housing. Shelters will remain open long enough for local officials to assist evacuees in finding interim housing. Typically, interim housing is available for approximately 18 months. During that time, the evacuees will either work to repair their damaged homes or find other permanent housing.

One of the more challenging decisions that will need to be made by the Unified Command in this area will be in relation to the decontamination of housing. Depending on the nature of the materials involved in the incident, the decontamination process may simply require washing down of the home's exterior, which means the evacuee might be able to return directly from the shelter. However, the decontamination process may also need to be more invasive and employ other types of chemicals or solvents. For the more invasive operations, consideration needs to be given to the cost-effectiveness of decontaminating residences. It may be more effective to demolish the structure, clean the surrounding grounds to remove contaminants, and then rebuild the home. This decision will need to be made in consultation with the homeowner and in accordance with the community's condemnation procedures.

If the event were to receive a major disaster declaration from the President, housing assistance could become available through the Individual Assistance Program. In this situation, after insurance, one of the major sources of assistance would be the FEMA Individuals and Household Program (IHP). This program provides temporary help in the form of alternative housing and financial assistance for other needs. Under IHP, individuals and families might be eligible for the following:[91]

- **Temporary Housing:** Assistance to rent a different temporary home for up to 18 months. If rental properties are not available, the government may provide a housing unit.
- **Repair:** Assistance to homeowners to repair disaster-related damage that is not covered by insurance for a primary residence.
- **Replacement:** Assistance to homeowners to replace a home destroyed in the disaster that is not covered by insurance.

If the applicant is eligible for one of these programs, they may also be eligible for additional assistance in the form of

- **Lodging Expense Reimbursement (Transitional Sheltering Assistance):** Lodging Expense Reimbursement is an extension of sheltering, but it does not include meals.
- **Rental Assistance:** Homeowners or renters will receive a check for short-term rental assistance based on the fair market rates in their area. Rental assistance provides homeowners with an initial 3 months' rent; renters may receive funds for 2 months.
- **Government-Provided Direct Housing (Manufactured Housing):** Direct housing in the form of mobile homes, travel trailers, and park model units can be used to augment temporary housing needs.
- **Mortgage Assistance:** Applicants are eligible if they are not able to make their mortgage payments as a result of disaster-related financial hardship (e.g., loss of income) and have received a written foreclosure notice or notice of intent to foreclose from a mortgage lender. The Mortgage Assistance Program is intended to provide emergency assistance to survivors who, without such assistance, would be dispossessed from a primary residence.

5.2.4 Re-Entry to Homes and Businesses

During pre-incident, as well as post-incident, planning operations, procedures related to issues such as transportation for individuals without vehicles and how individuals will retrieve their

vehicles after decontamination will have been addressed and appropriate resources identified. However, there are still several operations that should take place prior to allowing individuals back into their homes and businesses within the impacted area. If decontamination of the area is required, those operations need to be completed before re-entry can be allowed (see Section 5.3 for infrastructure decontamination).

When the area is considered decontaminated, local communities need to look to basic health and safety issues (e.g., is there working sanitation, is potable water available, and are utilities—power, gas, etc.—operational?). Another step is to determine if the structures are safe enough for continued occupancy. This step is designed to ensure there has been no damage to structures by the incident or the materials involved that would impact the safety of the structure. Typically, these types of evaluations are performed by local building inspectors.

In some cases, structures may not be safe enough for continued occupancy or there may be issues around the provisions for basic health and safety. In these cases, consideration might be given to allowing individuals, business owners, and employees short periods of time to re-enter the area to retrieve personal and business possessions. In relation to business possessions, there will also need to be a process to ensure that those possessions are not contaminated.

The final step in the process is to determine whether re-entry will be controlled, or whether the individuals will be allowed to freely re-enter the impacted area. This decision will be based on the size and magnitude of the incident.

5.2.5 Summary of Mass Care Recovery Operations

Table 5-1 summarizes the components and actions addressed in mass care recovery operations. Local planners can use this type of matrix to identify their own barriers to implementation and possible resolutions.

5.3 Operations for Infrastructure Recovery

As previously discussed, infrastructure refers to the built environment and includes roads, bridges, rail lines, utilities, buildings, etc., as well as the systems that utilize them, like mass transportation. There are three basic components to this recovery element as follows:

- Debris operations;
- Infrastructure decontamination; and
- Repair.

The FOSC will typically be actively involved throughout the operation, and the federal resources available to the FOSC will be deployed as needed.

As with the decision regarding decontamination of victims, similar decisions will need to be made regarding infrastructure. Decontamination operations for infrastructure can be highly complex. In worst-case scenarios, this operation can take a year or more to complete. One of the federal resources available to provide technical assistance during this time will be the EPA's National Decontamination Team. Their expertise could be quite helpful in developing the necessary decontamination plan (see Section 4.5.2, Post-Incident Planning for Mass Care).

In most situations, repairs to infrastructure (see Figure 5-4) will be limited to the incident site. However, depending on the material(s) released, they may have a significant harmful impact on construction materials in the surrounding area. In this case, the repair work will have to wait until decontamination operations are complete so engineers can have access to the roads and buildings to perform required evaluations and determine how best to repair the infrastructure.

Table 5-1. Summary of mass care recovery operations.

Short-Term Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Evacuation	Determine if evacuation and decontamination of evacuees will be necessary	Incident Commander, EOC Manager, Legal Counsel	Lack of legal authority	Develop ordinance establishing authority to order evacuation
	Establish hot zone and cold zone and clearly mark the perimeter of the hot zone	Fire, Law Enforcement, Public Works	Identification of lead agency	Pre-incident planning to include identification of lead agency
			Monitoring hot zone for potential spread of contamination	Monitoring equipment; computer models
	Provide security around the hot zone with checkpoints and provide them with location of the reception and decontamination area	Law Enforcement, Local Security Contractors, National Guard	Lack of adequate staffing	Develop mutual aid agreements with surrounding jurisdictions, develop contracts with private security firms, recruit volunteers, and provide appropriate training
			Need for Personal Protective Equipment (PPE)	Provide pre-incident training for all levels of PPE
			Public resistance	Public Information campaign to explain the process
	Announce evacuation order	Incident Commander, EOC Manager, Law Enforcement; Fire, EAS, Reverse 9-1-1	Lack of legal authority	Develop ordinance establishing authority to order evacuation
			Public resistance	Public Information campaign pre-incident to explain authorities
	Provide security at the shelters	Law Enforcement, Local Security Contractors, National Guard	Public resistance	Public Information campaign pre-incident to explain authorities
	Provide security at the shelters	Law Enforcement, Local Security Contractors, National Guard	Lack of adequate staffing	Develop mutual aid agreements with surrounding jurisdictions, develop contracts with private security firms, recruit volunteers and provide appropriate training
	Track evacuees		System for tracking especially those who leave the area	
			Lack of adequate staffing	Develop mutual aid agreements with surrounding jurisdictions, recruit volunteers, and provide appropriate training

Table 5-1. (Continued).

Short-Term Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Shelters	Open shelters	Red Cross, Emergency Management, Faith-Based Organizations, Community-Based Organizations, Local/State Dept. of Social Services, Federal ESF #6	Lack of available locations	Survey jurisdiction and locate facilities that could be used for shelter locations
				Develop MOU(s) with facility owners to allow the jurisdiction to use the facility as a potential shelter
			Lack of adequate staffing	Develop mutual aid agreements with surrounding jurisdictions, recruit volunteers, and provide appropriate training
Decontamination of Evacuees	Establish reception area and set up decontamination station in cold zone or at local hospital and announce location	Fire, EMS, Law Enforcement, Dept. of Transportation, Public Works, Emergency Management, State/local EMS, State/Local Social Services	Lack of adequate equipment	Secure needed equipment from mutual aid sources
			Lack of public information	Prepare public information materials during pre-incident planning
	If at the local hospital, provide transportation	Local Transit District, Local Dept. of Transportation		
	Provide security around the reception and decontamination area	Local Law Enforcement, Local Security Contractors		
	Implement decontamination operations	Hospital Staff, Local Fire, State EMS, National Guard		
Interim Housing	Identify available short-term housing	Local Housing Authority, Property Management Companies, Property Owners	Lack of available properties	Develop MOU(s) with neighboring jurisdictions to increase the number of available properties
			Funding for reimbursement	
	Develop and implement program requirements	Local Housing Authority, State/Local Dept. of Social Services		
Medical Treatment	Establish triage area at decontamination center and announce	Fire, EMS, Law Enforcement, Dept. of Transportation, Public Works, EAS, Reverse 9-1-1	Appropriate level of training	Work with CDC or local university to implement appropriate training
	Order drugs from Strategic National Stockpile (SNS)	Local/County Public Health, CDC	Lack of an SNS plan and protocols	Pre-incident planning in conjunction with Local/County Health Department
	Establish dispensing site and implement mass prophylaxis	Local/County Public Health, Local Law Enforcement, State EMS, Federal ESF #8	Public Information	Develop public information materials during pre-incident planning

(continued on next page)

Table 5-1. (Continued).

Intermediate Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Evacuation	Demobilize established hot zone and remove perimeter marking	Fire, Law Enforcement, Public Works		
	Demobilize security staff and provide debriefing	Law Enforcement, Shelter Manager		
	Transfer tracking records to established office and continue tracking of evacuees	Emergency Management, Local/State Dept. of Social Services		
Long-Term Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Evacuation	Close out tracking records as evacuees transition from long-term housing to return to their homes	Emergency Management, Local/State Dept. of Social Services		
Long-Term Housing	Demobilize long-term housing program and debrief staff	Local Housing Authority, State/Local Dept. of Social Services		
Medical Treatment	Identify patients for long-term monitoring for physical and mental health problems	Hospital Staff, State EMS, Local Health Dept., Private Non-Profit Health Organizations	Lack of programs	Develop mutual aid agreements with surrounding communities
				Secure grant funding to develop monitoring program
	Demobilize long-term monitoring and debrief staff	Program Manager		

(SOURCE: http://www.fema.gov/photolibrary/; Photo credit: FEMA/Marvin Nauman: FEMA News Photo)

Figure 5-4. Rail bridge repairs near New Orleans, Louisiana.

As in other previously discussed aspects of recovery, opportunities for innovative solutions may become evident as recovery operations progress. For example, following a disastrous snowstorm in Velva, North Dakota, in 2010,[92] power was knocked out to numerous remote locations. The Verendrye Electric Cooperative (Verendrye) came up with a solution that consisted of using solar cells to power two livestock wells in the affected areas. This repair saved Verendrye the cost of repairing the damaged electrical infrastructure, and Verendrye now operates approximately 220 solar sites serving livestock wells in other isolated areas. Following a hazardous materials transportation incident, innovative solutions to problems have the potential to aid recovery operations and minimize the impact on the community.

Figure 5-5 depicts the decision points related to infrastructure recovery, including which positions have the authority to make decontamination and permitting decisions and which positions have input into the decision-making process.

5.3.1 Debris Operations

The complexity of debris operations associated with a hazardous materials transportation incident will be dependent on the impact of the incident and, more specifically, the material(s) involved. Operations could be as simple as removing the debris generated at the incident site, which can usually be accomplished in several days, to the intricacy of debris removal that would

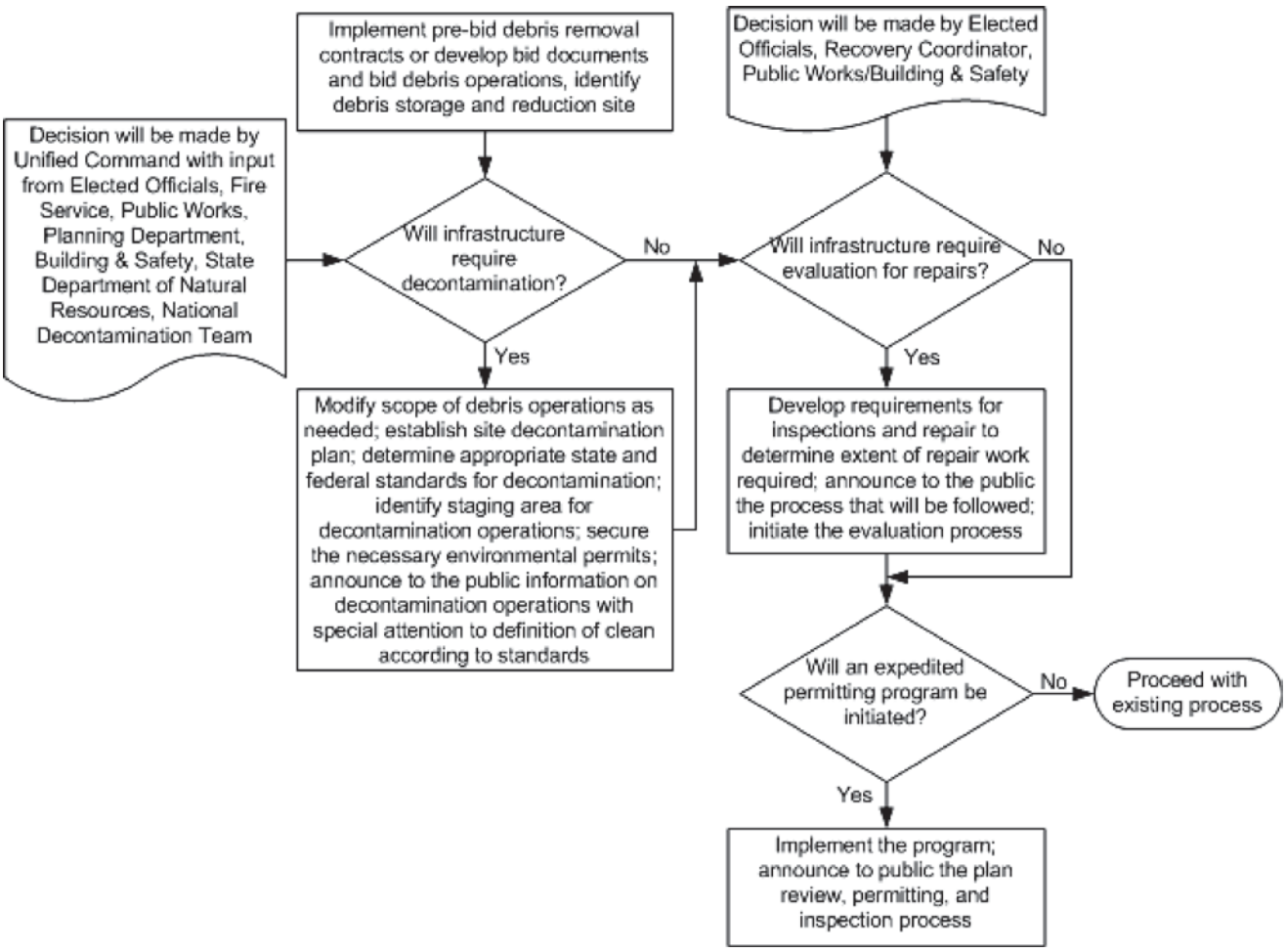

Figure 5-5. Decision points for infrastructure recovery.

be required for a full-scale decontamination operation for the built environment, an operation that can often take more than a year.

Shortly after the occurrence of the event, the community would either activate their pre-bid debris operations contracts or develop the necessary bidding documentation to bid debris operations under standing procurement policies. For small incidents, it is possible that debris operations could be completed using the community's public works/sanitation department personnel, assuming these individuals are trained and have the appropriate level of personal protective equipment.

In accordance with the Resource Conservation and Recovery Act (RCRA), a temporary debris storage and reduction site will need to be established (see Figure 5-6). The location for this site needs to be chosen such that it does not present a hazard to the public or the environment in the event that storage containers leak. Initial steps include identifying areas within the site for debris to be stored and installing impermeable barriers to ensure that leaks do not infiltrate the ground water. Berms or dikes will also need to be constructed to contain any materials that leak from their containers.

Depending on the nature of the material(s) involved in the incident, consideration may also need to be given to maintaining equipment available on-site to continuously decontaminate vehicles after they deliver debris. Additionally, all materials used for decontamination operations will need to be collected, packaged in safe containers and transported to this site for future delivery to an established hazardous waste material site for final disposal. Staff working at the site will also need to be provided with the appropriate level of personal protective equipment. The jurisdiction needs to be prepared to implement and provide training to the staff at the site. Such training should cover personal safety, personal protective equipment, and handling of the debris materials.

If the decision is made to require decontamination of individuals caught in the hot zone by the incident, all materials associated with the decontamination operation need to be considered contaminated debris. According to the RCRA (see Section 2.3.7), the materials associated with decontamination will need to be collected, packaged in sealed containers, and disposed of in an established hazardous materials disposal site. All manner of contaminated items will need to be

(SOURCE: http://www.epa.gov/hurricane/hur_photos.html; Photo credit: EPA)

Figure 5-6. Temporary debris storage and reduction area.

considered as debris, including decontamination materials (chemicals or water); clothing (both victims' and decontamination specialists'); equipment used in the decontamination operation; and, potentially, vehicles used for the transport of victims. Once the decontamination operation is completed, the entire area will need to be cleaned and the materials used (water, solvents, chemicals, etc.) will need to be collected, packaged, and added to the rest of the debris for appropriate disposal.

If roads, bridges, buildings, etc., require decontamination, every action that was taken at the decontamination centers for people in relation to the decontamination process will need to be repeated within the area that is to be decontaminated. This could generate considerable amounts of additional debris, and the contractors involved will need to ensure that they have a sufficient number of appropriate containers available for the storage of materials. In an extreme case, the infrastructure may require decontamination with other chemicals. This could include road surfaces, exterior building surfaces, interior building surfaces, the insides of air handling duct work within buildings, etc. In such extreme cases, decisions will need to be made regarding what is economically reasonable to decontaminate and what should be discarded.

Even if decontamination is not necessary, there may still be a large quantity of debris depending on the material(s) involved. For example, if there is a retail and/or manufacturing area within the impacted zone, it may not be economically feasible to clean store inventories. In this case, all or part of the inventory could be contaminated and would need to be handled accordingly. To minimize the impact on the public, routes would need to be established for moving debris from the impacted area to the debris disposal and reduction site. A route should be selected that minimizes the time that trucks are on the road with the contaminated debris, while also decreasing the potential for spreading contamination.

States are required to regulate the management of solid and hazardous waste in accordance with provisions of the RCRA (see Section 2.3.7). Solid waste is defined broadly under the law as "any garbage, refuse . . . and other discarded material" (42 U.S.C. § 6903). Hazardous waste, a subset of solid waste, is defined as a solid waste that is either specifically listed in the regulations (40 C.F.R. §§ 261.31-261.33), or meets specific criteria that make it toxic, ignitable (i.e., burns readily), corrosive, or reactive (e.g., explosive) (40 C.F.R. § 261.3).

In an ideal setting, debris removal crews would first segregate the waste. The waste that can be removed using heavy equipment (e.g., a front loader) would then be loaded onto trucks. Remaining waste would be removed by hand by a right-of-entry crew (i.e., a crew that has received permission from the property owner to enter the site).[93] Following Hurricane Katrina, residents were asked to separate waste into general categories to assist this process. Post-incident analysis shows this did not typically happen, a problem that was compounded by the fact that so many residents were not present to collect and separate their debris.

For a hazardous materials transportation incident, many of the same requirements as noted above could exist (i.e., the need to segregate debris that is moved to the temporary debris reduction and storage area, etc.). An additional challenge would be that all of this debris could potentially be contaminated and would most likely have to be packaged and moved to a hazardous materials waste site. The amount of time required for debris removal, and the associated costs, would be further increased if there was a significant volume of contaminated inventory, equipment, and household furnishings to deal with. For example, following a typical flood disaster, debris removal can usually be completed with three passes through affected neighborhoods. During Hurricane Katrina, it took more than 20 passes in some neighborhoods, and in some cases, the debris removal was still not complete.[94]

5.3.2 Infrastructure Decontamination

There are numerous hazardous materials that require some form of decontamination in order to render an area safe for human occupancy. This can be compounded in a hazardous materials transportation incident through the involuntary mixing of hazardous materials as a result of the incident. Such operations can be extremely time-consuming, labor-intensive, and costly. Environmental regulations will have a significant impact on the operation and on debris removal activities. However, while such operations can be expensive and time-consuming, they may be vital to the community's well being and for assuring the public that the streets and buildings are safe and free from contamination. This, in turn, can have a significant impact on the restoration of business and tourism activities within the community.

The decision to decontaminate immediately triggers the need to prepare a comprehensive site decontamination plan (the contents of this plan and the planning process to create the plan were discussed in Section 4.6.2). Once the plan is complete and has been accepted by community leaders and the Unified Command, implementation will typically begin immediately. Rarely will a community have the resources in house to perform large-scale infrastructure decontamination operations. The FOSC and the National Decontamination Team will thus be valuable resources in helping to clearly define the process, what needs to be included in the bidding documents, and identification of potential bidders. The affected community may also wish to consider a sole-source contract which, if allowed under the community's procurement procedures, permits the community to negotiate with a single contractor without going through a bidding process.

An important part of this process is the implementation of federal standards on the level of decontamination required to render the infrastructure clean. This also necessitates that the criteria be clearly communicated to the public in non-technical language so they understand the concept of "how clean is clean." These criteria will be a central element of the decontamination site plan and will set the parameters for the entire operation. It is also vital that this information be completely and accurately conveyed to the public. As has been shown by past cleanup operations, unless the public understands the level to which infrastructure is being cleaned, there will often be lingering concerns about the potential for ongoing and future contamination. Such concerns often manifest themselves in how fast the community can restore its economic base, as has been the case with the Gulf Coast fishing industry following British Petroleum's *Deepwater Horizon* oil spill in 2010.

The decontamination site plan will be the guiding document and set the metrics for a successful decontamination operation. It also establishes goals and benchmarks that make it easy to convey the progress being made to the public. Providing the public with regular progress reports has been shown to significantly increase confidence in the effectiveness of the recovery operations.

Utility Restoration. Utility (water, sewer, electric, gas, communications) restoration will need to be coordinated between the community and the utility providers. Once the impact of the event on the utilities has been fully assessed, priorities will need to be established to ensure that restoration occurs as quickly as possible. Since in most cases utilities are privately owned and not a part of the local jurisdiction (i.e., special districts), the community may be at the mercy of the provider(s). Further, even though governments may try to work with utility provider(s) to restore services, unless a pre-disaster working relationship exists, local government may still not be able to implement identified restoration priorities.

Underground utilities, such as gas, electric, water, and communications, are less likely to be impacted by the presence of a plume than those above ground (electric and communications).

Conversely, the underground utilities are more likely to be impacted by a pooling spill than those above ground. The most difficult of all the spills to mitigate are those involving radioactive materials. The following provides some general information on the expected impacts from each scenario.

- **Plumes** – Caustic and flammable materials will have the greatest impact on the above ground utilities. When the released material has a density less than that of the surrounding air, a plume will form and be directed by the wind. Not much can be done regarding evaluation and restoration of aboveground utilities until the concentration of the material reduces to a point where no further damage is occurring to materials and/or the potential for an explosion and fire is eliminated. For caustic materials, the impact on aboveground utilities will be to the poles, wires, and cables, with an "eating away" of the materials in contact with the caustic material. For flammable materials, the biggest threat will come from damaged electrical lines that can spark and cause an explosion or otherwise ignite the materials. If the plume passes over open reservoirs used to store potable water, the water utility will need to implement an immediate testing program to determine what actions are needed to ensure that the water being delivered to the public is potable.
- **Pooled liquids** – The biggest potential threat to utilities from pooled liquids is having such liquids enter the storm sewers. In cases where these sewers empty directly into a waterway, actions will need to be taken to stop the flow before it can enter the waterway, either by blocking entrance to the sewers or blocking the outflow locations. For sewer systems that flow into treatment plants, there is less of a hazard to the environment. However, the treatment facilities will most likely have to modify their processes to account for the introduction of the hazardous material. Should the spill occur in a stream or river feeding a reservoir used for potable water, the water utility will need to increase testing and treatment of the water entering the service lines and, depending on the material involved, may have to implement cleanup activities within the reservoir.
- **Radiological materials** – A radiological release will produce less impact (damage) to utility systems than the other types of releases. However, the cleanup operations will be significantly more difficult. This is especially true if there is inclement weather associated with the release. Rain will wash the radioactive materials into the storm sewers, increasing the size of the impacted area.

The restoration of these utilities to service will depend on the priorities established by the community in collaboration with the provider(s). These priorities are typically based on community need, available resources, and the time required to bring the specific utility back into service.

5.3.3 Repair of Infrastructure

The likelihood of significant physical damages to infrastructure beyond the incident site is typically small in a hazardous materials transportation incident (see Figure 5-7). However, many hazardous materials can have a deleterious impact on construction materials. In such cases, a community may need to implement a building evaluation process to determine the level of repairs necessary to restore facilities to their pre-incident condition. Because it is very difficult to completely seal a building, the impact of the hazardous materials involved in the incident could also extend to the interior, as well as the mechanical and electrical systems within a building. This same concept applies to other forms of infrastructure such as roads, bridges, utilities, etc. These systems will require evaluation and, potentially, testing to determine the extent of damages.

If damage to building materials is widespread, the community may consider creating an accelerated permitting process that will allow a more rapid plan review, expedited issuance of

(SOURCE: http://www.fema.gov/photolibrary/; Photo credit: FEMA/Mike Moore: FEMA News Photo)

Figure 5-7. Rail repairs on Galveston Island, Texas.

necessary building permits, and follow-on building inspections for the repair work. To expedite the process further, it may also make sense to consider either a reduced building permit fee or even the elimination of all, or part, of the fee. This is a process that has been used after other types of disasters to speed up the repair process and get people back into their homes and businesses more rapidly.

The decision to implement accelerated programs will typically be made by the community's elected officials, the recovery manager, and the public works department/department of building safety. Here again, the FOSC and representatives from the National Decontamination Team should be able to provide valuable information relative to the impacts of hazardous materials on construction materials; however, this is ultimately a local government decision. If necessary, additional technical assistance will often be available through the FOSC to assist in this process.

The recovery of systems that utilize the infrastructure, such as mass transportation, freight rail, etc., will depend on the overall impact to the area. For example, the restoration of rail service may be delayed if the incident involved a derailment. Likewise, bus service may be impacted if a tunnel or bridge were involved in the incident. These systems are vital to getting the commuting public moving and minimizing delays that can have a significant impact on businesses that were not directly affected by the incident. Early definition of alternate routes or alternate means of transportation can be highly effective in minimizing the economic impacts of the incident.

If the event were to receive a declaration of major disaster from the President, assistance to the community and its infrastructure could be available through FEMA's Public Assistance Program. If this program were activated, there are various activities in which the community will need to participate. These typically include the following:

- Preparing a list of all damaged sites with a brief description of the damages;
- Attending the applicant's briefing conducted by FEMA and the state (a general briefing to all potential applicants on the parameters of the Public Assistance Program);

- Attending the kickoff meeting, at which time the list of damaged sites will be provided to FEMA and appropriate schedules and programmatic timelines will be established and discussed (meeting with the FEMA Public Assistance Coordinator Crew Leader, state representative, and FEMA and state Project and Technical Specialists);
- Working with FEMA and State Project Specialists at each site to develop the required project worksheets, which provide a description of the damages, an eligible scope of work for repair, and a cost estimate;
- Completing the eligible work to restore the facility to pre-incident condition; and
- Upon completion of all public assistance projects, attending the close-out briefing with FEMA and state representatives.

5.3.4 Summary of Infrastructure Recovery Operations

Table 5-2 summarizes the components and actions addressed in the section on infrastructure recovery operations and can be adapted for local planning.

5.4 Operations for Environmental Recovery

This report focuses on the sudden onset of hazardous materials contamination caused by a transportation incident. Long-term pollution clean-up is addressed in EPA's Brownfield Program as well as other federal and non-federal programs and is not discussed in this report. Additional information on the Brownfield Program is available from the EPA at www.epa.gov/brownfields.

To date, most hazardous materials clean-up (see Figure 5-8) has consisted of washing down contaminants (dilution), attempting to contain foreign (toxic) substances to prevent spread and further contamination (removal and disposal), and attempting to restore the environment to pre-event conditions. Clean-up usually consists of calculated and intentional actions to rapidly rehabilitate damaged areas. The extent of clean-up activities can range from extensive operations like those on the Gulf Coast following the British Petroleum *Deepwater Horizon* oil spill in 2010, to simply restoring some productivity to degraded lands.

Hazardous materials transportation incidents are handled on a case-by-case basis and remediation methods are based on the type and severity of the contaminants involved. Remediation in such cases is further complicated by the environment itself. Besides surface contamination, air, water, flora, fauna, and below ground ecosystems must also be considered. Additionally, the culture, economics, psychology, and ecology of the impacted area need to be addressed.

Public information and media reinforcement often play key roles in allaying the community's concerns. The role of media should not be overlooked or minimized, as there are numerous examples of how the media can shape public perceptions. Indeed, media "spin" may be more instrumental in public assurance than any accurate, documented facts regarding "safe" and "clean." This is demonstrated in the following case study of lessons learned from the *Cosco Busan* oil spill (2007) in San Francisco Bay.

On November 7, 2007, the M/V *Cosco Busan* departed the Port of Oakland located on the Oakland Estuary in San Francisco Bay. With visibility in the estuary limited by dense fog, the San Francisco Bar Pilot and the assist tug *Revolution* moved the ship into the channel and headed for the Golden Gate Bridge and the open sea. As the *Cosco Busan* passed the San Francisco-Oakland Bay Bridge, there was a collision with the Delta Tower Pier, damaging the port side of the ship and the pier's fendering. Three port wing tanks were

Table 5-2. Summary of infrastructure recovery operations.

Short-Term Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Debris Management	Establish temporary debris storage and reduction site	Local Public Works, Local Sanitation Dept., Local Planning Dept.	No pre-defined storage and reduction areas	Work with Local/State Resources Dept., Local Planning Department, and Public Works to identify potential sites
	Implement pre-approved debris contract for clearance from critical roads and highways	Local Public Works, Local Sanitation Dept., Debris Contractor(s)	No debris management plan	Develop a debris management plan
			No pre-existing contracts	Develop contracts with debris contractors (pre-incident bids) to provide debris removal and management services post-incident
	Develop/implement hold harmless agreements & right to entry for debris removal from private property, if required	Local Legal Counsel, Local Public Works		
	Implement pre-approved debris removal/disposal contract	Local Public Works, Local Sanitation Dept., Debris Contractor(s)	No pre-existing contracts	Develop contracts with debris contractors (pre-incident bids) to provide debris removal and management services post-incident
	If the incident occurred in a shipping channel or other waterway, implement salvage contracts	Local Public Works, Local Planning Dept., Local/State Office of Natural Resources, U.S. Coast Guard, Salvage Contractors	No pre-existing contracts	Develop contracts with debris/salvage contractors (pre-incident bids) to provide debris removal/salvage and management services post-incident
	Determine level of decontamination that will be required (how clean is clean?) using federal standards	Local Public Works, Decontamination Contractors, Local/State Office of Natural Resources, Federal ESF #3 and #10	Lack of local resources	Request assistance of National Decontamination Team
	Announce to the public the level of decontamination to be accomplished	Public Information Officer (Fire, Law Enforcement, Public Works, Emergency Management, Sanitation)		
	Decontaminate infrastructure within the "hot zone" if required	Local Public Works, Decontamination Contractors, Local/State Office of Natural Resources, Federal ESF #3	Lack of local resources	Request assistance of National Decontamination Team
Repair/Restore Infrastructure	Perform initial evaluation of damages to determine repair/restoration approach	Local Public Works, Utility Providers, Contract Engineers, Contractors		
	Develop an expedited permitting process for infrastructure damaged by the incident	Local Building Department, Local Planning Dept., Public Works		
	Restore essential infrastructure	Local Public Works, Utility Providers, Contract Engineers, Contractors		

Table 5-2. (Continued).

Short-Term Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
	Perform initial evaluation of damages to utilities and prioritize	Local Planning Dept., Local Public Works, Utility Providers, Contract Engineers, Contractors		
	Restore utilities	Local Public Works, Utility Providers, Contract Engineers, Contractors		
	Begin restoring transportation routes and mass transportation	Local Planning Dept., Local Public Works, Transportation Providers, Contract Engineers, Contractors		
Intermediate Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Debris Management	Demobilize the temporary debris storage and reduction site and restore/decontaminate the site as required	Local Public Works, Local Sanitation Dept., Site Management Contractor		
Decontamination	Following decontamination, restore hot zone and properly dispose of decontamination solutions	Local Public Works, Decontamination Contractors, Local/State Office of Natural Resources, Federal ESF #3		
	Announce to the public that decontamination operations are complete and reinforce the level of "clean" that was accomplished	Public Information Officer (Fire, Law Enforcement, Public Works, Emergency Management, Sanitation)		
	Demobilize decontamination operations	Local Public Works, Decontamination Contractors, Local/State Office of Natural Resources, Federal ESF #3		
Repair/Restore Infrastructure	Restore high-priority infrastructure	Local Public Works, Contract Engineers, Contractors		
Long-Term Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Repair/Restore Infrastructure	Restore remaining infrastructure	Local Public Works, Contract Engineers, Contractors		

damaged, two of which contained fuel oil, and spilled 53,269 gallons of fuel oil into San Francisco Bay.

5.4.1 Summary of Environmental Recovery Operations

Table 5-3 summarizes the components and actions addressed in the section on environmental recovery operations and can be adapted for local planning.

(SOURCE: http://www.fema.gov/photolibrary; Photo credit: FEMA/Leif Skoogfors: FEMA News Photo)

Figure 5-8. Oil spill cleanup, Coffeyville, Kansas.

Case Study

Incident Specific Preparedness Review (ISPR) M/V Cosco Busan Oil Spill in San Francisco Bay, Part II and Final Report, Multiple Federal, State, and Local Agencies, May 7, 2008 (http://www.uscg.mil/foia/CoscoBuscan/part2.pdf)

The information presented in this case study is taken directly from the referenced document.

Shoreline Treatment Termination Endpoints

The process of developing a shoreline cleanup termination endpoints document, while difficult and often painful, is critical to the end result. Termination endpoints can assist the UC [Unified Command] in logistical decisions about shoreline treatment technology, manpower requirements, and treatment aggressiveness.

While the cleanup or treatment termination endpoints agreement is by no means a legal contract, it should be approached as one. It should be expected that, in particular, stakeholders who are inexperienced in the variability of oil spill responses will consider this a binding and inviolate document. Therefore, the agreement should be specific and should provide for a consensual process by which conditions in the agreement can be changed, even to the extent that it involves an arbitrator of some kind (often the FOSC [Federal On-Scene Coordinator]).

Establishing one or several inspection spokespersons to represent the land managers and/or the communities can alleviate many of the scheduling concerns. This person(s) could be a trusted consultant paid for by the response or an experienced NGO [Non-Governmental Organization] representative or a state agency. Reducing the number of different individuals who must participate on the sign-off inspections will greatly increase scheduling flexibility and reduce delays in sign-off. It is important, however, that the individual chosen or hired to represent the stakeholder(s) is fully empowered to speak for the stakeholder(s) and runs no risk of being second-guessed.

Closure and Reopening of Beaches

It is critical to ensure that correct, timely information reaches local decisionmakers, particularly in the San Francisco Bay Area, where local, state and federal beaches and parks were affected.

Failure to effectively close beaches to the public may adversely impact wildlife protection, oiled wildlife recovery, and public safety.

Information from the UC is essential for local land managers to make the most appropriate closure decisions. Such information should include current and predicted status of oiled beaches and response activities scheduled for those beaches.

Without clear signage and prompt closures as needed, the public may assume the beach is safe and use it at potential risk to their health. The UC has no authority over closures but has an important role to play in communicating information to the myriad entities that do have that authority. This makes beach status communication extremely important.

Land managers may look to the UC for information relative to beach management.

Closure of Commercial Fisheries

DFG [Department of Fish and Game], the Governor's Office and federal trustees responsible for the regulation of fisheries must look to the UC, particularly the State Incident Commander, for information on oil spill amounts and trajectories, which they then will use in determining when, and if, fisheries should be closed. The recognized oil spill experts should be prepared to provide necessary data and guidance to fisheries decisionmakers in the event of a spill.

Expeditious tests and information are needed on assessing the human health impacts of spills on fish and fisheries, particularly with respect to making a decision to reopen a fishery.

NMFS [National Marine Fisheries Service], the State Incident Commander, and health officials were in consultation with the scientists in the UC as to fisheries management prior to the closure. The Governor's Office, making the decision to close the crab fishery, may not have directly benefited from those discussions.

Fisheries closures or restrictions during an oil spill for purposes of "market confidence" or potential for taint are appropriate, but require concerted communication efforts on the part of fisheries' regulating agencies.

While the full UC does not have authority to manage fisheries impacted by an oil spill, expertise and data within the UC should be expressly and readily provided to fishery management decisionmakers in a timely manner.

Fishery resource managers and health officials should aggressively seek input from the expertise within the UC in order to take advantage of all science generated during a spill. This will ensure that any closures are science-based, data-rich, and well considered.

To implement these recommendations it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation

1. Adequate public participation.
2. Lack of Public Relations staff with needed technical expertise in relation to cleanup operations and the types of contaminant(s).

Possible Resolution to Implementation Barriers:

1. The local community can encourage more public participation in establishing the parameters of the cleanup through their access to non-governmental organizations, business groups, and individuals within the community.
2. State and federal officials must bring Public Information Officers into the operation who have the experience necessary to adequately communicate the parameters of the operation with the general public.

Table 5-3. Summary of environmental recovery operations.

Short-Term Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Restore Environment	Perform assessment to identify impacts on environment	Local/State Office of Natural Resources, Local Planning Dept., EPA, Responsible Party		
	Determine level of decontamination/restoration that will be required (how clean is clean?) using federal standards	Responsible Party, Local Businesses, Public, Local/State Office of Natural Resources, Federal ESF #10		
	Develop restoration plan to include infrastructure and environment	Responsible Party, Local Businesses, Community-Based Organizations, Public, Local Planning Dept., Local/State Office of Natural Resources, Federal ESF #10	Lack of adequate public participation	Encourage more public participation through non-governmental organizations, business groups, and individuals within the community
			Lack of public relations staff with technical expertise in cleanup operations and types of contaminant(s)	State and federal officials must bring Public Information Officers with experience to communicate the parameters of the operation
	Develop volunteer pool, Initiate contracts for cleanup	Local Organizations, Legal Counsel, Responsible Party		
	Train volunteers who will assist with the cleanup and restoration	Responsible Party, Local Businesses, Public Works, Public, Local/State Office of Natural Resources, Federal ESF #10	Lack of trained personnel	Assistance from EPA through ESF #10 to provide training to volunteer pool
	Announce beginning of environmental restoration reinforcing "how clean is clean?"	Public Information Officer (Fire, Law Enforcement, Public Works, Emergency Management, Sanitation)	Lack of public relations staff with technical expertise in cleanup operations and types of contaminant(s)	State and federal officials must bring Public Information Officers with experience to communicate the parameters of the operation
	Restore critical elements of the environment per restoration plan	Local Organizations, Local Public Works, Utility Providers, Public, Responsible Party		
Intermediate Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Restore Environment	Restore high-priority environmental elements, including wildlife, per restoration plan	Local Organizations, Local Public Works, Utility Providers, Public, Responsible Party, EPA or USCG		
Long-Term Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Restore Environment	Restore remaining environmental elements	Local Organizations, Local Public Works, Utility Providers, Public, Responsible Party, EPA or USCG		
	Complete the cleanup and certify infrastructure as "clean and safe"	Local Organizations, Local Public Works, Utility Providers, Public, Responsible Party, EPA or USCG		
	Provide formal announcement to public	Public Information Officer (Fire, Law Enforcement, Public Works, Emergency Management, Sanitation)		

5.5 Operations for Economic Recovery

Perhaps the greatest underlying challenges associated with long-term recovery from catastrophic events stem from psychological and cultural issues. Americans tend to be steeped in nostalgia regardless of their experience, education, economic status, or professional level. After a major event, citizens typically yearn for a return to normal. However, normal is not necessarily an accurate representation of pre-disaster conditions. Further, there is an entrenched perception of "the way things should be," including ideas of where and how commercial districts fit into an area's physical layout.

Historically, commercial districts were created to be easily accessible to the general public: stores and services were located adjacent to other business and public concerns, such as banks, libraries, theaters, etc., to facilitate patronage. Before the advent, and later dependency, on personal transportation, these commercial areas were mostly within walking distance of residences, then as communities expanded into suburbs, by various modes of public transportation. As the country has grown, the concept of a central business district has also changed. Thus, the concept that applies in an urban community, such as Chicago, Illinois, is significantly different than the concept in a rural area such as Rochester, Washington. As a result, economic recovery approaches implemented in Chicago would likely not be very effective in Rochester, and vice versa. Consequently, each community has to assess its needs and develop its own approaches. This is most effectively accomplished through clear and continuing communication among community leaders, the public, and local businesses.

5.5.1 Short-Term Economic Revitalization

Although there is considerable knowledge and experience on how to deal with common hazardous materials incidents, there is very little documented experience with situations where major decontamination operations are required and businesses lose their inventory, equipment, etc. In such cases, simply relocating to an available building doesn't solve problems associated with restocking (retail and manufacturing) and obtaining replacement equipment (offices and industrial/manufacturing).

In Section 4.4.2, this report addresses response actions that can affect recovery. Research performed by the Georgia Technology Research Institute (GTRI) and the Georgia Institute of Technology on the impacts of the Graniteville, South Carolina, train accident highlights the concept of response actions impacting recovery. Decisions made by the Unified Command during the response phase restricted the entry of crews to cleanup and repair the Avondale Textile Mill for some 17 days. During that time, the chlorine gas had mixed with the moisture in the air and particulates within the mill to create acidic conditions that corroded metal and other surfaces to a point where, after 18 months of attempting to repair and restore the equipment, the Avondale Textile Mill was forced to close permanently and 4,000 workers across four states lost their jobs.[95] This situation highlights the precarious balance that exists between the Unified Command's objective of providing for public health and welfare versus the business owner's need to re-enter their facility to perform the cleanup and repairs necessary to resume operations.

The short-term economic consequences of the Graniteville incident included the following:[96]

- Cost to the Norfolk Southern railroad company of approximately $40 million, including the corporation's self-insurance retention (but no fines or penalties);
- Additional payments from Norfolk Southern to individual area residents who were evacuated, but did not seek medical attention within 72 hours of the accident (over 5,400 residents were evacuated – additional settlement amounts are not available due to confidentiality requirements associated with the settlements);

- Separate property damage settlements (amount unknown); and
- Claims for injuries or death (amount unknown).

The following long-term consequences to date (cases are still being tried) include:

- Closure of the Avondale Textile Mill, which put over 4,000 workers across four states out of work;
- According to Avondale Textile Mill, more than $140 million was spent on the failed effort to cleanup and repair their facility prior to its closure; and
- Norfolk Southern, through adjudicated court settlements to Avondale Textile Mill and its surviving entities, plus penalties levied through violations of the Clean Water Act (approximately $4 million), being ordered to pay a fine of $32,500 to the Superfund, purchase at least 3,000 fish to restock nearby Langley Pond, and contribute about $100,000 for a supplemental environmental project to plant vegetation along Horse Creek to improve water quality by decreasing erosion and sedimentation.[97]

Transportation Incidents Related to Hazardous Materials. Where decontamination is not required, or what is required is a simple process, local businesses will often be able to re-open within a matter of a few days to several weeks. Assistance to local businesses can include programs like those discussed in Section 4.8.1.

If the incident receives a declaration of major disaster from the President that activates the Individual Assistance Program, businesses may be eligible for SBA loans to supplement insurance settlements that will help them with lost revenue and repairing their facilities. Individual workers may also qualify for disaster-related unemployment benefits, housing assistance (including rental and mortgage assistance), as well as some relief from taxes.

If the presidential declaration includes public assistance, economic loss to the community is not an eligible cost. Consequently, it is important for local communities to take a very proactive approach to minimizing the impacts to business and the public in general. This will entail close coordination and communication with the local Chamber of Commerce, other business-related organizations, and the Unified Command managing the cleanup operations. Innovative solutions to the problems encountered will be necessary to effectively help local businesses, as presented in the following section.

Disastrous Hazardous Materials Transportation Incidents. For disastrous hazardous materials transportation incidents where major decontamination operations will require businesses within the impacted area (hot zone) to remain closed for a much longer period of time, there are limited solutions. It is quite likely that such an incident will change the complexion of a community's business district significantly.

When dealing with lost inventory and/or equipment, the task of re-ordering can be daunting, especially if the business will need to remain closed for a lengthy period of time. One possibility is that a business' insurance may cover loss of inventory. However, in a widespread event, processing insurance claims can be a time-consuming process. In an evacuation/relocation scenario, this process may be further complicated by competing claims, loss of records, and inability of insurance companies to meet their financial obligations.

A primary consideration here for the local community is relocating the business district to an area that is outside the impacted area. This will include answering questions such as

- Is the area properly zoned for retail, commercial, manufacturing, or industrial uses?
- Are suitable buildings readily available to move into, or does the area need to be built up?
- Is the infrastructure available to support a relocation of the business district?

When faced with a disastrous hazardous materials incident, the community's and even the county's budget process may be severely challenged. Hard decisions will need to be made on priorities for spending. In such cases, city councils and county executive boards may also want to consider providing some form of assistance to the business community outside what those businesses might be eligible for through insurance and under federally sponsored recovery programs. Such assistance may be easier to provide for small businesses, as their financial resources are typically more limited than larger businesses. Some possible assistance concepts include the following:

- For small commercial and retail businesses, consideration could be given to providing the businesses with trailers or pre-built module(s) and entering into a landlord/renter arrangement with the business. These temporary structures could be co-located within a community-owned park or other large parcel of land owned by the community.
- For moderately sized commercial and retail businesses, the community could help find space in existing business parks or even large shopping malls. Providing some form of rental subsidies would help defray their costs of getting back into business.

Options for large businesses, manufacturing, or other industrial types of business are more limited. At the same time, these businesses typically have better financial resources that provide them with more options. However, incentives could be provided to those businesses to ensure they remain in the community. Examples include

- Reduced property tax;
- Reduction in business license costs; and
- Reduced building permit fees for repairs associated with the incident.

5.5.2 Long-Term Economic Development

Even without the motivation and impact of a disastrous event, communities, especially in a downturn economy, are looking for ways to improve their economic base and enhance fiscal health for residents. A presidentially declared event may provide additional opportunities for a community by making available resources that are only accessible during disaster response/recovery periods.

Hurricane Katrina (2005) has been the most extensive and costly domestic event to date. Many of the short- and long-term recovery operations have been documented through websites for the Louisiana Recovery Authority and the long-term community recovery program (initiated by FEMA), *Louisiana Speaks.* Planning points, goals, and implementation strategies can be used as a starting point and adapted to suit other community requirements.

The following is the outline for "Economic and Workforce Goals" from Louisiana Speaks (http://www.louisianaspeaks-parishplans.org/IndSectorHomepage_RecoveryGoals.cfm?SectorID=2).

- Provide financial assistance for small businesses;
- Ensure that companies have access to qualified workers;
- Revamp the state's tax structure and economy;
- Develop a strategy for providing assistance to rural areas to help them increase wealth and create quality jobs;
- Develop a strategy to facilitate entrepreneurship and small business development;
- Develop new industries that take advantage of rebuilding efforts and/or regional resources and create high-quality jobs;
- Provide technical assistance for small businesses and assistance for the proven/dominant industries; and
- Improve business/investor confidence.

Strategies for economic growth in the post-disaster environment incorporate economic diversification, expanding and enhancing innovation clusters, supporting new business growth, and mitigating disaster impacts on existing businesses. When disaster strikes, these strategies can help lead to the rapid deployment of economic resources for recovery.

A critical component of economic development in disaster recovery is planning and taking appropriate action to mitigate the economic impact. Successful operations usually require that the community employ a comprehensive approach, encourage collaboration between and among diverse groups, and develop agreement on the community's long-term economic goals.[98] Economic development is driven from within a community by its needs and efforts. Marketing strategies are vital to economic growth, as are available materials, resources, and a trained workforce. In this regard, experience shows the following:

- The power of the press can make or break recovery efforts;
- Communities need to be proactive in their own rehabilitation;
- Communities outside an impacted area have little to no stake in redevelopment;
- The impetus and incentives to keep dollars within the community need to be created; and
- Outside assistance can be very helpful, but ultimately recovery happens from within.

The reality is that some businesses faced with the need to relocate will either relocate to the area provided by the community; choose to leave the community, or even the state, for another location; or choose to permanently close their doors. These issues are all economically based and determined by the business owner and their shareholders or other controlling bodies. The community will have little or no impact on this decision.

In the aftermath of the Graniteville, South Carolina, incident, an economic development partnership was formed by Aiken and Edgefield Counties to help address the long-term economic recovery issues. Their efforts to revitalize the Savannah River Basin were supported by the South Carolina Department of Commerce, along with other regional entities, and funded through the provisions of the U.S. Department of Commerce Economic Development Administration's investment program for "Suddenly and Severely Impacted Areas." The *Savannah River Basin Textile Recovery Plan and Graniteville Redevelopment Plan* was published on January 7, 2009.[99] The closing paragraph of the Graniteville redevelopment section (pages 24–25) reinforces that re-establishing a community's economy to pre-incident conditions may take years following the event.

> The overall redevelopment initiatives for the Graniteville/Vaucluse/Warrenville area are estimated to cost approximately $368 million and are expected to generate almost 3,600 new employment opportunities and an annual payroll of more than $118 million upon complete build out, which is expected to take 5 to 10 years.

5.5.3 Additional Economic Development Funding Resources

A major funding source for local communities is the Community Development Block Grant (CDBG) provided by HUD, a flexible program that provides communities with resources to address a wide range of community development needs, such as economic redevelopment of affected areas.

For activities in a disaster area, communities may request modification of some of the CDBG program requirements to facilitate disaster assistance. Communities may then use their CDBG funds for short-term assistance if such activities are not funded by FEMA or the SBA. These activities include the following:[100]

- Clearance of debris;
- Provision of extra security patrols;
- Demolition, clearance and/or reconstruction of damaged property posing an immediate threat to public safety;

- Emergency reconstruction of essential water, sewer, electrical, and telephone facilities;
- Provision of a variety of relief services to individuals and businesses; and
- Matching FEMA or other aid programs.

Table 5-4 presents several examples of innovative ways of using CDBG funds for disaster recovery. The examples are from the State of Louisiana, through the Louisiana Recovery Authority following Hurricanes Katrina (2005) and Rita (2005); Hancock County, Mississippi, through the Mississippi Development Authority following Hurricane Katrina (2005); and the State of Iowa through the Iowa Department of Economic Development following the 2008 floods.

Table 5-4. Innovative assistance programs for economic recovery.

Program	Description
State of Louisiana SOURCE: *Action Plan Amendment Number 2 for Disaster Recovery Funds*, Louisiana Recovery Authority, August 18, 2006, http://www.doa.la.gov/cdbg/dr/plans/Amend2_ED-Infra_Approved_06-09-13.pdf and *Action Plan Amendment Number 3 for Disaster Recovery Funds*, Louisiana Recovery Authority, http://www.doa.la.gov/cdbg/dr/plans/Amend3-WorkforceDev-Approved_06-08-10.pdf	
Small Firm Recovery Loan and Grant Program	Provides assistance to small firms that are deemed to have a chance to survive, contribute to the economy, and maintain and create jobs. Funds consist of small grants to reimburse for tangible losses and technical assistance to support the firms. Firms assisted would be those expected to survive and pay back the funds if given a loan.
Technical Assistance to Small Firms	Contracts with community-based organizations and other service providers allowing them to provide technical assistance to small firms, including nonprofits that have been adversely affected by the hurricanes and/or provide assistance to entrepreneurs or individuals seeking to start a new firm that would be located in the impacted area.
Long-Term Recovery Loan Guarantee Program	The goal of creating a longer-term loan program is to motivate banks to provide loans to viable small firms who may have experienced difficulty receiving loans from conventional lenders or the SBA because of complications following the hurricanes. Louisiana instituted a Disaster Bridge Loan Program to bridge the gap that exists from the time that insurance pays off losses or an SBA disaster loan is funded. These local and regional banks have now identified the need for longer-term capital to continue the recovery started with the bridge loans.
Louisiana Tourism Marketing Program	Prior to the storms, the tourism and cultural industries combined sustained 260,000 jobs for Louisiana residents. The significant loss of tourists means that thousands of small businesses that make up the character of south Louisiana are at serious risk of closing very soon. Even the most viable and successful of these companies have been hanging on, waiting for their customer base to return. However, their tourism customers have not yet returned, and many local customers do not yet have the ability and/or confidence to spend money. This fund will support a national campaign and other initiatives designed to bring out-of-state travelers back to the New Orleans region, Southeast Louisiana, and Southwest Louisiana.
Recovery Workforce Training Program	The loss of jobs from the hurricanes impacted every sector from healthcare and construction to retail and tourism. The Recovery Workforce Training Program addresses the loss of jobs and the re-employment of our workforce as a top priority in the recovery of the impacted areas and the long-term recovery of the state's overall economy. The program is centered on three interrelated factors critical to the recovery of Louisiana's economy: the return of the displaced workforce; the retention of the existing workforce; and a concerted effort to increase skills development for new jobs in sectors related to the immediate and long-term recovery and rebuilding efforts and the future of our economy. The RWTP will develop a highly skilled and well-trained workforce to meet the immediate and long-term needs of the six identified recovery sectors: Construction, Healthcare, Transportation, Advanced Manufacturing, Oil & Gas, and Cultural Sector.

(continued on next page)

Table 5-4. (Continued).

Program	Description
Hancock County, Mississippi SOURCE: *Economic Development Program Amendment 4 Modification 3*, Mississippi Development Authority, February 2, 2009, http://www.msdisasterrecovery.com/documents/ED_Amendment_4_Modification_3_Final_2-24-09.pdf and *Hancock County Long Term Recovery CDBG Disaster Recovery Program Amendment 7 Modification 1*, Mississippi Development Authority, March 30, 2009, http://www.msdisasterrecovery.com/documents/Hancock_County_AP_Amendment_7_Mod_1_Final_Version_Public_Comments20090429.pdf	
Hancock County Job Generation Fund	The primary objective of this loan program is to provide capital to small businesses most in need for the intended purposes of stimulating job growth and rebuilding in slum and blighted areas. Loan proceeds may be used • To repair or replace machinery; • To purchase inventory, furnishings, and fixtures; • For working capital/operating expenses (including rent, utilities, and payroll); and • For the rehabilitation of a building.
Hancock County Community Revitalization Program	Projects may include more than one activity and include • The acquisition of real property (including air rights, water rights, and other interest therein); • The acquisition, construction, reconstruction, or installation of public works, facilities (except for buildings for the general conduct of government), and site or other improvements; • Special projects directed to the removal of material and architectural barriers which restrict the mobility and accessibility of elderly and handicapped persons; • Clearance, demolition, removal of buildings and improvements, and movement of structures and other sites; • Projects that rehabilitate, preserve, and restore historic properties; and • Projects that rehabilitate commercial or industrial buildings.
State of Iowa SOURCE: *Disaster Recovery Business Assistance Programs*, Iowa Department of Economic Development http://www.iowalifechanging.com/jumpstart/business_rental.aspx	
Expanded Business Rental Assistance Program	Provides financial assistance to a business located in, or planning to locate in, a business rental space that was physically damaged by the 2008 natural disaster(s). Assistance will be in the form of rental assistance to help offset building rental lease payments for a maximum of 6 months. This program also provides assistance in the form of reimbursement for up to 75 percent of business expenses associated with the purchase of machinery and equipment, office equipment, furniture, supplies, and inventory.
Loan Interest Supplement Program	Provides assistance in the form of interest supplements to businesses who have obtained physical disaster loans or economic injury disaster loans from an eligible lender.
Commercial Rental Revenue Program	Assists with cash flow for commercial building owners to offset the loss of revenue from rental space that was physically damaged by the disaster.
Residential Landlord Business Support Program	Compensates landlords for lost residential rental revenue for providing affordable housing, whose rental units were physically damaged by the disaster.

If the incident receives a declaration of major disaster from the President of the United States, there are several other federal programs that can also be employed to assist communities. One of these programs is the Community Disaster Loan Program. This is a loan to the local community to " . . . maintain existing governmental functions or to expand such functions to meet disaster-related needs."[101] The amount of the loan, as noted in Section 206.361b of Subpart K, 44 CFR, is

based on need and shall not exceed 25 percent of the local government's annual operating budget for the fiscal year in which the disaster occurs or $5 million.[102]

5.5.4 Summary of Economic Recovery Operations

Table 5-5 summarizes the components and actions addressed in the section on economic recovery operations and can be adapted for local planning.

Table 5-5. Summary of economic recovery operations.

Short-Term Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Long-Term Recovery Planning	Hold community meeting(s) to determine vision and direction for revitalizing the community	Local Disaster Recovery Manager, Local Economic Development Dept., Local Planning Dept., Local Chamber of Commerce, Other Community-Based Organizations, Public		
	Develop long-term recovery plan based on direct and indirect damages identifying potential projects, funding sources, and priorities aimed at revitalizing the community in line with community vision	Recovery Coordinator, Local Economic Development Dept., Local Planning Dept., Local Chamber of Commerce, Other Community-Based Organizations		
Assistance to Impacted Businesses	Implement programs for business reimbursements developed in negotiations with Responsible Party and EPA	Local Government Elected Officials, Legal Counsel, Financial Institutions, Chamber of Commerce, Community-Based Organizations	Lack of authorities of local government	Develop ordinance or resolutions to provide authorities
	Identify available space within the community to which businesses can relocate	Local Planning Dept., Local Government Economic Development, Real Estate Businesses, Chamber of Commerce, Community-Based Organizations		
	Develop a program to assist local business to relocate to new/temporary facilities	Local Government Elected Officials, Legal Counsel, Financial Institutions, Chamber of Commerce, Community-Based Organizations	Lack of authorities of local government	Develop ordinance or resolutions to provide authorities
	Develop programs for local business to address economic losses not covered by negotiated settlement with Responsible Party	Local Government Elected Officials, Legal Counsel, Financial Institutions, Chamber of Commerce, Community-Based Organizations		
Economic Base	If community vision includes growth of the economic base, identify types of businesses desired and locations and identify modifications to infrastructure required	Local Government Economic Development, Legal Counsel, Local Planning Dept., Financial Institutions, Chamber of Commerce, Community-Based Organizations, State and Local Economic Development	Zoning Requirements may restrict the community's ability to re-establish and/or expand the economic base	Review and update/modify Comprehensive Plans; development regulations

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Table 5-5. (Continued).

Intermediate Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Long-Term Recovery Planning	Identify lead agencies and organizations for potential projects	Local Disaster Recovery Manager, Community Based-Organizations, Public		
	Develop schedule for implementation of Long-Term Recovery Plan	Local Planning Dept., Local Economic Development Dept., Local Chamber of Commerce, Other Community-Based Organizations, Public		
Assistance to Impacted Businesses	Working with the identified funding sources, begin development of grant applications	Local Economic Development Dept., Local Chamber of Commerce, Other Community-Based Organizations, Public	Funding source for local match on grants	Develop public-private partnerships
	Implement program to assist local business to relocate	Chamber of Commerce, Community-Based Organizations, Real Estate Agents		
	Implement programs for local business to address economic losses not covered by negotiated settlement with Responsible Party	Financial Institutions, Chamber of Commerce, Community-Based Organizations	Lack of funds	Develop and submit Community Development Block Grant applications
Economic Base	Implement public relations campaigns	State and Local Economic Development, Public Information Officers	Lack of funds	Apply for and secure Economic Development Grants
	Perform initial environmental studies to identify what the community needs to do to bring in more business and industry	Local Planning Department, State and Local Economic Development, Local Chamber of Commerce		
Long-Term Recovery				
Component	**Action**	**Resources**	**Barriers**	**Barrier Resolution**
Long-Term Recovery Planning	Implement the Long-Term Recovery Plan	Local Economic Development Dept., Local Chamber of Commerce, Other Community-Based Organizations, Public		
Economic Base	Negotiate agreements with new business and industry	Elected Officials, State and Local Economic Development		
	Implement infrastructure improvements for new business and industry	Public Works, New Businesses or Industry, Contractors		

5.6 Summary of Case Studies

Table 5-6 provides a summary of the recovery operations case studies presented in order of appearance in this section.

Table 5-6. Summary of recovery operations case studies.

Lessons Learned/Best Practices	Summary
Findings: *Disaster Recovery—FEMA's Long-Term Assistance was Helpful to State and Local Governments but had Some Limitations* (GAO-10-404), GAO, March 2010 (http://www.gao.gov/products/GAO-10-404)	• Conduct damage and safety assessments in public and private structures; • Restore transportation, communication, utilities, and other essential services; and • Implement short-term and long-term economic and community recovery practices.
Case Study: *After Action Report Graniteville Train Wreck – January 2005*, Aiken County Government (www.llis.gov)	• Joint training between EOC personnel and CP responders is needed. • South Carolina Emergency Management Department is developing the concept of a County EOC team (comprised of multiple county personnel) as well as an Incident Response Support Team to assist CP personnel with various activities (facility needs, communication needs, etc.). • Reverse 911 may be useful for personnel recall (pre-designated call groups) and training on the reverse 911 process is needed. • EOC PIO [Public Information Officer] suggests meetings with local agency PIOs to discuss lessons learned and preparedness for future incidents.
Case Study: *State Response to the Graniteville Train Derailment: Lessons Learned*, Team Visionary Collective under the Mentorship of Ron Fisher, May 27, 2006 (www.llis.gov)	Recommendation: To prevent future confusion about residents who should evacuate or shelter-in-place, city officials will not refer to the area as 1 mile or 2 miles from the hazardous site. All instructions will be more specific and referenced by street name. Giving more specific instructions should minimize confusion and reduce risk. Recommendation: All future accidents involving hazardous materials should have reflective arrows pointing toward the direction of safety so that people do not travel toward the scene of the accident.
Case Study: *After Action Report Graniteville Train Wreck – January 2005*, Aiken County Government (www.llis.gov)	Improvement Items • ACEMS attempted to medically monitor other responders, but they were entering incident area without EMS coordination. • Triage tags were not utilized, although they were available. • The on-duty EMS supervisor must relinquish control of outside incidents and focus on major incident being responded to. • Mass casualty plan not implemented initially due to communications difficulties. • Communication of patient status at decon was not well-coordinated with Red Cross shelter representatives. Persons at shelters were registered, but if they were sent to the hospital or left with friends/family, their status was unknown.
Case Study: *Mortuary Services: Victim Identification and Record Creation During a Mass Casualty Incident*, Lessons Learned Information Sharing (www.llis.gov)	The Rhode Island Station Club Fire After-Action Report recommends that medical examiners should consider using the DMORT VIP form from the outset of a mass casualty incident in order to expedite the victim identification and record creation process.
Case Study: *Incident Specific Preparedness Review (ISPR) M/V Cosco Busan Oil Spill in San Francisco Bay Part II and Final Report,* multiple federal, state, and local agencies, May 7, 2008 (http://www.uscg.mil/foia/CoscoBuscan/part2.pdf)	• Shoreline treatment termination endpoints • Closure and reopening of beaches • Closure of commercial fisheries

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Table 5-6. (Continued).

Lessons Learned/Best Practices	Summary
Case Study: *State Response to the Graniteville Train Derailment: Lessons Learned*, Team Visionary Collective under the Mentorship of Ron Fisher, May 27, 2006 (www.llis.gov)	Recommendation: An organizational structure should be established between agencies as soon as the different agencies begin working together so that there is no confusion with the order of hierarchy.
Case Study: *After Action Report Graniteville Train Wreck – January 2005*, Aiken County Government (www.llis.gov)	Improvement Items • EOC did not have press releases prior to distribution at CP. Hard copies of press releases were not initially distributed at press conferences. • Unmanned radio stations limited ability for local alerts to be made. • Initial notification did not go out through NOAA Weather Radio, although it was utilized later in the day. • EOC PIO could not get response from PIOs at CP to coordinate messages for media at EOC. • Citizens in shelters had no official information source. • Aiken County Help Line (211) received calls immediately but had no info to provide initially. The 211 line received updated information via television news report. As a result, 211 personnel did not learn key information such as the shelter-in-place message that had been transmitted to residents. • The 211 line is not accessible via cell phone. Additional number needs to be provided. • EOC was receiving updated information via television news reports. • Media staging area was located too close to CP.

CHAPTER 6

Best Practices for Community Public Information Efforts

6.1 Overview

The effective dissemination of information during both the response and recovery phases of a disaster is often critical to the actual, as well as perceived, success of these efforts. This section of the report discusses best practices related to public information efforts during both pre-incident planning and post-incident operations.

6.2 Pre-Incident Planning of Public Information Operations

Pre-incident planning should address the dissemination of public information through all available mediums. For successful operations, the public needs to be made aware of what is being done, where, by whom, and the expected outcome(s). Such a public information campaign will aid in addressing the public's concerns regarding contamination, thereby increasing public willingness to use available community facilities and services within the impacted area, purchase goods and materials from local merchants, and help reduce the economic impact on the community. A good approach to creating positive relations with the media is to include them in the development of the campaign and in associated training and exercises.

For decontamination operations and environmental recovery, it is imperative that the public fully understand the concept of "how clean is clean." A good example of this is the impact that the British Petroleum oil spill (2010) has had on the commercial fishing industry along the Gulf Coast. The impact of the loss of fishing revenues has been significant for the local and regional economies. As more waters are reopened for fishing, more fish and shellfish are appearing in the marketplace; however, the public's confidence in the cleanliness of these products has been slow to return.[103] What has not been effectively broadcast to the public (nationally, regionally, or locally) is the testing that has been done to ensure that the fish and shellfish are not contaminated and are safe for public consumption. A strong, well-coordinated public information campaign that addressed this issue could have helped with public confidence and potentially allowed the commercial fishing industry to recover much more quickly than it has.

For economic recovery, a concerted public education campaign that includes government officials, the local Chamber of Commerce, and key businesses is needed. This will also need to be a much broader effort than simply providing press releases. Again, the concept of "how clean is clean" needs to be emphasized in public service messages, radio and television commercials, and other identified avenues in order to get this information into the hands of the consuming public to help alleviate their fears and/or confusion in relation to potential contamination. Establishing approaches for this during pre-incident planning will allow for timely implementation following the event and also support more rapid mitigation of the potential economic impacts.

6.3 Public Information Operations during Recovery Operations

During the response to, and recovery from, a hazardous materials transportation incident, there is a need to provide timely and accurate information to the public (see Figure 6-1). This typically requires assistance from a broad range of sources, including the media, elected officials and their staffs, the private sector, volunteers, and community organizations. Maintaining a cautious and professional demeanor is essential to sound media relations. All media outlets have a job to do and deadlines to meet. If not given timely answers to their questions, they will typically turn elsewhere for information. Answers found elsewhere may not portray the operation in the most positive light and may also not accurately portray the events that are unfolding. In this respect, the role of the public information officer (PIO) is extremely important in ensuring that proper information is being provided. Some key PIO responsibilities include the following:[104]

- Scheduling interviews;
- Developing and maintaining a media contact list;
- Selecting appropriate team members for interviews;
- Preparing selected team members for interaction with the media;
- Escorting media representatives and VIPs throughout the operational area;
- Issuing press releases; and
- Gathering and verifying information.

All incidents have a public relations and information component. Local communities can obtain additional resources to help with their public information operations through ESF #15 – External Affairs. As with other ESFs, ESF #15 can be activated through FEMA via a request for assistance from the local community to the state.

Disastrous events can also often garner worldwide attention. The media highlights these incidents because they are unusual, unique, spectacular, and at times horrific, as can be seen by the events unfolding in Japan following the March 11, 2011, earthquake and tsunami. The media plays a role in all aspects of disaster management. Consequently, implementing an effective and coordinated public information operation can play a role in the success of the recovery phase.

(SOURCE: http://www.fema.gov/photolibrary/; photo credit: FEMA/ Bradley Carroll: FEMA News Photo)

Figure 6-1. Press conference in Tuscaloosa, Alabama.

Under the NRF, coordinated public information is developed and disseminated through the Joint Information Center. The NRF defines a Joint Information Center and Joint Information System (http://www.fema.gov/emergency/nrf/glossary.htm) as follows:

- **Joint Information Center (JIC):** An interagency entity established to coordinate and disseminate information for the public and media concerning an incident. JICs may be established locally, regionally, or nationally depending on the size and magnitude of the incident.
- **Joint Information System (JIS):** Mechanism that integrates incident information and public affairs into a cohesive organization designed to provide consistent, coordinated, accurate, accessible, timely, and complete information during crisis or incident operations. The mission of the JIS is to provide a structure and system for developing and delivering coordinated interagency messages; developing, recommending, and executing public information plans and strategies on behalf of the Incident Commander; advising the Incident Commander concerning public affairs issues that could affect a response effort; and controlling rumors and inaccurate information that could undermine public confidence in the emergency response effort.

The NRF concept of establishing a joint information center places all public information officers (PIOs) (representing all agencies and organizations involved in the incident operations) in a single location with the media. Typically, a JIC is located adjacent to, or close to, either the Joint Field Office (JFO) or the Incident Command Post where information releases can be reviewed and approved by the appropriate authorities and coordinated between all agencies. This aids in ensuring that information provided is accurate, timely, and coordinated, minimizing the potential for misinformation and rumors.

The following case study highlights lessons learned by the State of South Carolina following the Graniteville incident. These lessons learned underscore the importance of a coordinated public information campaign in getting necessary information about the operation to the public in an efficient and timely manner. These lessons are applicable to both response and recovery operations.

Case Study

State Response to the Graniteville Train Derailment: Lessons Learned, Team Visionary Collective Under the Mentorship of Ron Fisher, May 27, 2006 (www.llis.gov)

The information presented in this case study is taken directly from the referenced document.

The media was asked to directly report to the staging area to conduct live broadcasts, which provided information on the accident and evacuation instructions. Local news Channel 12 started broadcasting 2 hours before the Emergency Alert was heard by residents. During the entire event, incident commanders continued regular news briefings and held nightly town meetings at a nearby university for those affected by the event. According to the Sheriff's Office "After Action Report," there were no problems cited for public information. However, according to a report by the *Augusta Chronicle,* some black residents charged the Sheriff's Office with racial bias, claiming that they were told to evacuate later than white residents. Although the Sheriff's Office denied these charges, the result remains that public information was not perceived as successful by all parties.

At the same time, the public information was narrow in focus. According to Mitchell et al., "experts," defined as those from universities, professional and environmental organizations, and national agencies, accounted for less than 1 in 5 sources of the stories in the *Augusta Chronicle* and only about 1 in 25 in the *Aiken Standard.* Even Norfolk Southern was only quoted in 4 percent of the *Aiken Standard* articles and in 13 percent of the *Augusta Chronicle* articles. On the other hand, local law enforcement accounted for 24 percent of the *Aiken Standard* sources, following just behind residents and volunteers. As a result, local media focused not on the scientific, medical, or environmental details, concerns, or risks, but rather on the human-interest side of the disaster (e.g., injuries, deaths, logistical information, and lost pets).

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Case Study (Continued).
State Response to the Graniteville Train Derailment: Lessons Learned, Team Visionary Collective Under the Mentorship of Ron Fisher, May 27, 2006 (www.llis.gov)

Lesson Learned: Although forces on the ground have a unique perspective to environmental crisis, the perspectives of scientists and media providers is also important for understanding the multiplicity of implications. Populations at the greatest risk cannot afford miscommunication and oversight; it can cost them their lives. Therefore, it is necessary that mass media outlets provide balanced news that is informative, insightful, and may ignite response among the public. In turn, better coordination of public information might have improved public perceptions that race influenced evacuation and recovery.

Recommendation: With the number of agencies involved in the accident, there was a lack of organizational structure as the days progressed. Thus, we recommend that organizational structure be established between agencies as soon as the different agencies begin working together so that there is no confusion with the order of hierarchy.

To implement this recommendation it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation

1. Lack of a structured organization to maintain public information operations.
2. Lack of coordinated timeliness for information release (Channel 12 broadcasting 2 hours before the EAS to residents).

Possible Resolution to Implementation Barriers

1. Develop a unified public information (communications) plan to include definition of roles and responsibilities for Public Information Officers from all the agencies that could be involved in an incident. Such a joint operation will ensure accurate and coordinated information is provided to the public and the media.
2. Court media before incidents occur to establish good working relationships that will support response and recovery operations. This could include incorporating media representatives into the LEPCs as well as training and exercises.

As demonstrated in this next case study from Aiken County, South Carolina, one of the problems with their public information operation following the Graniteville incident was the lack of coordinated public information messages. In this incident, PIOs were stationed at the command post and the emergency operations center, while the media were located in a staging area near the incident site. Although focused on the response phase, the lessons learned can apply to both response and recovery.

Case Study
After Action Report, Graniteville Train Wreck – January 2005, Aiken County Government (www.llis.gov).

The information presented in this case study is taken directly from the referenced document.

OBJECTIVE: PUBLIC INFORMATION

Develop and disseminate accurate and timely information to the news media and the public.

Criterion 1: Inform state and county elected officials and local and national news agencies of the event, and disseminate accurate information and instructions to the public.

Improvement Item

- EOC did not have press releases prior to distribution at CP. Hard copies of press releases were not initially distributed at press conferences.
- Unmanned radio stations limited ability for local alerts to be made.
- Initial notification did not go out through NOAA Weather Radio, although it was utilized later in the day.
- EOC PIO could not get response from PIOs at CP to coordinate message for media at EOC.
- Citizens in shelters had no official information source.

Criterion 2: Demonstrate effective communications.

Strength

- Salvation Army provided interpreters for the Hispanic population.

Improvement Item

- Aiken County Help Line (211) received calls immediately but had no info to provide initially. Help Line (211) received updated information via television news report. As a result, 211 personnel did not learn key information such as the shelter-in-place message that had been transmitted to residents.
- Help Line (211) is not accessible via cell phone. Additional number needs to be provided.
- EOC was receiving updated information via television news reports.
- Media staging area was located too close to CP.

To implement these improvement items it is necessary to look at potential barriers and how those barriers might be overcome.

Barriers to Implementation

1. Insufficient staff to support comprehensive joint public information operations.
2. Lack of established plans for joint public information operations.
3. Lack of funding to complete public information plans and provide appropriate training.

Possible Resolution to Implementation Barriers

1. Ensure that responding agencies include public information officers along with deployed staff who have technical expertise in hazardous materials incidents and can communicate technical information to the public.
2. Local communities can develop planning teams to develop public information (communication) plans. Planning teams should include representatives from community agencies and the public, members of the media, appropriate state agencies, and the various federal agencies as appropriate.
3. Some grant funding is available to LEPCs for planning, training, and exercises through the HMEP grant program and various other federal grant programs (see Appendix E for more detailed information on this issue).

6.4 Summary of Case Studies

Table 6-1 provides a summary of the public information case studies presented in order of appearance in this section.

Table 6-1. Summary of best practices and lessons learned.

Lessons Learned/Best Practices	Summary
Lesson Learned: *State Response to the Graniteville Train Derailment: Lessons Learned*, Team Visionary Collective Under the Mentorship of Ron Fisher, May 27, 2006 (www.llis.gov)	Recommendation**:** An organizational structure should be established between agencies as soon as the different agencies begin working together so that there is no confusion with the order of hierarchy.
Lessons Learned: *After Action Report, Graniteville Train Wreck – January 2005*, Aiken County Government (www.llis.gov)	Improvement Items: • EOC did not have press releases prior to distribution at CP. Hard copies of press releases were not initially distributed at press conferences. • Unmanned radio stations limited ability for local alerts to be made. • Initial notification did not go out through NOAA Weather Radio, although it was utilized later in the day. • EOC PIO could not get response from PIOs at CP to coordinate message for media at EOC. • Citizens in shelters had no official information source. • Aiken County Help Line (211) received calls immediately but had no info to provide initially. Help Line (211) received updated information via television news report. As a result, 211 personnel did not learn key information such as the shelter-in-place message that had been transmitted to residents. • Help Line (211) is not accessible via cell phone. Additional number needs to be provided. • EOC was receiving updated information via television news reports. • Media staging area was located too close to CP.

CHAPTER 7

Gap Analysis

7.1 Overview

This section contains a list of shortfalls in information and guidance identified during the development of this report, as well as possible approaches for closing these gaps. The options for closing these gaps consider the differing capabilities and available resources among large, medium, small, rural, and urban communities, as well as among communities within any of the potential subsets.

7.2 Restitution and Funding Guidelines

Financial assistance for local communities is a major element of successful recovery operations. However, the project team's research found a lack of clarity between and among the various funding mechanisms that could come into play, potentially making it difficult for local communities to receive financial assistance in a timely manner.

7.2.1 Gap: Clear Guidance Needed on Funding Sources for Recovery

There appears to be confusion and misunderstanding regarding funding for response to, and recovery from, a hazardous materials transportation incident. There are some entities that believe the Stafford Act is a primary funding source. This is compounded by a mistaken belief that the NRF is tied directly to Stafford Act funding. For example

- Current guidance makes it clear that response and recovery activities associated with oil spills that are on, or impact, waterways are paid through the Oil Spill Liability Trust Fund (OSLTF), while releases of other types of hazardous materials (not based on oil or petroleum) are reimbursed through Superfund. Limits have been established for each of these funds; however, there is no discussion of what happens when those limits have been reached and the recovery operations are not yet completed. In such cases, it is unclear whether EPA or the USCG could go back to Congress for additional funding (in the case of the Stafford Act, if the original allocation from Congress for a particular disaster is exceeded, FEMA may request an additional allocation from Congress).
- If the funds from the responsible party are also exhausted, and the per incident limits imposed by the OSLTF or Superfund are met, it is unclear if the Stafford Act would apply, because the President would have to declare a major disaster and activate the Public Assistance Program, and Congress would have to allocate the necessary funds. The question of duplication of benefits also still exists, since the OSLTF or the Superfund could still have money even when an incident limit is reached.

Option: One potential approach to closing this gap would be for the EPA, USCG, and FEMA to develop clear and detailed guidance for each of the funding sources applicable to recovery from a hazardous materials transportation incident. This guidance document could explain the funds outline the limits, explain the process for securing funding from the potentially responsible party, describe eligible costs, and provide information on the claims process. Further, this guidance document could clearly articulate the relationship (or lack thereof) between the Stafford Act and the other funding sources.

7.3 Planning and Source Documentation

Many communities are not specifically planning for response to, and recovery from, a large-scale hazardous materials transportation incident. It is known that such an incident is possible, especially with the amount of these materials being transported and the fact that most are transported by truck. However, planning at the local and regional levels appears to be conducted more for local, small hazardous materials transportation incidents, rather than a large incident that could devastate a community regardless of its size, possibly involve multiple jurisdictions, and/or affect a large geographic area.

7.3.1 Gap: Coordinated Response and Recovery Planning Guidance Needed for Hazardous Materials Transportation Incidents

Review of the federal documents considered in developing this report shows that there are two primary documents available to local communities to assist in planning for hazardous materials transportation incidents. These are as follows:

- **EPA National Response Team – Hazardous Materials Emergency Planning Guide (2001).** This guidance document presents background information on the various environmental laws and walks through the planning process using a step-by-step approach. These guidelines address fixed-site facilities through the Emergency Planning Community Right-to-Know Act and transportation incidents. EPA's Chemical Emergency Preparedness and Prevention Office (CEPPO) *Technical Guidance for Hazards Analysis* (the "Green Book") may be used to assist local communities in ranking hazards posed by less prevalent but extremely hazardous substances.
- **DOE Transportation Emergency Preparedness Program (TEPP) –** *TEPP Planning Products Model Procedure Hazardous Materials Incident Response* (2007) contains recommended actions for response to a hazardous materials transportation incident that involves radioactive materials.

The NRT planning guidelines address the need for communitywide emergency plans consistent with other planning guidance from FEMA. The DOE document provides the basis for an incident-specific response plan to be used by hazardous materials teams responding to an incident involving radioactive materials. There is no indication that these two documents have been coordinated to ensure that the information presented in each is current, compatible, and applicable. Also, the NRT planning document is 10 years old, while the DOE guidance is 5 years old. Further, there is no indication of a schedule for review and update of either document.

A third document, which is available through TRB, is *HMCRP Report 5: A Guide for Assessing Community Emergency Response Needs and Capabilities for Hazardous Materials Releases,* prepared by Battelle Memorial Institute, Columbus, OH. Though not specifically planning guidance, this document provides the local community with tools to perform risk assessments, shows how to determine response needs and capabilities and how to fill the shortfalls, and discusses response operations.

Option: One possible solution that could close this gap would be for the NRT and TEPP to work together to develop a single planning document for local communities encompassing fixed hazardous materials sites and hazardous materials transportation incidents and including all major types of hazardous materials. This should consider the work included in *HMCRP Report 5* and this report. At a minimum, both programs could also consider a regular schedule for updating these planning guidelines.

7.3.2 Gap: A Single Repository is Needed for Hazardous Materials Background and Source Materials

Public access to background information regarding hazardous materials, and more specifically hazardous materials transportation incidents, appears to be widely dispersed between numerous public and private entities. From a federal agency standpoint, information is available from EPA, USCG, DOT, DOE, OSHA, FEMA, the CDC, and the National Fire Academy (NFA). Each of these entities has multiple components that develop and publish background information. Each of the referenced agencies also has differing responsibilities related to managing, transporting, and regulating hazardous materials. Additionally, industry maintains databases on various hazardous materials. For example, the rail industry annually publishes the most commonly shipped or released commodities and CHEMTREC maintains technical information on chemicals. As local communities work to develop and/or update their emergency plans to include response and recovery operations for hazardous materials transportation incidents, a single repository of this information would be invaluable.

Another issue is the difficulty in bringing all relevant characteristics of hazardous materials together in one database. This difficulty results from the lack of a common identifier code. Most databases listed have distinct purposes (e.g., USCG CHRIS Manual is designed specifically for hazardous materials behavior in water, OSHA is for workplace impacts, etc.). The development of a crosswalk of harmonized identification codes across agencies would be valuable.

Option: An approach to closing this gap could be for the identified agencies to work together to develop a single repository for planning guidance and background information relating to hazardous materials. This single repository could be something similar to, or perhaps even leverage, the DHS Homeland Security Digital Library (www.hsdl.gov) or FEMA's Lessons Learned Information Sharing site (www.llis.gov).

7.3.3 Gap: Minimal Information has been Compiled on Long-Term Recovery from Hazardous Materials Transportation Incidents

As with other types of disasters, both natural and manmade, there appears to be little information available regarding long-term recovery for local communities impacted by hazardous materials transportation incidents. There are federal and state requirements for the preparation of an after-action report and corrective action plan following the response to any incident. However, there are no such requirements in relation to recovery operations, more specifically, the long-term recovery component. For large-scale disasters and incidents, recovery operations may require many months or even years from the time of the incident. As these operations come to a close, there is little media attention, response agencies and departments have moved on to other activities, and elected officials are typically concerned with more current/pressing issues. There is a significant need within the emergency management community for access to documentation on long-term recovery lessons learned and best practices.

Option: One approach to closing this gap could be for FEMA, in conjunction with NEMA, to explore the reasonableness of modifying the National Incident Management System (NIMS)

to incorporate a recommendation that after-action reports covering the stabilizing, mid-term recovery activities, and long-term phases of recovery be developed for any incident. If it is found to be a reasonable requirement, appropriate guidance could then be developed. Another option would be to utilize the DOT 5800 Report, which may be the most adaptable report to capture details on recovery and mitigation.

7.3.4 Gap: A Current National Risk Assessment is Needed for the Transportation of Hazardous Materials

Emergency plans are typically risk based. However, the available data on hazardous materials transportation appears to be mostly outdated. Furthermore, in 2000, DOT commissioned an assessment of the effectiveness of its hazardous materials transportation program. One of the key findings of that study was that DOT's Strategic Plan did not highlight the risks associated with hazardous materials.[1] The report made recommendations for addressing this finding. For communities to put their risk for a hazardous materials transportation incident into the appropriate context, it would be helpful to have an updated national risk assessment for the transportation of hazardous materials similar to that presented in Table 1-4 in Section 1.2.2 of this report.

Option: One approach for addressing this gap could be for DOT to develop a national risk assessment and process for regular updates that would show the risks for transporting hazardous materials across all modes of transportation. This risk assessment could then be posted on the DOT website, such that it would be easily accessible to local communities.

7.4 Long-Term Consequences, Decontamination, and Cleanup of Hazardous Materials

There appear to be key gaps in documentation related to long-term recovery. For example, there is a large amount of information relating to the short-term consequences of exposure to various hazardous materials, but minimal information on the long-term consequences. In relation to building materials, there is almost no information on the long-term effects of various hazardous materials. This same lack of information also exists with decontamination, especially in relation to when decontamination is required, and finally with cleanup operations involving debris management.

7.4.1 Gap: Documentation Needed on the Long-Term Effects of Hazardous Materials

Very little information was found relating to the longer-term consequences to humans of exposure to hazardous materials. This lack of information also applies to the consequences of exposure of construction materials, such as wood, steel, concrete, asphalt, etc., to hazardous materials. For a local community to be able to adequately understand the full consequences of a hazardous materials transportation incident, background material on the short- and long-term consequences of exposure to hazardous materials is vital. This background material needs to cover both the human impacts, as well as those for the infrastructure and the systems that use that infrastructure.

Option: A possible solution to close this gap could be for EPA and CDC to encourage more research relating to the long-term consequences of exposure to hazardous materials. Local communities ultimately need this information to be able to plan for long-term medical care for

victims and responders. Communities will also need information on the impacts to building materials so they can create proper inspection procedures and determine how to proceed following hazardous materials transportation incidents.

7.4.2 Gap: Published Guidelines Needed on Planning for Decontamination Operations

Although there have been numerous guidelines developed by professional organizations, private companies, fire departments, and state agencies related to decontamination operations, these are mostly narrow in focus and tailored to the specific needs of the organization. For the private companies, much of the guidance was related to proprietary products. Most of the fire departments and professional organizations were focused on the use of water. The state guidelines typically focused on specific contaminants and did not provide general guidance. There were also numerous documents related to decontaminating patients in hospitals, but little information on when such decontamination would be required. Also, none of this guidance provided insight into when decontamination should be started. In addition, no information was found for establishing decontamination operations and procedures in the field for other than water hose-offs for responders.

DOE has published some guidelines through their TEPP program. Their decontamination guide, *TEPP Planning Products Model Procedure for Radioactive Material or Multiple Hazardous Materials Decontamination,* provides guidance for decontamination of emergency responders only when they leave the "hot zone" at either a transportation incident involving only radioactive materials or a transportation incident involving multiple hazardous materials (including radioactive material). The EPA's National Decontamination Team is also available to respond to incidents to provide onsite advice regarding decontamination. However, no EPA documents could be found relating to when decontamination would be required. This same lack of guidance also applies to decontamination of animals and livestock. The few documents we found provided good information for decontamination with water, but the documents were more of a procedural approach than a planning guideline.

As local communities develop or update their hazardous materials plans, comprehensive guidance on decontamination operations would be extremely helpful. These operations can be time-consuming and expensive. Some questions that planners need answers to include the following:

- What hazardous materials require decontamination of people and structures?
- What decontaminants are recommended under what kinds of situations? Or, is a thorough wash-down with water sufficient?
- What is the recommended approach to decontamination?
- If decontamination is required, to what level should people and structures be decontaminated? "How clean is clean?"
- Can community residents perform "self decontamination"?
- How are decontamination materials collected and properly disposed of?

Other areas that local community planners need to address include the following:

- How to evacuate and decontaminate animals from the local zoo or wild animal park if they are in the contaminated area;
- If the incident occurs at or near a tourist venue (stadium, amusement park, etc.):
  - How do you control and decontaminate the visitors?
  - How do you provide for their comfort and needs if they have to be quarantined or sequestered for a period of time?
  - How do you track them (especially out-of-town visitors)?
  - How do you/they take care of their needs or issues back home?

Contamination of foodstuffs is also an area of concern. Our research identified a few federal guidance documents, but these were primarily related to intentional contamination of food and dealt primarily with grocery stores and restaurants. In a disastrous hazardous materials transportation incident, it would be reasonable to assume that if buildings have been contaminated, then the foodstuffs in grocery stores, restaurants, and homes in the affected area would also be contaminated. How do homeowners and proprietors dispose of the contaminated foodstuffs? This also raises questions in relation to debris management and the collection of the contaminated foodstuffs.

Option: One approach for closing this gap could be for the National Decontamination Team to take the lead in developing comprehensive guidelines for decontamination operations. At a minimum, these guidelines could address when decontamination is required, the best methods and materials to use for decontamination, and how to dispose of the materials used for decontamination.

7.4.3 Gap: Planning and Operational Guidance Needed for Dealing with Debris Contaminated by Hazardous Materials

RCRA tells us that contaminated debris must be either decontaminated or placed in appropriate vessels for disposal at a recognized hazardous materials disposal site. The *Public Assistance Debris Management Guide, FEMA 325,* provides information on (1) contracting, managing, and establishing temporary storage and reduction sites and (2) the handling of disaster debris. However, there appears to be no guidance on how to pick up and manage contaminated debris following a hazardous materials incident, whether a fixed site or a transportation incident. This leaves many questions for which local communities need answers to be able to develop appropriate debris management plans. The element of contamination makes these operations significantly different than debris management following other types of disasters. Some of the issues that need to be addressed include, but are not limited to the following:

- How do businesses dispose of contaminated inventory and furnishings?
- How do residents dispose of contaminated furnishings?
- How do grocery stores, restaurants, and residents dispose of contaminated foodstuffs?
- What are the procedures for decontaminating debris in a temporary storage and reduction site?
- Who is responsible for the relocation of contaminated debris from a temporary storage and reduction site to a permanent storage area?
- What can local communities do to help their citizens prepare for a hazardous materials transportation incident?

Option: One possible approach for closing this gap could be for EPA, USCG, DOE, and DOT to develop a debris management guide for hazardous materials similar to the guidance developed by FEMA for debris generated by natural disasters. The guide could address what personal protective equipment (PPE) is required for the various contaminants, how to collect contaminated debris, how to decontaminate debris, and how to store and transport contaminated debris to a permanent storage area. Additional guidance for home and business owners on how to dispose of furnishings, foodstuffs, and inventories could also be very helpful for preparedness activities.

7.5 Evacuation and Victim Tracking

Tracking of evacuees and victims after an incident is of importance to local communities, especially as it relates to locating and reuniting families or making arrangements for debris to be removed from private property. In the case of a pending hurricane when entire communi-

ties are evacuated, it is necessary for the community to be able to find these individuals and to be able to make contact with them if for no other reason than to address issues of debris on their property. Many areas around New Orleans experienced this problem following Hurricane Katrina (2005), where piles of debris remained for several years because the local government could not locate the property owners and the government could not go on to private property to remove the debris.

7.5.1 Gap: A Simple Internet-Based System Needed for Tracking Evacuees that Accounts for Decontamination and Medical Assistance

Historically, as individuals check in to a shelter, their names and contact information are collected. This helps later in the recovery when families are being reunited. However, when individuals do not go to a shelter, it is very difficult to track these people. This issue becomes even more complicated for a hazardous materials incident that involves decontamination and the potential need for medical intervention.

Each community should have the capability of collecting basic information on evacuees and victims to aid in management of the incident. Ideally, this would be a Web-based system wherein the various departments and agencies within the community could have access to find people who have evacuated the area. Even for events with a long lead time (like a hurricane), people could be encouraged to log on, enter name, address of record, phone number, and the address where they are going. For those kinds of incidents where there is no lead time for evacuation, the information could be collected by hand at shelters, reception and decontamination centers, hospitals, clinics, etc. Dates and times of decontamination, medical treatment, etc. should also be entered.

The data can be provided to the geographic information systems (GIS) staff to be plotted on a map of the community. In the case where someone has left the area and there is a significant amount of debris on their property, this data could be used to get in touch with them and secure a right-of-entry agreement that would allow the community to remove the debris from their private property. This is just one example of how such data could be used in the recovery phase.

Option: One possible approach for closing this gap could be for the NEMA to develop a template tracking spreadsheet suitable for loading into a community's disaster management software. The tracking spreadsheet could include the individual's name, home of record, location to which they are evacuating, contact phone number, date and time of decontamination, and date and time of medical treatment. The spreadsheet could be available on line to shelters, medical centers, clinics, reception and decontamination centers, and the community's EOC.

7.6 Public Information

Compared to other types of disasters, both natural and manmade, hazardous materials transportation incidents do not appear to generate the same level of national attention that other types of disasters garner. This lack of attention could impact the speed at which assistance is provided to local communities.

7.6.1 Gap: Lack of Public Information Operations Guidance Regarding Hazardous Materials Transportation Incidents

There is a significant amount of information that can be generated from a hazardous materials transportation incident. This information needs to be clearly communicated with the public in

simple, non-technical terms. Following a hazardous materials transportation incident, the immediate needs for public information will be to announce that there is a health hazard, what precautions individuals need to take, identification of particular vulnerabilities (respiratory, contact, ingestion, etc.), the boundaries of where the contamination is located (places to avoid), and symptoms of exposure so people know if they need to go to the hospital immediately. This vital information is then followed by shelter-in-place requirements, information on any required evacuations, and information on the location and operations of reception and decontamination centers. As the operations move into the recovery phase, information will need to be shared with the public on standards that will be employed in decontamination, areas of the environment which may be closed during cleanup, and locations where individuals and businesses can apply for assistance. These types of public information releases should be developed prior to an incident with the incident specifics provided just before release. As the operations progress, and if decontamination is required, it will be extremely important that the parameters (how clean is clean) of the decontamination procedures be clearly presented to the public.

Option: A possible approach to closing this gap could be for EPA, USCG, DOE, and CDC to develop a guidance document for PIOs that outlines decontamination requirements and procedures. This document could also provide guidance for public information announcements on the issue of the level of decontamination.

7.6.2 Gap: Lack of Standardized Public Education Programs on Hazardous Materials

Research suggests that public awareness and understanding of hazardous materials is lacking. In this regard, no information was found regarding procedures or methods for enhancing the public's knowledge of hazardous materials and transportation issues. A more informed public can be a more prepared public.

Option: A possible solution to this gap could be for EPA, USCG, DOE, DOT, and CDC to work together on developing standardized public education programs on hazardous materials and safety issues related to hazardous materials that can be provided to local communities for presentation to the public. These programs could be in the form of public service announcements, fliers to accompany utility bills, web page content, radio campaigns, even ideas for documentaries. FEMA could play a role in this effort, because they have a successful record of creating such public education programs for other hazards.

7.7 Summary of Identified Gaps

Table 7-1 provides a summary of the identified gaps presented in order of appearance in this section.

Table 7-1. Summary of identified gaps.

Gap	Option
Clear Guidance Needed on Funding Sources for Recovery	One potential approach to closing this gap would be for the EPA, USCG, and FEMA to develop clear and detailed guidance for each of the funding sources applicable to recovery from a hazardous materials transportation incident. This guidance document could explain the fund, outline the limits, explain the process for securing funding from the potentially responsible party, describe eligible costs, and provide information on the claims process. Further, this guidance document could clearly articulate the relationship (or lack thereof) between the Stafford Act and the other funding sources.
Coordinated Response and Recovery Planning Guidance Needed for Hazardous Materials Transportation Incidents	One possible solution that could close this gap would be for the NRT and TEPP to work together to develop a single planning document for local communities encompassing fixed hazardous materials sites and hazardous materials transportation incidents, and including all major types of hazardous materials. At a minimum, both programs could also consider a regular schedule for updating these planning guidelines.
A Single Repository is Needed for Hazardous Materials Background and Source Materials	An approach to closing this gap could be for the identified agencies to work together to develop a single repository for planning guidance and background information relating to hazardous materials. This single repository could be something similar to, or perhaps even leverage, the DHS Homeland Security Digital Library (www.hsdl.gov) or FEMA's Lessons Learned Information Sharing site (www.llis.gov).
Minimal Information has been Compiled on Long-Term Recovery from Hazardous Materials Transportation Incidents	One approach to closing this gap could be for FEMA, in conjunction with NEMA, to explore the reasonableness of modifying the National Incident Management System (NIMS) to incorporate a recommendation that after-action reports covering the stabilizing, mid-term recovery activities and long-term phases of recovery be developed for any incident. If it is found to be a reasonable requirement, appropriate guidance could then be developed. Another option would be to utilize the DOT 5800 Report, which may be the most adaptable report to capture details on recovery and mitigation.
A Current National Risk Assessment is Needed for the Transportation of Hazardous Materials	One approach for addressing this gap could be for DOT to develop a national risk assessment and process for regular updates that would show the risks for transporting hazardous materials across all modes of transportation. This risk assessment could then be posted on the DOT website, such that it would be easily accessible to local communities.
Documentation Needed on the Long-Term Effects of Hazardous Materials	A possible solution to close this gap could be for EPA and CDC to encourage more research relating to the long-term consequences of exposure to hazardous materials. Local communities ultimately need this information to be able to plan for long-term medical care for victims and responders. They will also need information on the impacts to building materials so they can create proper inspection procedures and determine how to proceed following hazardous materials transportation incidents.

(continued on next page)

Table 7-1. (Continued).

Gap	Option
Published Guidelines Needed on Planning for Decontamination Operations	One approach for closing this gap could be for the National Decontamination Team to take the lead in developing comprehensive guidelines for decontamination operations. At a minimum, these guidelines could address when decontamination is required, the best methods and materials to use for decontamination, and how to dispose of the materials used for decontamination.
Planning and Operational Guidance Needed for Dealing with Debris Contaminated by Hazardous Materials	One possible approach for closing this gap could be for EPA, USCG, DOE, and DOT to develop a debris management guide for hazardous materials similar to the guidance developed by FEMA for debris generated by natural disasters. The guide could address what personal protective equipment (PPE) is required for the various contaminants, how to collect contaminated debris, how to decontaminate debris, and how to store and transport contaminated debris to a permanent storage area. Additional guidance for home and business owners on how to dispose of furnishings, foodstuffs, and inventories could also be very helpful for preparedness activities.
A Simple Internet-Based System Needed for Tracking Evacuees that Accounts for Decontamination and Medical Assistance	One possible approach for closing this gap could be for NEMA to develop a template tracking spreadsheet suitable for loading into a community's disaster management software. The tracking spreadsheet could include the individual's name, home of record, where they are evacuating to, contact phone number, date and time of decontamination, and date and time of medical treatment. The spreadsheet could be available on line to shelters, medical centers, clinics, reception and decontamination centers, and the community's EOC.
Lack of Public Information Operations Guidance Regarding Hazardous Materials Transportation Incidents	A possible approach to closing this gap could be for EPA, USCG, DOE, and CDC to develop a guidance document for PIOs that outlines decontamination requirements and procedures. This document could also provide guidance for public information announcements on the issue of the level of decontamination.
Lack of Standardized Public Education Programs on Hazardous Materials	A possible solution to this gap could be for EPA, USCG, DOE, DOT, and CDC to work together on developing standardized public education programs (on hazardous materials and safety issues related to hazardous materials) that can be provided to local communities for presentation to the public. These programs could be in the form of public service announcements, fliers to accompany utility bills, web page content, radio campaigns, even ideas for documentaries. FEMA could play a role in this effort, because they have a successful record of creating such public education programs for other hazards.

CHAPTER 8

Future Initiatives

8.1 Potential Additional Work Related to Hazardous Materials Transportation Incidents

Through this research and the comments from the peer review, it appears that a series of reports on hazardous materials transportation incidents is desired. In the following subsections, the study team has identified reports that would help to complete the overall series and assist in improving local community response and recovery from disastrous hazardous materials transportation incidents.

The research team suggests the following research topics:

- **Improving local community response to disastrous hazardous materials transportation incidents** – This new project would begin with the incident and extend through mitigation. It would address the same topics as this current report (i.e., planning, operations, etc.), but as related to response operations. Again, the document would be written for local community emergency managers and LEPCs who are responsible for managing the incidents. As with this report, the new project would also take a strategic approach to addressing the subject.
- **A tactical approach to response and recovery operations** – These follow-on reports would look at the subject of hazardous materials transportation incidents from a tactical stance. The concept would be to develop tactical flow charts or matrices that would lead the community through response, into recovery, and through recovery. The primary materials presented in these reports would be generic operations checklists and position descriptions. Additionally, this project might include the development of a template or model plan for response and recovery operations.
- **Guidelines for decontamination operations** – This report would present best practices and lessons learned in relation to decontamination of persons, pets, livestock, and infrastructure. The document would provide a recommended "how to" approach and address topics such as after-care for pets and livestock, procedures for establishing decontamination areas, and the development of decontamination plans.
- **Guidelines for environmental remediation** – This report would present best practices and lessons learned in relation to environmental cleanup following a hazardous materials transportation incident and the development of green techniques to restore the environment. The document would provide a recommended "how to" approach and address standards, procedures, public involvement, and the development of environmental remediation plans.

8.2 Training and Exercises

The proposed series of reports on hazardous materials transportation incidents could be developed into a multi-day training program for local community planners, LEPCs, and emergency managers. The course would be based on these documents and would include group

discussion, small group discussions aimed at problem solving, and activities aimed at improving the overall understanding of hazardous materials transportation incidents for these planners and managers. The training program could be developed for FEMA and presented at the Emergency Management Institute as a resident course and/or taken "on the road" by the FEMA regions to provide training in local communities.

A second part to this initiative would be the development of an exercise manual. This manual would present a series of progressively more complex exercise scenarios that local communities could use to increase their capabilities to prepare for, mitigate against, respond to, and recover from disastrous hazardous materials transportation incidents.

8.3 Methods of Distributing the Report(s)

This builds off the standard method of distribution used by TRB. In that regard, one of the single best approaches would be for TRB, possibly in conjunction with U.S.DOT, to sponsor a hazardous materials transportation conference for carriers, emergency managers, community leaders, responders, and the public. Such a conference would be most effective if held after the proposed series of reports was completed. As an option, there could also be a series of conferences, with each conference focused on one of the documents in the series.

Suggestions for promoting the subject of recovery, and more specifically, this report, include the following:

- A session on recovery at the National Academy of Sciences disaster roundtable where this document could be presented along with other information related to recovery.
- The National Emergency Managers Association has annual conferences where a paper developed from this report would be a viable topic. (Note: the Project Team is already considering how best to present such a paper.)
- The International Association of Emergency Managers also has regularly scheduled conferences where a paper drawn from this report could be presented.

During the peer review, there was discussion of making the document available electronically through various tools used by the emergency management community, to include "apps," tablets, iPads, etc. Such an electronic version would then be available for reference during actual operations and might provide the guidance that the local community needs in a specific area. These electronic versions could be downloaded from the TRB website.

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APPENDIX A

Acronyms

ADA	Americans with Disabilities Act
AOC	Administrative Orders on Consent
APA	American Planning Association
ATSDR	Agency for Toxic Substances and Disease Registry
BART	Bay Area Rapid Transit
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BRP	Business Recovery Program
BUOC	Business Utility Operations Center
C&D	Construction and Demolition
CAA	Clean Air Act
CBO	Community Based Organization
CCP	Casualty Collection Point
CD	Consent Decree
CDBG	Community Development Block Grant
CDC	Centers for Disease Control and Prevention
CDL	Community Disaster Loan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIRTF	Critical Infrastructure Resiliency Task Force
CP	Command Post
CWA	Clean Water Act
DHHS	Department of Health and Human Services
DHS	Department of Homeland Security
DMAT	Disaster Medical Assistance Team
DMORT	Disaster Mortuary Operational Response Team
DOC	Department of Commerce
DOD	Department of Defense
DOI	Department of Interior
DOJ	Department of Justice
DOL	Department of Labor
DOS	Department of State
DPMU	Disaster Portable Morgue Units
EEZ	Exclusive Economic Zone - a sea zone over which a state has special rights over the exploration and use of marine resources.
EMAC	Emergency Managers Assistance Compact
EMAP	Emergency Management Accreditation Program
EMS	Emergency Medical Service

EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act (also known as SARA Title III)
ESF	Emergency Support Function
FBO	Faith Based Organization
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FOSC	Federal On-Scene Coordinator
GAO	Government Accountability Office
GIS	Geographic Information System
GSA	General Services Administration
HAR	Highway Advisory Radio
HHS	Department of Health and Human Services
HMGP	Hazard Mitigation Grant Program
HMTUSA	Hazardous Materials Transportation Uniform Safety Act
HRS	Hazard Ranking System
HRSA	Health Resources and Services Administration
HSPD	Homeland Security Presidential Directive
HUD	Department of Housing and Urban Development
IA	Individual Assistance
ICS	Incident Command System
IFGP	Individual Family Grant Program
IHS	Indian Health Service
IND	Improvised Nuclear Device
JFO	Joint Field Office
JIC	Joint Information Center
JIS	Joint Information System
KCP&L	Kansas City Power and Light
LEPC	Local Emergency Planning Committee
LGR	Local Government Reimbursement
LP Gas	Liquefied Petroleum Gas
LTCR	Long-term Community Recovery
NBAR	Non-Binding Allocations of Responsibility
NCG	National Coordination Group
NCP	National Contingency Plan (National Oil and Hazardous Substances Pollution Contingency Plan)
NDMS	National Disaster Medical System
NDRF	National Disaster Recovery Framework
NEMA	National Emergency Management Association
NFPA	National Fire Protection Association
NGO	Non-Governmental Organization
NIEHS	National Institutes for Environmental Health Sciences
NIH	National Institutes of Health
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NPS	National Park Service
NRC	Nuclear Regulatory Commission

NRC	National Response Center
NRF	National Response Framework
NRS	National Response System
NRT	National Response Team
OEM	Office of Emergency Management
OIAA	Office of Information Analysis and Access
OPA	Oil Pollution Act
OSHA	Occupational Safety and Health Administration
OSLTF	Oil Spill Liability Trust Fund
PA	Public Assistance
PG&E	Pacific Gas & Electric
PIO	Public Information Officer
PKEMRA	Post-Katrina Emergency Management Reform Act
RCRA	Resource Conservation and Recovery Act
RDD	Radiological Dispersion Device
REO	Regional Environmental Officer
RRT	Regional Response Team
RSF	Recovery Support Function
RSPA	Research and Special Programs Administration
SARA	Superfund Amendments and Reauthorization Act
SBA	Small Business Administration
SDWA	Safe Drinking Water Act
SERC	State Emergency Response Commission
SNS	Strategic National Stockpile
SRT	Strategic Recovery Timeline
TIH	Toxic Inhalation Hazard
TSCA	Toxic Substances Control Act
UAO	Unilateral Administrative Order
UC	Unified Command
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VIP	Victim Identification Process

APPENDIX B

Reference Documents

B1.1 Hazardous Materials Transportation Incident/Exercise Documentation

1. **Document Reference Source:** *Incident Specific Preparedness Review (ISPR) M/V Cosco Busan Oil Spill in San Francisco Bay Part II and Final Report;* multiple federal, state, and local agencies, May 7, 2008 (http://www.uscg.mil/foia/CoscoBuscan/part2.pdf)

   Recovery Component(s): Environmental and Economic

   Document Type: After-Action Report

   Document Summary: On November 7, 2007, the *M/V Cosco Busan* departed the Port of Oakland located on the Oakland Estuary in San Francisco Bay. With visibility in the estuary limited by dense fog, the San Francisco Bar Pilot and the assist tug *Revolution* moved the ship into the channel and headed for the Golden Gate Bridge and the open sea. As the *Cosco Busan* passed the San Francisco-Oakland Bay Bridge, there was a collision with the Delta Tower Pier, damaging the port side of the ship and the pier's fendering. Three port wing tanks were damaged, two of which contained fuel oil, spilling 53,269 gallons of fuel oil into San Francisco Bay.

   Document Significance: This document relates to a hazardous materials transportation incident and presents lessons learned relating to environmental restoration and impacts to local businesses. These lessons learned could be of assistance in future similar incidents.

2. **Document Reference Source:** *After-Action Report Graniteville Train Wreck – January 2005,* Aiken County Government; and *After-Action Report – Graniteville Train Wreck – January 2005,* Aiken County Sheriff's Office (South Carolina) (www.llis.gov)

   Recovery Component(s): General

   Document Type: After-Action Report

   Document Summary: This document presents lessons learned, strengths, and areas for improvement from the Aiken County response to the Graniteville Train derailment of January 6, 2005. This derailment was caused by a Norfolk Southern train hitting a parked train at the Avondale Mills Textile Plant. The result of the incident was the release of approximately 90 tons of chlorine gas, the evacuation of 5,500 citizens, medical assistance for 529 people, and the deaths of 10 people. (Note: The numbers noted in the Document Summary are those reported in the After-Action Report. However, more recent information from the Aiken County HazMat Team that responded to the incident shows that there were 9 deaths and 80 tons of chlorine released from a 90-ton capacity rail car.)

   Document Significance: Much of the information contained in the lessons learned and the improvement areas for public information is response related. However, the topics can

be extrapolated to apply to recovery operations as well. This incident is an excellent example of the types of situations that can arise in recovery operations for hazardous materials transportation incidents.

3. **Document Reference Source:** *Chemical Incident Response: Assigning Staff to Greet and Instruct Patients at a Hospital Decontamination Area,* Lessons Learned Information Sharing (www.llis.gov)

   Recovery Component(s): Mass Care; Decontamination

   Document Type: Lessons Learned

   Document Summary: The lessons learned presented in this document were derived from a Chemical Stockpile Emergency Preparedness Program (CSEPP) exercise to test a hospital's capabilities for decontamination operations. The important lesson learned from this incident was the need to maintain the presence of properly protected hospital staff within the decontamination area to ensure that potential patients do not wander into the hospital, increasing the spread of the contamination.

   Citation:

   Federal Emergency Management Agency, U.S. Army. *Umatilla Community CSEPP Exercise 2007.* 16 Jul 2007. https://www.llis.dhs.gov/docdetails/details.do?contentID=26423

   Document Significance: Whether the incident is an accidental release of hazardous materials from a stockpile or the result of a transportation accident, hospital and decontamination staff need to ensure that patients are provided with the appropriate guidance at the decontamination center so as not to further contaminate otherwise clean areas. This is another example of an incident that is not transportation related, but which results in the same type of operation that might be required following a transportation incident involving hazardous materials.

4. **Document Reference Source:** *Hazardous Materials Response: Communicating an Alternate Decontamination Plan to Responders in the Hot Zone,* Lessons Learned Information Sharing (www.llis.gov)

   Recovery Component(s): Mass Care; Decontamination

   Document Type: Lessons Learned

   Document Summary: Directing victims to the appropriate safe areas is one of the key functions of all emergency responders. In most cases, as was shown in this full-scale exercise, the need for alternate plans is not always considered. In this case, victims began showing up for decontamination before the formal decontamination area had been established. This document refers to an alternate decontamination plan as being the plan for where to send victims before the formal decontamination area has been established and communicating that information to the hazardous materials personnel within the hot zone.

   Citation:

   Orange County (CA) Transit Police Services. *Orange Shield 2006 Full-Scale Exercise After Action Report.* 3 May 2006. https://www.llis.dhs.gov/docdetails/details.do?contentID=25285

   Document Significance: Any incident involving hazardous materials can require that victims be decontaminated. The process and procedures for accomplishing the identification of a site, set up, and completing the decontamination operations is the same for any incident involving hazardous materials. Consequently, the information presented herein as les-

sons learned will apply to the case of decontamination following a transportation incident involving hazardous materials.

5. **Document Reference Source:** *Mass Evacuation: Planning for the Evacuation of Special Needs Populations,* Lessons Learned Information Sharing (www.llis.gov)

   Recovery Component(s): Recovery Planning; Mass Care

   Document Type: Lessons Learned

   Document Summary: In many cases, identifying the resources available to help with the evacuation of special needs populations can be a challenge. Preplanning can help to ensure that these potential victims are moved to safe areas in a timely fashion. This document is based on the Apex Fire Department's (AFD) response to a report of a chlorine odor at a street intersection in Apex, North Carolina.

   Citation:

   Department of Homeland Security, United States Fire Administration. *Technical Report Series: Chemical Fire in Apex, North Carolina.* April 2008. https://www.llis.gov/docdetails/details.do?contentID=32996

   Document Significance: This event dealt with a structure fire resulting in the release of chlorine. A hazardous materials transportation incident could result in the release of chlorine or any other type of chemical resulting in the need to evacuate individuals once the plume has dissipated. The lesson learned from this incident applies to transportation incidents as well as other types of hazardous materials incidents.

6. **Document Reference Source:** *Mass Decontamination: Assigning Personnel to Monitor Access to Control Zones and Mass Decontamination: Clearly Demarcating Boundaries of the Control Zones,* Lessons Learned Information Sharing (www.llis.gov)

   Recovery Component(s): Mass Care; Decontamination

   Document Type: Lessons Learned

   Document Summary: This functional exercise pointed out two critical areas that need to be incorporated into decontamination operations—access control and clearly marking the boundaries of the hot zone. In this exercise, many responders and victims were wandering in and out of the hot zone. This activity can lead to an increased area of contamination and the repeated contamination of individuals. The document is based on an exercise conducted by Hood River County, Oregon.

   Citation:

   Department of Homeland Security. State of Oregon Hood River County Functional Exercise After-Action Report. 17 Sep 2005. https://www.llis.dhs.gov/member/secure/detail.cfm?content_id=23536

   Document Significance: The concepts of access control apply not only to radiological incidents, but to any incident that involves some level of contamination within a defined area. Establishing a hot zone defines the area of contamination and is intended to keep people out of that area so they do not become contaminated and spread the contamination to non-contaminated areas. This document is relevant to this project, as it shows the need for access control and monitoring, a function that is not dependent on the causative incident.

7. **Document Reference Source:** *State Response to the Graniteville Train Derailment: Lessons Learned,* Team Visionary Collective under the Mentorship of Ron Fisher, 27 May 2006 (www.llis.gov)

Recovery Component(s): Mass Care; Evacuation

Document Type: Lessons Learned

Document Summary: This document presents lessons learned by the State of South Carolina from their response to the Graniteville Train Derailment on January 6, 2005. This derailment was caused by a Norfolk Southern train hitting a parked train at the Avondale Mills Textile Plant. The result of the incident was the release of approximately 90 tons of chlorine gas, the evacuation of 5,500 citizens, medical assistance for 529 people, and the deaths of 10 people. "The collision occurred in an area known as 'dark territory' where electronic control and track signals are not used (The State, 2005). Human error and outdated equipment are believed to have contributed to this incident . . . ." (Note: The numbers noted in the Document Summary are those reported in the After-Action Report. However, more recent information from the Aiken County HazMat Team that responded to the incident shows that there were 9 deaths and 80 tons of chlorine released from a 90-ton capacity rail car.)

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South Carolina State Emergency Operations Center Situation Report #12. 1/13/2005 9:30. http://www.scemd.org/News/sitreps/graniteville-05/Graniteville%20train%20wreck12-01-13-05.pdf

Document Significance: This document addresses the problems attendant with evacuation following a hazardous materials transportation incident. The information and recommendations presented in this document can provide valuable operational insight to others experiencing a similar situation.

8. **Document Reference Source:** *Shelter Operations: Working with Property Managers to Identify Temporary Replacement Housing,* Lessons Learned Information Sharing (www.llis.gov)

   Recovery Component(s): Recovery Planning; Temporary Housing

   Document Type: Lessons Learned

   Document Summary: Finding adequate temporary housing within the impacted community is a major challenge to planners. This document is based on a tabletop exercise in North Carolina that looked at many of the issues in long-term temporary housing. The suggestion that planners should work with property management and rental associations to identify available rental units to use as temporary replacement housing is a solid lesson learned and identifies a valuable resource to local government planners and the community as a whole.

   Citation:

   Faltinowski, Gary. Information and Planning Section Chief, North Carolina Division of Emergency Management. Interview with *Lessons Learned Information Sharing,* 12 Dec 2006. Federal Emergency Management Agency, Region IV. *After Action Report: Hurricane Preparedness Tabletop Exercise—Region IV, May 31-June 2.* 1 Oct 2006, p 34. https://www.llis.dhs.gov/member/secure/detail.cfm?content_id=20873

   Document Significance: This tabletop exercise addresses temporary housing issues related to the aftermath of a Category 3 hurricane in North Carolina. Certainly, hurricane disasters point out the significant need for temporary housing both for the short and long term. Following a hazardous materials transportation incident where a defined area may need decontamination, and potentially repairs, there may be a need to house displaced victims that live in the area. Typically, shelter operations are very temporary and the desire is to move individuals into short-term housing until their properties are ready to be reoccupied. The principles of that operation are the same whether the causative event is a hurricane or a hazardous materials incident.

B1.2 Non-Hazardous Materials Transportation Incident/Exercise Documentation

1. **Document Reference Source:** *Wide Vigilance III-SNS Component Full Scale Exercise – After Action Report & Improvement Plan.* Cocciardi and Associates, Inc. September 25, 2010. (www.llis.gov)

   Recovery Component(s): Mass Care – SNS-Point of Distribution

   Document Type: After-Action Report

   Document Summary: *Wide Vigilance III – SNS Component Full Scale Exercise – After Action Report & Improvement Plan* describes the outputs of a full-scale exercise (FSE) sponsored by the South Central Task Force (SCTF) National Stockpile Working Group in support of planning and training for response and recovery. Primary focal points of the FSE included planning, communications, and mass prophylaxis within the context of a severe weather incident.

   Document Significance: In terms of regional and local planning, FSEs such as *Wide Vigilance III,* along with subsequent reports and improvement plans, not only represent a means of identifying best practices and areas for improvement, but also build cohesion among the participating organizations. This FSE involved more than 100 individuals from key response and recovery entities at the state, county, and local levels, including the Pennsylvania Department of Health—Office of Public Health Preparedness, local emergency management agencies, local police officials, EMS representatives, fire department officials, and school district representatives.

   Although the scenario posed in the FSE is a natural disaster, the focus on the Strategic National Stockpile (SNS) makes this exercise particularly relevant to hazardous materials transportation incidents that could result in medical supply needs that exceed local capacity.

2. **Document Reference Source:** *Mortuary Services: Victim Identification and Record Creation during a Mass Casualty Incident,* Lessons Learned Information Sharing (www.llis.gov)

   Recovery Component(s): Mass Care; Mortuary Operations

   Document Type: Best Practice

   Document Summary: During a mass casualty incident, rapid identification and record creation for those victims that have died as a result of the event is of critical importance. This best practice recommends that chief medical examiners consider using the Disaster Mortuary Operational Response Team's (DMORT's) Victim Information Profile (VIP) to assist in the identification and record creation for victims. This document is based on a fire that destroyed the Station Club in Warwick, Rhode Island, on February 20, 2003.

   Reference:

   Titan Systems Corporation. *Rhode Island: The Station Club Fire After-Action Report: State, Local, and Federal Government and the Private Sector.* 13 Jul 2004.

   https://www.llis.dhs.gov/member/secure/detail.cfm?content_id=10806

   Document Significance: Victim identification and records creation applies to any incident that involves mass casualties. This particular best practice results from a structure fire with a large number of victims who burned to death. The principles and concepts addressed by this best practice apply to a mass casualty incident involving a transportation incident, as well as any mass casualty incident.

B1.3 Federal-Level Recovery Planning Documentation

1. **Document Reference Source:** *Long-Term Community Recovery Planning Process – A Self Help Guide,* FEMA, December 2005 (http://www.fema.gov/library/viewRecord.do?id=2151)

   Recovery Component(s): Long-Term Recovery Planning

   Document Type: FEMA Self-Help Guide for LTCR

   Document Summary: Produced by FEMA, this self-help guide for communities provides a step-by-step approach to developing, implementing, and updating Long-Term Community Recovery (LTCR) Plans in an easy-to-digest format that supplements guidance with real-world case studies. The step-by-step approach detailed in this document includes the following 13 steps:

   - Assess the need for LTCR;
   - Select a leader and outline the LTCR program;
   - Secure outside support;
   - Establish a public information campaign;
   - Build consensus;
   - Identify LTCR issues and opportunities;
   - Articulate vision and set goals;
   - Identify, evaluate, and prioritize LTCR projects;
   - Develop a community recovery plan;
   - Choose project champions;
   - Prepare an LTCR funding strategy;
   - Implement the plan; and
   - Update the plan.

   In addition, this document provides a user-friendly LTCR planning process checklist and detailed information about additional resources for information related to community recovery.

   Document Significance: Prepared in coordination with ESF #14 partners and the Florida Long-Term Recovery Office (LTRO), FEMA's self-help guide builds upon best practices and case studies to provide informed guidance that is tailored to local communities.

2. **Document Reference Source:** *Disaster Recovery – FEMA's Long-Term Assistance was Helpful to State and Local Governments but had Some Limitations* (GAO-10-404), Government Accounting Office, March 2010 (http://www.gao.gov/products/GAO-10-404)

   Recovery Component(s): General/Long-Term Recovery

   Document Type: GAO Report on FEMA LTCR

   Document Summary: GAO reports on the roles that FEMA's Long-Term Community Recovery (LTCR) played following recent disasters including the (1) 2007 Greensburg tornado, (2) 2008 Iowa floods, and (3) Hurricane Ike in 2008. The report involved primary and secondary research that entailed reviewing agency documents and policy, along with interviews of relevant federal, state, and local officials. The report highlights broad criteria and timing challenges related to assistance, the effectiveness of specific coordination efforts, and the effectiveness of specific planning assistance practices.

   Based on the report's findings, GAO recommended that FEMA increase the effectiveness of the timing and level of recovery assistance to meet local and state-level capacity and needs. Additionally, GAO recommended FEMA evaluate the level of authority necessary for coordinating federal agencies with a role in the recovery process.

Document Significance: GAO's assessment of FEMA's LTCR provides valuable guidance on lessons learned from three natural disaster case studies.

B1.4 State and Regional Recovery Planning Documentation

1. **Document Reference Source:** *Iowa Disaster Recovery Tabletop Exercise After Action Report/ Improvement Plan,* Rebuild Iowa & Iowa Homeland Security & Emergency Management Division, August 2010 (www.llis.gov)

   Recovery Component(s): Recovery Planning

   Document Type: After-Action Report

   Document Summary: This exercise is based on scenarios covering the progression of a flood disaster well into long-term recovery. The scenario begins on April 8, 2022, with 2 weeks of rain and flooding throughout central Iowa. Twenty-five counties are named in a presidential Declaration of Major Disaster. The second scenario occurs 3 days later, with 67 counties now named in the disaster. In addition, the flooding has impacted two urban centers and destroyed many acres of cropland. Fifty people have been killed and/or injured, and another 60,000 have been displaced from their homes. A special meeting has been called by the Governor to discuss the status of the storms and on-going response efforts and to assess the state's capacity to address long-term recovery. Following the meeting, the Governor announces that the state Disaster Recovery Framework has been put into effect and a few high-level goals, including returning displaced residents to their homes quickly or providing suitable temporary housing, reopening businesses in a timely fashion, and repairing critical infrastructure as soon as possible, have been put into place. Scenario three takes place 4 months later. Congress has just appropriated $500 million in recovery funds to the State of Iowa. This amount is less than was requested and it will take some time for this to become available to the state. Considerable additional funding will be needed to fully recover, but for the time being, priorities need to be set for this funding and programs established. The final scenario is 2 years later and many displaced residents are now in permanent housing. New housing construction is still underway. Infrastructure repair and rebuilding continues. Eighty percent of businesses have reopened, but some still struggle. Programs are ongoing and additional funding requests are still pending. The Governor has asked for a transition plan over the next year from recovery back to normal operations.

   Document Significance: This tabletop exercise addressed recovery operations following devastating floods and involved 46 participants from multiple state agencies, local governments, and public-private partnerships that all have a role in recovery. Although the scenario covered is a flood disaster, the actions identified within the recommendations of the exercise are applicable to any type of disaster or incident. From a recovery planning standpoint, these recommendations are applicable to the recovery operations following a transportation incident.

2. **Document Reference Source:** *California Disaster Medical Operations Manual,* California Emergency Medical Services Agency, Global Vision Consortium, December 3, 2008 (www.llis.gov)

   Recovery Component(s): Recovery Planning; Mass Care

   Document Type: Guidance Document

   Document Summary: This document is a planning guideline for medical operations in California. Although the information is California-specific, many of the concepts can be used by other jurisdictions. The purpose of the document is to define and standardize disaster

medical response operational procedures and set performance guidelines to ensure that Californians are effectively served by the system's capabilities.

Document Significance: While the specifics of this document may not be universally applicable, the concepts presented could be of value in increasing the efficiency of the medical elements of any recovery operation, including those involving hazardous materials transportation incidents.

3. **Document Reference Source:** *Exxon Valdez Oil Spill Restoration Plan,* Exxon Valdez Oil Spill Trustee Council, November 1994 (http://www.fakr.noaa.gov/oil/eis/1994RestorationPlan.pdf)

   Recovery Component(s): Recovery Planning; Environmental Restoration & Economic Recovery

   Document Type: Plans

   Document Summary: Not long after midnight on March 24, 1989, the oil tanker T/V Exxon *Valdez* ran aground in Prince William Sound, Alaska, and spilled almost 11 million gallons of crude oil being transported from the North Slope area of Alaska. This plan provides long-term guidance for restoring the resources and services damaged by the oil spill that contaminated nearly 600 miles of Alaska's shoreline. This plan was employed to guide the use of the remaining settlement funds after restitution was paid by Exxon to the federal government and the State of Alaska.

   Document Significance: This is a hazardous materials transportation incident with an economic component to the restoration planning process and, as such, is significant to this project.

4. **Document Reference Source:** *Annex 14 (ESF-14) Recovery and Mitigation,* State of South Carolina, February 2010 (www.llis.gov)

   Recovery Component(s): Recovery Planning

   Document Type: Plan

   Document Summary: This document provides a sound outline for recovery operations as they relate to natural disasters.

   Document Significance: This plan from South Carolina primarily addresses natural hazards. However, it provides sound background information into what is required to manage a recovery operation. For this project, the study team extrapolated information as it could apply to a hazardous materials transportation incident.

B1.5 Local-Level Recovery Planning Documentation

1. **Document Reference Source:** *Emergency Management Programs for Healthcare Facilities: The Four Phases of Emergency Management,* Lessons Learned Information Sharing (www.llis.gov)

   Recovery Component(s): Recovery Planning

   Document Type: Best Practice

   Document Summary: The best practice presented here relates to the four phases of emergency management (also known as integrated emergency management) as they apply to hospitals. The phases are preparedness, mitigation, response, and recovery. Under this concept, emergency management is a cycle that begins before the incident starts. Emergency Managers have learned over many decades that this approach leads to a balanced approach to disaster operations. For the purposes of this project, the study team excerpted only the portion of the document related to recovery.

References:

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Document Significance: Key to the success of a recovery effort are the planning and preparedness efforts undertaken prior to the incident, which lay the groundwork for implementing recovery operations in a timely and effective fashion. Typically, we think of recovery planning as it relates to a jurisdiction. This best practice document is focused on hospitals and their recovery planning. In a transportation incident involving hazardous materials, there may be a significant role for hospitals in mass care (both short and long term). The better prepared the hospital is to address recovery issues within their own facility, the better they will be able to assist in the overall recovery of the jurisdiction.

2. **Document Reference Source:** *Strategic National Stockpile Distribution Planning: Using Staging Sites to Segment Dispensing Processes,* Lessons Learned Information Sharing (www.llis.gov)

   Recovery Component(s): Recovery Planning; Mass Care

   Document Type: Best Practice

   Document Summary: This best practice provides recommendations on the use of segmented dispensing sites aimed at better controlling the flow of patients and vehicles. The concept involves splitting dispensing site functions into multiple and distinct physical locations.

   References:

Centers for Disease Control and Prevention. "Receiving, Distributing, and Dispensing Strategic National Stockpile Assets: A Guide for Preparedness." Version 10, June 2005 (LLIS.gov ID #14197)

Centers for Disease Control and Prevention (CDC). *Strategic National Stockpile Preparedness Course.* 12-16 Jan 2004.

Michael Montello. *Lessons Learned from Fall 2001 Capital Region Anthrax Response.* National Institutes for Health (NIH).

Document Significance: Planning for a strategic national stockpile distribution does not relate to any particular incident beyond the need for dispensing some form of medication. This best practice fits with other planning considerations that need to be addressed regarding the recovery from hazardous materials transportation incidents. The strategic national stockpile has a significant potential for use following a hazardous materials transportation incident.

3. **Document Reference Source:** *Howard Street Tunnel Fire, Baltimore City, Maryland, July 18, 2001***,** U.S. Department of Transportation ITS Joint Program Office, prepared by SAIC, July 2002 (www.llis.gov)

   Recovery Component(s): Planning; Economic Recovery

   Document Type: Incident Report

   Document Summary: On July 18, 2001, a 60-car CSX freight train derailed inside the Howard Street Tunnel. The train contained several tank cars carrying tripropylene, hydrochloric acid, and ethyl hexylphthalate. In addition to these hazardous materials, the train was carrying paper, pulpwood, and plywood, as well as other cargo. The derailment resulted in the derailed car carrying tripropylene catching fire and one car with hydrochloric acid to leak; another tank car carrying hydrochloric acid derailed but did not leak. The situation was compounded by the break of a 40-inch water main located under the intersection of Howard and Lombard Streets – almost directly above the site of the derailment – spilling water into the tunnel and onto the street. As it turned out, the break was located near the tank car carrying the tripropylene. Four days later, the fire department was able to move the box cars carrying paper and plywood and extinguish the fire completely. On July 24, the tunnel was cleared for traffic and the first post-fire train passed through the tunnel.

   The incident occurred as the City of Baltimore was preparing for both the evening rush hour and the second game of a baseball doubleheader at Oriole Park at Camden Yards. The result was a potentially catastrophic situation at peak demand hours for transportation services. This incident also seriously impacted the local business community.

   Document Significance: This document highlights the economic impact on a local community as a result of both the transportation incident and the secondary issue of the broken water main. In this case, the businesses were compensated for their losses resulting from the incident itself; however, the lost business that resulted from a lack of foot traffic and transportation in the area, and the rescheduling of the second baseball game, resulted in extreme hardship and loss of significant revenues. The lessons learned from this incident are directly applicable to this report.

4. **Document Reference Source:** *Radiological Incident Response: Decontamination of Buildings and Public Sites,* Lessons Learned Information Sharing (www.llis.gov)

   Recovery Component(s): Planning; Economic Recovery and Decontamination

   Document Type: Best Practice

   Document Summary: On September 13, 1987, two men stole a radiotherapy unit from an abandoned clinic in downtown Goiania, Brazil. The unit contained approximately 20 grams (1,375 curies) of Cesium-137 (Cs-137) in the form of cesium chloride salt. The men did not know that the source was radioactive and dismantled the unit, subsequently selling it to a junkyard as scrap metal. In the process, they ruptured the container and released the cesium,

contaminating themselves, family members, and the environment. During the process, other people became fascinated by the radioactive powder that glowed blue and rubbed it on their skin. A couple of weeks later, the junkyard owner's wife took a bag of the powder to the local hospital by bus after her family had become sick. This then contaminated more people and locations. At the hospital, a physician recognized the symptoms of acute radiation syndrome and alerted the Comissão Nacional de Energia Nuclear (National Nuclear Energy Commission [CNEN]). After realizing the severity of the incident, CNEN requested help from the International Atomic Energy Agency (IAEA).

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Lessons Learned Information Sharing. Radiological Incident Response: Establishing a Temporary Storage Site for Contaminated Material. 27 Mar 2006.

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Steinhausler, Friedrich. "Chernobyl and Goiânia Lessons for Responding to Radiological Terrorism." *Health Physics.* Vol. 89, no. 5, Nov 2005, pp 566-575. United Nations Development Programme and United Nations Children's Fund (UNICEF).

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Department of Energy. *RESRAD.* http://web.ead.anl.gov/resrad/home2/

Document Significance: This document addresses planning concerns in relation to a radiological dispersion device or improvised nuclear device. Although not transportation related, the information is valid at a potentially reduced level to transportation incidents that may require decontamination operations. This document presents planning concepts that will assist in the implementation of decontamination operations.

5. **Document Reference Source:** *Contra Costa County Hazardous Materials Area Plan,* County of Contra Costa, CA, William Walker, MD Health Services Director, Randall L. Sawyer, Hazardous Materials Division Director, and Michael P. Wedl, Hazardous Materials Specialist, December 2005 (www.llis.gov)

   Recovery Component(s): Recovery Planning; Shelter-in-Place; and Evacuation

   Document Type: Plan

   Document Summary: Many areas throughout the country have requirements for the development of hazardous materials plans. In some cases, these plans become an annex to the jurisdiction's emergency plan, while in others, they are stand-alone documents. The need to plan for a hazardous materials incident response and recovery is essential to timely and effective operations. This plan contains good information relating to shelter in place, evacuation, clean-up, and financing. Under federal law, the responsible party is required to fund the clean-up operations of a hazardous materials incident. However, this level of funding is often insufficient to meet the community's needs. In this plan, Contra Costa County has developed county funding that will assist in covering the costs of clean-up.

   Document Significance: The excerpts from the Contra Costa County Hazardous Materials Plan are directly related to the work under this project. The plan addresses three of the planning areas that are of interest to this project. The information included provides an example for other communities on how to incorporate the information into their hazardous materials plans.

6. **Document Reference Source:** *Annex Q – Hazardous Materials & Oil Spill Response,* City of Houston, October 2006 (www.llis.gov)

   Recovery Component(s): Recovery Planning

   Document Type: Plan

   Document Summary: This element of planning looks at the protection of citizens and could provide the basis of an education campaign aimed at helping the public be more prepared for hazardous materials incidents. The City of Houston, Texas, has developed a sound approach to addressing the critical issues important to protecting citizens, including guidance on when to initiate shelter-in-place or evacuation procedures. This plan also provides some basic information to protect drinking water and to address issues related to waste water.

Document Significance: These are all important planning issues for many hazardous materials incidents.

7. **Document Reference Source:** *Unified San Diego County Emergency Services Organization Operational Area Emergency Plan – Annex Q – Evacuation,* San Diego County, CA, URS Corporation, April 2007 (www.llis.gov)

   Recovery Component(s): Recovery Planning; Evacuation

   Document Type: Plan

   Document Summary: This evacuation annex to the San Diego County, California, emergency plan is representative of good planning practice and provides a significant amount of detail that can be used as sound guidance to those who must implement the plan. What should be pointed out is the discussion on the legal authorities for evacuation and how emergency personnel should address the situation. This annex covers evacuation procedures that are independent of the cause for the evacuation.

   Document Significance: This document reflects good planning practices in relation to evacuations. The plan is not specific as to what incident might initiate an evacuation. Since evacuation is a potential requirement in a hazardous materials transportation incident, this document is a relevant tool for this type of planning.

8. **Document Reference Source:** *San Diego County Emergency Services Organization and County of San Diego – Recovery Plan,* County of San Diego, CA, URS Corporation, April 2007 (www.llis.gov)

   Recovery Component(s): Recovery Planning

   Document Type: Plan

   Document Summary: This plan created for San Diego County, California, provides good information on recovery. The discussion of short-term and long-term recovery provides a clear distinction between the objectives of each phase. Debris operations are a key element of the infrastructure component of recovery. The information contained in this plan is good background information for a recovery plan. Many of the organizations noted are San Diego specific; however, there may be similar types of organizations within a specific jurisdiction that can provide similar information.

   Document Significance: Although not hazardous materials transportation incident specific, the information presented provides sound guidance for other jurisdictions creating recovery plans. Of particular interest is the discussion of short- and long-term recovery and debris operations.

9. **Document Reference Source:** *Countywide Post Disaster Redevelopment Plan – Palm Beach County, Florida,* Palm Beach County Division of Emergency Management, August 2006. (http://www.co.palm-beach.fl.us/publicsafety/emergencymanagement/programs/planning/postdisredev.htm

   Recovery Component(s): Planning

   Document Type: Plan

   Document Summary: Regulations in the State of Florida require that all coastal jurisdictions include the intent to prepare a Post Disaster Redevelopment Plan (PDRP) "which will reduce or eliminate exposure of human life and public and private property to natural hazards." The Palm Beach PDRP was developed in accordance with state law and the *Disaster Mitigation Act of 2000.*

   This document details redevelopment goals and issues within the context of four categories: (1) local government recovery issues; (2) economic and private-sector issues; (3) social and

environmental issues; and (4) redevelopment and mitigation issues. Within each category, countywide actions are discussed, and ultimately a public workshop was held to prioritize these actions. The prioritization listed the 10 most important post-disaster recovery areas as follows:

1. Availability of temporary housing/long-term sheltering;
2. Rapid restoration of power and other private utilities;
3. Adequate health and mental health services available during recovery;
4. Including affordable housing in redevelopment projects;
5. Debris management and disposal;
6. Critical infrastructure and facility repair;
7. Sustaining essential government services;
8. Ability to rebuild with stronger structures;
9. Water pollution from sewer system failures;
10. Shortage of contractors/supplies slows repairing of homes and businesses.

Each of these recovery areas is discussed in greater detail, followed by guidance for local officials on implementing and maintaining short- and long-term recovery plans and redevelopment actions. A detailed matrix organized by the 10 specified topics provides action periods and approximate timeframes, actions, jurisdiction(s) involved, disaster level (as applicable), and funding considerations.

Document Significance: Although the Florida requirement for coastal communities to develop PDRPs is related to the annual threat of hurricanes, the valuable recovery planning lessons can be applied to hazardous materials transportation incidents. The detailed matrix is particularly useful to this research, as it supplies actionable recovery information to local officials.

B1.6 Academic/Institutional Research

1. **Document Reference Source:** *OSHA Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances,* United States Department of Labor, Occupational Safety and Health Administration, January 2005 (http://63.234.227.130/dts/osta/bestpractices/html/hospital_firstreceivers.html#appa31)

   Recovery Component(s): Mass Care, Decontamination

   Document Type: Guidance Document

   Document Summary: This document, prepared by OSHA, outlines best practices for hospitals in dealing with patients exposed to hazardous materials.

   Document Significance: This document provides best practices relating to decontamination operations within a hospital. Decisions will be made at the incident site or by the emergency operations center as to where the best location is for potential decontamination operations. These best practices relate to operations within a hospital without regard to the causative event that resulted in contaminated victims.

2. **Document Reference Source:** *Strategic National Stockpile Distribution Planning: Information Requirements of Patients at Dispensing Sites,* Lessons Learned Information Sharing (www.llis.gov)

   Recovery Component(s): Mass Care; Prophylaxis

   Document Type: Best Practice

   Document Summary: Efficient dispensing operations require providing the public with clear information to keep the process moving in an orderly fashion. This best practice

looks at information requirements, mechanisms, languages, and special needs, as well as follow-up information.

References:

American Society of Health-System Pharmacists. *Local Emergency Preparedness and Response: On the Road to Best Practices. Midyear Clinical Meeting 2002.* Georgia World Congress Center, Atlanta, Georgia. 10 Dec 2002.

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Missouri Department of Health and Senior Services. *Missouri's Plan for Receiving, Distributing, and Dispensing the Strategic National Stockpile. Version 2 – Draft,* Oct 2003. (LLIS.gov ID #8046)

San Juan Basin Health Department. Crisis and Risk Communications Plan. 25 May 2004.

Patricia Coomber, PhD, and Robert Armstrong, PhD. *Coping with an Attack. A Quick Guide to Dealing with Biological, Chemical, and "Dirty Bomb" Attacks.* Center for Technology and National Security Policy. National Defense University. (LLIS.gov ID #14188)

Document Significance: The strategic national stockpile will be used during any kind of incident wherein mass prophylaxis is required. Following a hazardous materials transportation incident, the potential exists for mass prophylaxis operations to be implemented. The development of information before the incident will simplify the dissemination of the information during the event. Most of the information included in this best practice can be developed before the event and will assist in the actual operations during the event.

3. **Document Reference Source: "**Economic Recovery from the 9/11 Disaster: Lessons From New York State's Response in Lower Manhattan," Karl Seidman, Massachusetts Institute of Technology and Beth Siegel, Mt. Auburn Associates, *Applied Research in Economic Development,* vol. 5, issue 2, October 2008 (www.usm.edu/aredjourna)

   Recovery Component(s): Recovery; Economic

   Document Type: Case Study

   Document Summary: This study outlines the activities of the New York State Empire State Development Corporation (ESD) and the city's Economic Development Corporation (EDC) following the terrorist attack of 9/11 on the World Trade Center. Estimates of the economic loss using different methodologies and time periods range between $33 billion and $98 billion. The challenges involved included such actions as assisting businesses to relocate to vacant space elsewhere in the city and assisting in the restoration of utilities. The complete text version of this article is available online at www.usm.edu/aredjournal.

   Document Significance: Though many small communities are not able to finance programs on the scale of New York City, the applicable information is that government and financial institutions can work together to develop inventive programs that can be implemented quickly to assist the local business community. For transportation incidents involving

hazardous materials, the scope of the potential programs most likely would be reduced, but the concept behind these programs can be applied as appropriate.

4. **Document Reference Source:** "Defining Disaster: Local Constructions for Recovery in the Aftermath of Chemical Contamination." *Social Problems* (39)4:345-365 Aronoff and Gunter (1992). http://www.jstor.org/pss/3097015 (abstract only).

   Recovery Component(s): Recovery; Mass Care

   Document Type: Study

   Document Summary: This study examines local efforts in St. Louis, Michigan, and the surrounding area of Gratiot County in the aftermath of toxic chemical contamination resulting from accidental addition of polybrominated biphenyl to cattle feed that subsequently impacted human populations through contaminated meats. Collaboration among residents and local authorities marked the 6-year span of local recovery efforts.

   Document Significance: The importance of local efforts in collaborating following this type of chemical accident provides useful insights regarding local recovery from hazardous materials incidents in that human health impacts are intermingled with social issues, public perception, and local government effectiveness. Lessons learned may be applicable for comparable communities; however, it is notable that actions geared toward public involvement in the 1970s tend to be different due to technological advancements.

5. **Document Reference Source:** "Modeling dispersion from toxic gas released after a train collision in Graniteville, SC." Buckley, Hunter, Addis, and Parker (2007). *Journal of the Air & Waste Management Association.* (57):268-278.

   http://www.environmental-expert.com/Files%5C6477%5Carticles%5C11898%5Cbuckley.pdf

   Recovery Component(s): Recovery

   Document Type: Case Study

   Document Summary: Written 2 years after the Graniteville, South Carolina, train accident and toxic chlorine release, this document provides a technical review of meterological conditions during immediate response and initial recovery highlighting the roles of federal, state, and local entities including the Savannah River Site (SRS) Emergency Operations Center, Department of Energy HQ, South Carolina Department of Health and Environmental Control, and the Savannah River National Laboratory.

   Document Significance: This document provides valuable information and validation regarding the need for technical expertise along with in-place mutual aid agreements in response and early recovery. In the case of Aiken County, mutual aid agreements with the Atmospheric Technology Group (ATG) of the Savannah River National Laboratory (SRNL) facilitated informed decisionmaking over the 2-day response period via hazard consequence modeling and meteorological assessments. These assessments changed the course of initial plans to remove damaged tankers by modeling potential impacts to surrounding areas due to downwind consequences and, as a result, teams redirected efforts toward siphoning remaining chlorine onto intact tankers.

6. **Document Reference Source:** *Transportation Performance, Disaster Vulnerability, and Long-Term Effects of Earthquakes.* Chang (2000). Second Euroconference on Global Change and Catastrophic Risk Management, Luxembourg, Austria, July 6-7, 2000.

   www.iiasa.ac.at/Research/RMS/july2000/Papers/chang3006.doc

Recovery Component(s): Recovery; Infrastructure

Document Type: Case Study

Document Summary: This presentation discusses long-term impacts of catastrophic disasters, in particular, as it relates to transportation loss. Notably, the author highlights (1) business loss at the Port of Kobe and (2) differences in economic recovery based on transportation accessibility in the aftermath of the 1995 Hyogoken Nambu earthquake in Kobe, Japan. Furthermore, the comparison is made between the lengthy restoration period required for transportation infrastructure as opposed to other critical infrastructure (e.g., power). For example, the author observes bridge repair on a major transportation corridor following the 1994 Northridge earthquake in California lasted nearly 1 year while power was restored in days. Also, the authors highlight the long-term economic impact potential following disasters at ports noting that marine traffic shifts may have serious economic consequences to the vitality of ports.

Document Significance: Post-disaster transportation corridor loss and restoration times impact long-term economic recovery. While this document provides earthquakes as case studies, analogous damages could result from massive explosions in a hazardous materials catastrophe at a port or major transportation route causing significant infrastructure damage. As such, the importance of economic recovery at ports and economic impacts of inaccessible transportation routes should be recognized among stakeholders involved in improving local community recovery.

7. **Document Reference Source:** *Winners and Losers: Predicting Business Disaster Recovery Outcomes Following the Northridge Earthquake.* Dahlhmaer and Tierney (1996). University of Delaware Disaster Research Center (Annual Meeting of the American Sociological Association, Toronto, Ontario, Canada, August 9-13, 1997).

   http://dspace.udel.edu:8080/dspace/bitstream/handle/19716/651/PP243.pdf?sequence=1

   Recovery Component(s): Recovery; Long-Term Recovery

   Document Type: Case Study

   Document Summary: This paper presents discussion on the post disaster recovery of local private-sector firms vis-à-vis long-term community recovery. The authors posit that recovery research overlooks "micro-level" recovery impacts and processes while highlighting findings from examining recovery among local private firms following the 1994 Northridge earthquake. Findings indicate that while pre-disaster financial condition is the key factor in post-disaster successful recovery, there are a variety of mitigating factors that led to unsuccessful recovery including business size, financial condition, disruption of services, and receipt of disaster assistance.

   Document Significance:

   - **Gap: More studies on micro-level recovery necessary.** This research suggests that more focus is needed on micro-level long-term economic recovery and observes that much of current literature is overly broad and too optimistic with regard to local-level, long-term community recovery.
   - **Gap: Long-term disaster impacts on lower income groups more severe.** This conclusion is particularly relevant to hazardous materials transportation due to the nature of proximity of lower income residences to major transportation corridors. While disproportionate losses may be experienced by lower income groups, it is also noted that certain individuals and businesses, in fact, benefit financially from disasters. This observation is also true for hazardous materials incident recovery, in that individuals and businesses with unique technical and/or restoration expertise (e.g., chemical experts, environmental firms, and construction contractors) may experience an influx of work.

- **Lesson Learned: Businesses that acquire state or federal post-disaster assistance report greater challenges with recovery.** This recovery lesson is valuable within the context of hazardous materials transportation incident recovery. The three reasons that the authors attribute are not disaster specific and are notable to consider. These are (1) businesses that seek disaster aid following a disaster experienced serious impacts in order to seek aid in the first place; (2) few businesses have disaster insurance and those that seek government or bank loans to cover losses suffer from financial debts; and (3) assistance is insufficient and/or cannot compensate for lost customers and loss of surrounding business environment.

8. **Document Reference Source:** "Train Wreck and Chlorine Spill in Graniteville, South Carolina: Transportation Effects and Lessons in Small Town Capacity for No-Notice Evacuation." Dunning and Oswalt (2007). *Transportation Research Record 2009,* pp 130-135. http://www.dot.gov/disaster_recovery/resources/TrainWreckChlorineSpillGranitevilleSC.pdf

   Recovery Component(s): Recovery; Mass Care; Evacuation

   Document Type: Case Study

   Document Summary: Using the 2005 Graniteville railroad chlorine spill as a case study, the authors highlight the need for increased evacuation preparedness and transportation recovery communication and collaboration as challenges to successful response and recovery. Furthermore, public information and technical expertise are also addressed as issues faced by communities in the aftermath of a hazardous materials incident.

   Document Significance: As acknowledged by the authors, although the death toll (nine people) of the Graniteville accident was low, the 2005 accident provides a critical case study regarding hazardous materials incident response and recovery efforts, issues, and gaps. Furthermore, the observation that the accident "permanently changed a community" highlights a critical psychosocial aspect of hazardous materials (and other types of) incidents:

   - **Disagreement, lack of information and lack of clear decision-making authority impacts short- and long-term recovery.** In the case of Graniteville, lack of information led to disagreement related to evacuation that resulted in inaction and may have caused increased exposure. According to the authors, the need for accurate and timely technical information during response, stabilization, and recovery "cannot be overstated."
   - **Responsible parties face financial challenges and stigmatization.** The financial burden for responsible parties is significant. According to the authors, the total cost to Norfolk Southern was in excess of $30 million. Furthermore, the incident not only impacts the responsible party but also increased public fears regarding the potential threat that hazardous materials rail cargoes pose to communities.
   - **Challenges exist between rail safety and profitability.** This document highlights NTSB conclusions that suggest (1) increased usage of electronic signals to indicate misaligned switches; (2) placement of hazardous materials in rear quarter of trains; (3) speed reduction for hazardous materials cargoes; and (4) reduction of train length for hazardous materials transport. However, the rail freight industry is highly competitive and these recommendations have economic impacts that are unfavorable to industry. The federal government, namely the FRA and FRA standards, seek to balance safety and economic considerations for industry; however, in the case of Graniteville, in compliance with federal standards, existing safeguards proved to be insufficient.
   - **Documenting infrastructure recovery may facilitate recovery processes.** Extensive recordkeeping and documentation, lacking in the case of Graniteville, are suggested as ways of increasing successful claims, facilitating grant processes, and aiding long-term recovery planning.
   - **Reentry logistics can hinder recovery.** Returning to work in the initial recovery period was deterred by reentry logistics in the case of Graniteville.

9. **Document Reference Source:** "From 9/11 to 8/29: Post Disaster Recovery and Rebuilding in New York and New Orleans." Gotham and Greenberg (2008). *Social Forces* (87) 2: 1039-1062. http://www.tulane.edu/~kgotham/Papers/Gotham&GreenbergSocialForces2008.pdf

   Recovery Component(s): Recovery; Economic

   Document Type: Case Study

   Document Summary: Focusing on recovery and reconstruction processes in New York and New Orleans since 9/11 and Hurricane Katrina, this article presents analysis of various problems associated with financing and implementing recovery, reconstruction, and reinvestment following disasters. While the experiences in New York and New Orleans have served as case studies in numerous recovery studies, the authors suggest that more effort is needed to examine negative impacts of "market-centered" and "neo-liberal" approaches employed by city and state officials and fostered by large private-sector firms. According to the perspective and research presented, market-centered approaches intended to aid recovery, in fact, increase a wide range of problems in communities.

   Document Significance:

   - **After disasters, the public is less likely to scrutinize or challenge government actions.** This conclusion presented by the authors is significant in that public involvement and support following hazardous materials incidents supports local recovery and enforces collaborative action. The purported tendency of the public to be less likely to question post-disaster decision-making can lead to decisions that may not be in the best interest of local individuals.
   - **Social and economic inequalities may be exacerbated by market-centered recovery programs.** Authors highlight the Lower Manhattan Development Corporation (LMDC) as well as the Louisiana Recovery Administration (modeled after the LMDC) as examples of a big-business focus that neglected low and moderate income groups as well as small business. Concerns that tax incentives, subsidies, and waivers on grant-making processes favor large firms and high-income residents, presents a recovery challenge that may result following various types of disasters. Ultimately, various studies highlight that disasters may produce "winners" and "losers" (Dylan and Tierney, 1997).

10. **Document Reference Source:** *Disaster Recovery as a Social Process* (Nigg 1995). University of Delaware Disaster Research Center. http://dspace.udel.edu:8080/dspace/bitstream/handle/19716/625/PP219.pdf?sequence=1

    Recovery Component(s): Recovery; Social

    Document Type: Case Study

    Document Summary: This document reviews various research endeavors and case studies in terms of assessing impacts to the social fiber of a community and emphasizes the "social processes" that are a fundamental aspect of disaster recovery and encompassing various phases of emergency management decisionmaking. While recognizing the importance of restoring the built environment and planning for infrastructure recovery (both short-term methods and long-term recovery planning), the author suggests that the focus on infrastructure and the environment overlooks the sociological significance of post-disaster community recovery.

    Document Significance: Perspectives based on research and disaster recovery that relate to sociological issues and challenges can be used to leverage community social services as well as the myriad NGOs that provide support in the short- and long-term recovery timeframe. It is important for community stakeholders to recognize that communities consist of a broad range of demographics and, as such, different social groups experience recovery differently. Significantly, the author touches upon the challenges of family recovery following events

that may have led to the death and injury of family members, damage to a family's homes, businesses, and/or livelihood, and the abilities and challenges families face. Community stakeholders may recognize reliance on family members and/or extended family members for shelter, food, financial support, and emotional support; however, tracking this type of "family" support and/or planning that leverages this type of support may be overlooked.

11. **Document Reference Source:** *A Review of the Literature and Programs on Local Recovery from Disaster* (Petterson 1999). Public Entity Risk Institute, Fairfax, VA. http://www.wildfirelessons.net/documents/LitReviewLocalRecovery.pdf

    Recovery Component(s): Recovery

    Document Type: Literature Review

    Document Summary: This document provides a comprehensive literature review, addressing each phase of emergency management in terms of its relation to the recovery process.

    Document Significance: This document (developed in 1998-1999) provides analysis of various findings in recovery literature and summarizes the programs that are available for providing post-disaster technical assistance.

12. **Document Reference Source:** "GRACE: Public Health Recovery Methods Following an Environmental Disaster" (Svendsen, Whittle, Sanders, McKeown, Sprayberry, Heim, Caldwell, Gibson, and Vena, 2010). *Archives of Environmental and Occupational Health.* (65) 2: 77-85.

    http://www.ncbi.nlm.nih.gov/pubmed/20439226 (abstract only).

    Recovery Component(s): Recovery; Public Health

    Document Type: Case Study

    Document Summary: The abstract for this research discusses the authors' approach to community-based participatory research with regard to extensive recovery work following the chlorine gas disaster in Graniteville. While the authors recognize the value of epidemiological studies in the aftermath of environmental disasters, they suggest that a balance must be achieved when integrating public health services, scientific research, and community engagement/empowerment.

    Document Significance: It is significant in pre-planning or post-disaster planning following hazardous materials transportation incidents to recognize the value in scientific and/or epidemiological studies focused on public health. However, it is important to consider lessons learned from previous scientific studies of impacted individuals undertaken over the course of recovery.

B1.7 Domestic and International Media Reports

1. **Document Reference Source:** "U.S. Military Purchases Gulf of Mexico Seafood, Boosting an Industry Battered by Oil Spill," Mary Foster, the *Washington Post,* February 6, 2011 (http://www.washingtonpost.com/wp-dyn/content/article/2011/02/06/AR2011020603941.html)

    Recovery Component(s): Economic Recovery & Public Information

    Document Type: Media Report

    Document Summary: This article looks at the consequences of the 2010 British Petroleum well explosion and accompanying oil spill. As a result of that spill, the fishing industry along the Gulf Coast was negatively impacted, resulting in both a significant loss of revenue and

jobs. Military Solutions Inc., has begun buying up the catches and selling it to the Army for resale in their commissaries. As of the date of this article, 72 commissaries along the East Coast are participating in this effort. The Defense Commissary Agency (DeCa) sells groceries to military personnel, reservists, retirees, and their families at cost plus a 5 percent surcharge. The article further notes that DeCa is not receiving any special federal funds to participate in this program, but has re-designed their purchasing procedures to take advantage of this opportunity.

Document Significance: This best practice provides an example of the type of creative solutions that are often essential to economic recovery following a disaster.

2. **Document Reference Source: "**Census Data Shows Less Populace New Orleans," David Mildenberg, the *Washington Post,* February 5, 2011

   Recovery Component(s): Background

   Document Type: Media Report

   Document Summary: This article discusses the population of Louisiana (specifically New Orleans) and Mississippi in the years following Hurricane Katrina. The net result will be a loss of some Congressional representation for Louisiana and a gain for Mississippi. When looking at Mississippi, the author states "Mississippi has rebounded more quickly. Its population grew over the decade by 4.3 percent to 2.97 million in 2010, the census data said. Louisiana gained 1.4 percent to 4.53 million. Mississippi's per capita income grew 1.7 percent between 2006 and 2008 compared with 0.3 percent in Louisiana, according to the Census Bureau. Since 2003, PACCAR, Nissan Motor, and GE Aviation have expanded production and jobs in Mississippi."

   Document Significance: This document reinforces that communities need to be prepared for a reduction in population, to some extent, along with the attendant ramifications, following disastrous incidents.

3. **Document Reference Source:** *FEMA: Hurricane Katrina Mississippi Recovery Update,* Release Number: 1604-714, Release Date: May 7, 2009.

   http://www.fema.gov/news/newsrelease.fema?id=48257

   Recovery Component(s): Temporary Housing

   Document Type: Media Report

   Document Summary: This article provides summaries of the monies FEMA obligated in Mississippi between August 29, 2005, and May 1, 2009. These funds reflect the federal assistance under the Stafford Act's Public Assistance, Individual Assistance, and Hazard Mitigation Grant Programs. The article notes that FEMA's temporary housing program in Mississippi for Hurricane Katrina ended on May 1, 2009. During its nearly 4 years of operation, FEMA's program provided temporary housing to more than 41,000 families. Now that the program has ended, the article notes that nearly 2,800 families are moving to Mississippi Cottages as part of the Mississippi Alternative Housing Program, which is administered by the Mississippi Emergency Management Agency (MEMA). This program is funded by a $281 million grant from FEMA.

   Document Significance: The need for long-term housing is a potential for any type of disaster or incident. In this case, the situation relates to a catastrophic hurricane event, and the numbers involved would need to be significantly reduced for a hazardous materials transportation incident. However, it certainly qualifies as a best practice to follow in providing long-term temporary housing, no matter the causative incident that leads to the need for housing.

B1.8 International Recovery Documentation

1. **Document Reference Source:** *The Radiological Accident in Goiania,* International Atomic Agency, Vienna, 1988

   www.llis.gov

   Recovery Component(s): Infrastructure

   Document Type: Incident Report

   Document Summary: Near the end of 1985, the Institute Goiano de Radioterapia in Goiania, Brazil moved to new premises, leaving behind a caesium-137 teletherapy unit without notifying the licensing authority. Following the move, the original facility was partially demolished, leaving the caesium-137 teletherapy unit unsecured. Two people entered the premises and, not knowing what the unit was, removed the source assembly from the machine thinking it had scrap value. They tried to dismantle it and ruptured the capsule – contaminating the surrounding environment and two individuals. The remnants of the source assembly were sold for scrap to a junkyard owner who noticed that the source material glowed blue in the dark. Over a period of days, friends and relatives came and saw the phenomenon. Fragments of the source the size of rice grains were distributed to several families over a period of 5 days, with a number of people showing gastrointestinal symptoms from their exposure.

   One of the people irradiated connected the illnesses with the source capsule and took the remnants to the public health department in the city. Thus began a chain of events that led to the discovery of the accident. A local physicist was the first to assess the scale of the accident and took actions on his own initiative to evacuate two areas. When the authorities were informed, the speed and scale of their response were impressive. Several other sites of significant contamination were quickly identified and residents evacuated. Areas of concern included the yards where the source assembly was ruptured, the residences of the people most affected, and an area of about 1 km^2 in the Aeroporto, Central, and Ferrovianos districts of Goiania. It took approximately 11 weeks of intensive work to survey and decontaminate the highly affected sites in this area, and a further 3 months to deal with residual low levels of contamination.

   Document Significance: Although not a transportation incident, medical equipment is transported by truck and other means of transportation. An accident could result in the release of radioactive source materials that could produce significant contamination. This incident report is used to extrapolate significant recovery components that will apply to a transportation incident resulting in contamination to the environment and people.

2. **Document Reference Source:** The Decontamination of People Exposed to Chemical, Biological, Radiological or Nuclear (CBRN) Substances or Material - Strategic National Guidance 2nd Edition, Minister of State for Counter-Terrorism & Resilience, Home Office, United Kingdom, Hazel Blears, May, 2004

   www.llis.gov

   Recovery Component(s): Mass Care; Decontamination

   Document Type: Guidance Document

   Document Summary: This is a planning guidance document from the United Kingdom relating to decontamination operations involving people exposed to chemical, biological, radiological, or nuclear (CBRN) materials. The purpose of the document is to " . . . provide strategic guidance on the decontamination of people upon which all responding agencies can base plans and Memoranda of Understanding (MOUs) for on-site management of CBRN incidents." Additionally, the decontamination information included is based on lessons learned from previous incidents and exercises, as well as ongoing research projects.

Document Significance: The process of decontaminating people in the wake of a terrorist attack or hazardous materials incident follows the same basic concepts. This document provides a concise view of the basic decontamination procedures that can be implemented at a reception and decontamination center in the area of the incident.

3. **Document Reference Source:** *The Mississauga Evacuation Final Report to the Ministry of Solicitor General,* the Institute for Environmental Studies, University of Toronto, June 1981

   www.llis.gov

   Recovery Component(s): Recovery Planning; Mass Care

   Document Type: Incident Report and Study

   Document Summary: On November 10, 1979, shortly before midnight, a Canadian Pacific Railways (CPR) freight train derailed outside the community of Mississauga. The train consisted of 3 locomotives, 106 freight cars, and 1 caboose. During the derailment, 24 cars left the track, consisting of 22 tank cars and 2 boxcars. Of the 22 tank cars, 11 carried propane, 1 chlorine, 3 tolulene, 3 styrene, and 4 caustic soda. Several of the propane cars were punctured and ignited; the cars carrying styrene and tolulene were also punctured and spilled their contents; the vapors from the styrene and tolulene ignited and a massive explosion of one of the cars resulted. During the following minutes there were two more explosions, the last one was a full propane car which was hurled approximately 2,214 feet. Three more propane cars ruptured, adding fuel to the blaze. Of the 11 propane cars, 3 exploded, 6 were either punctured or ruptured, and 1 released a small portion of its contents from a valve during pressure buildup. The three cars carrying styrene were crushed by the propane explosions. The four cars carrying caustic soda were damaged and spilled their contents. Sometime during this process, the car carrying chlorine ruptured, releasing a chlorine vapor cloud.

   Close to 2 hours following the derailment the local police, under the direction of the Control Group, ordered an evacuation of Mississauga because of the concentrations of chlorine that were blowing toward the city from the accident. The evacuation was conducted in 15 stages between 01:47 hours and 22:55 hours on November 11, and targeted those areas most at risk. In less than 24 hours, 216,935 individuals were evacuated. This included three hospitals and six extended care facilities. Approximately 40,000 evacuees reported to 19 evacuation centers. The remaining population made their own arrangements for short-term sheltering with family, friends, or at hotels. Approximately 95 percent of the evacuees remained within a 100 KM radius of the City of Mississauga.

   Two and a half days after the derailment, local officials addressed the issue of pets left behind during the initial evacuation. Police officers and Humane Society Officers donned protective breathing apparatus and entered 1,861 homes to rescue 2,500 animals.

   Document Significance: This document was based on a hazardous materials transportation incident resulting in a fire generated by propane, tolulene, and styrene, plus the release of chlorine. As such this document is directly related to this project.

4. **Document Reference Source:** *USAID/India Strategic Objective Close-Out Report,* USAID, point of contact Ms. Nina Minka (nminka@usaid.gov)

   Recovery Component(s): Recovery Planning

   Document Type: Incident Report

   Document Summary: On January 26, 2001, the Gujarat region of India was hit with a 7.6 magnitude earthquake that impacted 7,633 villages and towns in 21 districts. The human toll of the earthquake was almost 20,000 killed and 600,000 left homeless. The USAID assistance operation

was known as the Gujarat Earthquake Recovery Initiative (GERI). USAID provided assistance through four organizations: (1) CARE; (2) Catholic Relief Services (CRS); (3) United Nations Development Program (UNDP); and (4) World Vision (WV).

Document Significance: This document relates valuable lessons learned by USAID and its partner organizations from their assistance to Gujarat, India, following a devastating earthquake. The magnitude of this disaster surpasses what would be likely from a hazardous materials transportation incident, but the principles involved in the lessons learned provide sound guidance in the development of recovery plans for any kind of event.

5. **Document Reference Source:** *TransAPELL Guidance for Dangerous Goods Transport Emergency Planning in a Local Community;* United Nations Environment Programme; 2000

   http://www.unep.fr/shared/publications/pdf/2679-TransApellEN.PDF

   Recovery Component(s): General Planning

   Document Type: Guidance Document

   Document Summary: *TransAPELL Guidance for Dangerous Goods Transport Emergency Planning in a Local Community* provides information based upon the United Nations Environmental Programme's (UNEP) Awareness and Preparedness for Emergencies at Local Level (APELL) approach to planning and mitigating disaster response and recovery in the event of a hazardous materials transportation incident. Based upon TransAPELL pilot projects, this document outlines steps local communities can take to set up a planning workshop. The guidance described is applicable to all land transport of dangerous goods, as well as handling of goods in other modes, including ports and airports.

   Document Significance: The focus of this document is local planning specific to hazardous materials transportation incidents, particularly as it relates to response with application for recovery. This document is significant to this research due to specific recommendations that involve the cooperation of key response and recovery entities at the local level, along with step-by-step discussion of how to plan and execute a best-practices-based workshop specific to hazardous materials transportation incidents.

B1.9 Background Documents

1. **Document Reference Source:** *FAQ - HAZMAT Endorsement Threat Assessment Program,* Transportation Security Agency

   http://www.tsa.gov/what_we_do/layers/hazmat/faq.shtm#nav

   Recovery Component(s): General Background

   Document Type: Guidance Document

   Document Summary: The Department of Homeland Security, Transportation Security Agency, is responsible for ensuring the security of hazardous materials transportation. As such, they have created a set of frequently asked questions related to the HazMat Endorsement Threat Assessment Program.

   Document Significance: This information is presented as background for the transportation of hazardous materials. This hazardous materials endorsement is required of all commercial drivers who transport hazardous materials. Though not directly related to recovery operations, this is one federal program aimed at minimizing the potential for incidents involving hazardous materials.

2. **Document Reference Source:** *Traffic Incident Management in Hazardous Materials Spills in Incident Clearance.* Federal Highway Administration. October 2008

   http://www.ops.fhwa.dot.gov/publications/fhwahop08058/60.htm

   Recovery Component(s): General Background

   Document Type: Guidance Document

   Document Summary: FHWA's 2008 technical report on traffic incident management (TIM) for HAZMAT spills is geared for transportation officials, DOT operations personnel, first responders, and secondary responder agencies, including the Environmental Protection Agency and the United States Coast Guard. The express purpose of this document is to report practices regarding the clean-up of incidental spills highlighting selected states' best management practices in spill removal to improve incident clearance, reduce environmental impacts, and improve responder safety. The six highlighted states and focal areas are

   1. **Florida** – Site clean-up recommendations for early responders as well as longer term clean-up implications.
   2. **Colorado** – Practices related to reporting vis-à-vis surface and downstream water, sewer systems; practices for remediation personnel; remediation requirements, excavation, and off-site disposal; and closure reports following clean-up completion.
   3. **Texas** – Practices delineating responsibilities of TxDOT personnel; details on Texas Water Code and interagency contracts (IAC) between TxDOT and the Texas Commission on Environmental Quality (TCEQ); personnel requirements related to containment, clean-up, and hazardous materials neutralization; and practices for contracting clean-up, testing, and disposal.
   4. **Ohio** – Practices for responders (transportation agencies, law enforcement, firefighters/EMS, and towing); pre-incident planning; and incident review.
   5. **Virginia** – Practices related to discharge and containment; clean-up and disposal; and equipment resupply necessary for economic recovery of response entities.
   6. **California** – Practices delineating Caltrans workers' responsibilities and principal response and recovery tasks (1-safe approach, 2-isolation and containment, 3-notifications, 4-identification and hazard assessment, 5-clean-up and disposal); training guidelines and clean-up responsibilities (primarily specialty contractor through the spiller or through Caltrans).

   The report also maps applicable federal legislation to the hazardous materials transportation incident environment.

   Document Significance: As it pertains to planning, various best practices that are highlighted in this report are valuable not only for response, but also for recovery (in particular as it relates to longer term clean-up). Additionally, discussion about relevant legislation (including the National Contingency Plan and the Emergency Planning and Right-to-Know Act) is salient to this research.

3. **Document Reference Source:** *Disaster Response and Recovery Resource for Transit Agencies.* Federal Transit Administration, August 21, 2006

   http://transit-safety.fta.dot.gov/publications/safety/DisasterResponse/HTML/DisasterResponse.htm

   Recovery Component(s): General Background

   Document Type: Guidance Document

   Document Summary: The Federal Transit Administration's 2006 report was developed based on lessons learned from Hurricane Katrina and other events and divides information into

four sections: (1) background; (2) FAQs; (3) the role of federal agencies in emergency preparedness, disaster response, and disaster recovery; and (4) local resources for emergency preparedness, disaster response, and disaster recovery. Among the specific topics addressed are

- Suggested coordination between transit agencies and evacuation shelters, human service agencies, state emergency management office, and the FEMA regional office to (1) ensure that ongoing transportation needs are met and (2) take a leadership role in convening meetings among the aforementioned groups to address various community transportation needs.
- Recommendations on planning and preparedness vis-à-vis communicating public transit needs and services.
- Discussion on the applicability of the Stafford Act to transit recovery following a disaster including the availability of FEMA assistance to help replace or rebuild transit vehicles, equipment, and facilities.
- Overview of FTA's Connecting Communities emergency preparedness workshops
- Best practices in (1) emergency management planning, (2) serving special needs persons, (3) communications, (4) staffing and training, and (5) facilities, equipment, and supplies.

Document Significance: Although this document is geared toward transit and transit officials, the best practices and planning guidelines specific to recovery are often valuable to local transit; however, these also provide insights that are useful for other areas of local disaster recovery planning and mitigation.

4. **Document Reference Source: "**Chapter 11: Community disaster recovery" (Lindell, Prater, Perry, and Nicholson 2006) in *Fundamentals of Emergency Management.* Federal Emergency Management Agency

   http://training.fema.gov/EMIWeb/edu/fem.asp

   Recovery Component(s): Recovery

   Document Type: Case Study

   Document Summary: This chapter from 2006 FEMA training materials provides highlights of community disaster recovery factors and challenges. Recovery is presented as distinct from the other phases of emergency management. The authors focus on addressing housing, economic, and psychological components of recovery. Additionally, this document also discusses business recovery and financial resources (e.g., state, federal, and insurance) available for local community recovery.

   Document Significance: Although not specific to hazardous materials incident recovery, the extensive information provided in this document provides a valuable framework of key issues and challenges that have occurred following a wide variety of disasters. Highlights that could be applied relative to improving local community recovery from hazardous materials incidents include but are not limited to

   - Recovery should involve rebuilding disaster-resilient communities versus "restoring the community to its previous status";
   - Pre-disaster planning and pre-impact plans for recovery enable local input on mitigation and sustainable development that facilitates "holistic recovery";
   - Children should not be overlooked in recovery planning, in terms of mental and physical health;
   - NGOs and community-based organizations must be leveraged to supplement social services to aid community recovery;
   - "Unmet Needs Committees" should be developed in advance of disaster to support recovery;

- Historic preservation should be addressed prior to recovery in order to address potential demolition concerns; and
- Donations management should be considered in recovery planning.

5. **Document Reference Source: "**Recovery after Disaster: Achieving Sustainable Development, Mitigation, and Equity" (Berke, Kartez, and Wenger 1993) *Disasters* (17)2:93.

   http://www.crid.or.cr/digitalizacion/pdf/eng/doc4333/doc4333-b.pdf

   Recovery Component(s): Recovery

   Document Type: Case Study

   Document Summary: This document discusses local recovery in terms of sustainability based upon community type (e.g., communities with ties to external resources and programs versus isolated communities with limited and/or no collaborative arrangements) through examination of case study examples. Given the variety of communities across the United States, it is valuable to consider a range of budgetary, technological, and human resources available for short- and long-term recovery.

   Document Significance:

   - **Collaboration among local and non-local NGOs supports recovery by interlinking individuals with local knowledge with organizations with more resources.** Although the example provided of an autonomous community (Montserrat, West Indies) had fewer resources available than isolated communities in the United States, the collaborative process utilized among several local (with limited resources and significant local knowledge) and non-local (with greater resources and limited local knowledge) non-governmental organizations (NGOs) to support recovery and revitalization is a lesson learned from the aftermath of the Hurricane Hugo disaster that struck the island and is valuable to consider.
   - **Local government and citizens should collaborate to effectively communicate with non-local and/or state and federal recovery officials.** Similarly, the example of collaborative community partnerships between the local government and citizens of Santa Cruz, California, following the 1989 Loma Prieta earthquake offers insights into the ability of local organizations, individuals, and officials to work together to support both ongoing recovery as well as integration with non-local/federal efforts to improve local recovery effectiveness and federal relief efforts.
   - **Lack of local and non-local collaboration increases possibilities for local resistance to recovery efforts.** The Saragosa, Texas, case study provides constructive insights with regard to potential recovery gaps in small towns with limited resources. The fact that Saragosa's county seat, representing the official government, is 20 miles from the town and only one NGO, a church, could provide supplemental local recovery resources in the aftermath of a disastrous tornado in 1987, exacerbated the recovery process. Furthermore, limited involvement and/or outreach to locals was politically controversial and led to community resistance to recovery efforts with post-recovery surveys indicating that residents not only felt strong dissatisfaction with housing and rebuilt neighborhoods but also perceived themselves as "much worse off 2 years after the disaster."

6. **Document Reference Source:** "Sheltering and Housing Recovery Following Disaster" (Peacock, Dash, and Zhang, NNNN) in *Handbooks of Disaster Research,* 258-274.

   http://books.google.com/books?id=_LjS_lS2hQEC&lpg=PA258&ots=oxALtXkIgx&dq=handbook%20of%20disaster%20research%20peacock%20dash%20zhang%20housing%20recovery&pg=PA275#v=onepage&q&f=false

Recovery Component(s): Recovery; Housing

Document Type: Case Study

Document Summary: This research focuses on short- and long-term recovery challenges regarding housing in a post-disaster environment including issues related to displacement of renters/rental properties, low-income housing, inequities in accessing insurance and public recovery funding, and the reestablishment of permanent housing and the feeling of "home" among disaster victims.

Document Significance: Among the salient recovery issues highlighted is the recurring challenge in a post-disaster environment that vulnerable populations suffer greater inequities. Authors suggest a variety of potential research endeavors that could help define and address recovery challenges specific to housing. Stakeholders involved in hazardous materials transportation incident recovery planning can learn from various research endeavors that have cited such issues related to housing recovery.

APPENDIX C

Sample Recovery Plans

There are two approaches commonly followed in developing recovery plans. The first is to develop a recovery section to the community's emergency operations plan (basic plan) that outlines recovery information applicable to all hazards. The recovery plan from the County of San Diego, California, is presented as an example of this type of overarching recovery plan. The information presented in this appendix is taken directly from the referenced document.

Sample Recovery Plans
"San Diego County Emergency Services Organization and County of San Diego – Recovery Plan," County of San Diego, CA, URS Corporation, April 2007 (www.llis.gov)

RELATIONSHIP TO RESPONSE OPERATIONS

Response operations provide the foundation of the San Diego OA [Operational Area] Recovery Plan. Recovery operations typically begin concurrently with, or shortly after, commencement of response operations. For example, cost recovery and resource demobilization are recovery functions that begin during the response phase as costs are incurred and resources are mobilized.

In recognition of recovery's close relationship to response, the Operational Area will staff the position of Recovery Coordinator as a member of the Operational Area EOC [Emergency Operations Center] staff to coordinate recovery activities from the Operational Area EOC during the incident response phase. Depending on the nature, type, and severity of the disaster, the Recovery Coordinator may expand the Recovery Organization and may have additional branches and units established under it during the response phase.

Under the Operational Area EOC's SOPs [Standard Operating Procedures], an Initial Damage Estimate (IDE) is developed during the emergency response phase to support a request for a gubernatorial proclamation and for the state to request a presidential declaration. During the recovery phase, this assessment is refined to a more detailed level. This detailed damage/safety assessment will be needed to apply for various state and federal disaster financial assistance programs.

Short-term recovery operations may continue to be coordinated from the Operational Area EOC after the response phase is over, if required. Under the San Diego OAEP [Operational Area Emergency Plan], termination of the emergency's response phase is concurrent with the deactivation of the Operational Area EOC; however, continued coordination from the response phase into the recovery phase is necessary to identify high-priority areas for resumption of utilities, liability concerns, financing, and recovery ordinances.

SHORT-TERM RECOVERY OPERATIONS

Short-term recovery operations include all agencies and jurisdictions participating in the Operational Area's disaster response. Activities are generally coordinated from within the EOC and recovery activities begin during the response phase of the emergency.

(continued on next page)

Sample Recovery Plans (Continued).
"San Diego County Emergency Services Organization and County of San Diego – Recovery Plan," County of San Diego, CA, URS Corporation, April 2007 (www.llis.gov)

The key objectives of short-term recovery operations are to restore shelter, jobs, services, and facilities quickly and efficiently. These operations include

- Utility restoration;
- Expanded social, medical, and mental health services;
- Re-establishment of government operations;
- Transportation route restoration;
- Debris removal and cleanup operations;
- Building safety inspections; and
- Abatement and demolition of hazardous structures.

Emergency actions may be taken to address specific conditions such as

- Suspension of evictions;
- Request utilities to provide bill relief;
- Waiver of permit fees for damage repairs;
- Need for temporary housing and business space; and
- Change or alter traffic patterns.

Short-term recovery operations for the Operational Area will transition into long-term recovery operations at the direction of the Operational Area EOC Director. If the EOC is not activated at the time of transition, the Director of the County OES will make the determination to transition. At the local government level, the jurisdiction's Director of Emergency Services or similar position shall make the determination.

Under most circumstances, the transition from short- to long-term recovery operations will occur within 90 days of the termination of the emergency or close of the incident period. The 90-day time period is intended only as a guide. Transition to long-term recovery operations may occur at any time within or after the 90-day period, depending on the severity of the emergency and the effectiveness of the coordinated local, state, and/or federal response.

LONG-TERM RECOVERY OPERATIONS

The primary goal of long-term recovery operations is to rebuild safely and wisely, reducing future hazards and optimizing community improvements. The major objectives of these operations include

- Reconstructed public facilities;
- Coordinated delivery of long-term social and health services;
- Improved land use planning and implementation;
- An improved EOP;
- Re-establishment of the local economy to pre-disaster levels;
- Recovery of disaster-related costs; and
- Effective integration of mitigation strategies into recovery planning and operations.

Hazard mitigation actions will be coordinated and employed in all activities by all jurisdictions in order to ensure a maximum reduction of vulnerability to future disasters. Each affected jurisdiction is responsible for their own approach to mitigation, which could include zoning variances, building codes changes, plan reviews, seismic safety elements, and other land use planning techniques.

Local jurisdictions and special districts within the Operational Area will strive to restore essential facilities through repair, reconstruction, improvement, or mitigation during long-term recovery operations. Redevelopment agencies within the Operational Area will play a vital role in rebuilding commercial areas. Jurisdictions and special districts will also continue to assist individual citizens and private businesses through long-term recovery operations with continued provision of local services and information regarding state and federal assistance programs.

The county OES [Office of Emergency Services]/EOC Director may appoint a Recovery Manager to lead long-term recovery operations. The newly appointed Recovery Manager will perform his or her duties through county OES under the direction of the OES/EOC Director and will direct long-term recovery activities in the unincorporated areas; while acting as a central resource for recovery activities in the incorporated jurisdictions. Local jurisdictions and special districts may, or may not, designate a new position title to manage long-term recovery functions.

Debris Removal and Management

Overview

Major disasters can generate enormous volumes of debris in short periods of time. Debris clearance, removal, and disposal operations must be implemented quickly to protect public health and safety of the local population. The County of San Diego Disaster Debris Recycling and Handling Plan is presented in Appendix I.

Debris removal and management within the county will be coordinated through the county OES Recovery Coordinator/Manager; however, each city and the county is responsible for disaster debris cleanup within their jurisdictional boundaries unless alternative arrangements are made.

Information for debris handling and removal will be coordinated through the countywide 2-1-1 hotline that will refer residents to their appropriate jurisdiction's hotline and website.

Standardized press releases and public information will be coordinated through the Joint Information Center (JIC) for recycling, household hazardous waste, and debris handling. The speed of initial debris clearance, removal, and disposal operations depends upon the depth of pre-disaster planning by Operational Area jurisdictions and special districts.

Recycling

Debris recycling processes are provided in the County of San Diego Disaster Debris Recycling and Handling Plan (see Appendix I). To conserve the regional landfill capacity and to follow the state policy to maximize all diversion options in order to reduce the amount of solid waste that must be disposed, it is the county's intent that disaster-related debris be recycled or centrally held until it can be processed for maximum recycling. Recycling and processing costs are considered a cost of debris clearance if local debris management plans, existing prior to the disaster, provide for separate handling and cost accounting for disaster-created debris.

The county's Disaster Debris Recycling and Handling Plan is consistent with the California Integrated Waste Management Board (CIWMB) Disaster Debris Plan as well as FEMA's Debris Management Guide (FEMA 322). Local jurisdictions are encouraged to develop disaster debris plans as part of individual emergency operations plans.

Debris Clearance

Disaster debris may fall on roadways and block access to certain neighborhoods or communities. Clearance of this debris from roadways to allow the safe passage of emergency vehicles is a response function.

Curbside Debris Removal

Removal of debris located within public right-of-way is referred to as curbside debris removal. Debris may be placed within the right of way by the disaster, or by residents and businesses as private lots are cleaned. Debris located within the public right of way is a threat to general public health and safety, and its removal is considered a short-term recovery function.

Private Property Debris Removal

Private property debris removal (PPDR) is generally not eligible because it is the responsibility of the individual property owner. If the debris on private business and residential property is so widespread that public health, safety, or the economic recovery of a community is threatened, FEMA may fund PPDR, but FEMA must approve this activity in advance and all appropriate Rights of Entry (ROEs) must be secured.

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Sample Recovery Plans (Continued).
"San Diego County Emergency Services Organization and County of San Diego – Recovery Plan," County of San Diego, CA, URS Corporation, April 2007 (www.llis.gov)

Demolition
Demolition of disaster-damaged structures may be eligible for emergency work assistance if the work is necessary to

- Eliminate an immediate threat to lives, public health, and safety;
- Eliminate immediate threats of significant damage to improved public or private property;
- Ensure the economic recovery of the affected community to the benefit of the community at large;
- Mitigate the risk to life and property by removing substantially damaged and associated appurtenances as needed to convert property acquired through a FEMA hazard mitigation program to uses compatible with open space, recreation, or wetlands management practices.

Removal of slabs or foundations and covering of pads and driveways that do not present a health or safety hazard (except for structures in a FEMA-funded buyout program) is not eligible for reimbursement. As with PPDR, demolition of private structures requires approval by FEMA prior to start of work, and appropriate agreements with local governments to hold the federal government free from damages due to performance of the work must be in place. Demolition also requires condemnation by an authorized local official in accordance with state and local law.

Direct Federal Assistance
When the state and local government lack the capability to perform or contract for eligible emergency work and/or debris removal under sections, Direct Federal Assistance (DFA) may be available for curbside debris removal, PPDR, demolition, or vessel salvage operations.

FEMA will provide DFA through a mission assignment to another federal agency - upon request of the state - when the State and local government certify they lack the capability to perform or contract for the requested work. The duration of mission assignments for debris removal is limited to 60 days from the disaster declaration date. The Federal Coordinating Officer (FCO) may approve extensions for up to an additional 60 days, if a state or local government demonstrates a continued lack of capability to assume oversight of any debris removal mission.

Economic Recovery
Economic recovery is typically conceptualized within the framework of long-term recovery operations associated with major disasters. Special attention to economic recovery generally is not required as a result of local emergencies. While it is important that local, state, and federal agencies move as quickly as possible to address the economic impacts of major or catastrophic events, economic revitalization efforts must also be based on a sound understanding of the economic landscape before and after the disaster to ensure that recovery is sustainable.

Government efforts should strive to enhance regional competitiveness and support long-term development of the regional economy. To this end, it is important that Operational Area jurisdictions and special districts work not only with federal and state officials, but also with the region's business leaders and the San Diego Regional Chamber of Commerce during all aspects of economic recovery.

The foundation of economic recovery is the restoration of critical public infrastructure and resumption of public services needed to get businesses up and running again and get people back to work. For declared major disasters, FEMA's PA program is integral to economic recovery as the primary infrastructure recovery funding mechanism. If an incident demands large-scale evacuation or renders a significant portion of the region's housing stock damaged or inhabitable, repopulation is another essential economic recovery element. For declared major disasters, FEMA's IA temporary housing programs will facilitate repopulation efforts to facilitate economic recovery.

The U.S. Department of Commerce Economic Development Administration (EDA) is the primary federal agency within ESF #14 under the NRP [NRF] with responsibility for supporting coordinated long-term recovery following natural disasters. EDA's participation in major disaster recovery efforts has traditionally supplemented the lead roles assigned to FEMA. In addition to its ESF-14 role, EDA may be tasked by FEMA to perform economic impact evaluations or carry out other specific tasks.

San Diego Regional Economic Indicators The County Land Use and Environment Group (LUEG) and the San Diego Regional Chamber of Commerce collaborate to maintain a database of economic indicators measuring the monthly vitality of the San Diego economy. Indicators are displayed in a Briefing Book format generated by the county's performance management software. Indicators that are tracked include

- Economic Indexes
- Employment Data
- Housing Indicators
- Mortgage Rates
- Sales Statistics
- Stock Indexes
- Tourism Industry Statistics
- Charity Donation Data

Agencies that could be consulted for economic and demographic indicators include the following:

- San Diego Association of Governments (www.sandag.org): Provides demographics; jobs, wages, and economic impact by traded cluster.
- California Employment Development Dept. (www.edd.ca.gov): Provides jobs and wages by occupation; jobs by industrial sector; number of companies and size of companies by employees by sector; total employment; unemployment rate.
- California Association of Realtors (www.car.org): Provides median home price by county; housing affordability.
- San Diego Association of Realtors (www.sdar.org): Provides median home price and number of homes sold by zip code.
- San Diego Regional Chamber of Commerce (www.sdchamber.org): Provides gross regional product.
- San Diego Business Journal annual Book of Lists (www.sdbj.com): Provides largest companies by sector.
- Centre City Development Corp. (www.ccdc.com): Provides demographics and new construction data on downtown San Diego.

The second approach is to develop a stand-alone hazardous materials plan that includes a recovery component. The plan from Contra Costa County, California, is an example of that type of planning activity. The information presented in this appendix is taken directly from the referenced document.

Sample Hazardous Materials Plan

"Contra Costa County Hazardous Materials Area Plan, County of Contra Costa," California, William Walker, MD Health Services Director, Randall L. Sawyer, Hazardous Materials Division Director, and Michael P. Wedl, Hazardous Materials Specialist, December 2005

SHELTER-IN-PLACE & EVACUATION PLANS

The following procedures have been developed to safeguard the public affected by a hazardous materials incident:

1. Determine the properties of the hazardous materials involved, including toxicity, physical, chemical, fire, explosion, quantity, concentration, vapor pressure, density, and potential health effects;
2. Evaluate area topography, meteorology, hydrology, demography, and facility characteristics, including the delineation of potentially impacted areas.

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Sample Hazardous Materials Plan (Continued).
"Contra Costa County Hazardous Materials Area Plan, County of Contra Costa," California, William Walker, MD Health Services Director, Randall L. Sawyer, Hazardous Materials Division Director, and Michael P. Wedl, Hazardous Materials Specialist, December 2005

3. Determine whether shelter in place or evacuation is necessary;
4. The affected public are to shelter in place first, and remain sheltered in place until it is determined that an evacuation is necessary;
5. Timely notification of the affected public through activation of the Community Warning System (CWS);
6. Coordinate available information with responding agencies and Emergency Medical Services (EMS) to determine logistics (i.e., evacuation routes, mass-care facilities, shelter and reception areas).
7. Hospitals will be notified by EMS of shelter in place and shelter-in-place release.

CLEANUP

1. Overall operations for returning the incident scene to a normal condition are the responsibility of the IC. It is the policy of Contra Costa County that the IC identify and encourage the responsible party to take prompt remedial action.
   a. Prompt remedial action by the responsible party includes funding the cost of containment, removal, disposal, and restoration of the scene to a normal condition under the direction of the Contra Costa County Health Officer.
   b. When the responsible party accepts responsibility for a hazardous materials incident, responding agencies may submit any claims for the recovery of costs to the responsible party. Each agency is responsible for documenting their costs incurred during the incident and submitting them to the responsible party.
2. CCHS-HazMat will assume mitigation and cleanup responsibilities whenever the responsible party is
   a. Unknown;
   b. Unable to pay;
   c. Unwilling to accept responsibility; or
   d. Not conducting an adequate cleanup.
3. CCHS-HazMat's policy is to only commit county funds to clean up a hazardous materials incident when an imminent threat to human health or the environment exists and no responsible parties have been identified. Incidents where the identified hazardous material is not presenting an imminent threat, CCHS-HazMat staff will advise and assist the IC with cleanup functions, but will not commit county funds.

   Cleanup must ultimately meet health and safety standards as prescribed by the Contra Costa County Health Officer. The Contra Costa County Health Officer is the local government authority for determining when
   a. The cleanup operation is complete; and
   b. Secured areas may be reopened (e.g., buildings, roadways, waterways and evacuated areas, etc.)
4. The IC should not sign to pay for cleanup costs unless previously approved by the Department Chief, City Manager, or County Administrator.
5. The Contra Costa County Board of Supervisors, by Resolution 86/543, has authorized the California Highway Patrol (CHP) to clean up hazardous materials spills and commit county funds in the event of life-threatening hazardous materials releases (see Appendix 13-4).

EMERGENCY FUNDING ACCESS

1. Local funds may be accessed through CCHS-HazMat on incidents when an imminent threat to human health or the environment exists and no responsible parties have been identified or will not assume financial responsibility for cleanup costs. County funds are normally limited to $5,000 per incident.
2. On incidents where a responsible party has not been identified or does not assume financial responsibility for cleanup costs, state funds may be accessed through the State Office of Emergency Services (State OES) at (800) 852-7550 (24 hours).

a. Access to the emergency reserve account for hazardous materials incidents must be in accordance with the guidelines contained in the California Environmental Protection Agency - Department of Toxic Substances Control's (CAL EPA-DTSC) document entitled "Funding for Hazardous Materials Incidents Using the Emergency Reserve Account." This form is available through CAL EPA-DTSC or CCHS-HazMat.
b. All incidents involving state funding must be reported to the CAL EPADTSC. Funding requests must be approved prior to funds being spent. No retroactive payments will be made.

3. On incidents where a responsible party has not been identified or does not assume financial responsibility for cleanup costs, and when local and state funds are not available or costs will exceed local and state resources, federal funds may be accessed through the United States Coast Guard (USCG) and the United States Environmental Protection Agency (US-EPA).
   a. USCG and US-EPA can be contacted at the following (see Appendix 13-5 for explanation of zones):
      i. USCG Sector San Francisco located on Yerba Buena Island (415) 399-3547 (24 hours).
      ii. All county areas: US-EPA Emergency Spill Response Section (415) 744-2000 (24 hours).
   b. Funding requests must be approved prior to funds being spent. No retroactive payments will be made.
   c. All incidents involving federal funding must be reported to the National Response Center at (800) 424-8802 (24 hours).

APPENDIX D

Sample Decontamination Plan

The following best practice relates specifically to an attack using a radiological dispersion device (RDD); however, the concepts presented relating to the development of a decontamination plan are applicable for any incident that requires decontamination. The information presented in this appendix is taken directly from the referenced document.

Sample Decontamination Plan
"Radiological Incident Response: Decontamination of Buildings and Public Sites," Lessons Learned Information Sharing (www.llis.gov)

DEVELOPING A SITE DECONTAMINATION PLAN FOR AN URBAN AREA

An RDD attack would likely occur in an urban area. Emergency managers should consider developing site decontamination plans specifically tailored to metropolitan areas within their jurisdictions. Planners must be aware that decontamination activities following an RDD incident will be extremely complex and require a coordinated federal, state, and local effort. Planners should take into consideration the sociopolitical, geographical, geological, and architectural characteristics of possible target areas when planning for cleanup and site restoration activities.

Experts believe that recovery planners will necessitate extensive radiological data to successfully perform site decontamination after an RDD incident. Planners should establish mechanisms to coordinate recovery managers' requirements with organizations that will likely perform radiological data collection after an RDD incident.

The Department of Homeland Security (DHS) Preparedness Directorate's draft guidance, *Protective Action Guides for Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents,* advises planners to adopt a site-specific approach to RDD contamination. It might not always be possible to reduce the level of contamination to pre-incident levels. Jurisdictions may expect to return contaminated areas to normal conditions if the RDD impacted area is relatively small. However, "if the impacted area is very large, then achieving even very low criteria for remediation of the entire area and/or maintaining existing land uses may not be practicable."

PUBLICLY ACCEPTED LEVEL OF CONTAMINATION

The success of cleanup operations could depend on several factors, including the level of residual radioactivity deemed acceptable by the public. Emergency planners should be aware that many people could interpret "decontamination" to mean the lack of any radioactivity. Jurisdictions should take into account public perception and expectations when planning for site decontamination after an RDD event. Clear public communication is essential for jurisdictions to effectively manage perception and expectations of the population. For more information on public information, please refer to the lessons learned information sharing best practice document, *Radiological Dispersal Device Incident Response Planning: Public Information.*

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Sample Decontamination Plan (Continued).

"Radiological Incident Response: Decontamination of Buildings and Public Sites," Lessons Learned Information Sharing (www.llis.gov)

Example: Following the 1987 cesium-137 release in Goiânia, Brazil, the local population insisted that exposure levels had to be returned to pre-incident levels. Many residents of contaminated houses did not understand the concept of an acceptable level of contamination. They insisted that their homes be entirely free of cesium-137 after decontamination and refused to use clothes, furniture, and cooking supplies if they showed any radioactivity. Scientists who took part in the cleanup process testified, "This implied that the levels of intervention as defined, for example, in the *Basic Standards for Radiological Protection* (IAEA 1996) became no more than reference values. Due to the extensive public pressure, the cleanup and site restoration resulted in an excessive amount of radioactive waste (total amount: 3,500 m^3 [cubic meters], stored in over 6,000 containers, weighing some 6,000 T [tons]) as compared with the amount that should have been removed on the basis of solely preventing an unacceptable radiological risk to the population."

DECONTAMINATION PLANS

Experts believe that radiological decontamination of metropolitan areas following an RDD event could be a lengthy and costly process. Decontamination in an urban setting could close off an incident area for months. It could require cleanup workers to remove radioactive particles from the cracks of buildings, streets, parks, sewage systems, buses, cars, and infrastructure. In some cases, sidewalks, asphalt, and the top layer of soil may have to be removed. The vegetation also may have to be cut down and disposed of. Sandblasting or chemical agents such as acids might have to be used to dissolve rust and mineral deposits in which radioactive contamination is trapped. For more information on decontamination issues in an urban setting, please also refer to the lessons learned information sharing, lesson learned document, *Radiological Incident Response: Decontamination of Buildings and Public Sites.*

The National Council on Radiation Protection and Measurement report, *Management of Terrorist Events Involving Radioactive Material,* encourages emergency planers to tailor site remediation procedures to both the RDD's effects and the unique needs of local residents. The length of the cleanup effort should be balanced, for example, with the needs of residents and businesses to access hospitals, bridges, utility plants, and other essential infrastructures as quickly as possible.

Emergency managers should consider the following aspects when establishing site decontamination plans specifically tailored to metropolitan areas:

- **Contamination distribution:** The distribution of radioactive material can be non-homogeneous or homogeneous. Experts believe that following an RDD event, the dispersal of radiological material would likely be uneven and the radiation level in different areas would vary depending on meteorological factors, such as wind speed and precipitation. Plans should include provisions for the cleanup of hot spots as well as moderately contaminated areas.
- **Contamination location:** Part of the radioactive material will deposit on buildings' external surfaces. However, some of the release may contaminate buildings' interiors through ventilation systems, cracks, and open doors and windows. Plans should detail provisions for decontamination of building exteriors, sidewalks, streets, parks, and sewage as well as building interiors, including walls and floors, carpeting, ventilation ducts, etc. Transport systems and water supplies may also need to be decontaminated.
- **Contamination type:** Radioactive material may be released as a liquid spill or in solid form. Contaminated dust that has settled on the external surfaces of buildings may be common. Some radionuclides also may be absorbed by porous materials, such as concrete or wood, or become embedded in soil and plants. Plans should include provisions for cases when the only disposal method for contaminated soil is large-scale removal of contaminated dirt.

- **Decontamination or demolition:** Decontamination of some structures could be impractical or impossible in some cases. The decision to decontaminate or to demolish a structure should be made on a case-by-case basis. Planners should take into account several elements when deciding between these two options, including operation costs; labor, equipment, and material needed; liquid and solid waste processing and disposal capabilities; overall level of contamination; and rebuilding costs. Planners should also take into account the social, historical, or religious significance of buildings.

RECOVERY MANAGER AND TECHNICAL WORKING GROUPS

Jurisdictions should identify a recovery manager and subject-matter experts who could help plan cleanup activities prior to an RDD event. The Department of Homeland Security Preparedness Directorate's draft guidance, *Protective Action Guides for Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents*, advises that long-term decisions should be made with the involvement of stakeholders and incident-specific technical groups of subject matter experts. This guidance includes a list of technical working groups to which planners can refer.

The National Nuclear Security Administration's Municipal Radiological/Nuclear Emergency Preparedness Plan states that municipal, state, and federal authorities should appoint a recovery manager at the end of the radiological emergency phase. The recovery manager will be charged with assessing incident conditions, evaluating alternative decontamination options, and formulating and implementing the recovery plan. The recovery manager should also designate a recovery team with representatives from federal, state, and local organizations.

RESPONSIBILITIES DURING CLEANUP AND SITE RESTORATION

Decontamination in a metropolitan area after an RDD event will likely be extensive and require a large amount of resources and specialized technical expertise. Decontamination will probably be a collaborative effort involving local, state, and federal organizations. In extreme cases, international assistance may become necessary:

- The decontamination of radioactive foci in Goiânia, Brazil, in 1987 took 6 months and involved 550 cleanup workers and experts from 10 countries. Brazilian authorities informed the International Atomic Energy Agency (IAEA) soon after the accident was discovered. They requested IAEA's assistance under the terms of the international Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.
- On April 26, 1986, the Chernobyl-4 reactor in Ukraine exploded, releasing an estimated 100-150 million curies of radioactivity into the atmosphere. The incident killed 30 people, including 28 from radiation exposure. According to the United Nations Scientific Committee on the Effects of Atomic Radiation, 237 power plant workers and emergency responders exhibited signs and symptoms of acute radiation syndrome with 134 of these cases confirmed by clinical diagnosis. The Soviet government acknowledged the incident only after the drifting plume had set off radiation alarms in a nuclear plant in Sweden nearly 3 days after the event. From 1986 to 1988, the Soviet leadership coordinated decontamination in the region. In 1989, the United Nations (UN), other international organizations, and all member states started providing assistance to Belarus, Russia, and Ukraine. In 1990, the UN Office for the Coordination of Humanitarian Affairs established an Inter-agency Task Force on Chernobyl to supervise long-term management activities. The UN shifted its strategy on Chernobyl from emergency relief to long-term recovery and development in 2002.

PUBLIC-PRIVATE PARTNERSHIPS DURING CLEANUP AND SITE RESTORATION

Experts advise jurisdictions to establish partnerships with private-sector groups to coordinate cleanup and site restoration. Many private-sector groups are likely to play a critical role during cleanup and site restoration. An RDD incident could quickly deplete public resources available in many jurisdictions. Private-sector groups can be called to fill critical gaps in personnel, equipment, and expertise during the recovery process. Sharing scarce resources can enhance both the public and private sectors' recovery capabilities following such an incident.

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Sample Decontamination Plan (Continued).
"Radiological Incident Response: Decontamination of Buildings and Public Sites," Lessons Learned Information Sharing (www.llis.gov)

DECONTAMINATION TECHNIQUES

A number of decontamination techniques may be available for jurisdictions following an RDD event. Emergency response organizations should establish plans including pre-selected techniques based on local requirements, needs, and achievable goals. Several resources are available to help recovery planners select decontamination techniques following an RDD event, including the following:

- Environmental Protection Agency (EPA), Cleanup: Technologies, and Tools, which lists various resources, publications, and programs;
- EPA, Workshop on Decontamination, Cleanup, and Associated Issues for Sites Contaminated with Chemical, Biological, or Radiological Materials report;
- EPA, Office of Air and Radiation, Radiation Protection Division's Center for Remediation Technology and Tools, Technology Screening Guide for Radioactively Contaminated Sites; and
- Headquarters, Department of the Army, Commandant, U.S. Marine Corps, NBC Decontamination Operations, field manual no. 3-5, Marine Corps Warfighting Publication (MCWP) 3-37.3.

DECONTAMINATION OF FOOD AND WATER

An RDD attack could cause contamination of consumer goods such as water, food, and other commodities. Emergency response organizations need to prepare for the decontamination of food and water supplies. Resources available to help emergency planners select food and water decontamination techniques include

- Department of Health and Human Services, Food and Drug Administration, Center for Devices and Radiological Health's Accidental Radioactive Contamination of Human Food and Animal Feeds: Recommendations for State and Local Agencies; and
- Headquarters, Department of the Army's Health Service Support in a Nuclear, Biological, and Chemical Environment: Tactics, Techniques, and Procedures field manual.

The Advisory Team for Environment, Food, and Health is a federal asset available upon request to provide recommendations on protective actions to prevent or minimize exposure from contaminated milk, food, and water; to dispose of contaminated food and livestock; etc. After an RDD event, the only feasible option may be the disposal of contaminated food and water supplies. Indeed, the public may be reluctant to purchase and consume decontaminated goods from an incident area, fearing health consequences.

IDENTIFICATION OF A SHORT-TERM STORAGE SITE FOR CONTAMINATED WASTE

An RDD event could create a large amount of contaminated debris. The decontamination process itself can also generate contaminated materials, such as equipment and protective gear, which need to be discarded instead of decontaminated. Jurisdictions are advised to identify a suitable site that could be used for the short-term storage of contaminated waste materials following an RDD event. Planners should consider the following elements when planning to establish a short-term waste storage site:

- **Site geography and structure:** Experts generally agree that the temporary storage site should be located in an isolated area. The site should be large enough to house a considerable amount of waste materials and covered to withstand adverse meteorological conditions. The storage site also could have platforms to accommodate the waste containers as well as barriers, embankments, and ditches to retain contamination spills.
- **Transportation:** Plans could include provisions for transporting contaminated waste from the incident site to the short-term waste storage site. Plans also should establish mechanisms to monitor and, when necessary, to decontaminate personnel and vehicles after each trip. A police escort and personnel who are trained and equipped to manage radiological emergencies should accompany each shipment.

- **Security and safety:** Jurisdictions should have provisions in place to supply and secure the short-term storage site. These provisions could include guards patrolling the site, a clearly demarcated perimeter enclosed with fences or walls, and signs that identify the site as radioactive. Plans also could include monitoring and sampling systems to track radiation buildup at the security fences and inside the site.

LONG-TERM MONITORING

An RDD event will have consequences that will last months or years afterwards. Jurisdictions should consider planning for long-term monitoring of the incident site, the population, and the food and water supply for years after the event. Issues that jurisdictions might need to consider when planning for long-term management of an RDD event can include

- **Establishing, maintaining, and regularly updating a register for long-term monitoring of victims and onsite emergency response personnel:** Health departments are advised to plan to establish a registry of victims and onsite emergency response personnel at the onset of an RDD emergency response operation. The U.S. Department of Health and Human Services (HHS) can assist local and state health departments in establishing a registry of potentially exposed individuals. HHS is responsible for long-term public monitoring and supports follow on personal data collection. HHS also can track victim treatment and long-term health effects. The Centers for Disease Control and Prevention (CDC) has developed several resources for population monitoring following a nuclear or radiological event. These resources may help federal, state, and local public health officials; first responders; emergency management service managers; and other officials planning for initial and long-term monitoring of the population following an RDD event.
  - CDC, Public Health Training Network Satellite Broadcast and Webcast, Preparing for Radiological Population Monitoring and Decontamination: This broadcast helps public health workers prepare to conduct short- and long-term monitoring of people affected by a nuclear or radiological terrorist incident or by an accidental release of radioactive materials into the environment.
  - CDC, National Center for Environmental Health, Division of Environmental Hazards and Health Effects, Radiation Studies Branch, Roundtable on Population Monitoring Following a Nuclear/Radiological Incident: The report includes sections on population identification, training, logistics, equipment, etc.
- **Establishing mechanisms for long-term monitoring of soil, food, water, and livestock:** Monitoring soil, food, water, and livestock may also be necessary to validate the efficacy of the restoration efforts and to help people near the incident site cope with the long-term consequences of an RDD event. Jurisdictions are advised to establish programs for the long-term monitoring of soil, food, water sources, and livestock. Long-term monitoring also may help people feel more comfortable about consuming food and water from the incident area, curbing economic losses. The National Response Framework's Nuclear/Radiological Incident Annex states that federal resources are provided at the request of, and in support of, the affected state. HHS is charged with coordinating federal support for monitoring people and decontamination in consultation with the coordinating agency.

APPENDIX E

Available Grant Programs

The information presented in Table E-1 is taken directly from the referenced websites and is presented as background information for each grant. To apply for any of these grants requires going to www.grants.gov to secure the necessary applications.

Table E-1. Grant programs.

Program	Objectives	Use and Restrictions
Hazardous Materials Specific		
National Motor Carrier Safety (http://www.federalgrantswire.com/national-motor-carrier-safety.html) Department of Transportation, Federal Motor Carrier Safety Administration (FMCSA)	To reduce the number and severity of accidents and hazardous material incidents involving commercial motor vehicles by substantially increasing the level and effectiveness of enforcement activity and the likelihood that safety defects, driver deficiencies, and unsafe carrier practices will be detected and corrected.	Financial assistance to states for the implementation of programs for the adoption and uniform enforcement of safety rules, regulations, and standards compatible with the Federal Motor Carrier Safety Regulations and Federal Hazardous Materials Regulations for both interstate and intrastate motor carriers and drivers. This is financial assistance to the states.
Pipeline Safety Program Base Grants (http://www.federalgrantswire.com/pipeline-safety.html) Department of Transportation, Pipeline and Hazardous Materials Safety Administration	To develop and maintain state gas and hazardous liquid pipeline safety programs.	State expenditures in any given year, without federal assistance, cannot be less than the average amount expended by the state for gas and hazardous liquid safety programs for the 3 fiscal years prior to the fiscal year in which the Secretary makes the payment.
Interagency Hazardous Materials Public Sector Training and Planning Grants (HMEP) (http://www.federalgrantswire.com/interagency-hazardous-materials-public-sector-training-and-planning-grants.html) Department of Transportation, Pipeline and Hazardous Materials Safety Administration	To increase state, local, territorial, and Native American tribal effectiveness to safely and efficiently handle hazardous materials accidents and incidents; enhance implementation of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA); and encourage a comprehensive approach to emergency planning and training by incorporating response to transportation standards.	Increase the emphasis on transportation in ongoing efforts to improve the capability of communities to plan for and respond to the full range of potential risks posed by accidents and incidents involving hazardous materials. The grants have two principal uses • Assist states, territories and Native American tribes in developing, improving, and implementing emergency response plans under EPCRA; including the determination of flow patterns of hazardous materials within a state, between states and Native American lands; determining the need for regional hazardous materials response teams. • Stimulate support for training of public-sector employees to respond to accidents and incidents involving hazardous materials.

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Table E-1. (Continued).

Program	Objectives	Use and Restrictions
Chemical Stockpile Emergency Preparedness Program (CSEPP) (http://www.federalgrantswire.com/chemical-stockpile-emergency-preparedness-program.html) Department of Homeland Security	To enhance emergency preparedness capabilities of the states, local, and tribal communities at each of the six chemical agent stockpile storage facilities. The purpose of the program is to assist states and local communities in efforts to improve their capacity to plan for, and respond to, accidents associated with the storage and ultimate disposal of chemical warfare materials.	Applications are accepted from the States of Alabama, Arkansas, Colorado, Illinois, Indiana, Kentucky, Oregon, Utah, Washington, and the Confederated Tribes of the Umatilla Indian Reservation. The eligible states house the U.S. Army stockpiles unitary chemical warfare agent as bulk chemicals and munitions. Local governments are eligible to participate as subgrantees. CSEPP funds are to be utilized for effective emergency management capabilities in the seven affected states, local, and tribal communities surrounding the six Army stockpile locations. CSEPP funds may not • Be used as a substitute for other mandated, unfunded programs required for existing needs or by other laws; • Be used to supplant other forms of emergency management funding; or • Be commingled with other, non-CSEPP funds.
Fire Service Hazardous Materials Preparedness and Response (http://www.federalgrantswire.com/fire-service-hazardous-materials-preparedness-and-response.html) Department of Homeland Security	Provide information to the fire and emergency services community, emergency managers, and other local government officials concerning issues related to the planning, mitigation, prevention, and response to hazardous materials incidents, which includes acts of terrorism.	Restricted to recipient designated by congressional statute or DHS, and limited in scope to the project description for the purpose of information sharing related to hazardous materials and acts of terrorism.
Hazardous Materials Assistance Program (http://www.federalgrantswire.com/hazardous-materials-assistance-program.html) Department of Homeland Security/Federal Emergency Management Agency	To support states, local, and Indian tribal governments in oil and hazardous materials emergency planning and exercises and enhance their capabilities to interact with the National Response System (NRS); through the states, provide technical and financial assistance to support activities under the Comprehensive Hazardous Materials (Hazmat) Emergency Response - Capability Assessment Program (CHER-C).	Funding must be used for planning, exercising, and educational projects that will serve to enhance emergency management capabilities for dealing with oil and hazardous materials releases. Certain equipment purchases are not authorized, such as automated data processing and facsimile machines, and any other equipment acquired for the sole purpose of carrying out the day-to-day work activities. However, equipment purchased exclusively for the implementation of exercises and/or CHER-CAP activities (disposable personal protective equipment, simulated emergency response equipment used only for training) are authorized. Reimbursement of salaries and benefits is restricted, and funding for contractual support is permitted. Funding for training and educational programs are limited, and may not be used to supplement the nonfederal matching requirements associated with Hazardous Materials Transportation Act (HMTA), or SARA Title III funds, nor used to attend courses available under any other FEMA programs when separate funds are available for that training.

Table E-1. (Continued).

Other Types of Grants		
Program	**Objectives**	**Use and Restrictions**
Emergency Management Performance Grants (EMPG) (http://www.federalgrantswire.com/emergency-management-performance-grants.html) Department of Homeland Security	To provide resources to assist state and local governments to sustain and enhance all-hazards emergency management capabilities.	Each state shall obligate 100 percent of the total grant program amount to the designated state-level emergency management agency.
Homeland Security Grant Program (HSGP) (http://www.federalgrantswire.com/homeland-security-grant-program.html) Department of Homeland Security	To enhance the ability of the state, local, and tribal governments to prepare, prevent, respond to, and recover from terrorist attacks and other disasters.	The HSGP is comprised of four separate grant programs: State Homeland Security Program (SHSP), Urban Areas Security Initiative (UASI), Citizen Corps Program (CCP), and Metropolitan Medical Response System (MMRS). Funds will be administered by the respective State Administrative Agency (SAA). Each SAA shall make no less than 80 percent of the total grant program amount available to local units of government within 45 days of the receipt of funds.
Mental Health Disaster Assistance and Emergency Mental Health (http://www.samhsa.gov/grants/) Department of Health and Human Services, Substance Abuse and Mental Health Services Administration	To provide supplemental emergency mental health counseling to individuals affected by major disasters, including the training of workers to provide such counseling.	Provides funds for staff, travel, consultants and other expenses incident to the provision of mental health counseling to, and referral of, individuals in a disaster area. Funds may not be used for long-term treatment.

APPENDIX F

Summary of Lessons Learned, Best Practices, and Gaps

The report highlights the following best practices, lessons learned, gaps, and recommended initiatives provided in Tables F-1 through F-4.

Table F-1. Summary of recovery planning case studies.

Lessons Learned/Best Practices	Summary
Case Study: *Iowa Disaster Recovery Tabletop Exercise After Action Report/Improvement Plan*, Rebuild Iowa & Iowa Homeland Security & Emergency Management Division, August 2010 (www.llis.gov)	• Adopt a scalable, flexible state disaster recovery framework. • A state Recovery Council should be established. • A state Recovery Coordinator position needs to be created. • Create a system to collect and share comprehensive, standardized damage assessment data. • A centralized communication team must gather and disburse information. • Finance an emergency disaster fund so that resources are available to fund long-term disaster recovery programs.
Case Study: *Strategic National Stockpile Distribution Planning: Using Staging Sites to Segment Dispensing Processes*, Lessons Learned Information Sharing (www.llis.gov)	Provides information on • Staging site advantages and disadvantages, • Staging site functions, • Staging facility requirements, • Public information requirements, • Transportation requirements, and • Triage at staging sites.

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Table F-1. (Continued).

Lessons Learned/Best Practices	Summary
Case Study: "Economic Recovery from the 9/11 Disaster: Lessons from New York State's Response in Lower Manhattan," Karl Seidman, Massachusetts Institute of Technology, and Beth Siegel, Mt. Auburn Associates, *Applied Research in Economic Development,* vol. 5, issue 2, October 2008; the complete text version of this article is available online at www.usm.edu/aredjournal	Describes three inventive loan or grant programs established early in the recovery before federal money was available. • Bridge Loan Program to address expected time delays in receiving SBA loan approvals. • Retail Recovery Grant (RRG) program to provide 3 days of lost revenue. • Lower Manhattan Grant Program (LMGP) provided grants to non-retail businesses and nonprofit organizations. As part of the long-term recovery strategy three additional programs were implemented. • Business Recovery Grant Program (BRG), an entitlement grant to compensate businesses for economic losses. • Business Recovery Loan Program (BRLP) to fill a financing gap for creditworthy smaller firms that did not qualify for SBA disaster loans. • Job Creation and Retention Program (JCRP), a financial incentive for larger firms to remain in, or relocate to, Lower Manhattan.
Case Study: *Exxon Valdez Oil Spill Restoration Plan*, Exxon Valdez Oil Spill Trustee Council, November 1994 (http://www.fakr.noaa.gov/oil/eis/1994RestorationPlan.pdf)	Presents steps in developing an environmental restoration plan including • Mission and policies; • Categories of restoration actions; • Goals, objectives, and strategies; • Strategies: o Biological resources, o Recovering resources, o Resources not recovering, o Recovery unknown, o Other resources, and o Services. Then for each species, biota, or wilderness area: • Objectives and strategies by resource and service, • Injury and recovery, • Recovery objective, • Restoration strategy, • Monitor recovery, and • Appendices.

Table F-2. Summary of recovery operations case studies.

Lessons Learned/Best Practices	Summary
Findings: *Disaster Recovery-FEMA's Long-Term Assistance was Helpful to State and Local Governments but had Some Limitations* (GAO-10-404), GAO, March 2010 (http://www.gao.gov/products/GAO-10-404)	• Conduct damage and safety assessments in public and private structures; • Restore transportation, communication, utilities, and other essential services; and • Implement short-term and long-term economic and community recovery practices.
Case Study: *After Action Report Graniteville Train Wreck – January 2005*, Aiken County Government (www.llis.gov)	• Joint training between EOC personnel and CP responders is needed. • South Carolina Emergency Management Department is developing the concept of a county EOC team (comprised of multiple county personnel) as well as an Incident Response Support Team to assist CP personnel with various activities (facility needs, communication needs, etc.). • Reverse 911 may be useful for personnel recall (pre-designated call groups) and training on the reverse 911 process is needed. • EOC PIO [Public Information Officer] suggests meetings with local agency PIOs to discuss lessons learned and preparedness for future incidents.
Case Study: *State Response to the Graniteville Train Derailment: Lessons Learned*, Team Visionary Collective under the Mentorship of Ron Fisher, May 27, 2006 (www.llis.gov)	**Recommendation:** To prevent future confusion about residents who should evacuate or shelter in place, city officials will not refer to the area as 1 mile or 2 miles from the hazardous site. All instructions will be more specific and referenced by street name. Giving more specific instructions should minimize confusion and reduce risk. **Recommendation:** All future accidents involving hazardous materials should have reflective arrows pointing toward the direction of safety so that people do not travel toward the scene of the accident.
Case Study: *After Action Report Graniteville Train Wreck – January 2005*, Aiken County Government (www.llis.gov)	Improvement items • ACEMS attempted to medically monitor other responders, but they were entering incident area without EMS coordination. • Triage tags were not utilized, although they were available. • The on-duty EMS supervisor must relinquish control of outside incidents and focus on major incident being responded to. • Mass casualty plan not implemented initially due to communications difficulties. • Communication of patient status at decon was not well-coordinated with Red Cross shelter representatives. Persons at shelters were registered, but if they were sent to the hospital or left with friends/family, their status was unknown.

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Table F-2. (Continued).

Lessons Learned/Best Practices	Summary
Case Study: *Mortuary Services: Victim Identification and Record Creation during a Mass Casualty Incident*, Lessons Learned Information Sharing (www.llis.gov)	The Rhode Island Station Club fire after-action report recommends that medical examiners should consider using the DMORT VIP form from the outset of a mass casualty incident in order to expedite the victim identification and record creation process.
Case Study: *Incident Specific Preparedness Review (ISPR) M/V Cosco Busan Oil Spill in San Francisco Bay Part II and Final Report,* multiple federal, state, and local agencies, May 7, 2008 (http://www.uscg.mil/foia/CoscoBuscan/part2.pdf)	• Shoreline treatment termination endpoints • Closure and reopening of beaches • Closure of commercial fisheries
Case Study: *State Response to the Graniteville Train Derailment: Lessons Learned*, Team Visionary Collective under the Mentorship of Ron Fisher, May 27, 2006 (www.llis.gov)	**Recommendation:** An organizational structure should be established between agencies as soon as the different agencies begin working together so that there is no confusion with the order of hierarchy.

Table F-3. Summary of best practices and lessons learned public information.

Lessons Learned/Best Practices	Summary
Lesson Learned: *State Response to the Graniteville Train Derailment: Lessons Learned*, Team Visionary Collective under the Mentorship of Ron Fisher, May 27, 2006 (www.llis.gov)	**Recommendation:** An organizational structure should be established between agencies as soon as the different agencies begin working together so that there is no confusion with the order of hierarchy.
Lessons Learned: *After Action Report Graniteville Train Wreck – January 2005*, Aiken County Government (www.llis.gov)	Improvement Items: • EOC did not have press releases prior to distribution at CP. Hard copies of press releases were not initially distributed at press conferences. • Unmanned radio stations limited ability for local alerts to be made. • Initial notification did not go out through NOAA Weather Radio, although it was utilized later in the day. • EOC PIO could not get response from PIOs at CP to coordinate message for media at EOC. • Citizens in shelters had no official information source. • Aiken County Help Line (211) received calls immediately but had no info to provide initially. The help line received updated information via television news report. As a result, 211 personnel did not learn key information such as the shelter-in-place message that had been transmitted to residents. • The 211 help line is not accessible via cell phone. Additional number needs to be provided. • EOC was receiving updated information via television news reports. • Media staging area was located too close to CP.

Also presented in this report is a series of identified gaps in dealing with hazardous materials transportation incidents. Table F-4 summarizes those gaps and provides potential options for closing the gaps.

Table F-4. Summary of identified gaps.

Gap	Option
Clear guidance needed on funding sources for recovery	One potential approach to closing this gap would be for the EPA, USCG, and FEMA to develop clear and detailed guidance for each of the funding sources applicable to recovery from a hazardous materials transportation incident. This guidance document could explain the fund, outline the limits, explain the process for securing funding from the potentially responsible party, describe eligible costs, and provide information on the claims process. Further, this guidance document could clearly articulate the relationship (or lack thereof) between the Stafford Act and the other funding sources.
Coordinated response and recovery planning guidance needed for hazardous materials transportation incidents	One possible solution that could close this gap would be for the NRT and TEPP to work together to develop a single planning document for local communities encompassing fixed hazardous materials sites and hazardous materials transportation incidents, and including all major types of hazardous materials. At a minimum, both programs could consider a regular schedule for updating these planning guidelines.
Single repository needed for hazardous materials background and source materials	An approach to closing this gap could be for the identified agencies to work together to develop a single repository for planning guidance and background information relating to hazardous materials. This single repository could be something similar to, or perhaps even leverage, the DHS Homeland Security Digital Library (www.hsdl.gov) or FEMA's Lessons Learned Information Sharing site (www.llis.gov).
Minimal information has been compiled on long-term recovery from hazardous materials transportation incidents	One approach to closing this gap could be for FEMA, in conjunction with NEMA, to explore the reasonableness of modifying the National Incident Management System (NIMS) to incorporate a recommendation that after-action reports covering the stabilizing, mid-term recovery activities, and long-term phases of recovery be developed for any incident. If it is found to be a reasonable requirement, appropriate guidance could then be developed. Another option would be to utilize the DOT 5800 report, which may be the most adaptable report to capture details on recovery and mitigation.
Current national risk assessment is needed for the transportation of hazardous materials	One approach for addressing this gap could be for DOT to develop a national risk assessment and process for regular updates that would show the risks for transporting hazardous materials across all modes of transportation. This risk assessment could then be posted on the DOT website, such that it would be easily accessible to local communities.
Documentation needed on the long-term effects of hazardous materials	A possible solution to close this gap could be for EPA and CDC to encourage more research relating to the long-term consequences of exposure to hazardous materials. Local communities ultimately need this information to be able to plan for long-term medical care for victims and responders. They will also need information on the impacts to building materials so they can create proper inspection procedures and determine how to proceed following hazardous materials transportation incidents.

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Table F-4. (Continued).

Gap	Option
Published guidelines needed on planning for decontamination operations	One approach for closing this gap could be for the National Decontamination Team to take the lead in developing comprehensive guidelines for decontamination operations. At a minimum, these guidelines could address when decontamination is required, the best methods and materials to use for decontamination, and how to dispose of the materials used for decontamination.
Planning and operational guidance needed for dealing with debris contaminated by hazardous material	One possible approach for closing this gap could be for EPA, USCG, DOE, and DOT to develop a debris management guide for hazardous materials similar to the guidance developed by FEMA for debris generated by natural disasters. The guide could address what personal protective equipment (PPE) is required for the various contaminants, how to collect contaminated debris, how to decontaminate debris, and how to store and transport contaminated debris to a permanent storage area. Additional guidance for home and business owners on how to dispose of furnishings, foodstuffs, and inventories could also be very helpful for preparedness activities.
Simple Internet-based system needed for tracking evacuees that accounts for decontamination and medical assistance	One possible approach for closing this gap could be for the National Emergency Management Association (NEMA) to develop a template tracking spreadsheet suitable for loading into a community's disaster management software. The tracking spreadsheet could include the individual's name, home of record, where they are evacuating to, contact phone number, date and time of decontamination, and date and time of medical treatment. The spreadsheet could be available online to shelters, medical centers, clinics, reception and decontamination centers, and the community's EOC.
Lack of public information operations guidance regarding hazardous materials transportation incidents	A possible approach to closing this gap could be for EPA, USCG, DOE, and CDC to develop a guidance document for PIOs that outlines decontamination requirements and procedures. This document could also provide guidance for public information announcements on the issue of the level of decontamination.
Lack of standardized public education programs on hazardous materials	A possible solution to this gap could be for EPA, USCG, DOE, DOT, and CDC to work together on developing standardized public education programs on hazardous materials and safety issues related to hazardous materials that can be provided to local communities for presentation to the public. These programs could be in the form of public service announcements, fliers to accompany utility bills, webpage content, radio campaigns, even ideas for documentaries. FEMA could play a role in this effort, because they have a successful track record of creating such public education programs for other hazards.

Abbreviations and acronyms used without definitions in TRB publications:

AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation