Denver UASI All-Hazards Regional Recovery Framework

October 31, 2012 - Version 1.1

Homeland Security

Prepared by the Denver UASI, State of Colorado and Federal Stakeholders cooperating through the Wide Area Recovery and Resiliency Program
Funded by the U.S. Department of Homeland Security, Science & Technology Directorate

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
31 OCT 2012	**Final**	**01 Feb 2011 - 30 Sep 2012**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Wide Area Recovery and Resiliency Program (WARRP) Denver UASI All-Hazards Regional Recovery Framework	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S) **Hard, David**	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **State of Colorado Division of Emergency Management 9195 Mineral Ave #200 Centennial, CO 80112**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) **Lori Miller Department of Homeland Security Science and Technology Directorate Washington, DC 20538**	10. SPONSOR/MONITOR'S ACRONYM(S) **DHS**
	11. SPONSOR/MONITOR'S REPORT NUMBER(S) **1.11.5 Attachment 1**

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT
To support recovery planning, the jurisdictions comprising the Denver UASI partnered with the State of Colorado, military, private sector, non-governmental organizations, and the U.S. Department of Homeland Security and other federal agencies developed a disaster recovery framework. From this comprehensive framework, critical recovery decisions can be made at a regional level, and local jurisdictions have a guide by which to develop their own recovery plans. Sections of the framework lay out its purpose, scope, and overall issues; provide context on approach and principles for the three phases of recovery defined by FEMA (short-term, intermediate, and long-term); and address functions needed to restore communities. Annexes provide specific details on recovering from biological, chemical, and radiological/nuclear incidents.

15. SUBJECT TERMS
WARRP, CBR recovery, UASI, chemical incident, biological incident, radiological incident

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**UU**	**154**	

Version 1.1 – Released October 31st, 2012

Version 1.1 includes the recommendations from the WARRP Waste Management Workshop, the Agricultural Waste Disposal Knowledge Enhancement Workshop, the Unmet Needs & Long Term Recovery Group Knowledge Enhancement Workgroup and the Behavioral Health Knowledge Enhancement Event, as approved by the WARRP Framework Writing Team. Version 1.1 also includes the comments received from EPA on the second round of review of the Chemical, Biological and Radiological Annexes.

Foreword

The "Denver UASI All-Hazards Regional Recovery Framework" is a document that was developed through a collaborative effort by the Denver UASI and the State of Colorado in partnership with the U.S. Department of Homeland Security's Science and Technology Directorate and other federal agencies called the Wide Area Recovery and Resiliency Program. It is designed to lay the foundation for a regional and collaborative recovery approach.

Attached are the Denver UASI Chemical, Biological and Radiological (CBR) Incident Annexes that address unique aspects of anthrax, agent yellow, and cesium-137 when compared to all-hazards recovery approaches.

DHS S&T would like to thank the following individuals and groups for their support in development and review of this document. The views and opinions expressed herein do not necessarily state or reflect those of their respective organizations or the US Government.

Contributors: We would like to recognize the Denver UASI leadership (City/County of Denver, Jefferson County, Douglas County, City of Englewood, Boulder County, State of Colorado and Buckley AFB) who were instrumental in the development of this document.

Performers: We further recognize our dedicated performers from Pacific Northwest National Laboratory who assisted with coordination of the various local, state, regional and federal teams.

Our Sincere Thanks,

-Doug Hardy, SPAWAR, WARRP XM
-Lori Miller, DHS S&T, WARRP PM

For the latest version of the document,
See www.denvergov.org/oem/

Executive Summary

Recovery is the process of returning a community to a state of normality after a disastrous incident. No community is immune to disaster, which makes recovery planning paramount. To support recovery planning, the jurisdictions comprising the Denver Urban Area Security Initiative (UASI) partnered with the State of Colorado, military, private sector, non-governmental organizations, U.S. Department of Homeland Security, and other federal agencies to develop this recovery framework. The framework lays the foundation for a regional and collaborative recovery approach. This approach, known as the Whole Community concept of planning, requires that all aspects of a community (volunteer, faith-, and community-based organizations; other non-governmental organizations; the private sector; and the public) work together. The teamwork enables communities to develop collective, mutually supporting local capabilities to withstand the potential initial impacts of these incidents, respond quickly, and recover in a way that sustains or improves the community's overall well-being.

The Denver UASI identified the following eleven Recovery Support Functions, which help guide the recovery process:

- Prioritization of cleanup
- Debris management
- Economic redevelopment
- Fatality management
- Identification, stabilization, and maintenance of infrastructure and property
- Natural and cultural resources
- Post-disaster housing
- Public health and medical services
- Public information and messaging
- Public safety/access control
- Unmet needs.

For each Recovery Support Function, the framework lays out the scope; roles and responsibilities of local, state, and federal partners; and key assumptions and considerations that must be addressed in the short term, intermediate term, and long term for successful recovery. Three annexes highlight special considerations for biological, chemical, and radiological incidents. The expectation is that agencies and organizations will use this framework to guide the development of recovery plans for their areas of responsibility.

The framework was developed through a collaborative effort by the Denver UASI and the State of Colorado in partnership with the U.S. Department of Homeland Security's Science and Technology Directorate and other federal agencies called the Wide Area Recovery and Resiliency Program.

Contents

Figures

Tables

1.0 – Introduction

Recent national and international incidents, such as the Deepwater Horizon Oil Spill, Hurricane Katrina, and the earthquake and tsunami that struck Japan, have forced discussions regarding the ability of a community to absorb, adapt, and recover from a catastrophic incident. Closer to home, the Denver region has seen historic flooding, and Boulder County continues to recover from devastating wildfires. These incidents confirm that no community is immune to disaster and reinforce the importance of recovery planning.

Michael Rieger/FEMA

Recovery is the process of returning a community to a state of normality after a disastrous incident.[1] For a community to effectively recover, several key factors must be considered, such as the health and safety of community members and responders, the restoration of the community's infrastructure, and the economic viability of the area.

This framework was developed by the jurisdictions comprising the Denver Urban Area Security Initiative (UASI), including Buckley Air Force Base, to lay the foundation for a regional and collaborative approach to recovery. Development of the framework involved extensive outreach with more than 200 stakeholders from all levels of government and private and non-profit partners through focused workshops, and committee and individual meetings with subject matter experts.

The functions and concepts within the framework align with those of the State of Colorado's Disaster Recovery Plan as well as the National Disaster Recovery Framework. As shown in Figure 1, sections of the framework lay out its purpose, scope, and overall issues;

[1] This document uses the term recovery as defined in the National Disaster Recovery Framework. Recovery was also defined in the National Response Framework (2008) as an extension of the response phase in which basic services and functions are restored. In the long term, recovery is a restoration of both the personal lives of individuals and the livelihood of the community. Recovery can include the development, coordination, and execution of service- and site-restoration plans; the reconstitution of government operations and services; programs to provide housing and to promote restoration; long-term care and treatment of affected individuals; and additional measures for social, environmental, and economic restoration.

provide context on approach and principles for the three phases of recovery; and address functions needed to restore a community. In addition, annexes provide specific details on recovering from Anthrax, Cesium-137 and Agent Yellow incidents. All main sections of the report apply to those annexes as well.

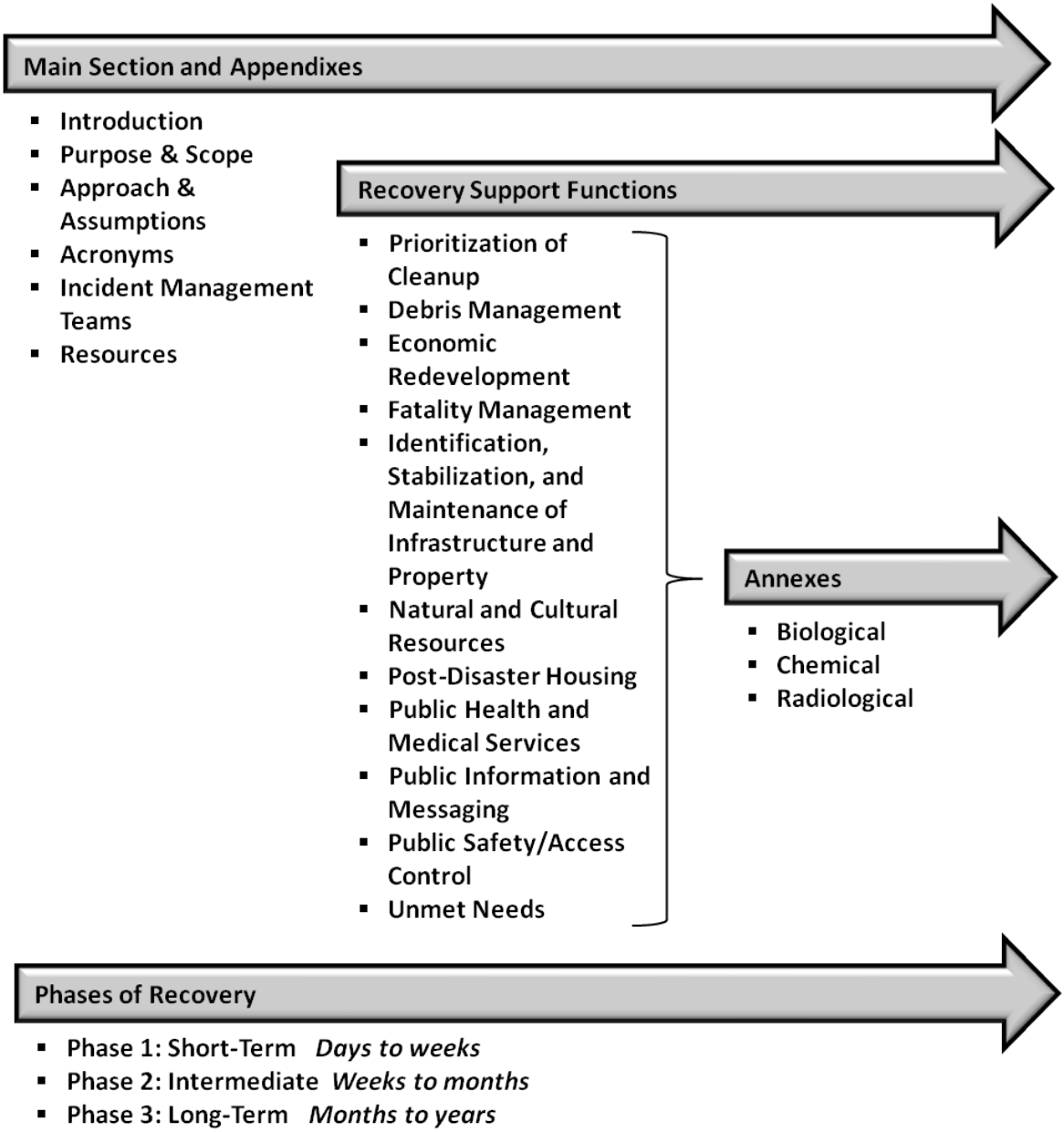


Figure 1. Overview of the Recovery Framework

The development of the framework came about through a collaborative effort by the U.S. Department of Homeland Security (DHS), the Denver UASI, and the State of Colorado, called the Wide Area Recovery and Resiliency Program (WARRP). WARRP aimed at enhancing the wide-

area recovery capabilities of the Denver UASI to enable a timely return to functionality, restore basic services, and re-establish social and economic order following a catastrophic incident. WARRP builds on the success of the Interagency Biological Restoration Demonstration (IBRD), which took place in the Seattle UASI region from 2007 to 2010 and explored recovery from wide-area biological threats to civilian and military installations. While the IBRD program specifically focused on recovery from a biological threat, WARRP developed solutions to reduce the time and resources required to recover wide urban areas, military installations, and other critical infrastructure following a catastrophic chemical, biological, or radiological incident.

As was the case with IBRD, DHS closely coordinated with the U.S. Department of Defense (DoD) to meet WARRP objectives. Additional federal agencies, including the Department of Energy, Environmental Protection Agency, and Department of Health and Human Services (DHHS), also collaborated in this effort.

2.0 – Purpose and Scope

This document is an all-hazards catastrophic recovery framework for the Denver UASI, with supporting annexes for chemical, biological, or radiological incidents. From this comprehensive framework, many critical recovery decisions can be made at a regional level, and local jurisdictions have context by which to develop their own recovery plans. The following sections provide additional information on the purpose and scope of the framework.

2.1 – Purpose

The key goals of this framework are to

- Protect life, property, and the environment to the greatest extent possible
- Shorten the recovery timeline as much as possible
- Restore the impacted area to pre-disaster conditions and a state of normality, often called a "new normal."

To aid development of local recovery plans, the framework outlines specific functions, defines partners, and identifies considerations for each of the following phases (Figure 2):[2]

- **Phase 1: Short-term recovery** refers to the days and weeks after the incident. This phase of recovery addresses the health and safety needs beyond rescue, the assessment of the scope of damage and needs, the restoration of basic infrastructure, and the mobilization of recovery organizations and resources including restarting and/or restoring essential services for recovery decision-making.
- **Phase 2: Intermediate recovery** refers to the weeks and months after the incident. This phase of recovery involves returning individuals, families, critical infrastructure and essential government or commercial services to a functional, if not pre-disaster, state. Such activities are often characterized by temporary actions that provide a bridge to permanent measures.
- **Phase 3: Long-term recovery** refers to the months and years after the incident. This phase of recovery addresses complete redevelopment and revitalization of the impacted area; the rebuilding or relocating of damaged or destroyed social, economic, natural and built environments; and a move to self-sufficiency, sustainability, and resilience.

[2] Definitions are taken from the Federal Emergency Management Agency's (FEMA) National Disaster Recovery Framework at http://www.fema.gov/recoveryframework/index.shtm (accessed 4/6/2012).

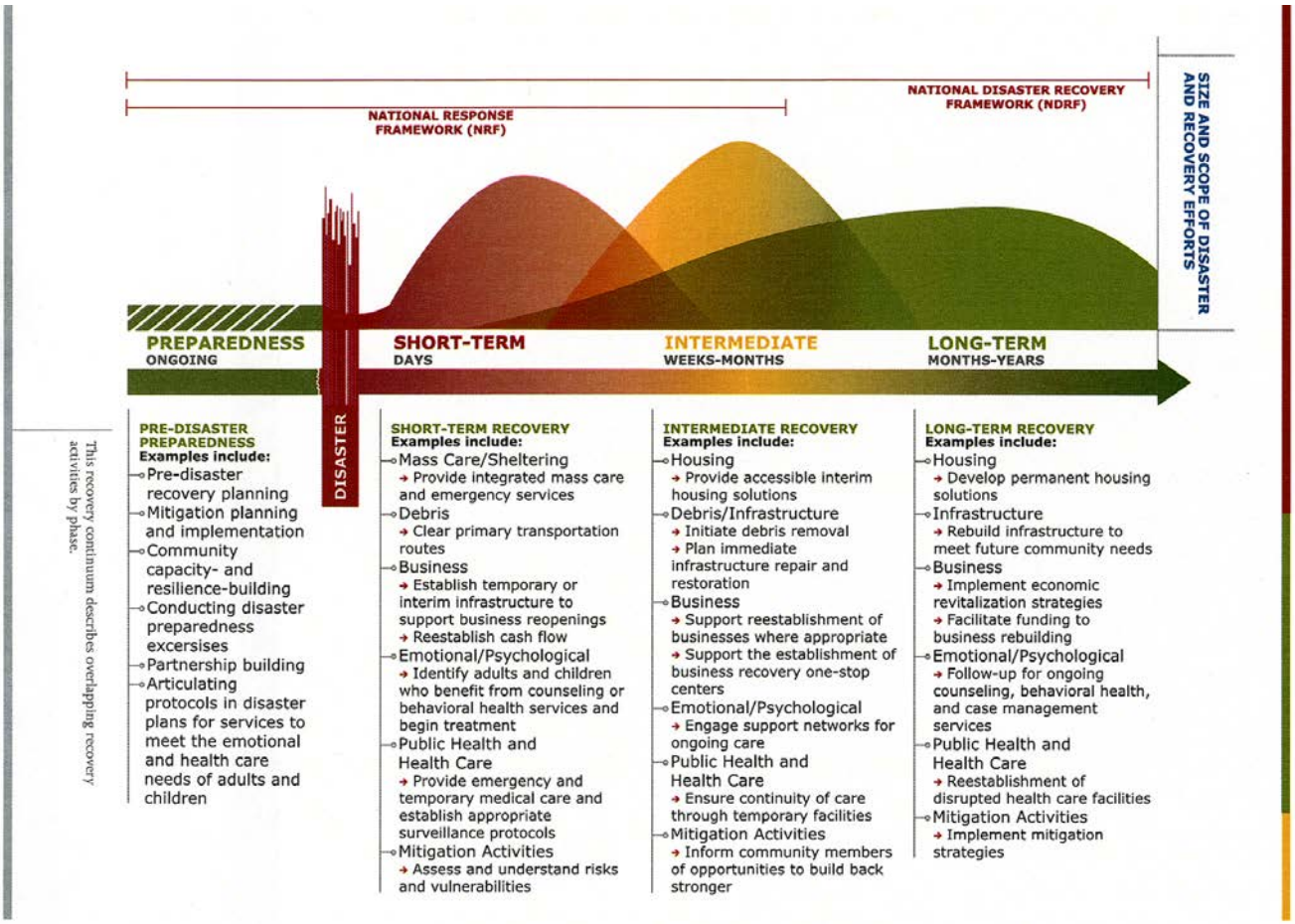


Figure 2. Phases of Recovery

2.2 – Scope

The scope of this framework includes recovery actions for incidents that may occur in the Denver UASI, which is a geographically diverse region organized around ten counties; over 160 cities, districts, towns, and municipalities; and a population of over 2.5 million citizens spread over 6,922 square miles (Figure 3). More than 50% of the state's population resides within the Denver UASI, including 47% of the state's first responders. The Denver UASI also includes more than 460 governmental entities and contains much of the state's critical infrastructure.

The Denver UASI faces a variety of hazards. Because of its diversity, the area is prone to tornadoes in the eastern communities and wildfires in the western foothills. The entire UASI may experience other natural hazards, including severe winter weather, grass fires, and flash flooding. Additionally, because of its location and the large population, the Denver UASI faces a clear threat of human-caused disasters such as hazardous materials spills (either by rail or

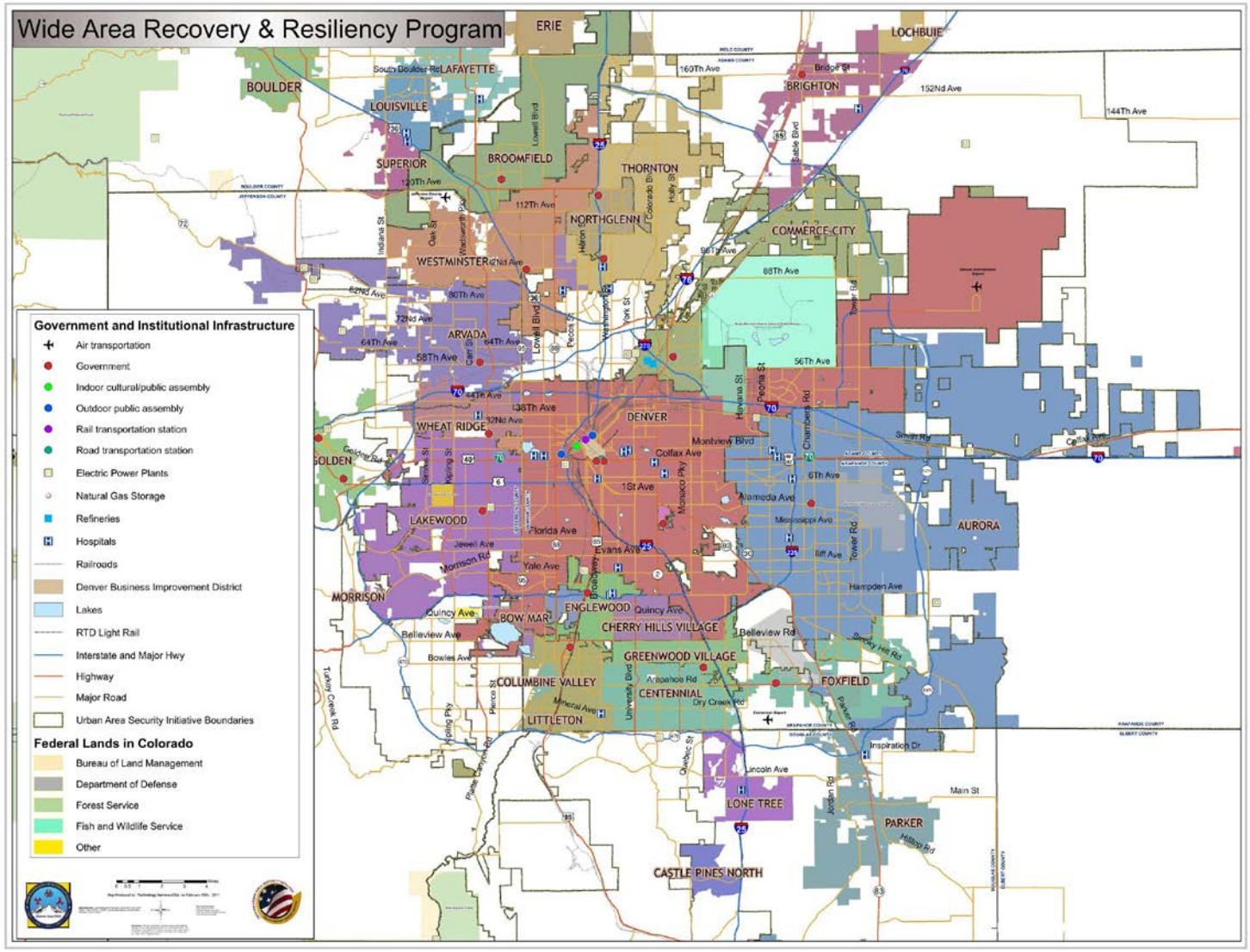


Figure 3. Denver UASI

highway transport or at fixed facilities) and terrorist actions involving the loss of lives or key infrastructure. Depending on the severity, location, and timing of the specific incidents, each of these hazards could have devastating effects. For these reasons, this framework takes an all-hazards approach.

This framework has several limitations in its scope:

- It is not all-inclusive in that it is not possible to list every needed recovery action.
- It does not address issues of immediate response or communications.
- It does not address the specifics of federal assistance or federal funding streams that may be available. The Colorado Office of Emergency Management (COEM) can be an initial point of contact for federal disaster assistance programs.

2.3 – Relationship to Other Plans

In the Denver UASI, most jurisdictions have comprehensive emergency operations plans, outlining the actions that will be taken during the response phase of any emergency. Additionally, emergency responders work together on a regular basis to create response protocols, procedures, and agreements to ensure adequate response. What recent incidents and exercises have shown, however, is that recovery will be much longer in duration, will involve key players outside of the typical emergency responder community, and will include complexities not seen in any other part of emergency management.

Recovery planning is in its infancy across the Denver UASI and in the nation, but coordinating with other emergency disaster plans within the Denver UASI will be necessary for effective recovery. The following plans directly relate to concepts within the framework and are referenced throughout the report where applicable:

Regional Plans

- North Central Region Mass Fatality Plan
- Denver Regional Natural Hazard Mitigation Plan
- Tri-County Health Department Public Health Emergency Operations Plan

State Plans

- Department of Housing Disaster Housing Plan
- State of Colorado Natural Hazards Mitigation Plan
- State of Colorado Emergency Operations Plan
- State of Colorado Disaster Recovery Plan.

3.0 – Approach and Assumptions

This framework takes a "Whole Community" approach to recovery planning and considers the connection of response to recovery, the focus on resiliency, and the decision-making process needed when multiple jurisdictions must work together for a prolonged period. In addition, a number of assumptions and considerations must be taken into account across all phases and functions of recovery.

3.1 – Connection of Response to Recovery

The framework should be implemented immediately upon confirmation of an incident. Initially, response plans will be put in motion first, and response operations will have priority. However, the complexity of recovery will require that recovery planning activities be started as soon as possible. Efforts will transition to the priorities of recovery once areas are secure enough to begin initial disaster assessment. This assessment will determine the nature, magnitude, impacts, and scope of the incident. The information will allow decision makers to assign the appropriate priorities to response and recovery, activate community service networks, and request the most beneficial and necessary outside resources. The state is in a key position to consolidate data across multiple jurisdictions and create a comprehensive situational assessment. The assessment also serves to begin the emergency assistance and disaster declaration process necessary for effective recovery.

3.2 – Focus on Resilience

This framework focuses on actions that will allow a community to be resilient. Disaster resilience can be described as a community's ability to cope with and recover from the impacts of a major incident. The resiliency of a community depends not only on the continuity planning of government agencies and businesses, but also on the preparedness of the community's individual citizens. A community is not resilient unless all of its sectors (such as hospitals, banking, and wastewater treatment) are resilient**.**

Michael Rieger/FEMA

3.2.1 Individual/Community Preparedness

Communities should strive to empower citizens to be able to take care of themselves and teach them how to strengthen their own personal capabilities. Communities need to remind citizens that, during emergencies, local responders will likely be overtaxed and will need to prioritize their actions, thereby requiring community members to have individual and neighborhood action plans to assist in ensuring their safety.

The community should be encouraged to evaluate its vulnerabilities and to consider the infrastructure and vital services it relies on. Educating individuals on mitigation practices can help alleviate some of the potentially long-term consequences of a disaster.

Citizens must also be aware of their surroundings, including the inherent risks associated with living in a hazard-prone area (flood zone, wild land interface, etc.). They must weigh this against other reasons for living in these areas and be prepared to take steps to remove themselves from harm's way as well as sustain themselves after a disaster strikes.

3.2.2 Continuity of Government/Operations

Governments must also prepare for emergencies. Continuity of Government (COG)/Continuity of Operations (COOP) can be described as a jurisdiction's ability to perform minimum essential government functions during any situation and the ability to resume normal operations once the incident has ended. Without a continuity program in place, jurisdictions risk leaving citizens without vital services in what could be their time of greatest need. An organization's resiliency is directly related to the effectiveness of its continuity capability.

The State of Colorado and many of the larger jurisdictions within the Denver UASI have COG/COOP plans in place, and this framework assumes that these plans will be activated upon a major disaster within the Denver UASI.

3.2.3 Whole Community Approach

This recovery framework strives to use a Whole Community approach. According to FEMA,

> "Whole Community is a means by which residents, emergency management practitioners, organizational and community leaders, and government officials can collectively understand and assess the needs of their respective communities and determine the best ways to organize and strengthen their assets, capacities, and interests. By doing so, a more effective path to societal security and resilience is built."[3]

By incorporating the Whole Community concept into the recovery process, communities have recognized that they can address long-term recovery in a more effective and efficient manner. All aspects of a community [e.g., volunteer, faith-, and community-based organizations; other non-governmental organizations (NGOs); the private sector; and the public] are needed to effectively recover from a catastrophic incident. It is critical that all

[3] This information is from FEMA's document *A Whole Community Approach to Emergency Management: Principles, Themes, and Pathways for Action*, FDOC 104-008-1, published December 2011.

stakeholders work together to enable communities to develop collective, mutually supporting local capabilities to withstand the potential initial impacts of these incidents, respond quickly, and recover as rapidly as possible in a way that sustains or improves the community's overall well-being.

The Whole Community concept begins at the individual preparedness level with individual, family, and community planning. Utilizing an inclusive process, and engaging community members from a broad spectrum, enhances recovery opportunities and actions. For example, the concerns of individuals with access and functional needs cannot be considered adequately without first engaging the community in the planning process. Also, government entities cannot recover without accessing private business and resources, NGOs, and volunteer communities. Each of these stakeholders is vital to the overall success of any recovery effort.

3.2.4 The Role of Voluntary Organizations Active in Disaster (VOADs)

VOADs and the nonprofit sector play an essential and unduplicated role in both short and long term recovery of impacted communities. Nonprofits directly supplement and fill gaps where government authority and resources cannot. Resourceful fundraisers, grantors and investors inject needed financial resources to meet recovery needs and obligations that otherwise are not funded by a government program. Nonprofit organizations are also critical for ensuring participation and inclusion of all members of the impacted community.

To effectively use the nonprofit sector and VOADs they need to be connected to and have established partnerships with key players and agencies ahead of time that will need donations and volunteers. Formalization of the roles and responsibilities for government, public sector, private sector and non-profit sector as part of pre-disaster planning combined with the inclusion of VOADs in emergency operations plans at every level of the government will assist with the latter.

3.3 – Multi-Jurisdiction Decision-Making

A wide range of functional areas are represented within the Denver UASI, including emergency management, law enforcement, fire services, special districts, public health, emergency medical services, hospital organizations, public works, and regional transportation. These functional areas are effectively integrated through a collaborative, multi-functional approach to planning.

When there are multiple jurisdictions vying for limited resources or when multi-jurisdictional policy-related decisions are needed, the Unified Recovery Coordination process will be followed. This process centers on a Unified Recovery Coordination Group (also

commonly referred to as multi-agency or multi-jurisdictional coordination group), which includes local, state, and federal partners; NGOs; volunteer organizations; the private sector; and others involved in response and recovery that have the authority to make policy and decisions, allocate resources, and commit funds.

Figure 4 shows the legal authority framework for the Boulder Office of Emergency Management under which disasters fall in Boulder. For a full set of authorities, see the Emergency Management Program Guide.[4]

[4] The Emergency Management Program Guide is available through the Colorado Office of Emergency Management.

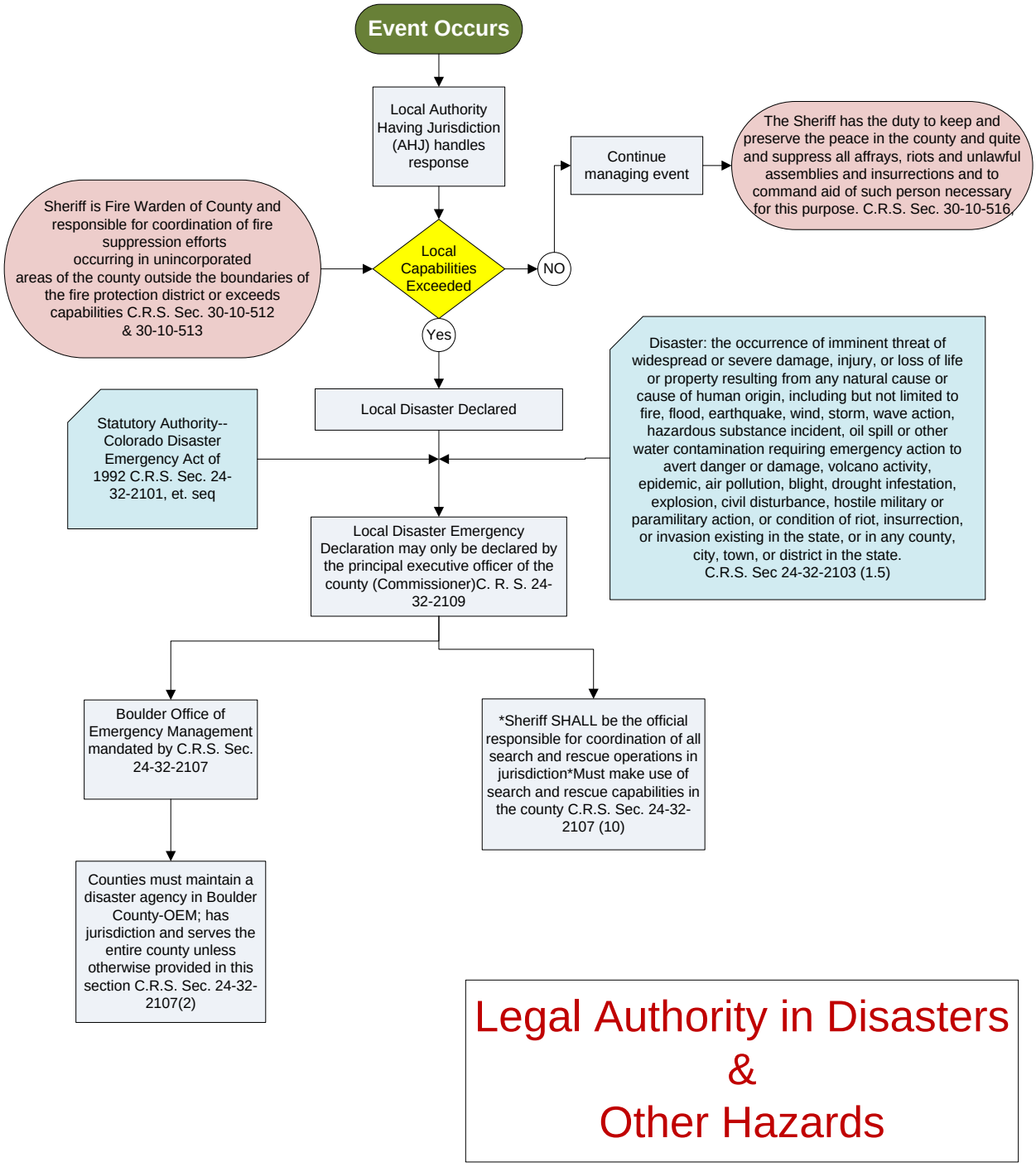


Figure 4. An Example of Legal Authority in Disasters and Other Hazards for Boulder County

3.4 – Key Considerations and Assumptions for Recovery Planning

Pre-disaster planning greatly improves a community's ability to successfully recover from a disaster. By identifying available resources, roles, and responsibilities, state and local officials will have the knowledge to better leverage assistance and coordinate with emergency

management partners to maximize availability and use of those resources. Below are some of the more significant considerations and assumptions that can be addressed during recovery planning. Some of these are repeated in more detail in other sections of the framework.

- Recovery from a catastrophic incident may take months to years and will involve many governmental, non-governmental, private sector, and nonprofit organizations and partners.
- The recovery timeline can be shortened significantly by pre-disaster identification of resources that can improve the speed of operations and increase the capabilities of all levels of government, the private sector, and others involved in recovery.
- A catastrophic incident such as a natural disaster or a chemical, biological, or radiological incident may result in a significant number of casualties (potentially overstressing the healthcare and mortuary system), health care issues, and waste disposal concerns, and potentially devastating economic impacts.
- Any influx of volunteers and disaster workers will require housing, food, medical care, and other necessities. Colorado may not have sufficient housing to accommodate the number of displaced people and the personnel managing the recovery operations.
- The DoD facilities, systems, and/or human resources, like those of all entities in the affected area, will be impacted to some extent, which may limit military operations.
- Critical infrastructure may remain operable but could be damaged. Resuming and maintaining operations of locally identified critical infrastructure and key resources will be a priority for recovery operations.
- The recovery process should be transparent, to the extent possible, to ensure public trust and confidence.
- The news media may characterize the incident as being insurmountable. Social media coverage will be extensive and become both a positive and negative force in shaping public opinion.
- Evacuations may be required, and access to impacted areas will need to be controlled.
- Law enforcement agencies having jurisdiction will decide when the area is no longer a crime scene.
- For some incidents, a wide range and high volume of material will require treatment or disposal.
- Some of the structure from the response phase such as Joint Information Systems and Incident Management Teams (see Appendix B) may be able to be used during recovery.

- Large-scale emergencies have psychosocial impacts on the affected population as well as those involved in long-term recovery of the Denver UASI.

4.0 – Recovery Support Functions

The Recovery Support Functions (RSFs) that have been identified by the Denver UASI are those functions determined to be the most likely to impact the recovery process. The RSFs outline the key issues and considerations related to functional areas of recovery within each of the three phases of recovery.[5] Each RSF includes a description of the key planning considerations and assumptions, as well as identification of the main stakeholders and organizations that will have a role in implementing the specific function.

The objective of the RSFs is to identify relevant stakeholders and experts that will facilitate the identification, coordination, and delivery of assistance and resources to resolve recovery challenges. The activities within the RSFs assist communities with accelerating the process of recovery.

The RSFs that were identified as being applicable to the Denver UASI align with the RSFs included in the National Disaster Recovery Framework as well as many of the RSFs included in the State of Colorado's Disaster Recovery Plan. Table 1 depicts the alignment between the RSFs for the Denver UASI, federal, and state recovery frameworks.

Table 1. Recovery Support Functions at the Regional, Federal, and State Levels

Denver UASI RSF	Associated Activities	Federal RSF	State RSF
Prioritization of Cleanup	Identifying the key priorities for the restoration of an affected area	Community Planning and Capacity Building	Damage Assessment
			Hazard Mitigation
Debris Management	Clearing debris, including staging, segregating, and properly disposing	Health, Social, and Community Services	Debris Management
Economic Redevelopment	Recovering and ultimately improving the economic vitality of the area	Economic Development	Economic Recovery
Fatality Management	Recovering, identifying, transporting, storing, processing, and providing final disposition (burial and cremation) of human remains, including notifying next of kin	Health, Social, and Community Services	Behavioral Health Services

[5] As used in the National Disaster Recovery Framework, RSFs are functions necessary to restore a community to a new normal following a devastating incident.

Denver UASI RSF	Associated Activities	Federal RSF	State RSF
Identification, Stabilization, and Maintenance of Infrastructure and Property	Stabilizing and maintaining critical infrastructure, buildings, and privately owned property	Infrastructure Systems	Infrastructure Systems
Natural and Cultural Resources	Protecting and restoring natural and cultural resources and historical properties	Natural and Cultural Resources	Historical and Cultural Resources
			Environmental Restoration
Post-Disaster Housing	Providing and supporting housing of people	Housing	Housing (interim and long-term)
Public Health and Medical	Providing life-sustaining, safety, and health services related to the incident, including supporting mental and environmental health	Health, Social, and Community Services	Public Health and Safety
Public Information and Messaging	Involving, educating, and informing the public about recovery efforts and their role in recovery	Health, Social, and Community Services	Consumer Protection
Public Safety/Access Control	Providing for the protection, safety, and welfare of the public	Health, Social, and Community Services	Public Health and Safety
Unmet Needs	Directing volunteer resources to areas where they can be most effective and matching unsolicited, undesignated in-kind donations with credible voluntary organizations	Health, Social, and Community Services	Donations Management
			Volunteer Coordination
			Disaster Assistance Centers

4.1 – RSF Prioritization of Cleanup

Robert Kaufmann/FEMA

One of the first steps in the successful recovery of the Denver UASI will be to establish a prioritization working group that includes stakeholders from each jurisdiction to begin the process of determining priorities. This prioritization working group could be part of the Unified Recovery Coordination Group. Regardless, any decisions about the priorities of the Denver UASI should be built on consensus from all involved.

Prioritization of cleanup is broadly defined as the decisions and actions associated with identifying the key priorities for remediation and restoration of the affected area. Input from subject matter experts should help guide prioritization policy decisions.

Prioritization relies in part on information gathered during the disaster assessment process and evaluation of the situation. Decisions regarding prioritization will likely be subject to extreme political and media scrutiny because there may be limited resources and personnel for catastrophic incidents and because of the high impact prioritization will have on the economic viability of the Denver UASI. Decisions should therefore be as inclusive and transparent as possible.

Initial priorities may include the following:

- Life safety
- Property protection
- Critical infrastructure
- Social needs
- Economic needs
- Environment.

Support Function: A Unified Recovery Coordination Group, with increased involvement from private partners in Phase 3 of recovery

Phase 1: Short-Term Recovery

Scope: Establishing a prioritization process and conducting urgent activities

Considerations/Assumptions:

- Prioritization should be completed using a similar technique as emergency triage: Do the greatest good for the greatest number of people.
- The interface with local, state, and federal plans and needs may have a serious impact on prioritization. Federal or state government agencies may want to set priorities for work supported by their resources, and these priorities need to be coordinated with local priorities. Liaison with local emergency operations centers, coordination groups, and Incident Command will ensure priorities are consistent and in the best interests of the community.
- Steps in the prioritization process may include the following:
    - Identification of members of the prioritization working group and development of the group's roles, responsibilities, and processes
    - Determination of prioritization decision criteria including economic, infrastructure, and community needs because these decisions could impact business viability and recovery time
    - Establishment of effective situational awareness and a common operating picture regarding cleanup issues
    - Collection of critical asset data
    - Receipt and compilation of information on structural damage, the preliminary extent of any contamination, preliminary facility needs, and available resources
    - Based on preliminary impact information, evaluation and confirmation of the short-term prioritization scheme
    - Triage of impacted facilities and re-evaluation of more specific priorities integrating contamination, damage information, and available resources
    - Town hall meetings to provide information to the public and learn concerns.
- Initial key activities may include the clearing of major roads for first responders and damage assessment teams, and evaluating critical infrastructure.
- The prioritization scheme may be impacted by the available technologies and approaches developed for cleanup at the time of the incident.
- The tone of community dialogue may change during recovery, creating possible political pressure that did not exist in previous phases of the emergency. The political environment may affect overall priorities involving cleanup.

- Acknowledging interdependencies will be important. Utilities are needed for hospitals to operate. Businesses have to come back to provide a means for people to return to work. Transportation routes must be open.
- Key pieces of infrastructure and the economy often depend on each other; thus, restoring infrastructure should be a top priority. Prioritization decisions must consider enabling assets for both cleanup and operation of high-priority facilities and areas as well as the demands for debris disposal.
- Of critical concern will be the availability of and access to resources. Cleanup of a building that is a health and safety risk or heavily contaminated may need to be lowered in priority until resources are available. Resource limitations may also impact cleanup time.

Phase 2: Intermediate Recovery

Scope: Determining the order in which cleanup teams take action

Considerations/Assumptions:

- The restoration of critical infrastructure and utilities, hospitals, care facilities, and schools should continue to be evaluated. Tools such as the Automated Critical Asset Management System (ACAMS) can be used in decision planning regarding critical facilities.
- Certain critical industries will have their own continuity plans, but the ability to follow those plans may depend on local resources.
- Private sector dependencies should be considered to help support economic recovery.
- Media and political pressure about prioritization decisions may increase and change.
    - Re-evaluation of priorities will be a constant process as new capabilities are stood up, technologies improve, lessons are learned, and information is gathered.
    - Prioritization should be responsive to changes in government leadership, structure, and priorities.

Phase 3: Long-Term Recovery

Scope: Continuing to address those priorities impacted by the incident

Considerations/Assumptions:

- Priorities should be set at the local, state, and federal levels to best support local jurisdictional needs in recovery. Decision-making must continue to be a collaborative process among all those affected.
- Elected officials who may have set recovery goals for their jurisdiction may now be out of office.
- Each jurisdiction will have to evaluate progress in the recovery process and determine how to proceed.
- Evaluation of the level of recovery in all the impacted areas should be ongoing.
- A great deal of information will have been learned from this effort and should be documented and shared with others.
- Decisions regarding prioritization may result in litigation.

4.2 – RSF Debris Management


Tim Burkitt/FEMA

Debris management is associated with clearing debris and contaminated waste[6] and consists of staging, segregating, reducing, composting, recycling, and proper disposal. Disasters often create large amounts of waste that must be managed as part of both immediate response and long-term recovery processes. Only a few state and local agencies in Colorado have debris management plans, and these plans do not necessarily address all types of debris, environmental laws, and legal and/or monitoring responsibilities.

Support Function: At the local level, the departments involved will depend on the local jurisdiction but will likely include the environmental health department, public works, and parks and recreation. At the state level, the agencies involved would be the Colorado Department of Public Health and Environment (CDPHE) and the Colorado Department of Transportation (CDOT). The Colorado Department of Agriculture would be the lead for commercial animal issues related to disposal.

Considerations/Assumptions:

- The regulatory scheme and agency in charge will be determined and communicated to all parties involved and a command/management structure will be set up.
- Existing debris management plans should have criteria for identifying debris sites depending on the type of debris generated from disasters.
- Because the classification for contaminated waste is not clear, treatment and disposal methods may be uncertain. Regulatory and disposal officials will be consulted before final decisions on disposal are made.
- There are pre-incident planning opportunities, including specifying criteria for landfill siting; identifying specific locations prior to an incident, and identifying siting and

[6] In the main all-hazards framework, the term refers to waste contaminated by sewage, blood, or other infectious agents (salmonella, mold, etc.). Waste contaminated by chemical, biological, or radiological incidents is discussed in the annexes addressing such incidents.

criteria for unacceptable sites. Although scoping new sites has costs associated with it and changes in land development could take pre-identified sites out of consideration.

- Pre-approved contracts will be in place for qualified contractor and restoration firms.

Phase 1: Short-Term Recovery

Scope: Staging and disposing of various types of debris including vegetative debris, construction and demolition waste, hazardous waste, white goods, vehicles and vessels, garbage, animal carcasses, and infectious wastes. Chemical, biological, and radiological debris are not specifically addressed in this main section of the framework but are addressed in the attached annexes.

Considerations/Assumptions:

Personnel and Resources

- There may be shortages of facilities, equipment, and techniques to test and clear affected debris areas.
- There may be shortages of trained debris management personnel [including those with appropriate personnel protective equipment (PPE)] to characterize, treat, and dispose of debris properly. This, however, does not lessen any agencies' or jurisdictions' obligations to comply with federal, state, or local governments' environmental laws, statutes, regulations, or ordinances. Regulatory and disposal experts should be consulted when considering waiving any environmental laws.
- Worker safety and collective bargaining agreements could present a challenge for quickly scaling up the capability of local waste haulers and treatment centers to handle contaminated waste.
- There may be a lag between cleanup and waste disposal readiness while personnel are trained and outfitted for everything from transportation to final disposition of the contaminated waste.

Characterization and Classification

- The management of waste that falls outside of classification will need to be determined.
- Debris may need to be sorted and required to be segregated.
- Key questions of effectiveness will need to be addressed:
    - How to determine if an area is clean; which agency and level will make that decision

- Possible collection and staging options (curbside collection, collection sites, sorting or not sorting, etc.)

Transportation

- Transportation methods, special requirements, and contracts will need to be evaluated, including hauling routes and staging areas.
- Regulations need to be followed when transporting waste across jurisdictions. The specific regulation will depend on the type of waste, amount, and transportation route.
- The public will most likely need to accept areas through which waste is transported.

Treatment and Disposal

- Whether to decontaminate debris at the incident site before disposal will need to be decided.
- Determination for treating waste streams in place will be based on the cost, effectiveness, and public health requirements.
- Various disposal options will need to be considered, including the use of landfills, incinerators, and autoclaves.
- Gaining public acceptance for issues including nearby waste disposal may be challenging.
- Waste should be managed in a cost-effective and appropriate manner and efforts made to dispose of materials in a responsible way (i.e., recycling and composting materials) when possible.

Phase 2: Intermediate Recovery

Scope: Disposing of most of the waste. This phase may include the following activities:

- Waste characterization, treatment, clearance, and transportation
- Debris management site restoration (staging operations)
- Public messaging.

Considerations/Assumptions:

- As residents and business owners return to their property, increased amounts of normal waste may be generated. Waste may also increase as those returning renovate and re-establish a home environment. This phase may begin while cleanup activities are ongoing in other areas.
- Availability of trained personnel (such as contractors, restoration firms, and waste management personnel) and methods to increase the number of available resources for waste disposal activities may be an issue.

- A mechanism will be needed to verify contractors are qualified and comply with the debris management processes.
- Appropriate transportation methods need to be identified, including those for loading, routing, and unloading.
- Final disposal sites should be designated by waste type.
- Cleanup and long-term environmental monitoring may be needed at temporary waste treatment and storage sites in areas that have been reoccupied.

Phase 3: Long-Term Recovery

Scope: Returning waste management to local jurisdictions to meet all state and federal criteria, working with homeowners to return to pre-incident conditions (moving to a support function), and conducting long-term environmental monitoring of sites exposed, both in passing and in process, to contaminated waste

Considerations/Assumptions:

- Waste disposal sites, transportation routes, temporary waste storage sites, waste treatment facilities, trucks, and other facilities associated with the incident may need long-term monitoring, depending on the waste stream.
- Workers may need long-term monitoring to track any medical complications associated with their employment.
- Responsibility for the long-term monitoring of waste disposal sites will need to be determined.

4.3 – RSF Economic Redevelopment

Adam DuBrowa/ FEMA

Economic redevelopment in this context is broadly defined as the planning and actions to recover and ultimately improve the economic vitality of the Denver UASI after a catastrophic incident. A primary goal of economic redevelopment is to retain and attract back local businesses and workers during all phases of recovery.

Economic redevelopment efforts will occur throughout recovery with changes in policy to support the objectives of each phase. The speed of recovery is an important aspect that affects the rate of businesses and population returning to the Denver UASI. There must be a sense of urgency surrounding recovery, with immediate strategies developed to retain businesses.

Support Function: At the local level, local offices of economic development, planning departments, and chambers of commerce should be involved. At the state level, the agencies involved will be the Department of Local Affairs, Division of Local Government.

Considerations/Assumptions:

- Businesses that plan for disruption are less likely to go out of business after a disaster than those that do not. COOP plans should be activated on the first signs of disruption.
- Economic recovery should be a key factor when considering priorities for cleanup of critical infrastructure (see Prioritization of Cleanup). Also, these assets may need to be bolstered in nearby areas to support the relocation of people, government, and business.
- The Metro Denver Economic Development Corporation (EDC) has identified eight core sectors in Denver's economy: aerospace, aviation, bioscience, broadcasting & telecom, energy, financial services, healthcare, and IT/software. Particular attention will be paid to the health of these industries.
- Locally owned businesses spend twice as much money in a local economy as non-locally owned businesses and should be prioritized.

- Critical businesses should be identified in advance of a significant incident by the city managers and directors (e.g., economic development director).
- While the state's resources registry (Connect Colorado), with more than 70 private sector companies registered, will be useful in an emergency, a back-up will be needed outside of the Denver metro area to ensure timely sharing of resources from the outside.
- In some cases, facilities may be set to be reoccupied in weeks or months. Incentives should be prepared immediately for these cases. In other cases, it may be years before reoccupation can occur, and preparation for new incentives to bring in new businesses during long-term recovery will be important. The development of a "toolbox" of tactics, tools, and techniques used to provide credit and financial incentives is advised to increase the availability of credit and capital to recovering businesses. This toolbox would be developed and approved by local mayors and the planning and community development teams.

Phase 1: Short-Term Recovery

Scope: Planning for retaining, maintaining, and improving the economic vitality of the Denver UASI

Considerations/Assumptions:

Plans/Policy

- A UASI-wide strategy should be developed that may include consulting with businesses which vacated the area to determine what incentives would encourage reoccupation during intermediate recovery.
- Small businesses are likely to run out of working capital after as little as two weeks. Emergency micro-loan programs should be created to allow businesses to remain open.
- Development of a clearinghouse, with input from the Colorado Department of Regulatory Agencies (DORA) and its Division of Insurance, for validation of credible businesses should be considered. The focus of the clearinghouse should be on consumer protections, including policies about price gauging.
- Planning for repurposing of land should begin immediately to support prioritization efforts and minimize recovery time.

Infrastructure

- Locally identified critical economic infrastructure should be determined. Roads, telecommunications, schools, housing, healthcare, fuel, public transportation, and other infrastructure that supports employees' needs are all key enabling assets for businesses. It will also be useful to determine which employees live where.
- Reopening the Denver airport, which employs nearly 15,000 people, will be critical to ensure that airlines do not shift business to another transit hub.
- DoD installations should be encouraged to achieve mission readiness to support economic sustainment and recovery in their surrounding areas. DoD installations employ a large number of on- and off-base personnel, which in turn support enabling businesses.

Businesses

- Government agencies should work closely with the private sector during all phases, including providing information on plans, getting feedback, and involving the private sector in decision processes. Where possible, agencies will establish a business resource center with a liaison to the Unified Recovery Coordination Group.
- A business continuity assistance center should be set up to support local businesses affected by the disaster. This center can include information that addresses business needs and answer questions such as the following:
    - Which companies can be hired to help clean up?
    - Are they certified?
    - Have they been trained in the current cleanup standards?
    - What codes and standards are currently in place?
    - Have codes been relaxed for the short term to facilitate recovery?
- Insurance representatives will be deployed by their respective companies and should be immediately involved in the transition to recovery.
- Incentives should be provided to move businesses to backup locations in the Denver UASI. Incentives should include support for expansion or maintenance of existing critical economic infrastructure in the alternate locations to handle additional usage, waiving of licensing fees or regulatory requirements, short-term tax breaks, and relocation loans.
- Reoccupation offers a distinct opportunity to repurpose and rezone areas to improve their resiliency to disasters and promote recovery objectives.

Phase 2: Intermediate Recovery

Scope: Implementing and refining strategies to continue to retain, maintain, and improve the economic vitality of the Denver UASI, including the protection and growth of primary jobs (ones that create things as opposed to service industry jobs)

Considerations/Assumptions:

- Agencies must work closely with the private sector to coordinate resources and cleanup efforts and provide information that businesses need to remain confident in the long-term viability of the regional economy. This coordination can address concerns and interests to support the reoccupation of the affected area.
- A lead agency should be identified or established to mitigate the economic impact of the disaster in the Denver UASI by promoting the return and re-establishment of businesses and workers.
- Private sector investment will be essential to helping small businesses rebuild. The lead agency for economic recovery should conduct outreach to investors to limit the borrowing costs of local businesses.
- A key to the success of Denver's economy is high-value jobs. Colorado ranks second in the nation for bachelor's degree holders, second for aerospace jobs, and third for high-tech jobs. Re-attracting these workers and industries will be critical.
- Information about cleanup resources should be provided to enable the private sector to retain and clean up their facilities. Sufficient information about the permitting for reoccupation should be provided along with any incentives for business retention or reoccupancy.
- The maximum use of local workforce and resources should be encouraged, to supporting reoccupancy and discouraging relocation to enhance local economic recovery. Where feasible, construction contracts should mandate that local labor and materials be used.
- The chambers of commerce can provide assistance with outreach and strategies for economic redevelopment in conjunction with other local organizations.
- Employees may be trained to be contractors for recovery during this phase. Areas could look at training and education programs to help build a new workforce.
- Public commitments from large businesses to remain or rebuild in the area should be sought to increase confidence in the health of the economy.

- Communal resource centers for small businesses should be established to allow continuing operations. Local resources, such as schools and parks, can be used as market spaces while businesses rebuild their facilities.

Phase 3: Long-Term Recovery

Scope: Beginning to phase out incentives and shifting activities toward more normal economic development as key objectives are accomplished. Once regional objectives are realized, the process of economic development will be transitioned back to local jurisdictions.

Considerations/Assumptions:

- Development plans are beginning to be initiated and a public involvement process has been established.
- Policy to develop incentives in the form of property tax credits, infrastructure improvements, wage subsidies (federal), and extended unemployment benefits may be developed.
- Public support at both the state and federal level will likely wane for continued economic and policy incentives for the Denver UASI as the situation establishes a new normal. This change may impact the ability of government to provide financial incentives to business.
- Incentives to promote tourism, trade, and hosting of business and government meetings may help promote an image of a healthy, functioning area and bring needed outside money into the Denver UASI.

4.4 – RSF Fatality Management

Fatality management encompasses investigation, recovery and identification, transport and storage, notification, and processing/final disposition (burial and cremation) of human remains.


FEMA News Photo

Support Function: Coroners and medical examiners[7] from the local jurisdiction will have the lead. CDPHE will have a supporting role in a mass fatality response of this scale. Engagement of the U.S. State Department will be necessary to help with deaths of foreigners.

Considerations/Assumptions:

- Fatality management needs to begin as soon as possible during any emergency involving fatalities.
- The North Central Region's Mass Fatality Plan would be enacted.
- Any large-scale incident that results in mass fatalities will overwhelm local capabilities. Infrastructure, facilities, and personnel (medical examiners/coroners) identified in plans may no longer be available because of the extent of the disaster. The Disaster Mortuary Operational Response Team (DMORT) is the only federal response organization prepared to handle large numbers of fatalities.
- While the fatality management process works well in the case of a single death, high fatality rates may require amending processes and procedures.
- The agency responsible for vital records is critical to effective fatality management.
- Planning needs to begin immediately to address the overwhelming number of people (family members, friends, and media) seeking information about missing loved ones who may be victims of the disaster. Family assistance services are a key component of mass fatality management.

[7] The coroner and medical examiner's offices are under different authorities and agencies in different jurisdictions. It may be the local department of health or another agency.

- Early in emergency response, local jurisdictions will often have to depend on local agencies and organizations, such as the Colorado Human Remains Extraction and Recovery Team (CO-HEART), to support recovery efforts. State and federal support systems may take 24 to 48 hours to respond and establish operations. Federal mortuary response teams available for most disasters include the DMORT and the Family Assistance Center Team (FACT), which will be deployed as requested.
    - DMORTs are composed of private citizens, each with a particular field of expertise, who are activated in the event of a disaster. National Disaster Medical System/DMORT personnel are required to maintain appropriate certifications and licensure within their discipline. When personnel are activated, licensure and certification is recognized by all states, and the personnel are compensated for their duty time by the federal government as a temporary federal employee. During an emergency response, DMORTs work under the guidance of local authorities by providing technical assistance and personnel to identify and process deceased victims. DMORTs can provide the following services: temporary morgue facilities, victim identification, forensic anthropology methods, processing, and preparation and disposition of remains.[8]
    - The FACT is a sub-group within DMORTs that manages the collection of antemortem information and provides support for the families of victims.[9]
- Morgue capacity in most hospitals may not be adequate for this task. Several solutions including refrigerated trailers or buildings, free-span structures, or temporary centralized morgue facilities should be considered early in the emergency response phase and used during recovery.

Phase 1: Short-Term Recovery

Scope: Conducting parallel efforts to deal with both a large number of human fatalities and to support public communication for community recovery; determining the area affected, number of fatalities, collection methods, and the recovery, storage, processing and identification of human remains.

---

[8] Department of Health and Human Services. “Disaster Mortuary Operational Response Teams.” http://www.phe.gov/Preparedness/responders/ndms/teams/Pages/dmort.aspx

[9] Region 3 DMORT. “Disaster Mortuary Operational Response Team.” http://www.dmort3.org

Considerations/Assumptions:

Storage/Capacity

- Capacity issues will be impacted by a decision about the extent to which each of the remains will be examined (autopsied/confirmatory testing for cause of death) and how deaths will be legally certified. Per Colorado State Statute, the coroner/medical examiner's office is responsible for deciding when an autopsy is performed and has jurisdiction over deaths for identification and certification. Public officials may be able to waive certain laws for certification of death and issuance of death certificates, depending on the incident.
- Local jurisdictions will need to determine a means of rapidly identifying and collecting human remains as well as storing, processing, and final disposition.
- Temporary facilities will need to be established early, including the following:
    - Temporary morgue(s)
    - Family Assistance Center
    - Facilities for the holding, collection, and final disposition of human remains
    - Land for temporary internment.
- Continuity of operations may be a problem for the coroner/medical examiner's offices, which may also have sustained casualties and lost access to facilities.
- National Guard assets may be available for processing/identifying bodies and performing autopsies. International support may prove necessary.
- If necessary, the coroner/medical examiner will need to establish collection points for overflow capacity of human remains.

Facility Assistance Center

- Pre-planning includes identification of the agency that will work in collaboration with the coroner's office and will be responsible for obtaining, establishing, and managing an appropriate physical facility and staff for a Family Assistance Center or Call Center.
- CDPHE will activate the Disaster Behavioral Health Division to provide behavioral health support for impacted communities including directly affected victims, families, and emergency response personnel (for more information on behavioral health see 4.8 – RSF Public Health and Medical Services).
- Messages to volunteers, families, and others involved may change. Communication should include
    - Information for individuals and families seeking their missing loved ones
    - Direction to either a Family Assistance Center or Call Center to enable coroners to obtain necessary *ante mortem* information and possibly DNA

- An educational resource to inform families of what they should expect from the fatality management process
- Targeted messages about grief, loss, and community dislocation from behavioral health organizations in coordination with the Family Assistance Center.

Disposition

- Religious and cultural considerations should be made when establishing policy with regard to mass fatalities. Timelines associated with different cultures and religions for disposition of human remains should be considered. These preferences will be impacted by policy decisions about priorities.
- Some people may wish to bury their loved ones, or spread their ashes, in a traditional area that is impacted. Agencies will need to work with public officials to determine protocols to either support or deny such requests.
- Coordination with DoD for disposition of military personnel will be very important.
- A protocol will be needed for deaths of workers on the job. Will they receive higher priority for processing and final disposition because of liability concerns associated with worker safety and health?
- Non-disaster-related deaths will continue to occur. Tactics to maintain normal operations should be developed.
- The set-up of a temporary cremation facility should be considered for identified remains.

Phase 2: Intermediate Recovery

Scope: Continuing efforts to manage a large number of human remains and to establish and maintain sustainable fatality management systems and processes, with a focus on returning to mostly normal, day-to-day operations

Considerations/Assumptions:

- Continuing fatality management operations without outside support will be difficult because of worker fatigue and the overwhelming workload.
- Personnel health and well-being will remain important, especially in this phase where stress, fatigue, and emotions are high. Personnel working in the area of fatality management will be affected by stress, especially with long-term exposure to mass fatalities. Acute traumatic stress may increase and result in psychosocial issues and disorders. Communication and interventions should focus on
    - Recognition of signs of normal stress reactions

  - Suggestions for coping with acute and chronic stress as well as long-term behavioral health
  - Resources available for support and well-being.

- Support may be needed for final disposition, including financial, social, and health issues.
- Many short-term waivers and policy guidance documents may expire during this timeframe, leading into normal operations.
- Facilities may close, requiring alternate solutions and staffing. Trigger points for the closure of facilities must be considered before this occurs.
- The coroner/medical examiner's office will need to make final disposition decisions on remains that have no next of kin.

Phase 3: Long-Term Recovery

Scope: Conducting new normal operations

Considerations/Assumptions:

- Autopsy reports are public records and can therefore be released to the public as requested and through proper channels. It will need to be determined how the surge of requests will be handled.
- General statistics and information regarding fatality management operation will likely be made available through a final report on the incident. Capturing lessons learned and updating policies, plans, and procedures will be essential to ensure effective response and recovery in future incidents.

4.5 – RSF Identification, Stabilization, and Maintenance of Infrastructure and Property

This function applies to the preservation and restoration of public and private sector infrastructure systems and privately owned property. The disruption of certain infrastructure systems can have significant impacts on businesses and government functions, causing cascading effects far beyond the specific system itself.[10] Infrastructure sectors including transportation systems, utilities, sanitation, and water systems should be identified before an incident to ensure disruption of services is minimized and to allow for pre-identification of backup resources.


Michael Rieger/FEMA

Support Function: At the local level, support will depend on the jurisdiction's structure and will possibly include road and bridge departments or public works, with private sector involvement. At the State level, the lead agency will be CDOT.

Phase 1: Short-Term Recovery

Scope: Preserving property and mitigating secondary impacts

Considerations/Assumptions:

Community Redevelopment

- Community zoning, planning, and land-use processes will need to be evaluated to determine whether they meet the needs of the community post-disaster.
- The policies and procedures needed to expedite the relocation, reopening, and creation of sustainable businesses and community redevelopment will need to be defined.
- Business and community leaders will have to make strategic decisions regarding funding and revenue to determine whether to rebuild.

---

[10] For example, the destruction of a major road will cause disruptions in the supply chains, which will have a debilitating impact on the economy; a road closure will also affect the ability of emergency workers to access areas of need.

- Banks and other financial institutions should be contacted to discuss their responsibilities in maintaining defaulted properties.

Critical Infrastructure

- The incident may result in significant disruptions to the area's critical infrastructure, such as energy, transportation, water systems, public health, and medical systems.
- Initial activities may include conducting an impact assessment to determine the extent of damages and complete emergency repairs. Damaged or destroyed critical infrastructure should be identified and prioritized.
- Perimeter security will need to be reinforced and resources provided for staffing and fencing.
- Identification of temporary alternatives to using damaged property and infrastructure will need to be a priority.
- Damaged roads must be restored to maintain supply lines as well as to provide access for emergency workers.
- A cost/benefit analysis associated with various forms of disposition (restoration versus demolition) can help with the decision-making process.

Private Sector

- Agencies should meet with business owners to determine their needs as well as to provide a forum for owners to meet with the Small Business Administration for financial assistance.
- Developing solutions and implementing plans that provide incentives to building owners to clean up in a timely manner should be a priority so as not to lose tenants.
- The level of building and property inspection required for certification of reoccupancy should be clarified in advance.
    - Specialized training may be required to rapidly increase the number of inspectors who can certify properties for reoccupancy.
    - Certifying buildings for reoccupancy may be considered a liability issue for those responsible.
- Restaurants and grocery stores will be inspected and reopened as expeditiously as possible to provide basic human needs and to restore economic vitality.

Phase 2: Intermediate Recovery

Scope: Continuing to preserve property and mitigate secondary impacts

Considerations/Assumptions:

- Continued assessment of infrastructure systems will be needed to determine ongoing needs. Assessments of general infrastructure pertaining to transportation and schools will be needed to ensure citizens are able to return to the area. Secondary impacts such as a decrease in structural integrity will also need to be assessed.
- A coordination mechanism will be needed between disaster assessment and remediation teams. This could be a role for the Unified Recovery Coordination Group.
- A process will be needed for tracking buildings that have already been cleaned.
- Procedures (developed during short-term recovery) that identify the level of inspection required before a building is certified for reoccupancy can be obtained from building, zoning, or fire officials.
- Rebuilding or demolition of infrastructure and property must follow public health and building codes.
- Legal authorities need to be defined as they relate to access and acquisition of private property, particularly for facilities that owners have surrendered, failed to claim, or failed to maintain and restore.
- During the transition from assessment to maintenance, adequate records need to be maintained of maintenance and remediation efforts in buildings.

Phase 3: Long-Term Recovery

Scope: Stabilizing and maintaining infrastructure, defining the new normal, and implementing mitigation measures to improve resiliency

Considerations/Assumptions:

- The use of temporary solutions should be transitioning back to more permanent solutions.
- A redevelopment planning study should be conducted with land-use reviews.
- Identification of mitigation measures to prevent similar future problems will be important.
- Lessons learned from the incident should be documented, shared, and publicized to educate stakeholders.

4.6 – RSF Natural and Cultural Resources

This function covers the protection of a community's natural and cultural resources and historic properties (NCH) following a catastrophic disaster, which can be a powerful catalyst for recovery and revitalization because it helps maintain and restore the fabric of a community, providing symbols of resilience. Preservation professionals can aid this process by being an integral part of recovery efforts.

Support Function: At the local level, the lead will depend on the local jurisdiction but will likely include local planning or parks and recreation departments. At the state level, the lead would be the Colorado State Historic Preservation Office.

Considerations/Assumptions:

- Pre-identification of historic properties in the community will help recovery teams quickly locate those specific resources that require specially trained personnel.
- Advanced identification of personnel with specific preservation knowledge can assist with pre-disaster mitigation and post-disaster recovery.
- FEMA will typically trigger historic preservation compliance through the National Historic Preservation Act.
- Responsibilities for ensuring historic properties are being properly addressed during the recovery process will need to be determined.
- Local and state emergency plans should include salvage protocols for historic properties and, whenever possible, training for salvage contractors on the special needs of historic materials and features.

Phase 1: Short-Term Recovery

Scope: Stabilizing NCH resources

Considerations/Assumptions:

- Architects, engineers, historians, archaeologists, and inspectors with training and expertise in historic structures and sites should be included on damage assessment teams whenever possible. Preservation expertise lays the groundwork for more effective stabilization, repair, and rehabilitation in historic areas.
- Compliance with relevant environmental and other laws during recovery activities will be necessary.
- Interdependencies among short-term recovery decisions and long-term environmental impacts should be taken into account.
- The Colorado Division of Natural Resources will provide technical advice and assistance to help preserve, protect, conserve, stabilize, rehabilitate, or restore NCH resources and establish logistical links with organizations in those areas.
- The Historical Society of Colorado will provide technical advice to affected jurisdictions concerning historical property or artifacts destroyed or harmed during emergencies.
- The Natural Resources Conservation Service will assist in rehabilitating conservation facilities damaged by a disaster.
- Security of damaged cultural facilities will need to be considered to prevent such crimes as looting of artifacts.

Phase 2: Intermediate Recovery

Scope: Conserving, restoring, or recovering the community's valuable NCH resources

Considerations/Assumptions:

- Historic preservation offices have guidelines on documentation, salvage, and other post-disaster procedures for historic resources. Preservationists should make sure that local building and emergency officials are aware of these best practices and allow time to properly evaluate damage and explore preservation solutions.
- A preservationist can provide advice regarding which neighborhoods and districts should receive priority attention in the repair and rebuilding phase; however, historic preservation professionals may be in short supply.
- A mechanism will be needed to verify contractors are qualified and comply with any applicable laws related to preservation.

Phase 3: Long-Term Recovery

Scope: Returning to a state of normalcy

Considerations/Assumptions:

- Additional experts in the area of cleaning, repair, replacement, and reconstruction to assist in the repair of historic properties may need to be located.
- Long-term environmental monitoring may be needed in areas that have been restored.

4.7 – RSF Post-Disaster Housing

Post-disaster housing is broadly defined as providing housing assistance to individuals after a catastrophic incident. The nature of the support will depend on whether insurance covers losses caused by the incident. Post-disaster housing needs may be significant for both the interim and the long term.

Marilee Caliendo/FEMA

Support Function: At the local level, Public Housing Authorities, human/community services, and volunteer organizations will be involved. At the state level, the Colorado Department of Local Affairs, Division of Housing (DOH); Colorado Housing Finance Authority (CHFA); and Colorado Department of Human Services will be involved.

Considerations/Assumptions:

- The range of people in need of support may include the homeless, destitute, displaced residents, disaster workers, and volunteers.
- A significant population may remain in the impacted area, unable to self-evacuate because of access and functional needs, poverty, language barriers, or limited access to transportation resources.
- FEMA, Housing and Urban Development, and other federal resources may be available if a federal disaster is declared.
- Long-term temporary housing solutions may be required for several years following the disaster.
- Housing assistance will depend on meeting income eligibility requirements, meaning some displaced residents may not receive needed assistance.
- All potential housing solutions should be considered, including innovative and non-traditional sources such as college dorms and trailers, keeping in mind local zoning and land use policies.
- Every effort should be made to keep families, friends, and communities together to help strengthen the resilience of individuals and groups and reduce the long-term psychosocial consequences.
- Multiple jurisdictions may compete for limited housing resources.

Phase 1: Short-Term Recovery

Scope: Developing strategies for housing displaced residents

Considerations/Assumptions:

Temporary Housing

- Emergency shelters should only be used for a short time.
- The eventual demobilization of post-disaster housing and emergency shelters should be considered in planning.
- Temporary housing decisions should consider proximity to family, schools, transportation, and employment.

Permanent Housing

- A strategy for reoccupation of the affected area will be communicated to the affected population.
- A Disaster Assistance Center[11] will be opened to enable individuals to meet with insurance agents and local officials to discuss options for rebuilding or relocation.
- Relocation plans should be developed. Permanent relocation outside the area should be discouraged to help with the economic recovery of the community.
- The Colorado Chapter of the International Code Council can assist in finding building officials and permit technicians to supplement local building inspectors.
- Housing inspection (for building and safety codes) before occupancy should be considered along with the possibility of waiving or altering the inspection requirement. The funding stream dictates whether inspections are necessary for building permits. If state rental assistance is provided, an inspection will be required.
- Rules for site acceptance and the authority for inspections will need to be determined. Normal standards and codes may need to be adjusted to accommodate resource constraints. Building codes may need to be adjusted.

Coordination

- Coordination between jurisdictions could help prevent competition.
- Partnering with the private sector, including developers and building owners, will be an important component in securing housing options.

[11] A Disaster Assistance Center is a location where those affected by a disaster may go for information about FEMA or other disaster-related assistance programs, including post-disaster housing.

- The DOH can provide technical assistance to local housing authorities in the development of post-disaster housing plans.

Funding

- Available housing resources may be insufficient to care for everyone affected by the disaster. Upon a state declaration of disaster, DOH will prioritize assistance for those eligible populations that have the fewest means to return to self-sufficiency.
- Financial assistance from DOH typically includes up to three months of rental assistance without a presidential declaration and longer with a presidential declaration.
- The sources and restrictions of funding as well as the duration of their availability should be identified.

Phase 2: Intermediate Recovery

Scope: Relocating people from temporary disaster housing, followed by scaling down post-disaster housing

Considerations/Assumptions:

- Local and state governments must be prepared to develop housing strategies after federal government rental assistance ends. Once post-disaster housing operations end or funding is cut off, some individuals may be rendered homeless. The Long-Term Recovery Committee (see Unmet Needs RSF) will assist in identifying these vulnerable populations.
- Competition for a limited supply of housing may be ongoing between displaced residents and disaster workers.
- Residents and property owners will be directed to interim housing availability through www.coloradohousingsearch.com for both listing and locating housing options.
- People may be relocated during this phase based on relocation plans developed in short-term recovery. Continuing to prioritize multi-dwelling sites and interim or long-term solutions is important.
- NGOs and faith-based organizations will assist in providing disaster housing case management.
- People may want to stay in their post-disaster housing indefinitely, and incentives may be needed to move them back to the area to maintain economic vitality.
- Upon a federal disaster declaration, CHFA can activate a protection plan to suspend payments on mortgages in the impacted area.

- Rent control measures should be considered in areas that receive displaced residents to prevent indirect economic damage, such as inflation, price gouging, or predatory lending.
- The determination should be made whether people displaced by the incident will be prioritized or given incentives to return to the area.

Phase 3: Long-Term Recovery

Scope: Resolving financial and long-term administrative issues and considering permanent housing options

Considerations/Assumptions:

- The primary responsibility for permanent housing falls on individual homeowners, property owners, and private entities such as insurance companies. The Long-Term Recovery Committee (see Unmet Needs RSF) should address the unmet needs of survivors as they relate to housing issues
- The Small Business Administration can make federally subsidized loans to homeowners and renters to repair or replace homes.
- The State Disaster Housing Task Force will assist with recovery efforts when requested by COEM upon issuance of a state disaster declaration.
- Final disposition of remaining post-disaster housing resources (e.g., trailer cities, shipping containers, and tents) will need to be determined.
- Whether the government can subsidize property to limit the impact of severely declined property values on recovery should be determined.

4.8 – RSF Public Health and Medical Services

Public health and medical services is broadly defined as life-sustaining, safety, and health activities related to the incident. Initial recovery efforts will include several key activities for this RSF:


Casey Deshong/FEMA

- Communicate community public health and risk information to a variety of audiences
- Conduct disease surveillance and environmental monitoring, and determine the source of the disease or environmental contaminant
- Assess environmental health threats and ensure the safety of air, water, and food
- Identify population(s) at risk, including workforces and responders, and protect both their physical and behavioral health to the greatest extent possible
- Assess the need for and coordinate the provision of behavioral health support to the community
- Facilitate and coordinate the procurement and distribution of medicine and medical resources
- Support the surge capabilities of health care organizations
- Support the restoration of critical medical infrastructure including facilities, distribution, and supply chains
- Recover and maintain the production and dissemination of vital records.

Public health and medical services will be active through all phases of recovery, although the scope and emphasis may change according to the characteristics of each phase.

Risk communication will be a major component of public health and medical services activities. Actionable guidance for all recipients of the information–health care providers, the emergency response community, and the public, should be provided (see Public Information and Messaging RSF for details).

Support Function: At the local level, local public health departments will lead. At the state level, CDPHE and Colorado Department of Human Services will be involved.

Considerations/Assumptions:

Resources

- A disaster declaration would be in place to allow for the release and use of critical resources, to implement altered standards of care, and to provide a waiver for liability-related challenges.
- Because of the widespread impacts of the incident, managing resources such as medical supplies, pharmacies and clinics, and medication inventories will be a challenge.
- Durable and non-durable medical resources will be severely limited, particularly in the directly impacted areas.
- The medical and healthcare system costs associated with the incident will likely exceed local and state financial resources.
- Work force protection will be modified as appropriate and tailored to the incident to account for the increased and unknown risk.
- Just-in-time training will be necessary to address personnel shortages and should be developed, along with job action sheets, in advance to facilitate backfill across public, environmental, mental, and medical health roles.
- The civilian and public health care system may be completely overwhelmed. Alternative care sites should be considered as necessary.
- Medical care facilities will likely have logistical challenges.

Coordination

- Significant numbers of people with medical needs may be staying in shelters, possibly for months depending on the incident. Coordination with the shelters will be important.
- People will leave the immediately impacted area and seek medical assistance of both emergency and routine natures in other health jurisdictions.
- Long-term environmental monitoring will be needed of water, food, air quality, sanitation systems, and debris management systems. This monitoring will be a coordinated effort with environmental health, public works, and other local, state, and federal agencies including public, environmental, and mental health and medical services. An initial process should be developed and in place during the response phase that can be refined for recovery.
- Vital records managers will need to coordinate with coroners and medical examiners to manage fatalities caused by the incident.

Level of Care

- The morbidity and mortality rates associated with the incident may be significant.
- Palliative care will be established based on the needs of the incident.
- Altered standards of care established during the response phase may extend into the recovery phase. (For more information on altered standards of care, see the report concerning pandemic influenza from CDPHE.[12])
- Patient tracking will be maintained through short- and long-term recovery.
- Mental health/behavioral health support will be required for the local, state, and federal responders as well as the community and may be one of the longest-lasting functions of the incident.
- Family members of those in the affected area will need support, which will further tax the mental/behavioral health resources as well as other human service resources.

Phase 1: Short-Term Recovery

Scope: Focusing on impacts and treatment of public, environmental, mental/behavioral, and medical issues associated with the incident, as well as providing public health communication

Considerations/Assumptions:

Public Health

- Providing technical assistance and support related to recovery efforts will be ongoing and adjusted as necessary.
- It may be necessary to provide or assist in providing vaccinations for responders involved in the recovery effort.
- A mechanism may need to be identified to prioritize distribution of antibiotics, depending on local public health policy on working with private sector critical infrastructure and the Strategic National Stockpile.
- Rocky Mountain Poison Control can provide support for disaster recovery activities to include operating the Colorado Health Emergency Line for the Public (CO HELP), which provides ongoing messaging to the public.

---

[12] CDPHE. *Guidance for Alterations in the Healthcare System during a Moderate to Severe Influenza Pandemic*, available at http://www.cdphe.state.co.us/epr/Public/Alterations.pdf.

Environmental Health

- Air quality concerns include the potential for continued site-specific monitoring and surveillance for smoke, particulate dust, and asbestos during debris removal and for potential releases from affected manufacturing, dry cleaning, and other air-permitted businesses.
- Messaging on indoor environment hazards including carbon monoxide, mold, hazard safety, and household chemical hazards will be ongoing and adjusted as necessary.
- Water quality information will be provided as water services are restored and/or boil water orders or water supplies are continued.
- Sanitation, food and drinking water safety, and vector control issues will be ongoing and may increase in priority during this phase of recovery. Vector issues relative to standing water, food disposal, and other incidents associated with outbreaks will be addressed, as necessary, through public messaging.
- Coordination with public works, debris haulers, and regulatory agencies will be actively underway to support debris removal activities. Public and environmental health will need to monitor and provide technical support for debris removal activities, debris management site activities, and debris recycling/disposal activities.
- The community needs to be provided standards and guidance for who certifies what is clean.

Medical Services

- Support for the capacity and solvency of the overall medical system in the Denver UASI may be needed. Health care facilities and healthcare workers may be impacted. Areas surrounding the impacted area may also need augmented medical capacity, including supplies, personnel, and facilities.
- Restoration of the logistics and delivery of incident-related pharmaceuticals and medical supplies will need to be monitored, coordinated, and prioritized.
- Labs for sample analysis other than Laboratory Response Network (LRN) labs should be identified.
- Protocols for transporting patients outside of the impacted area need to be developed, accounting for movement across and into many jurisdictions. One option could be to use the National Disaster Medical System for patient tracking and movement. The protocols should also incorporate mechanisms for decontamination before transport or address how to ensure health care facilities receiving biologically contaminated patients will be protected.
- Poison Control centers can help in disasters.

  - They can provide medical information and treatment guidelines including countermeasures to assist with the treatment of survivors.
  - They have surge capability to continue to provide medical information and guidance for continuing treatment of survivors while still providing regular services as traditional medical services resume.
- Key objective triggers should be established within public health and emergency management to ensure a behavioral health response.

Phase 2: Intermediate Recovery

Scope: Conducting parallel efforts that address continuation of a surveillance plan, ongoing environmental monitoring, and public messaging for public health issues; restoring and stabilizing the medical care system from the short term; and maintaining a strong emphasis on communication as the Denver UASI returns to mostly normal, day-to-day operations

Considerations/Assumptions:

- A massive effort to process and analyze the data from recovery will be underway**.** Communicating to the public this transition will be critical to assure transparency and support confidence in the public sector. Continuing to provide "what you can do" guidance is also important as it augments natural perception of survivorship and resilience.

Public Health

- Public health will return to continued surveillance for ongoing and emerging diseases and will also assess long-term health outcomes from the incident and continue disease control activities as required.
- Public health should also implement behavioral health surveillance, watching for signs/symptoms of extreme behavioral health impact on the community as a whole (not just focused on the individual).
- Workforce protection will need to be reassessed and modified as necessary.
- Rates of mental health issues, anxiety, and depression will likely increase for those who have elected to stay in the Denver UASI and those who left. Given the number of deaths, communities throughout the country may be directly impacted as friends and relatives learn of the fate of their loved ones.

Environmental Health

- Restoration activities related to environmental concerns will increase.

- Identification, management, and control of vectors may increase.
- Emphasis will shift from clearing restaurants and the general food supply, to a steady state and focus on supporting the reestablishment and distribution of the local wholesale food supply chain.
- The local water supply would be restored and returned to a functional state supported by quality control measures and public messaging.
- Coordinated messaging and communication will be needed to ensure the safety of indoor, residential environments as people return to their homes.

Medical Services

- Medical surge may still be ongoing. Essential medical services related to the incident will continue to be maintained and supported. The rebuilding and reestablishment of permanent medical facilities will begin, if necessary, to address primary, inpatient, and long-term care.
- There will be increasing focus on how to sustain and maintain solvency of the medical and behavioral health care systems.
- Agencies need to reach an understanding of who can direct and manage decontamination teams for materials by sewage, blood, and other infectious agents.

Phase 3: Long-Term Recovery

Scope: Restoring, evaluating, and following up while moving toward a pre-incident state

Considerations/Assumptions:

- At this stage, public, environmental, behavior/mental health, and medical-related impacts should have been assessed at all levels.

Public Health

- A long-term monitoring or surveillance program will be put in place to track long-term chronic impacts.
- Mental health issues should normalize. Indicators such as school absences, liquor sales, domestic violence and driving under the influence citations could be assessed and compared to pre-event statuses to assist with determining if psychological well-being and health issues have returned to normal levels.

- Determination will need to be made regarding how long public health continues its monitoring efforts and how long the public sector continues to provide healthcare to the survivors.
- Sensitive populations with predisposed conditions secondary to the incident may need to be dealt with separately.

Environmental Health

- Secondary impacts of the incident (e.g., from fires to floods to new hazards) created in the new normal state will need to be assessed.

Medical Services

- The massive doses of treatment may lead to secondary impacts to the immune system, rendering it less resistant to other disease, particularly if, during the other phases, treatments were made using over-the-counter drugs.
- Any loss of personnel related to attrition caused by the incident will need to be rebuilt.

4.9 – RSF Public Information and Messaging


Tim Burkitt/FEMA

A catastrophic incident will require extensive coordination of information to minimize miscommunication (which could seriously impact recovery time), both with the public and in the interagency process. Additionally, with public messaging, effective risk communication will be vital to shorten the recovery time. The messages should be coordinated but may not be identical in all areas because of the localized differences in the impact of the incident. Public communication may take on different aspects as the effort transitions from phase to phase, but sharing information with and gathering information from the public will remain important throughout recovery, shifting from crisis communications to community relations.

Public messaging takes place in three primary ways:

- Formal communication with the public (press releases, public meetings)
- Interagency message coordination through the Joint Information System, which harmonizes all public messaging across agencies and jurisdictions
- Informal communication (social media, blogs, etc.).

Support Function: At the local level, the lead will most likely depend on the type of incident but could include the public information officers (PIOs) through the mayor's office or public health department. At the state level, the lead will also depend on the type of incident but may come through COEM, CDPHE, or the governor's office.

Considerations/Assumptions:

- A PIO is generally included in an emergency operations center (EOC) as part of the Incident Command System and reports to the Incident Commander. This type of structure is assumed to remain in place for recovery.
- A local Joint Information System(JIS) will be established to coordinate information within the impacted area even during recovery.
- Federal partners may set up a center (or public information group) and integrate into the JIS at each impacted EOC. The federal government will establish a Joint Field Office

for any large incident, and they will coordinate with the state and local PIOs in some fashion.

- There may be multiple sources of conflicting information.
- Messaging should be coordinated and presented by authoritative voices to maintain public confidence. Diversion from the message may have a negative impact on recovery because of the associated decline in public confidence.
- Opportunities will be needed to allow the public to communicate with agencies. Questions, suggestions, and offers of support must be managed and used to help fuel additional communication efforts.

Phase 1: Short-Term Recovery

Scope: Establishing reliable and accurate systems to provide clear, positive, and directive information; coordinating interagency messages to harmonize all public messaging across agencies and jurisdictions; and gathering information to understand public needs

Considerations/Assumptions:

Process

- A method for coordinating among federal, state, and local communication priorities should be established.
- The agency responsible for crafting public messages about each topic must be clearly identified.
- The JIS membership will have an impact on how information is communicated. The JIS should include both civilian PIOs and military public affairs officers.
- Transparency and visibility of the recovery process is important, so accurate and complete documentation should be maintained. This information will include detailed records of the incident and recovery planning.
- The public and private sector may have more confidence if they have more information, for example on contractors and insurance needs. Many forums exist to support this effort, including community meetings.
- PIOs should engage with community leaders, NGOs, and non-profits to help deliver the message and gather input on community information needs.
- Information should be disseminated to department heads and key partners.

Spokespeople

- PIOs may identify subject matter experts to assist with messaging.
- Spokespeople for the incident should be established and used consistently. These may include individuals who are subject matter experts or key elected officials who can deliver a unified, official public message, are recognizable, and are trusted by local populations. More than one person will be needed to communicate with different audiences. Examples include the local health officer and elected officials.
- Spokespeople may vary by jurisdiction, but for continuity and to build trust, the number of spokespeople delivering messages to different audiences should be limited.
- PIOs will provide talking points to the spokespeople based on information about the incident and public information needs.
- Multiple disciplines may all want to issue information, but it is important that subject matter experts and agencies balance interests to provide a clear, consistent message that will support recovery objectives.

Content

- Public health information will be urgently needed.
- Under the coordination of the JIS, public health agencies will communicate to the public the nature of the incident and information about access to medical services and resources. The primary goals of this communication are to allay fears, articulate risks, and detail the appropriate treatment for the general public. Communication should also be coordinated with the local environmental health agency.
- Communicating with populations that have access and functional need issues, including recent immigrants, those speaking foreign languages, and the homeless, may be very difficult.
- Communication regarding psychosocial wellbeing and self-care should begin in this phase and continue throughout recovery.
- A template should be developed for crafting public messaging and used to maintain consistency in message presentation. The first five messages can be pre-developed:
    - Message 1–Public health and safety information
    - Message 2–Donation and volunteer information
    - Message 3–Where to find information with and without technology access
    - Message 4–Reunification information (where to register the missing, families, and deaths)
    - Message 5–Location of the Disaster Assistance Center and services available.

- The JIS will work to promote a strong message and, if needed, address conflicting or erroneous information. Anti-government and negative messages may increase.
- The public messages will be communicated across a wide-spectrum of media, including the traditional print media, video media, radio, and social media.

Phase 2: Intermediate Recovery

Scope: Conducting regular, day-to-day communication across the Denver UASI, with critical messages going through JIS unified messaging approach

Considerations/Assumptions:

- All levels of communication should be engaged; however, emphasis will be on messaging from the local agencies rather than federal government and should be characterized by more communication to and from the private sector.
- There will be the continuing shift of communication from response issues to community recovery issues. During this phase, there will be a transition from basic messages regarding immediate needs to active listening and responsive messaging.
- The content of official public messaging could shift to information about local government functional areas such as police and public health.
- Providing as much information as possible will enhance public trust and confidence. It is useful to provide pamphlets with information and use websites and social media. Topics could include legal issues, cleanup resources, and other important information.
- Decisions about messaging should be authorized by local jurisdictions.
- The JIS will need to monitor the news media and social media for inaccurate information and issue corrected information as needed.
- PIOs should continue to engage nonprofits and other community groups to help deliver coordinated messages.
- A major state, national, and international messaging and public relations campaign may be needed to begin re-establishing trust in the area's products (see the Economic Redevelopment RSF).
- Agencies should promote business and economic opportunities in the Denver UASI, providing messages that help recruit businesses, retain workers, and support the community.

- Public health messaging should include issues such as
    - Stress management
    - Behavioral health guidance
    - Ongoing health risks
    - Prevention opportunities
    - Encouragement to seek or continue medical treatment as needed.
- To establish trust, public messaging should include information about recovery activities and inform the public of actions they can take.
- Politicians, public figures, and jurisdictions may compete for air time and may have a negative impact on communications.
- Some jurisdictions may make decisions that are unpopular in other jurisdictions, which will necessitate close coordination among jurisdictions. Policy groups should fully understand the implications and impacts of decisions and be able to explain those decisions to the public.

Phase 3: Long-Term Recovery

Scope: Establishing a new sense of identity with a focus on returning to self-sufficiency, sustainability, and resilience

Considerations/Assumptions:

- The group charged with public messaging for the recovery should continue its work well into the long-term phase.
- A long-term recovery lead should be identified to work with community partners and government agencies.
- Public messaging will have a new or renewed emphasis on preparation, prevention, and mitigation actions and activities.
- Scientific studies and historical references will serve as the greater focus of communication. A repository of lessons learned, medical articles, and information about studies during restoration may also be created.
- Policy groups should be aware of the community's thoughts and attitudes toward and acknowledgement of the disaster (such as anniversaries) and should determine appropriate actions. These groups should identify and acknowledge milestones and successes in recovery.

4.10 – RSF Public Safety/Access Control

Access control is broadly defined as the restriction of appropriate individuals to the affected area and structures, as well as requiring egress from the impacted zones through check points. Public safety will be required through all phases of an incident and should be established and continuously maintained.

Support Function: At the local level, local law enforcement, building officials, and public health will be involved. At the state level, the Colorado State Patrol and CDPHE will be involved.

John Ficara/FEMA

Phase 1: Short-Term Recovery

Scope: Controlling the impacted areas and jurisdictions

Considerations/Assumptions:

Coordination

- Communities or governments should have disaster statutes/memorandums of understanding in place to allow cross-jurisdictional authorities. Communities should have this written into their COG/COOP plans.
- The impacted area will have to be quickly identified, and resources will likely need to be combined to provide adequate public safety. Cross-jurisdictional issues will need to be addressed. Maintaining cooperation across jurisdictions will be vital to prevent secondary impacts from public safety decisions made in other jurisdictions.
- Interagency communications must be established immediately. It is likely that radio communications will be required because of overloading or collapse of normal communication channels (phone lines, internet). Having the ability to access common radio channels will be critical to re-establishing order and responding to crises.
- Memorandums of understanding with private security forces are recommended.

- Neighboring jurisdictions outside of the immediately impacted area should be included in planning.
- Evacuees will need to be coordinated between jurisdictions.

Resources

- The inclusion of federal and private resources may become necessary given that local first responders may consider that their primary obligation is to their families and fail to report for duty, adversely impacting public safety staffing. Resources such as the National Guard, U.S. Army Reserve, other police agencies, and private security firms should be considered to provide assistance with public safety and security.
- Resource availability and allocations must be communicated quickly and may be determined by political influences (see Prioritization of Cleanup RSF).
- There may not be sufficient resources (human and equipment) to maintain public safety services at the local level. Intergovernmental agreements will be implemented.

Access Control

- A security perimeter may be difficult to establish because of the inherent difficulty of securing a large area. Additional resources may be required, whether from mutual aid agreements or from additional state and federal resources.
- Access control issues will be put forth to the policy groups for guidance.
- Certain personnel, including those associated with critical infrastructure, damage assessments, public works, and utilities, will need access to the area. Establishing criteria for determining who should be provided access should be considered.
- A system (potentially a badging or other credentialing system) will be necessary to control access in certain areas to authorized individuals.

First Responder Needs

- Acceptable risk to first responders needs to be evaluated and standards may need to be altered/lowered.
- Public safety personnel may require PPE to prevent long- term illnesses.
- Labor contracts may influence the short-term recovery phase based on work hours, safety conditions, and working conditions. Jurisdictions must understand local contracts and how they may impact recovery.
- Taking care of responders and responder families may include mental health issues.

Legal and Cultural Issues

- Public safety requirements will likely have an impact on transportation through impacted zones and will have a direct impact on usable emergency access routes.
- Perpetrators will be processed and housed based on severity of offense and threat to life/public safety and the availability of facilities. Minor offenses will likely be ignored initially.
- There may be limited law enforcement resources to devote to black market/profiteering activities, which often occur in disasters.
- Public safety concerns will be considered when religious doctrine requests are made. Leaders of the religious community should be consulted regarding any sensitivities.
- Legal authorities regarding access to private property for cleanup operations will need to be investigated.

Phase 2: Intermediate Recovery

Scope: Expanding public safety operations while continuing to restrict ingress of individuals and property into impacted zones to credentialed individuals and requiring egress of individuals and property from damaged zones through access control points

Considerations/Assumptions:

- High-visibility patrols have been established to convey to the public the importance of public safety and instill confidence. As the area is reoccupied, these patrols will be scaled back.
- Protocols must be established for moving large quantities of debris outside of the impacted incident perimeter to include hours of transportation, security, and items accepted for movement.
- Mutual aid agreements are still in effect for access control personnel and resources.
- The size of perimeter areas and level of control will begin to reduce in some areas. Access control needs to be scalable so that it can be limited appropriately as zones inside the original perimeter are cleared to allow a safe reoccupation.
- Multiple types of facilities and areas with different levels of access must be clearly delineated.
- Public health will make recommendations associated with acceptable levels of risk for different usage areas. Varying levels of assessment from various sectors will be used to determine that the usage area matches accessibility.

- Any security force would be managed and screened through ESF 13 and coordinated under the Incident Command System, even during recovery.

Phase 3: Long-Term Recovery

Scope: Returning to full-scale public safety, with limited access control to a few areas that will have been deemed irreparably damaged

Considerations/Assumptions:

- Law enforcement should now be working under a normal course of business circumstances.

4.11 – RSF Unmet Needs

The term Unmet Needs[13] as an RSF refers to individual and family needs that were not met by insurance, governmental assistance, and immediately available emergency assistance from voluntary agencies. Included within this Unmet Needs RSF are the subcategories of Long-Term Recovery Committee (LTRC), Volunteer Coordination, and Donations Management.


Michael Rieger/FEMA

Support Function: At the local level, the LTRC, Colorado 211, Colorado Voluntary Organizations Active in Disaster (COVOAD), and Metro Volunteers will be involved. At the state level, the Office of Emergency Management would be the lead agency.

4.11.1 Long-Term Recovery Committee

Recovery from a disaster is a process that can take years for some survivors. As they begin to rebuild their lives, they may confront disaster-related needs that remain after personal and government-related resources have been exhausted. In these cases, the community itself may be best equipped to assist through the formation of a LTRC. LTRCs often include a combination of government agencies, nonprofits, voluntary organizations active in disaster (VOADs) and faith-based partners, businesses, and community-based organizations and serve as a clearinghouse for matching individual or family needs with available local resources.

Considerations/Assumptions:

- The need for a Disaster Assistance Center should be evaluated to provide a one-stop hub for governmental and nonprofit assistance and information.
- Case management may be assigned to the LTRC to ensure that the needs of affected individuals and families are reviewed.
- A resource such as Coordinated Assistance Network (CAN) allows for the sharing of information about cases, enabling the best use of community resources, and helps to prevent duplication of services.
- A variety of factors including age, disability, language barriers, lack of personal documentation, distance from the Disaster Assistance Center, and unfamiliarity with the

[13] Some volunteer organizations and agencies in the emergency management community use the term Long-Term Recovery Committee interchangeably with Unmet Needs Committee.

disaster relief system can limit some survivors' access to assistance. It is often those in most desperate need that are least able to get help. Public information delivered in a method appropriate to the various needs of survivors will be critical.

- Typical areas of enduring need after a disaster may include the following:
    - Long-term mental and behavioral health concerns related to the traumatic incidents of the disaster
    - Transportation issues
    - Temporary short-term and long-term housing
    - Comprehensive case management
    - Children's stability within schools and child care settings
    - Home repairs or insurance deductibles
    - Loss of employment or business
    - Legal issues.

4.11.2 Volunteer Coordination and Donation Management

Volunteer Coordination is defined as the process of matching unaffiliated spontaneous volunteers with VOAD member agencies or credible voluntary organizations so they can support relief and recovery activities. Spontaneous unaffiliated volunteers are people who show up to volunteer but are not associated with any major volunteer organization.

Donation Management involves a process for effectively matching unsolicited undesignated in-kind donations with credible voluntary organizations. Agencies should encourage individuals to contribute donations to a VOAD member agency or other credible organization. Donations in the form of financial contributions should be encouraged whenever possible.

Considerations/Assumptions:

- Volunteer Reception Centers (VRCs) will have been established in the response phase.
- Volunteers will show up before access control is established and VRCs are operational.
- Donation management facilities and processes (collection centers, multi-agency warehouses, and distribution centers) have been established.
- Despite public messaging on appropriate donations, volunteers and donated goods have begun showing up at fire stations, churches, and government facilities.
- The Volunteer Coordination Team (VCT) will be activated. The VCT, which comprises government agencies, community representatives, voluntary organizations, and other key stakeholders, aims to coordinate and facilitate the effective management and utilization of spontaneous unaffiliated volunteers in the response and recovery efforts following a disaster.

- The Donations Coordination Team (DCT) will be activated. The DCT, which comprises government agencies, community representatives, voluntary organizations, and other key stakeholders, aims to coordinate and facilitate the effective management and allocation of unsolicited undesignated in-kind donations in the response and recovery efforts following a disaster.
- Colorado Donations and Volunteer Management Network (CDVMN, also known as Aidmatrix) can be activated. The purpose of the CDVMN is to effectively connect potential donors/volunteers with relief agencies through the CDVMN Portal (a web-based tool) so that response and recovery agencies are better able to support communities following a disaster. See the Colorado State Emergency Operations Plans, Volunteer and Donations Management Support Annex for more details on CDVMN.

Phase 1: Short-Term Recovery

Scope: Volunteer Coordination–Coordinating and matching volunteers to credible organizations

Donation Management–Receiving, sorting, cataloguing, storing, and dispersing goods to areas and people in need of support

Considerations/Assumptions:

Volunteers

- Resources can be deployed in a coordinated fashion through the VCT in conjunction with VOAD agencies.
- Careful donation and volunteer management planning and strategies will reduce problems associated with unsolicited donations and spontaneous unaffiliated volunteers.
- Requests for volunteer support will likely come through the VRC.
- Volunteers may need credentials to enter and exit the impacted area and may also need "Volunteer ID cards" from their respective affiliated organization.
- Military volunteers may be available on request and dispatched by their respective EOCs for help inside the installation.
- It is recommended that the public be provided with a single URL (www.HelpColoradoNow.org or other site) for information on how to help in a disaster.

Donations

- Offers from the public and private sector are important resources in the recovery efforts and must be effectively coordinated.
- If not effectively managed, undesignated in-kind donations can prove detrimental to relief efforts. Unplanned deliveries of donated goods to a disaster site can jam distribution channels, overwhelm government and voluntary agencies, and interfere with the recovery efforts.
- A huge quantity of undistributed donated goods may require cataloguing and sorting.
- Unsuitable and unneeded donations must be disposed of properly. Where possible, unusable items will be recycled, distributed to non-profit organizations, and/or donated to disaster areas in other states (with the approval of the DCT). Unsolicited, undesignated donations that are unsuitable for use by any organization involved in relief efforts will not be accepted.

Financial Contributions

- Public messaging will emphasize that financial contributions are the best way to assist in disaster recovery. The public will be encouraged to give a financial contribution to the charity of their choice. Undesignated financial contributions will be directed to an online list of agencies with disaster relief programs in Colorado.
- When an LTRC is formed with a system to manage financial contributions to address outstanding needs, the public will also have the option to contribute to a fund managed by the LTRC. A member of COVOAD may be identified by the DCT to serve as the fiscal agent for funds directed to a LTRC. An alternative option would be to have funds deposited directly into a bank account earmarked for the LTRC.
- Legal requirements for volunteers in Colorado will need to be identified.
- The laws governing the use of volunteers in a disaster will need to be identified.

Phase 2: Intermediate Recovery

Scope: Volunteer Coordination–Receiving and affiliating volunteers to areas in need of support.

Donation Management–Continuing to receive, sort, catalogue, store, and disperse goods to areas and people in need of support and directing financial contributions to verified reliable organizations

Considerations/Assumptions:

- Large aid missions may be deployed to the area to support as needed.
- Donors will be discouraged from sending undesignated in-kind donations directly to the disaster site. Donors who attempt to donate unsolicited or inappropriate goods will be directed to community-based agencies such as food banks, thrift stores, and voluntary organizations in need of the donated goods.

Phase 3: Long-Term Recovery

Scope: Volunteer Coordination–Transitioning to local volunteer organizations as the community rebuilds

Donation Management–Phasing out of the efforts to receive, sort, catalogue, store, and disperse goods to areas and people in need of support and possibly replacing the work with an effort to dispose of excess or unnecessary goods

Considerations/Assumptions:

- Affiliated organizations will transition more functions to local volunteer organizations. Many of the roles previously assigned to volunteers should be transitioned into jobs, perhaps under the authority of the agency in charge of long-term monitoring and recovery.
- The disposition of unused in-kind donations will need to be addressed.
- Reimbursements (from federal and state) will be contingent on sound documentation and record keeping, consistent with National Incident Management System framework.
- Agencies that receive donated resources should document donor names and addresses, specific items donated, how they were used, and final disposition. Organizations accepting donations of cash and/or goods will follow applicable internal audit policies and procedures.
- Affiliated organizations will be responsible for long-term monitoring of their volunteers.

Additional Resources

Chemical-Biological-Radiological Disposal in Landfills http://www.epa.gov/nhsrc/pubs.html

- Tool 1: Incident Waste Assessment & Tonnage Estimator (I-WASTE) online decision support tool
- Tool 2: Radiological Dispersal Device (RDD) Waste Estimation Support Tool

Colorado Emergency Management Association http://www.cemacolorado.com/

Colorado Office of Emergency Management http://www.coemergency.com/

Debris Management Workshop Report
http://www.colorado.gov/cs/Satellite/DOLA-Main/CBON/1251595685691

Denver Office of Emergency Management and Homeland Security http://www.denvergov.org/Default.aspx?alias=www.denvergov.org/oem

National Disaster Recovery Framework http://www.fema.gov/national-disaster-recovery-framework

Appendix A – Acronyms and Definitions[14]

Acronyms

BI	biological indicator
CAL EPA	California Environmental Protection Agency
CDC	U.S. Centers for Disease Control and Prevention
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CDVMN	Colorado Donations and Volunteer Management Network
CFR	Code of Federal Regulations
CHFA	Colorado Housing Finance Authority
cm^2	square centimeters
COEM	Colorado Office of Environmental Management
COG	Continuity of Government
COOP	Continuity of Operations
COVOAD	Colorado Voluntary Organizations Active in Disaster
CST	Civil Support Team
CWA	chemical warfare agent
DCT	Donations Coordination Team
DHS	U.S. Department of Homeland Security
DHHS	U.S. Department of Health and Human Services
DMORT	Disaster Mortuary Operational Response Team

[14] The acronyms and definitions in this section cover terms used in the main framework as well as the three annexes and their attachments.

DoD	U.S. Department of Defense
DOH	Colorado Division of Housing
EOC	emergency operations center
EPA	U.S. Environmental Protection Agency
EROWG	Environmental Remediation Operations Working Group
FAC	Family Assistance Center
FACT	Family Assistance Center Team
FEMA	Federal Emergency Management Agency
GEEERC	Governor's Expert Emergency Epidemiological Response Committee
hr	hour
HSPD	Homeland Security Presidential Directive
IARC	International Agency for Research on Cancer
IBRD	Interagency Biological Restoration Demonstration
IC/UC	Incident Command/Unified Command
IMT	Incident Management Teams
JIS	Joint Information System
kg	kilogram
L	liter
LTRC	Long-Term Recovery Committee
m^3	cubic meters
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
mg	milligram
NCH	natural and cultural resources and historic properties

OSTP	Office of Science and Technology Policy
PAL	Provisional Advisory Level
PCR	polymerase chain reaction
PIO	public information officer
PPD	Presidential Policy Directive
RAGS	Risk Assessment Guidance for Superfund
RSF	Recovery Support Function
SHEDS	Stochastic Human Exposure and Dose Simulation
TIC	toxic industrial chemical
UASI	Urban Area Security Initiative
USDA	U.S. Department of Agriculture
VCT	Volunteer Coordination Team
VOAD	Voluntary Organizations Active in Disaster
VRC	Volunteer Reception Center
WARRP	Wide Area Recovery and Resiliency Program
WMD	weapon of mass destruction
µg	micro-grams

Definitions

biological agents – living organisms or the materials derived from them that cause disease in or harm to humans, animals, or plants or cause deterioration of material. Biological agents may be used as liquid droplets, aerosols, or dry powders. (Source: FEMA, 2002, *Managing the Emergency Consequences of Terrorist Incidents: Interim Planning Guide for State and Local Governments*)

catastrophic incident – any natural or human-made incident, including terrorism, that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population,

infrastructure, environment, economy, national morale, and/or government functions. A catastrophic event could result in sustained national impacts over a prolonged period of time; almost immediately exceeds resources normally available to local, state, tribal, and private sector authorities in the impacted area; and significantly interrupts governmental operations and emergency services to such an extent that national security could be threatened. (Source: FEMA, 2012, *National Disaster Recovery Framework*)

chemical agent – chemical substance that is intended to kill, seriously injure, or incapacitate people through physiological effects. Generally separated by severity of effect: lethal, blister, and incapacitating. (Source: FEMA, 2002, *Managing the Emergency Consequences of Terrorist Incidents: Interim Planning Guide for State and Local Governments*)

cleanup – returning a specific property or area to usable condition

critical infrastructure – systems and assets, whether physical or virtual, so vital that the incapacity or destruction of such may have a debilitating impact on the security, economy, public health or safety, environment, or any combination of these matters, across any local, state, tribal, and federal jurisdiction. (Source: FEMA, 2012, *National Disaster Recovery Framework*)

cultural resources – aspects of a cultural system that are valued by or significantly representative of a culture or that contain significant information about a culture. Cultural resources may be tangible entities or cultural practices. (Source: FEMA, 2012, *National Disaster Recovery Framework*)

debris – items and materials broken, destroyed, or displaced by a natural or human-made disaster. Examples of debris include, but are not limited to, trees, construction and demolition material, and personal property. (Source: FEMA, 2007, FEMA 325, *Debris Management Guide*; note that the 2009 *Colorado Northeast Regional Debris Management Plan* uses debris as an overarching category and types of waste as subsets.)

debris removal – picking up debris and taking it to a debris management site, composting facility, recycling facility, permanent landfill, or other reuse or end-use facility (Source: FEMA, 2007, FEMA 325, *Debris Management Guide*). The goal of debris removal is to use existing solid waste best practices and methods to reduce, reuse, recycle, or recover, with landfill as a final option (Source: 2009 *Colorado Northeast Regional Debris Management Plan*).

decontamination – the process of making people, objects, or areas safe by absorbing, destroying, neutralizing, making harmless, or removing the hazardous material (Source: FEMA, 2002, *Managing the Emergency Consequences of Terrorist Incidents: Interim Planning Guide for State and Local Governments*)

garbage – waste that is regularly picked up by an applicant. Common examples of garbage are food, packaging, plastics, and papers. (Source: FEMA, 2007, FEMA 325, *Debris Management Guide*)

historical properties – any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places, including artifacts, records, and material remains that are related to such a district, site, building, structure, or object. (Source: FEMA, 2012, *National Disaster Recovery Framework*)

infectious waste – waste capable of causing infections in humans, including contaminated animal waste, human blood and blood products, isolation waste, pathological waste, and discarded sharps (needles, scalpels, or broken medical instruments). (Source: FEMA, 2007, FEMA 325, *Debris Management Guide*)

intermediate recovery – phase of recovery that involves returning individuals, families, critical infrastructure, and essential government or commercial services to a functional, if not pre-disaster, state. Such activities are often characterized by temporary actions that provide a bridge to permanent measures. (Source: FEMA, 2012, *National Disaster Recovery Framework*)

long-term recovery – phase of recovery that may continue for months or years and addresses complete redevelopment and revitalization of the impacted area; the rebuilding or relocating of damaged or destroyed social, economic, natural, and built environments; and a move to self-sufficiency, sustainability, and resilience. (Source: FEMA, 2012, *National Disaster Recovery Framework*)

radiation dispersal device (RDD) – any device that causes the purposeful dissemination of radioactive material without a nuclear detonation. (Source: U.S. Department of Health and Human Services, Radiation Emergency Medical Management)

recovery – 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. (Source: FEMA, 2012, *National Disaster Recovery Framework*)

redevelopment – rebuilding degraded, damaged, or destroyed social, economic, and physical infrastructure in a community, state, or tribal government to create the foundation for long-term development. (Source: FEMA, 2012, *National Disaster Recovery Framework*)

response – capabilities necessary to save lives, protect property and the environment, and meet basic human needs after an incident. (Source: FEMA, 2012, *National Disaster Recovery Framework*)

restoration – returning a physical structure, essential government or commercial services, or a societal condition back to a former or normal state of use through repairs, rebuilding, or reestablishment. (Source: FEMA, 2012, *National Disaster Recovery Framework*)

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 decision-making. (Source: FEMA, 2012, *National Disaster Recovery Framework*)

waste – unwanted or useless materials; waste is a subset of debris (Source: 2009 *Colorado Northeast Regional Debris Management Plan*)

Appendix B – Agricultural Waste Disposal

On July 17th, 2012, an Agricultural Waste Disposal Knowledge Enhancement Workshop was held in Lakewood, CO. The purpose of the workshop was to advance the understanding of agricultural waste disposal following a Foot and Mouth Disease (FMD) outbreak in Weld County, CO; identify issues significant to agricultural carcass disposal; and obtain feedback on current agricultural waste disposal tools.

While the workshop was focused on educating the participants on the issues surrounding animal waste disposal, there is still the need for detailed guidance on responding and recovering from an incident with large amounts of agricultural waste. The next step in the evolution of the Denver UASI All-Hazards Regional Recovery Framework would be the development of an agricultural waste disposal annex that specifically addresses the unique considerations associated with this issue during each phase of response and recovery.

Appendix C – Incident Management Teams

Incident Management Teams (IMTs) have been in existence since the 1970s. Developed in California in response to large disasters, IMTs have since grown to become national, regional, and local assets that respond to all types of hazard incidents. An IMT is a group of people with expertise in using the Incident Command System as well as the National Incident Management System. Under "management by objectives," IMTs divide the problem and identify solutions in a way that assists the local jurisdiction in achieving its goals, whether in response or recovery.

IMTs have differing levels of expertise. A Type I team is a national asset that has the highest level of capability and depth. Type II teams are more of a regional asset and have slightly lesser capabilities. Type III or All-Hazard IMTs are usually a state, county, or local team. Members have experience and depth to manage complex incidents for 3 to 5 days, and teams have wide range of personnel from diverse organizations that include not only first responders but public health, public works, and animal and agriculture expertise as well.

The decision of which teams are activated depends on the complexity of the incident. Activation is determined in part by the anticipated length of the incident, how many responders and agencies are involved, and the political complexities of the incident.

Some have suggested that IMTs can play a role in long-term recovery. The purpose of this appendix is to describe the IMTs and their potential role in recovery, which will vary by jurisdiction.

B.1 Role of the IMT in Recovery

Traditionally, IMTs managed response activities. In some instances, they have been involved in short-term recovery operations such as the Space Shuttle Columbia recovery mission and more intermediate recovery aspects such as housing and debris removal.

However, the same decisions, processes, and problem-solving techniques are inherent to both response and recovery. Management by objectives and prioritizing resources and actions based on the goals of the governing officials take place in all incidents. Using proven Incident Command System tenets, the IMT is able to evaluate problems, identify goals, develop objectives, and then direct operations to achieve the goal. IMTs are also very good at capturing situational awareness details, tracking resources and costs, and developing action plans so that everyone is following the same path. IMT members are proficient at thinking "outside the box" and finding ways to creatively solve problems. Team members also know the importance of finding the technical expertise that will allow them to be successful.

Logistical support and coordination are critical in any disaster. In the case of long-term recovery, even more equipment, supplies, specialized resources, and staffing will be needed. IMTs are practiced in setting up small cities in support of the incident. This expertise was invaluable in disasters such as 9-11 at the World Trade Center and Hurricane Katrina, where multiple IMTs of varying capability were called in to assist.

B.2 Activation

Type I and Type II teams can usually only be activated during a Stafford Act declaration. The exception to that is to manage wild land fires where other federal laws allow them to respond. Depending on local agreements, Type III or All-Hazard Teams may be activated locally, regionally, intra-state, or state to state through systems like the Emergency Management Assistance Compact. It is important that each jurisdiction determine what IMT capabilities are available in its area and how to access them.

B.3 IMT Requirements for Success

Effectively using an IMT requires consideration of several key factors:

- **Authority to Make Decisions**. IMTs must be given the authority to make decisions on behalf of the agency having jurisdiction over the incident. An IMT coming in from another state or region has no authority to act without some type of delegation, mission tasking, or other formal permission given to the Incident Commander, allowing him or her to make decisions.
- **Access to Agencies Having Jurisdiction**. IMTs always work for a governing entity or entities. In a large-area incident where multiple jurisdictions are affected, it is critical that those jurisdictions work together to give the IMT unified and coordinated direction.
- **Logistical Support**. As mentioned before, IMTs are very experienced with setting up logistical support for large incidents. They understand resource typing, ordering, inspection, tracking, and demobilization. They also know how to provide food, housing, communications, and supplies for thousands of people over a long period of time.
- **Situational Awareness, Prioritization, and Planning**. In any disaster, and especially in catastrophic incidents, gaining situational awareness quickly and accurately is critical. Understanding what the situation is, what has been affected, and what resources are available drives the ability to prioritize both the response and the recovery. Once priorities have been identified, a plan can be put into place to send resources to those critical areas. Progress is evaluated by the IMT daily. Any adjustments can be made quickly to promote effectiveness and efficiency.

Colorado has a comprehensive Type III IMT Program throughout the state, with multiple teams that can respond locally and statewide. Organizations should check with their local emergency response agency for more information.

Annex 1 – Denver UASI Chemical Incident Annex for Agent Yellow

FOREWORD:

The *"Denver UASI Chemical Incident Annex for Agent Yellow"* is a document prepared by Pacific Northwest National Laboratories (PNNL) under contract to Department of Homeland Security, Science & Technology Directorate in collaboration with local, state, and federal partners. It is one of three specialized annexes associated with the *"Denver UASI All-Hazards Regional Recovery Framework"*. This annex is designed to identify the unique challenges of an Agent Yellow incident to the recovery support functions as identified in the *"Denver UASI All-Hazards Regional Recovery Framework"* core document.

The content represents the best efforts of the participants based on the information available at the time of publication, but is not intended to convey formal guidance or policy of the federal government or other participating agencies. The views and opinions expressed herein do not necessarily state or reflect those of their respective organizations or the US Government.

Contributors: We would like to recognize the Denver UASI and the State of Colorado who were instrumental in the development of this document.

Performers: We further recognize our dedicated performers from Pacific Northwest National Laboratory who had the task of coordinating the various local, state, regional and federal teams, and then consolidating the efforts.

Reviewers: We would also like to acknowledge the Environmental Remediation Operations Working Group and agency comments from EPA and CDC.

Our Sincere Thanks,

-Doug Hardy, SPAWAR, WARRP XM

-Lori Miller, DHS S&T, WARRP PM

Denver UASI Chemical Incident Annex for Agent Yellow

This annex outlines the Recovery Support Functions (RSFs) and responsibilities that govern the various recovery[1] activities of the organizations comprising the Denver Urban Area Security Initiative (UASI) as well as any outside organizations providing assistance in an incident involving a chemical agent. The information in this annex relies on existing policies, plans, and procedures where applicable. Bear in mind the following when using this annex to support recovery planning:

- The considerations and assumptions addressed in each RSF augment those of the main Denver UASI All-Hazards Recovery Framework, which was designed to be used as the starting point for developing recovery plans for any hazard.
- This annex is specific to recovering from an incident involving Agent Yellow; however, many of the considerations can be applied to planning for recovery from other chemical incidents.

This annex focuses on recovery from an incident involving Agent Yellow. Each chemical agent can behave differently, in how it affects humans and the environment, how long it persists in the environment, whether it degrades into other byproducts, and how items are decontaminated and disposed of. The specific characteristics of each class of agent should be considered when developing broader recovery plans.

The following sections lay out the scenario used in developing this annex, characteristics of the agent, general considerations and assumptions, considerations and assumptions specific to the RSFs included, and more information on the effects of Agent Yellow. A list of points of contact and additional resources is provided at the end of the annex.

Also attached to this annex is a document describing a possible interim clearance strategy for a chemical incident. *Interim Clearance Strategy for Environments Contaminated with Hazardous Chemicals* was developed by the Environmental Remediation Operations Working Group (EROWG) as a separate, stand-alone deliverable to the Wide Area Resiliency and

[1] This document uses the term recovery as defined in the National Disaster Recovery Framework (see the main All-Hazards Framework for the definition). Recovery was also defined in the Draft *Planning Guidance for Recovery Following Biological Incidents*, a joint 2009 U.S. Environmental Protection Agency (EPA)/U.S. Department of Homeland Security (DHS) report (http://www.regulations.gov/#!documentDetail;D=EPA-HQ-ORD-2009-0331-0002) as, in the short term, an extension of the response phase in which basic services and functions are restored. In the long term, recovery is a restoration of both the personal lives of individuals and the livelihood of the community. Recovery can include the development, coordination, and execution of service- and site-restoration plans; the reconstitution of government operations and services; programs to provide housing and to promote restoration; long-term care and treatment of affected individuals; and additional measures for social, environmental, and economic restoration. Recovery generally includes actions taken after Notification and First Response activities have been initiated.

Recovery Program (WARRP). It has been published by WARRP under this heading and is listed in the WARRP Product Reference Guide. This document was developed with input from the combined membership from the EROWG, which included federal, state, and local partners and was designed specifically for the WARRP chemical scenario release in Denver, Colorado. It is representative of what the Denver community might do under this scenario and should not be considered policy or guidance. It may be useful as a starting point for other local governments to develop their own clearance strategies, but the EROWG highly recommends that anyone developing a clearance strategy consult with their federal, state, local, private sector, and volunteer organizations to develop an appropriate strategy. Any clearance strategy should also be based on the chemical agent that is released and the site specific conditions of the region where the release takes place.

1.0 Scenario Used for Annex Development[2]

To create this annex, the Denver UASI agencies and partners relied on a scenario based on the National Planning Scenario #5: Chemical Attack–Blister Agent, tailored for the region. This scenario was utilized during several workshops and discussions to help frame the context for this annex and includes the following characteristics:

- **Blister agent attack on a packed Coors Field (downtown Denver).** 95 fatalities; over 1,000 hospitalized (maximum capacity of the field is 55,445).
- **Evacuations/displaced persons:** Tens of thousands evacuated and thousands seeking shelter (decontamination required).
- **Significant contamination in affected areas, including the stadium and surrounding area.** Agent generated a downwind vapor hazard. Approximate distance of contamination = over 5 miles.
- Several **high-value properties** contaminated including Coors Field, Pepsi Center, and Sports Authority Field at Mile High**.**
- **Basic services and local businesses** are affected.

The specific scenario is as follows: Terrorists acquire **175 gallons of Agent Yellow,** equip a small airplane with sprayers, and fly the plane at low altitude over **Denver's Coors Field** during a Rockies baseball game. At the closest approach to the stadium, the pilot veers directly toward the target. Ignoring frantic air traffic control calls and an approaching police helicopter, he cuts his speed and drops over the stadium, simultaneously hitting the spray release button. A coarse spray of Agent Yellow is released. In the stadium, surprise at the appearance of the aircraft turns to panic when the spray is observed coming out of the rear of the plane. **In total, 53,000 people have been either hit by, or breathe vapors of, the**

[2] This scenario was developed for exercise purposes only and is available for public release per email guidance from the DHS Program Manager, Chris Russell, on May 5, 2011.

Agent Yellow spray. Thousands are injured and many are killed in the rush to exit the stadium. People hit in the eyes experience immediate pain, and the first ones out of the stadium try to get away as quickly and as far as possible. Numerous car accidents occur in the parking lot and access roads. Some people track contamination into nearby residences, onto public transportation, and into hospitals. Over a longer period, byproducts of the chemical persist in the environment.

2.0 Characteristics of Agent Yellow

Agent Yellow, which is a mixture of the blister agents sulfur mustard and lewisite, is a liquid with a garlic-like odor.[3] The two-letter code for this agent is HL. Sulfur mustards, also known as **mustard gas** (1,5-dichloro-3-thiapentane) are cytotoxic, vesicant chemical warfare agents with the ability to form large blisters on exposed skin. Lewisite (β-chlorovinyldichloroarsine) is an arsenical vesicant. When mixed with sulfur mustard, lewisite lowers the freezing point of the mixture, making it more suitable for use in colder weather and for aerial dispersion.[4]

Following exposure to a mustard-lewisite mixture, the effects of lewisite exposure are seen within seconds to minutes; the effects of sulfur mustard are more delayed. The time course for symptoms falls between the time courses of the two individual agents but is closer to the time course for lewisite.[5] However, within 24 hours of exposure to mustard agent, victims experience intense itching and skin irritation, which gradually turns into large blisters filled with yellow fluid wherever the mustard agent contacted the skin.[6] Mustard gas vapor easily penetrates clothing fabrics such as wool or cotton, so it is not only the exposed skin of victims that gets burned. Exposed eyes become sore, starting with conjunctivitis, after which the eyelids swell, resulting in temporary blindness.[7,8] At very high concentrations, if inhaled, mustard agent causes bleeding and blistering within the respiratory system, damaging mucous membranes and causing pulmonary edema.[9] Depending on the level of contamination, mustard gas burns can vary between first and second degree burns, though they can also be every bit as severe, disfiguring, and dangerous as third degree burns.[10]

---

[3] "National Planning Scenarios" version 21.3, March 2006. Created for Use in National, Federal, State, and Local Homeland Security Preparedness Activities.

[4] "Blister Agents Lewisite (L) ($C_2H_2AsCl_3$) CAS 541-25-3, UN 1556; and Mustard-Lewisite Mixture (HL) CAS Number not available, UN 2810" http://www.atsdr.cdc.gov/mhmi/mmg163.pdf

[5] The Emergency Response Safety and Health Database, "Mustard-Lewisite Mixture (HL) :: Blister Agent" NIOSH; http://www.cdc.gov/niosh/ershdb/EmergencyResponseCard_29750007.html

[6] "Toxic Syndrome Description Vesicant/Blister Agent Poisoning" http://www.bt.cdc.gov/agent/vesicants/tsd.asp

[7] "Blister Agents Lewisite (L) ($C_2H_2AsCl_3$) CAS 541-25-3, UN 1556; and Mustard-Lewisite Mixture (HL) CAS Number not available, UN 2810" http://www.atsdr.cdc.gov/mhmi/mmg163.pdf

[8] Sidell, F.R., J.S. Urbanetti, W.J. Smith, and C.G. Hurst. 2008. *Medical Aspects of Chemical and Biological Warfare*, Chapter 7 Vesicants. Borden Institute, U.S. Army Medical Department http://www.bordeninstitute.army.mil/published_volumes/chemBio/Ch7.pdf

[9] "Blister Agents Lewisite (L) ($C_2H_2AsCl_3$) CAS 541-25-3, UN 1556; and Mustard-Lewisite Mixture (HL) CAS Number not available, UN 2810" http://www.atsdr.cdc.gov/mhmi/mmg163.pdf

[10] Medical Management Guidelines for Blister Agents: Lewisite (L)(C2H2AsCl3) Mustard-Lewisite Mixture (HL) http://www.atsdr.cdc.gov/mmg/mmg.asp?id=922&tid=190

Long-term after-effects of inhalation exposure may include loss of taste and smell; chronic respiratory illness, including asthmatic inflammation of the large airways (bronchitis), recurrent respiratory infections, and increased fibrous tissue in the lung (fibrosis); and cancer of the airways (following repeated exposures). Skin scarring and pigment changes may follow a severe skin lesion from sulfur mustard exposure; cancer sometimes develops in scarred skin. Sulfur mustard exposures may produce lasting central nervous system effects; minor psychological problems can last for a year or more after exposure.[11] Additionally, exposure to lewisite or mustard-lewisite also can cause damage to bone marrow and blood vessels.[12] The U.S. Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the U.S. Environmental Protection Agency (EPA) have not classified lewisite as to its carcinogenicity. Both the DHHS and IARC have classified the blister agent H/HD (the sulfur mustard used in the mustard-lewisite mixture) as a human carcinogen. It's not known whether the mustard-lewisite mixture itself might also be a human carcinogen.[13]

The skin of victims suspected to have been exposed to the agent should be thoroughly washed and rinsed (using cold or warm water) using a soap and water solution; however, since mustard agent initially has no symptoms, exposure is usually not recognized until skin irritation begins, at which point it is too late for countermeasures.[14] The vesicant property of mustard gas can be neutralized by oxidation or chlorination, using 0.5% sodium hypochlorite solution or absorbent powders such as flour, talcum powder, or Fuller's earth.[15] After initial decontamination of the victim's wounds is complete, medical treatment is similar to that required by any conventional burn; however, medical personnel are cautioned not to over-hydrate the patient as fluid requirements are less than with corresponding thermal burns. The amount of pain and discomfort suffered by the victim is comparable as well. Mustard gas burns heal slowly, and as with other types of burn, there is a risk of sepsis caused by pathogens such as *Staphylococcus aureus* and *Pseudomonas aeruginosa*.[16]

---

[11] The Emergency Response Safety and Health Database, "Sulfur Mustard" NIOSH; http://www.cdc.gov/niosh/ershdb/EmergencyResponseCard_29750008.html

[12] "Blister Agents Lewisite (L) ($C_2H_2AsCl_3$) CAS 541-25-3, UN 1556; and Mustard-Lewisite Mixture (HL) CAS Number not available, UN 2810" http://www.atsdr.cdc.gov/mhmi/mmg163.pdf

[13] Toxic Substance Portal – Blister Agents: Lewisite (L), Mustard-Lewisite Mixture (HL) http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=923&tid=190

[14] The Emergency Response Safety and Health Database, "Mustard-Lewisite Mixture (HL) :: Blister Agent" NIOSH; http://www.cdc.gov/niosh/ershdb/EmergencyResponseCard_29750007.html

[15] "Blister Agents Lewisite (L) ($C_2H_2AsCl_3$) CAS 541-25-3, UN 1556; and Mustard-Lewisite Mixture (HL) CAS Number not available, UN 2810" http://www.atsdr.cdc.gov/mhmi/mmg163.pdf

[16] *Medical Management of Chemical Casualties Handbook*, U.S. Army Medical Research Institute of Chemical Defense (USAMRICD). 4th Edition February 2007.

Note that lewisite tends to break down in the environment into different component byproducts. Some of these byproducts can be toxic and persist for long periods.[17]

3.0 Situation and Assumptions

The following general assumptions can be made with regard to recovery from an Agent Yellow incident in the Denver UASI:

- For a terrorist incident, the Federal Bureau of Investigation will initially be the lead federal agency, and a criminal investigation will be ongoing during initial recovery activities.
- The hazard assessment conducted during characterization (response) will determine the extent of residual hazard posed by Agent Yellow, including any contamination of water, soil, vegetation, crops, animals, buildings, vehicles, and other objects as well as the likelihood for toxic byproducts that may persist in the environment.
- Experts will need to be consulted regarding safe decontamination procedures in a number of areas, including cultural and historical artifacts.
- Depending on the extent of contamination, liability issues may vary. To plan for management of liability issues, every jurisdiction needs to obtain legal advice before using volunteers to work in or near the contaminated area.
- Public safety service levels will still need to be maintained. Access to contaminated areas must be limited to those with proper personal protective equipment (PPE) and training. The need for PPE in additional to labor requirements may limit the duration of first responder time in the contaminated area.

4.0 Recovery Support Functions

The considerations and assumptions for each of the following RSFs are specific to recovery from an incident involving Agent Yellow and do not include considerations or assumptions that are more general in nature or those listed in the main section of the of the Denver UASI All-Hazards Recovery Framework:

- Debris Management
- Economic Redevelopment*
- Fatality Management
- Identification, Stabilization, and Maintenance of Infrastructure and Property*
- Public Health and Medical Services*
- Public Information and Messaging.

** Indicates RSFs identified in the National Disaster Recovery Framework.*

[17] CDC. "Facts about Lewisite." http://www.bt.cdc.gov/agent/lewisite/basics/facts.asp.

4.1 Debris Management[18, 19, 20, 21, 22]

Unlike a natural disaster, where potentially vast amounts of heterogeneous, co-mingled materials (debris) constitute the majority of the waste to be managed, this chemical incident will result in little structural damage to infrastructure and allow a systematic management of contaminated materials. However, the handling, transporting, treating, and disposing of materials contaminated by an Agent Yellow attack will present unique challenges. In such an incident, a wide range of material, including furniture, carpeting, sewage sludge, vehicles, and building material, will likely require decontamination and disposal. While many federal, state, and local agencies (including the City of Denver) have debris management plans, these plans often do not address chemical contamination. Having access to reliable information on characterization, treatment, and disposal of contaminated waste will help to reduce the cleanup costs and shorten recovery timelines.

Considerations and Assumptions:

Strategy

- Ensuring that the waste goes to the appropriate treatment or disposal facility could be expedited by maintaining facility data. Specific data details could include: name and type of facility, permit status, capacity, compliance status, etc.
- An exit strategy should identify a process for transitioning waste management oversight to its pre-incident state and address: the scale-down/close-out of the waste management oversight activities performed (e.g. site visits/ inspection of waste management facilities and sites); the transition of roles and responsibilities; and the frequency of the oversight activities.

Characterization/Collection

- Laboratory capacity will be needed for the necessary sampling for characterization and monitoring.

---

[18] In this annex, as in the All-Hazards Framework, the term debris is defined as items and materials broken, destroyed, or displaced by a natural or human-made disaster. Examples of debris include, but are not limited to, trees, construction and demolition material, and personal property (Source: FEMA, 2007, FEMA 325, *Debris Management Guide*). The term waste is defined as unwanted or useless materials; waste is a subset of debris (Source: 2009 *Colorado Northeast Regional Debris Management Plan*).

[19] EPA considers waste management to encompass disposal, treatment, storage, reuse, recycling, segregation, transportation, and other activities.

[20] The Denver City and County Emergency Incident Debris Management Plan follows the FEMA definition of debris – items and materials destroyed, or displaced by a natural or human-made disaster.

[21] The EPA views debris as a subset of waste; while FEMA definitions and usage in Colorado is consistent with the view that waste is a subset of debris

[22] The representatives of the Denver UASI responsible for developing this annex decided to use the term debris management to be consistent with usage in FEMA as well as the debris management plan for city and county of Denver. Other jurisdictions may choose to use the term waste management instead for this RSF.

- A systematic approach to waste collection will be developed, based on the strategies in the waste management plan.[23] Materials will be able to be effectively separated and/or combined to achieve the objectives of the waste management and decontamination strategies.

Contaminated Materials Management

- Denver has pre-designated debris management staging sites for waste treatment and disposal.
    - These staging sites will need additional engineering controls to handle the volume and nature of Agent Yellow.
    - One or more of the sites may need to be opened to the public for disposal of household items. A public messaging campaign will be needed to provide guidance on site location and items that can be disposed.
- Decontamination standards and clearance goals will need to be determined and established immediately (see the attachment on interim clearance standards for guidance).
- The run-off from decontamination and precipitation will need to be contained, necessitating more engineering steps during the decontamination process.
    - Determination for treating waste streams in place will be based on cost, effectiveness, and public health issues.
    - A determination will still need to be made as to if and who will take the wastewater, even if it has been treated.
    - Agencies will need to work with the wastewater authority in planning for such events.
- Many types of material cannot be decontaminated very easily or are not cost effective to sample and ensure appropriate levels of cleanliness. These materials may instead need to be disposed. Such matters should be considered in the waste management plan, balancing the factors of cost, time, public acceptance, and ability to decontaminate.
- Exposure to residual agent can occur from rinse water. Appropriate actions will need to be taken to either neutralize the water or prevent exposure by remediation workers conducting decontamination/treatment functions.

[23] For more information on developing a Waste Management Plan, see the "Knowledge Enhancement Events: Waste Management Workshop after Action Report."

- The persistence, fate, and natural decomposition of agents in the soil will need to be assessed and monitored.
- For some areas, a viable option for decontamination may be to allow the chemical to degrade in the environment through natural processes so long as the area is monitored to ensure no contact with people or animals (called monitored natural attenuation). However, this may not be practical for Lewisite because the byproducts are likely to be toxic.
- The effectiveness of decontaminating urban features such as trees, playgrounds, and sidewalks will need to be investigated and may require additional technical research to develop effective cleanup strategies.
- There are additional treatment options not discussed in this document. For more information see http://www.epa.gov/osw/homeland/options.htm.

Disposal

- Waste minimization should be emphasized to limit the impact on landfills.
- Some waste management infrastructure (e.g., wastewater treatment facilities) may be contaminated.
- The Colorado Department of Public Health and Environment (CDPHE) will be the lead state agency for management of waste disposal.
- Pursuant to state regulations, everything that comes into contact with Agent Yellow will be considered hazardous waste. As a result, the material will need to be disposed in a hazardous waste landfill. Disposal in another state should be investigated as a possible option.
    - As a result, waste quantities may exceed the capacity of existing landfills. New landfills or new landfill cells could take some time to construct.
    - There may be a need for temporary waste storage areas, which will require planning and compliance with regulations.
- Ensuring that the waste goes to the appropriate treatment or disposal facility could be expedited by maintaining facility data. Specific data details could include: name and type of facility, permit status, capacity, compliance status, etc.

Personnel

- All cleanup workers will need to be educated on the risk of exposure as well as the appropriate use of PPE.
- The Occupational Safety and Health Administration and the National Institute of Occupational Safety and Health should be consulted regarding worker protection requirements and guidance, particularly for those working in the area of highest chemical exposures.

- Initially, trained personnel to characterize, treat, and dispose of waste may be in short supply. EPA should be consulted for advice on cleanup and waste management.
    - Private sector industries such as those associated with hazardous waste cleanup may be trained to perform some of the cleanup functions.
    - Solid waste haulers will need to be appropriately trained so they can provide surge capacity.
    - Training requirements will likely need to be modified to fit the context and time constraints.
- Long-term mental health and medical support will be needed for waste management workers.

Regulation

- Collection, segregation, recycling, treatment, transportation, and disposal of contaminated waste will require consultation with the private sector (i.e., facility owners and haulers) and federal and state agencies (i.e., regulatory and waste management entities) to ensure regulatory compliance.
- Different federal, state, county, and local regulations need to be followed when transporting waste across jurisdictions, depending on the type of waste, quantity, and transportation route.
- A mechanism for verifying that contractors are complying with the waste management processes will need to be established.
- Issues associated with improper waste treatment and disposal may need to be considered and addressed.

4.2 Economic Redevelopment

An Agent Yellow attack will likely impact the regional and state economies. Tourism, the second-largest industry in the Denver UASI, will be devastated, particularly with the contamination of such iconic structures as Coors Field. An Agent Yellow attack would also severely undermine confidence in products that have passed near the affected area.

Considerations and Assumptions:

- At this time, the Stafford Act and most insurance companies do not provide protection from a terrorist incident, but it is reasonable to expect financial support and assistance for businesses and individuals. If terrorism is the cause of the incident, a priority for recovery will be to get expert financial support and assistance for businesses and individuals.
- With widespread contamination, operations at key regional businesses may need to shut down for decontamination, and some facilities may experience total loss. Cleanup costs may deter businesses from reopening; businesses may choose instead to relocate outside of the area.
- In similar circumstances, building owners have indicated that their maximum limit for absorbing loss of rent is 6 months.[24] At that point, they are likely to abandon their facilities, particularly if they are facing large decontamination costs.
- The trade-offs of cost and speed to rehabilitate the impacted area and the psychological challenges of bringing people back into facilities that were contaminated will need to be examined. In some cases, rapid demolition and rebuilding may be the best option, particularly for highly contaminated areas where cleanup costs would be greatest.
- Prior land use and community development plans may be particularly useful in determining areas that might be best demolished and rebuilt to encourage community revitalization.
- Areas that experience business growth outside but near the contaminated area may create opportunities for some businesses to relocate but stay in the region. These opportunities should be broadly promoted to keep businesses and jobs in the impacted area.
- Shock to the region and nation, combined with destruction of key infrastructure, will adversely impact tourism and trade at least early in the recovery process.

[24] Judd, K.S., and A.M. Lesperance. 2010. *Business Continuity Planning Resources for Small- and Medium-Sized Businesses*. PNNL-19067, Pacific Northwest National Laboratory, Richland, Washington.

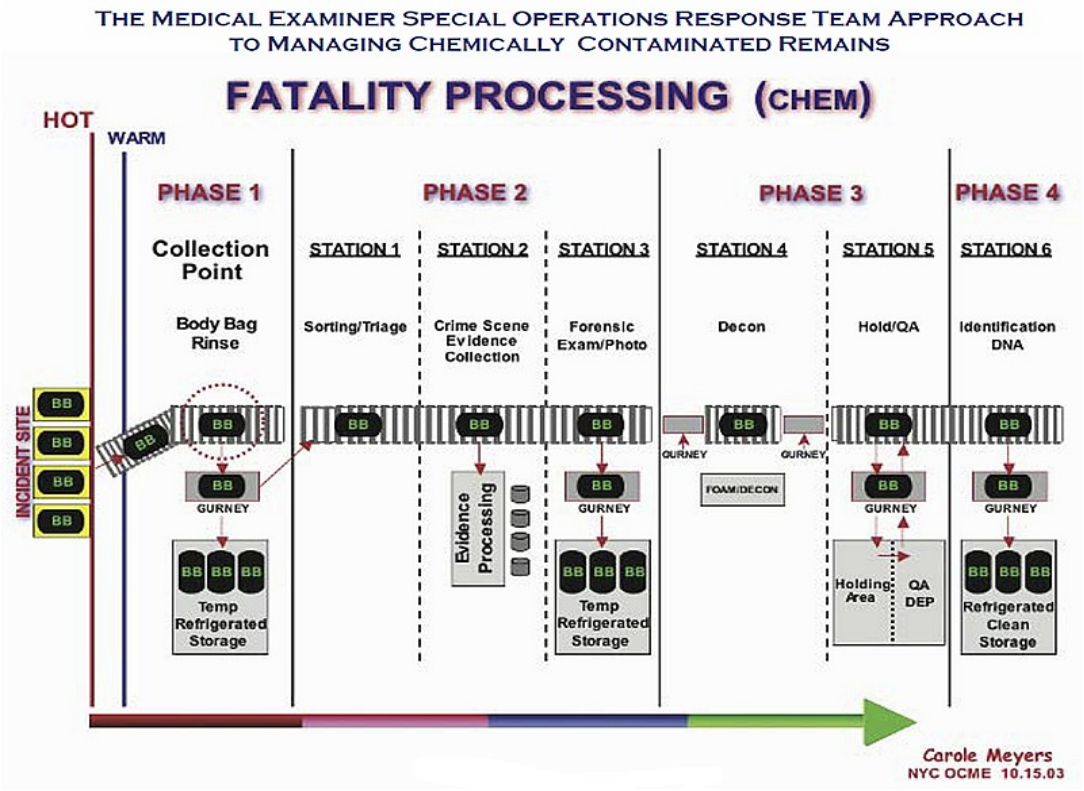
4.3 Fatality Management

While the fatality management process works well in the case of a single death, medium to high fatality rates that may be found in an Agent Yellow attack may require that processes and procedures be amended.

Considerations and Assumptions:

- A chemical incident will likely lead to delayed recovery and processing of the remains because of the need to use PPE and ensure worker safety. A decision will need to be made as to who and what level of PPE will be necessary for recovering remains.
- A decision will need to be made whether autopsies will be required. The medical examiners/coroners will determine the appropriate identification methods to be used. For example, a decision may be made to use fingerprints or dental records for identification.
- Crisis standards of death care, such as complete and timeliness of death certificates will likely need to be established and communicated to the general public. A team comprising mass fatality experts, public health experts, public officials, and public information officers (PIOs) will need to convene to develop these messages.
- A strategy will need to be determined for the processing, transporting, decontamination, storage, and final disposition of the contaminated deceased.
- Appropriate procedures for final disposition will need to be established and conveyed to funeral directors/mortuary workers to ensure their safety.
- Hospital fatality management issues such as surge capacity will become a critical concern with contamination issues. Traffic patterns within the hospital for movement of decedents as well as staff safety and behavioral health concerns will need to be appropriately handled.
- Cremation and embalming capacity for contaminated fatalities will need to be rapidly assessed. Capacity for cremation is limited and requires a lot of time and a significant amount of fuel. Embalming may lead to an issue of contaminated fluids and greater exposure of mortuary workers to contamination. Note that transporting of the deceased across state lines requires that the bodies be embalmed.
- Dialogue must occur with the spiritual care community to address multiple religious preferences for proper final disposition.
- A plan will need to be developed to work with families of the deceased to address unidentified remains.
- A plan will need to be developed for descendants from outside the country and their family members who wish to claim their remains. Bodies leaving the country will require certification if they are not decontaminated.

The following chart provides recommended procedures for chemical agents in general. [25]



BB=Body Bag

[25] "Fatality Management for Incidents Involving Weapons of Mass Destruction" a capstone document. August 2005. Developed by the Department of Defense U.S. Army Research Development and Engineering Command, Military Improved Response Program, and Department of Justice, Office of Justice Programs, Office of Domestic Preparedness.

4.4 Identification, Stabilization, and Maintenance of Infrastructure and Property

An incident involving Agent Yellow may result in some abandonment of property, whether voluntarily or as a result of death. Much of the property may be infrastructure to support economic recovery (e.g., Coors Field) or a potential hazard if allowed to degrade. Degradation could occur as the result of improper rendering of the facility before evacuation or normal wear and tear over several years. Additionally, if structures are not properly maintained, secondary risks from mold, structural degradation, or fire could add to the challenges.

Considerations and Assumptions:

- A cost/benefit analysis associated with various forms of disposition (cleanup versus demolition) will support decision-making.
- Clearances goals, including staged and conditional clearance values, must be agreed upon by all interested parties before cleanup activities can proceed (see attachment for possible interim clearance strategies for chemical incidents).
- Cleanup contractors may need specialized training and require PPE.
    - A process will be needed to certify additional contractors.
    - Educating private property owners on proper cleaning methods, to include the use of PPE, may accelerate cleanup in some cases.
- Citizens who choose to decontaminate their own property must follow state and federal regulations on both decontamination and waste disposal. The local environmental health department should consider providing a toolbox to assist them in meeting the local requirements and processes.
- Consumer fraud has occurred in similar situations, and organizations and individuals interested in hiring a cleanup firm for their property should take care to ensure they are working with appropriately qualified and experienced companies (also see the CDC database for more information, www.cdc.gov/niosh/ershdb). Some of the things to consider when hiring contractors include the following:
    - Are they bonded and insured?
    - Do they meet local and state licensing and certification?
    - Are they able to provide proof of training for employees working on the job?
    - Do they meet Occupational Safety and Health Administration requirements for hazardous waste operations and emergency response training as outlined 20 Code of Federal Regulations (CFR) 1910.20?
    - Can they show that they have a medical surveillance program as outlined 20 CFR 1910.120(b)?
    - Can they show that they have a respirator protection program as outlined in 20 CFR 1910.134?

  - Can they provide proof of biological/chemical agent training?
  - Do they have experience with decontamination procedures?
  - Have they been trained to use the specific decontamination technologies to be applied?
  - Do they use National Institute of Occupational Safety and Health-certified chemical, biological, radiological, nuclear, and explosives respiratory equipment?[26]
- A site-specific health and safety plan will be needed for each location before cleanup can begin.
- A process and a team for certifying decontaminated buildings for reoccupancy will need to be established.
- The process for determining individual property rights under emergency conditions will need to be defined and established.
- Specialized training may be required for the additional independent verification contract (ICV) inspectors needed to confirm and verify that decontaminated properties are ready for final approval by the local health authority.
- Buildings that are "clean" will need to be tracked and monitored for recontamination.
- The zone of contamination will likely change by the week based on natural attenuation, monitoring, and sampling. This information must be shared with the public to aid repopulation and avoid recontamination.
- Precautions will need to be taken for workers who operate critical infrastructure like wastewater treatment plants that are contaminated. These precautions may include PPE and/or working shorter shifts.

[26] Judd, K.S., and A.M. Lesperance. October 2009. *List of Contractors to Support Anthrax Remediation*. PNNL-18933, Pacific Northwest National Laboratory, Richland, Washington.

4.5 Public Health and Medical Services

A wide-area Agent Yellow incident will significantly impact the health care community and require massive logistical coordination over the long-term for medical distribution, hospital supplies, and other needs. The demand of resources (i.e., beds, supplies, and staff) will increase and may result in the need to consider adjustment of the standards of care. Further, health care workers will need to be protected to prevent exposure, burn-out, and trauma. Long-term treatment of the individuals exposed to the agent will need to be provided.

Considerations and Assumptions:

Public Health

- The Strategic National Stockpile will be deployed. Likely, the region will need medication and pulmonary resources, especially over the long-term. There may be delays before other federal assets are authorized and available.
- Public messaging on personal decontamination issues as well as information on symptoms, treatment, and location of contamination will be important. Messages should provide public reassurance so individuals can begin to minimize the exposure impact.
- Mental health needs will likely increase. Concerns can be alleviated through appropriate public messaging and allowing the public opportunities to share information with agencies.
- Long-term surveillance can be accomplished through a cancer registry, particularly for those who were subject to high exposure.
- For ocular and asthmatic surveillance, partnering with local and state public health, the U.S. Department of Health and Human Services, and additional specialists should be considered.

Medical Services

- Environmental and medical health surge capacity may be an issue. Mutual aid agreements with jurisdictions outside of the affected area should be considered.
- Large numbers of patients, including those who believe they have been exposed, will seek medical attention, with a corresponding need for medical supplies, diagnostic tests, and hospital beds.
- Appropriate decontamination must consider both short- and long-term needs (e.g., persistent byproducts). Personnel decontamination will be key to minimizing injuries.
- Some patients may be hospitalized for extended periods of time.
    - For respiratory injuries, skilled nursing facilities can handle respiratory and fluid management.
    - For burn injuries, patients would likely stay in a hospital.

- Medical personnel will need to be educated on the long-term health effects of a chemical exposure.

4.6 Public Information and Messaging

A wide-area Agent Yellow attack will require extensive coordination of information, both with the public and in the interagency process. Effective risk communication will be vital to shortening the recovery time. Conflicting information on decontamination and general prophylaxis from non-authoritative sources may present a significant challenge. Public anxiety related to a chemical incident will require a coordinated delivery of information from all the region's jurisdictions and through a variety of communication venues.

Considerations and Assumptions:

Interagency Message Coordination

- A Joint Information System (JIS) will be implemented to provide timely, accurate public information.
    - Most of the messaging will be focused on health risks, recovery actions to take, safety, and managing mental health needs.
    - Information regarding those who could have been exposed needs to be made clear and should clarify who was not affected.
- Messaging should be coordinated among all jurisdictions (local, state, and federal) and presented by authoritative voices to maintain public confidence.
- Tools such as Web EOC can be used to collect and document information about the incident.

Official Communication to the Public

- Regular press releases must be provided regarding Agent Yellow and the basic precautions and actions the public should take.
- Pre-planned messages regarding recommended actions individuals should take, including those for children and pregnant women, should be considered.
- Answers to frequently asked questions related Agent Yellow should be provided to the public. Distribution methods will include the same channels used as in other disasters (for example, social media, websites, public broadcasting messages, and the news media).
- It's important for local and state health departments to coordinate messaging. Input from CDC will also need to be included.
    - CDPHE would be the lead agency for toxicology statements, with the local health authorities issuing the guidance. To ensure accuracy, experts at CDC and other health networks should be consulted.
    - The state would use the health alert network (HAN).

- The rapid spread of information and misinformation will be a challenge because of the access of smart phone videos and pictures.
- Requests for information by the public will need to be coordinated. One option is to establish a central repository for all information including resource fact sheets from multiple agencies.
- The use of an editorial board to convince the media to not repeatedly show disturbing images can help alleviate some of the vicarious trauma.
- Local officials need to continue to be visible during long-term recovery, and PIOs should regularly cover events and public meetings to keep the dialogue open with the community.

5.0 Clinical Overview of the Components of Agent Yellow[27]

Agent	Properties	Signs and Symptoms	Onset and Persistence	Initial Treatment	Environmental Fate
Mustard	Smells like garlic, onions, or horseradish; or is sweet; sometimes has no odor. Can be a vapor, an oily-textured liquid, or a solid. Clear to yellow or brown when it is in liquid or solid form.	**Dermal**: skin erythema and yellow blistering (delayed 2-24 hours), second- and third-degree burns (liquid). **Respiratory**: cough, bloody nose, dyspnea, pneumonitis, and acute lung injury. **Ocular**: conjunctivitis, eyelid edema, and burns. **Gastrointestinal** (ingestion route): vomiting, abdominal pain, and diarrhea. **Long-term exposure**: Human carcinogen.	Rapid onset of effects (minutes) but could be delayed (2-24 hours)	No antidotes exist. Rapid removal of the agent from the body as soon as possible after exposure can prevent or decrease tissue damage to the body. Immediately wash any exposed part of the body thoroughly with plain, clean water. Flush eyes with water for 5 -10 minutes. Do not cover eyes with bandages, but protect them with dark glasses or goggles. Ingestion: do not induce vomiting.	Can persist 1-2 days in the environment under average weather conditions; weeks to months under very cold conditions. Bulk mustard can persist for decades in soil or water. Breaks down slowly in the body, so repeated exposure may have a cumulative effect. Vapor is heavier than air, so it will settle in low-lying areas. Sulfur mustard does not move from soil to groundwater or build up in the tissues of animals.
Lewisite	Oily, colorless liquid (pure form). Amber to black (impure form). Odor like geraniums.	**Dermal**: immediate skin erythema and blistering (2-12 hours). Note: blister begins as a small blister in the middle of the red areas and then expands to cover the entire reddened area of skin. **Cardiovascular**: Hypotension (with high-dose exposure),	Immediate clinical effects	Lewisite should be removed from the body as soon as possible and supportive medical care in a hospital setting provided. An antidote is available and is most useful if given as soon as possible after exposure.	Vapor is heavier than air, so it will settle in low-lying areas. Remains a liquid under a wide range of environmental conditions (below freezing to very hot temperatures), so it can persist in the environment for long periods of time.

[27] CDC. "Facts about Lewisite." http://www.bt.cdc.gov/agent/lewisite/basics/facts.asp. CDC. "Facts about Sulfur Mustard." http://www.bt.cdc.gov/agent/sulfurmustard/basics/facts.asp.

Agent	Properties	Signs and Symptoms	Onset and Persistence	Initial Treatment	Environmental Fate
		"Lewisite shock," or low blood pressure. **Respiratory**: cough, dyspnea, pneumonitis, and acute lung injury. **Ocular**: conjunctivitis, eyelid edema, and burns. **Gastrointestinal** (ingestion route): vomiting, abdominal pain, and diarrhea. Contains arsenic. Can exhibit effects similar to arsenic poisoning, including stomach ailments and low blood pressure.			

6.0 Points of Contact

Organization	Contact Number
Colorado Department of Public Health and Environment	(303) 692-2000 or 1-800-886-7689
Tri-County Health Department	(303) 220-9200
U.S. Environmental Protection Agency – Region VIII	(800) 227-8917 (Region VIII states only); (303) 312-6312 for all calls outside Region VIII
U.S. Centers for Disease Control and Prevention	(800) 232-4636

7.0 Additional Information

CDC's Fact Sheets on Specific Chemical Agents: http://www.bt.cdc.gov/chemical/factsheets.asp

CDC's and the National Institute of Occupational Safety and Health's Emergency Response Safety and Health Database: http://www.cdc.gov/niosh/ershdb/

Colorado Department of Local Affairs' Disaster Recovery Page: http://www.colorado.gov/cs/Satellite/DOLA-Main/CBON/1251595685691

EPA Office of Resource Conservation and Recovery Waste Management for Homeland Security Incidents Page: http://epa.gov/waste/homeland/

Santa Clara County Public Health's Managing Mass Fatalities: http://www.sccgov.org/sites/sccphd/en-us/HealthProviders/BePrepared/Pages/Managing-Mass-Fatalities.aspx

U.S. National Response Team Quick Reference Guides on Various Chemical Agents: http://www.nrt.org/production/NRT/NRTWeb.nsf/PagesByLevelCat/Level3ChemicalHazards?Opendocument

Annex 2 – Denver UASI Biological Incident Annex for Anthrax

FOREWORD:

The *"Denver UASI Biological Incident Annex for Anthrax"* is a document prepared by Pacific Northwest National Laboratories (PNNL) under contract to Department of Homeland Security, Science & Technology Directorate in collaboration with local, state, and federal partners. It is one of three specialized annexes to be delivered with the *"Denver UASI All-Hazards Regional Recovery Framework"* to the State of Colorado Office of Emergency Management. This annex is designed to identify the unique challenges of an Anthrax incident to the recovery support functions as identified in the *"Denver UASI All-Hazards Regional Recovery Framework"* core document.

The content represents the best efforts of the participants based on the information available at the time of publication, but is not intended to convey formal guidance or policy of the federal government or other participating agencies. The views and opinions expressed herein do not necessarily state or reflect those of their respective organizations or the US Government.

Contributors: We would like to recognize the Denver UASI and the State of Colorado who were instrumental in the development of this document.

Performers: We further recognize our dedicated performers from Pacific Northwest National Laboratory who had the task of coordinating the various local, state, regional and federal teams, and then consolidating the efforts.

Reviewers: We would also like to acknowledge the Environmental Remediation Operations Working Group and agency comments from EPA and CDC.

Our Sincere Thanks,

-Doug Hardy, SPAWAR, WARRP XM

-Lori Miller, DHS S&T, WARRP PM

Denver UASI Biological Incident Annex for Anthrax

This annex outlines the Recovery Support Functions (RSFs) and responsibilities that govern the various recovery[1] activities of the organizations comprising the Denver Urban Area Security Initiative (UASI) as well as any outside organizations providing assistance in an incident involving a biological agent. The information in this annex relies on existing policies, plans, and procedures where applicable. Bear in mind the following when using this annex to support recovery planning:

> This annex focuses on recovery from an incident involving *Bacillus anthracis*. Each biological agent can behave differently, in the way it is transmitted, how it affects humans and the environment, how it is treated, and how items are decontaminated and disposed of. The specific characteristics of each class of agent should be considered when developing broader recovery plans.

- The considerations and assumptions addressed in each RSF augment those of the main Denver UASI All-Hazards Recovery Framework, which was designed to be used as the starting point for developing recovery plans for any hazard.
- This annex is specific to recovering from a wide-area anthrax incident; however, many of the considerations can be applied to planning for recovery from other biological incidents.
- Because some of the diseases caused by exposure to biological agents can be transmitted from person to person or on belongings before being recognized and treated, it is possible for a terrorist act to spread disease far beyond the Denver UASI. However, recovery beyond the Denver UASI is not considered in this annex.

The following sections lay out the scenario used in developing this annex, characteristics of the agent, general considerations and assumptions, considerations and assumptions specific to the RSFs included, and more information on anthrax as a disease. A list of points of contact and additional resources is provided at the end of the annex.

[1] This document uses the term recovery as defined in the National Disaster Recovery Framework (see the main All-Hazards Framework for the definition). Recovery was also defined in the Draft *Planning Guidance for Recovery Following Biological Incidents*, a joint 2009 U.S. Environmental Protection Agency (EPA)/U.S. Department of Homeland Security (DHS) report (http://www.regulations.gov/#!documentDetail;D=EPA-HQ-ORD-2009-0331-0002) as, in the short term, an extension of the response phase in which basic services and functions are restored. In the long term, recovery is a restoration of both the personal lives of individuals and the livelihood of the community. Recovery can include the development, coordination, and execution of service- and site-restoration plans; the reconstitution of government operations and services; programs to provide housing and to promote restoration; long-term care and treatment of affected individuals; and additional measures for social, environmental, and economic restoration. Recovery generally includes actions taken after Notification and First Response activities have been initiated.

Also attached to this annex is a document describing a possible interim clearance strategy for a biological incident. The draft version of the *Interim Clearance Guidance for Environments Contaminated with Bacillus anthracis* was developed by the Centers for Disease Control (CDC) and the US Environmental Protection Agency (EPA) and is not part of the WARRP program. It has been re-printed here simply as an example of a clearance strategy that could be used to support a scenario similar to the WARRP *Bacillus anthracis* scenario in Denver. The document is currently undergoing revision; however, the clearance goal described in the document will remain the same. When finalized, the document will be available on CDC's anthrax website.

The strategy set forth here is intended as an interim guide for public health and environmental Federal responders. It represents knowledge from best practices and available science. Because this is an EPA/CDC document, unlike the chemical and radiological clearance strategies created as part of WARRP, the strategy will be managed and updated jointly by EPA and CDC as new information becomes available. The incident command/unified command (IC/UC) is ultimately responsible for developing site- and incident- specific clearance strategies. It is highly recommended for anyone developing a clearance strategy to consult with their federal, state, local, private sector, and volunteer organizations to develop an appropriate strategy. Any clearance strategy should also be based on the biological agent that is released and the site specific conditions of the region where the release takes place.

This document may not be applicable or appropriate for releases of different agents, or at different locations, or under different circumstances.

1.0 Scenario Used for Annex Development[2]

To create this annex, the Denver UASI agencies and partners relied on a scenario based on the National Planning Scenario #2: Biological Attack–Aerosol Anthrax, tailored for the region. This scenario was utilized during several workshops and discussions to help frame the context for this annex and includes the following characteristics:

- **Two covert anthrax aerosol attacks** by an organized worldwide terrorist group. **Tens of thousands of people exposed and thousands of deaths**
- **Evacuations/displaced persons**: Tens of thousands evacuated; thousands seek shelter in immediate area (decontamination required)
- **Significant contamination** in affected areas, including critical infrastructure and commercial, military, and private property. Approximate size of contaminated area = 2 areas of 10 square miles each
- Local **government operations have been relocated**
- **Local businesses, military installations, and basic services** have all been affected.

[2] This scenario was developed for exercise purposes only and is available for public release per email guidance from the DHS Program Manager, Mr. Chris Russell, on May 5, 2011.

The specific scenario is as follows: On an autumn Monday morning, a specially fitted truck drives north on I-25. When the truck reaches the Auraria section, the driver's companion turns on a concealed improvised spraying device with a conventional nozzle that rapidly aerosolizes approximately 100 liters of wet-fill *Bacillus anthracis* slurry. The release is sufficient to result in the potential exposure of tens of thousands of persons. Approximately 50 minutes later, a second truck drives along East Alameda Parkway in Aurora, Colorado, releasing a second cloud. The wind blows the cloud over Buckley Air Force Base, contaminating the airstrip and an area extending nearly to the Denver airport.

Two days later, Denver area BioWatch samplers detect the presence of anthrax, and it is determined that a bioterrorism incident has occurred. The appropriate notifications are made, and patients begin to report to area hospitals.

2.0 Characteristics of *Bacillus anthracis*

Anthrax is a bacterial disease caused by *Bacillus anthracis.* There are three types of this disease: cutaneous anthrax, gastrointestinal anthrax, and inhalation anthrax.[3] *Bacillus anthracis* spores delivered by aerosol spray result in inhalation anthrax, which develops when the bacterial organism is inhaled into the lungs. A progressive infection follows. A lethal infection is reported to result from inhalation of about 8,000-50,000 spores.[4]

Respiratory infection in humans initially begins with cold or flu-like symptoms for several days, followed by severe (and often fatal) respiratory collapse.[5] Historical mortality was greater than 85%, but when treated early (seen in the 2001 anthrax attacks), observed mortality was 45%.[6] Distinguishing inhalation anthrax from more common causes of respiratory illness is essential to avoiding delays in diagnosis and thereby improving outcomes.[7, 8] Illness progressing to the fulminant phase (where anthrax toxins induce blood vessel permeability and lung edema) has a 97% mortality regardless of treatment.[9]

---

[3] "Questions and Answers About Anthrax: Frequently Asked Questions (FAQ)" http://www.bt.cdc.gov/agent/anthrax/faq/

[4] *Medical Management of Biological Casualties Handbook*, Seventh Edition. September 2011. U.S. Army Medical Research Institute on Infectious Diseases, Blue Book.

[5] CDC, "Fact Sheet: Anthrax Information for Health Care Providers" http://emergency.cdc.gov/agent/anthrax/anthrax-hcp-factsheet.asp

[6] *Medical Management of Biological Casualties Handbook*, Seventh Edition. September 2011. U.S. Army Medical Research Institute on Infectious Diseases, Blue Book.

[7] *Medical Management of Biological Casualties Handbook*, Seventh Edition. September 2011. U.S. Army Medical Research Institute on Infectious Diseases, Blue Book.

[8] CDC, "Fact Sheet: Anthrax Information for Health Care Providers" http://emergency.cdc.gov/agent/anthrax/anthrax-hcp-factsheet.asp

[9] Holty, J.E., D.M. Bravata, H. Liu, R.A. Olshen, K.M. McDonald, and D.K. Owens. "Systematic review: a century of inhalational anthrax cases from 1900 to 2005." *Ann Intern Med*. 2006, 144(4):270.

An anthrax vaccine licensed by the U.S. Food and Drug Administration (FDA) is available. The BioThrax vaccine, or Anthrax Vaccine Adsorbed, was formerly administered in a six-dose primary series at 0, 2, and 4 weeks and 6, 12, and 18 months, with annual boosters to maintain immunity. On December 11, 2008, the FDA approved the removal of the 2-week dose, resulting in the currently recommended five-dose series.[10]

Anthrax cannot be spread directly from person to person, but a patient's clothing and body may be contaminated with anthrax spores.[11] Effective decontamination of people can be accomplished by a thorough wash down with soap and water.[12] After decontamination, there is no need to immunize, treat, or isolate *contacts* of persons ill with anthrax unless they were also exposed to the same source of infection.[13]

Early antibiotic treatment of anthrax is essential—delay significantly lessens chances for survival. Treatment for anthrax infection and other bacterial infections includes large doses of intravenous and oral antibiotics, such as penicillin, doxycycline, and fluoroquinolones (such as ciprofloxacin). In possible cases of inhalation anthrax, early antibiotic prophylaxis treatment is crucial to prevent possible death.[14]

3.0 Situation and Assumptions

The following general assumptions can be made with regard to recovery from an anthrax incident in the Denver UASI:

- Authorities will likely not detect and confirm an incident until at least 2 to 3 days after the release based on currently available technology.
- Symptoms of an infection may not appear for several days, causing the delay of necessary treatment. In addition, an accurate diagnosis of the disease may be delayed, even after symptoms are present, because anthrax mimics the flu.
- The hazard assessment conducted during characterization (response) will determine the extent of residual hazard posed by anthrax, including any contamination of water, soil, vegetation, crops, animals, buildings, vehicles, and other objects.

---

[10] "Use of Anthrax Vaccine in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP)", 2009. *Recommendations and Reports* July 23, 2010 / 59(rr06);1-30.

[11] CDC. "Fact Sheet: Anthrax Information for Health Care Providers" http://emergency.cdc.gov/agent/anthrax/anthrax-hcp-factsheet.asp

[12] Inglesby, T.V., T. O'Toole, D.A. Henderson, J.G. Bartlett, M.S. Asche, E. Eitzen, A.M. Friedlander, J. Gerberding, J. Hauer, J. Hughes, J. McDade, M.T. Osterholm, G. Parker, T.M. Perl, P.K. Russell, and K. Tonat. Working Group on Civilian Biodefense. "Anthrax as a Biological Weapon, 2002: Updated Recommendations for Management." *Journal of the American Medical Association*. 2002 May 1, 287(17):2236-2252.

[13] CDC, "Questions and Answers About Anthrax: Frequently Asked Questions (FAQ)" http://www.bt.cdc.gov/agent/anthrax/faq/

[14] CDC, "Anthrax Q & A: Treatment" http://emergency.cdc.gov/agent/anthrax/faq/treatment.asp

- Both decontamination (removing *B. anthracis* spores) and cleanup (returning a specific property or area to usable condition) will be needed.
- For a terrorist incident, the Federal Bureau of Investigation will initially be the lead federal agency, and a criminal investigation will be ongoing during initial recovery activities.
- Decontamination capacity will be limited, further driving the need for prioritization. Lab capacity limitations may influence the prioritization of sampling and analytical activities across all aspects of recovery.
- Experts will need to be consulted regarding safe decontamination and cleanup procedures in a number of areas, including cultural and historical artifacts.
- Liability issues will need to be considered for workers, volunteers, and others associated with the incident.
- Public safety service levels will still need to be maintained, even if first responders such as fire fighters and law enforcement may be ill. Public safety officials will also need access to medical countermeasures as soon as possible. Access to contaminated areas must be limited to those with proper personal protective equipment (PPE) and training. The need for PPE in addition to the labor requirements may limit first responder time in the contaminated area.

4.0 Recovery Support Functions

The considerations and assumptions for each of the following RSFs are specific to recovery from an anthrax incident and do not include considerations or assumptions that are more general in nature or those listed into the main section of the Denver UASI All-Hazards Recovery Framework:

- Debris Management
- Economic Redevelopment*
- Fatality Management
- Identification, Stabilization, and Maintenance of Infrastructure and Property*
- Public Health and Medical Services*
- Public Information and Messaging.

** Indicates RSFs identified in the National Disaster Recovery Framework.*

4.1 Debris Management[15, 16,17,18,19]

The handling, transporting, treating, and disposing of large amounts of waste generated by a wide-area anthrax incident will present unique challenges. In such an incident, a wide range of material, including furniture, carpeting, sewage sludge, building material, and animal carcasses, will likely require decontamination and disposal. In addition, fixtures of the community (sidewalks, trees, fire hydrants) may not be considered waste but may require decontamination. While many federal, state, and local agencies (including the City of Denver) have debris management plans, these plans often do not address biological contamination. Having access to reliable information on the characterization, decontamination, and disposal of contaminated materials will help to reduce the cleanup costs and shorten restoration timelines.

Considerations and Assumptions:

Strategy

- Standards for determining a level of acceptable decontamination will need to be established (see the attachment on interim clearance strategies for guidance).
- The costs of differing decontamination options should be estimated and provided to decision-makers for policy decisions.
- A systematic approach to waste collection will be developed, based on the strategies in the waste management plan.[20]
- A process to identify and potentially return personal property should be considered. There may be valuable items (e.g., records, data, and family heirlooms) in the contaminated areas that individuals will want to retain. The material will need to be decontaminated before it is returned. Some items, such as electronics, will need special consideration when decontaminating and removing from the area.

[15] In this annex, as in the All-Hazards Framework, the term debris is defined as items and materials broken, destroyed, or displaced by a natural or human-made disaster. Examples of debris include, but are not limited to, trees, construction and demolition material, and personal property (Source: FEMA, 2007, FEMA 325, *Debris Management Guide*). The term waste is defined as unwanted or useless materials (Source: 2009 *Colorado Northeast Regional Debris Management Plan*).

[16] EPA considers waste management to encompass disposal, treatment, storage, reuse, recycling, segregation, transportation, and other activities.

[17] The Denver City and County Emergency Incident Debris Management Plan follows the FEMA definition of debris – items and materials destroyed, or displaced by a natural or human-made disaster.

[18] The EPA views debris as a subset of waste; while FEMA definitions and usage in Colorado is consistent with the view that waste is a subset of debris.

[19] The representatives of the Denver UASI responsible for developing this annex decided to use the term debris management to be consistent with usage in FEMA as well as the debris management plan for the city and county of Denver. Other jurisdictions may choose to use the term waste management instead for this RSF.

[20] For more information on developing a Waste Management Plan, see "Knowledge Enhancement Events: Waste Management Workshop After Action Report."

- A policy decision will need to be made as to what materials should be decontaminated (i.e., hard surfaces) versus disposed. Porous surfaces such as carpeting will likely need to be removed for offsite disposal; however, an alternative may be to leave porous materials in place during fumigation or bleaching and then dispose of them as regular waste. Agencies should consult with the EPA and appropriate state regulatory authorities to determine the most appropriate process at a particular site.
- For transportation, applicable regulations for infectious waste will need to be followed. A waiver will likely need to be acquired for the movement of large quantities of waste.
- Ensuring that the waste goes to the appropriate treatment or disposal facility could be expedited by maintaining facility data. Specific data details could include: name and type of facility, permit status, capacity, compliance status, etc.
- An exit strategy should identify a process for transitioning waste management oversight to its pre-incident state and address: the scale-down/close-out of the waste management oversight activities performed (e.g. site visits/ inspection of waste management facilities and sites); the transition of roles and responsibilities; and the frequency of the oversight activities.

Characterization

- The laboratory capacity for testing for the presence of the biological agent, starting with the Laboratory Response Network (LRN), is going to be limited. The sampling procedures will depend on the situation and available technologies.
    - Additional laboratory capacity may be available through other federal agencies, such as the Integrated Consortium of Laboratory Networks, which encompasses laboratories from the U.S. Department of Agriculture (USDA), Department of Commerce, Department of Energy, Department of Health and Human Services, DHS, Department of Interior, Department of Justice, Department of State, and the EPA.
    - Sampling capacity will limit the amount of data and knowledge available to decision makers. Timely decisions will still have to be made.

Contaminated Material Management

- Denver has pre-designated debris management staging sites for waste treatment and disposal.
    - The sites will allow for segregation of waste.
    - These staging sites will need additional engineering controls to handle the volume and nature of the biologically contaminated material.
    - One or more of the sites should be opened to the public for disposal of household items. A public messaging campaign will be needed to provide guidance on site location and items that can be disposed.
- Reaerosolization is a possibility for *B. anthracis* spores. The necessary materials and engineering controls for this type of situation should be identified in advance. Engineering controls and

containment materials used for asbestos abatement activities might be adaptable depending on the circumstances.

- Contaminated household waste may need to be decontaminated before disposal, at the discretion of state and local officials. Agencies should refer to *The City and County of Denver: Emergency Incident Debris Management Plan* for specific guidance.
- The effectiveness of decontaminating urban features such as trees, playgrounds, and sidewalks will need to be investigated and may require additional technical research to develop effective cleanup strategies.
- A determination for treating waste streams in place will be based on the cost, effectiveness, availability of equipment and personnel, and public health issues. A determination will still need to be made as to if and who will take the wastewater, even if it has been treated. There are additional treatment options not discussed in this document. For more information see http://www.epa.gov/osw/homeland/options.htm.
- For those individuals or companies with sufficient resources and interest to decontaminate their own property, specific guidance on where to bring their waste and how to minimize the effects should be provided.

Disposal

- Contaminated waste may need to be disposed separately from routine household garbage. Local, state, and federal regulations for disposing biological waste will need to be followed, but agencies may need to explore options to change or relax regulatory requirements.
- Waste minimization should be emphasized to limit the impact on landfills, although the materials may still need to be decontaminated.
- Waste quantities may exceed the capacity of existing landfills. New landfills or new landfill cells could take some time to construct.
- The disposal cells[21] that hold the biologically contaminated waste will require long-term monitoring.

Personnel

- All cleanup workers will need medical countermeasures and should be educated on the appropriate use of PPE if they are required to be in the affected area. The landfill operators' long-term health and safety also needs to be considered.
- The number of individuals who are trained to characterize, treat, and dispose of contaminated waste will likely be insufficient. EPA should be consulted for advice on cleanup and waste management resources.

[21] A disposal cell is a fixed area in a sanitary landfill where waste is disposed, compacted into the smallest place possible, and then covered with soil on a daily basis. http://www.epa.gov/osw/education/quest/gloss1a.htm

- For anthrax, aerosolization of contamination during the wastewater treatment process could present a health hazard.
- Private sector industries such as those associated with pest control may be trained to perform anthrax cleanup; however, attention should be paid to the difference between fumigation and surface cleaning. Training requirements will likely need to be modified to fit the context and time constraints.
- Because remediation workers and other individuals working in the area may need to be on medication for an extended period, long-term mental health monitoring as well as medical support to these workers will be essential.

Regulation

- Collection, segregation, recycling, treatment, transportation, and disposal of contaminated waste will require consultation with the private sector (i.e., facility owners and haulers) and federal and state agencies (i.e., regulatory and waste management entities) to ensure regulatory compliance.
- The EPA has statutory responsibility under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) for registering (licensing) or exempting from registration the sale and use of antimicrobial and other pesticide products in the U.S. (7 U.S.C. 136-136y). Because no antimicrobial pesticide is currently registered by the EPA specifically for the inactivation of *Bacillus anthracis* spores, a federal or state agency will need to check with EPA about obtaining an emergency exemption from EPA for each specific use of a selected antimicrobial pesticide to decontaminate a facility. EPA has the authority to issue such exemptions (FIFRA section 18) when emergency conditions exist.
- Different federal, state, county, and local regulations need to be followed when transporting waste across jurisdictions, depending on the type of waste, quantity, and transportation route.
- Liability issues for waste or damage caused during processing and transportation of waste may need to be addressed.

4.2 Economic Redevelopment

Economic redevelopment will be necessary because a wide-spread anthrax incident will likely have a severe impact on the regional, state, and national economies. Tourism, the second-largest industry in the Denver UASI, will be devastated. An anthrax incident would also severely undermine confidence in products that have passed near the affected area. Additionally, because of the potential delay in detecting the incident, many areas well outside of the directly affected area could be impacted, further undermining consumer confidence worldwide and developing a stigma about products that have passed near the region.

Considerations and Assumptions:

- At this time, the Stafford Act and most insurance companies do not provide protection from a terrorist incident, but it is reasonable to expect financial support and assistance for businesses and individuals. If terrorism is the cause of the incident, a priority for recovery will be to get expert financial support and assistance for businesses and individuals.
- With widespread contamination, operations at key regional businesses may need to shut down for decontamination, and some facilities may experience total loss. Cleanup costs may deter businesses from reopening; businesses may choose instead to relocate outside of the area.
- Building owners have indicated that their maximum limit for absorbing loss of rent is 6 months. At that point, they are likely to abandon their facilities, particularly if they are facing large decontamination costs.[22]
- The trade-offs of cost and speed to rehabilitate the impacted area and the psychological challenges of bringing people back into facilities that were contaminated will need to be examined. In some cases, rapid demolition and rebuilding may be the best option, particularly for highly contaminated areas where cleanup costs will be greatest.
- Areas that experience business growth outside but near the contaminated area may create opportunities for some businesses to relocate but stay in the region. These opportunities should be broadly promoted to keep businesses and jobs in the region.
- Other parts of the nation may be concerned about goods coming from or transported through the region. A public awareness campaign will be vital for the sustainment of local businesses.

[22] Judd, K.S., and A.M. Lesperance. 2010. *Business Continuity Planning Resources for Small- and Medium-Sized Businesses*. PNNL-19067, Pacific Northwest National Laboratory, Richland, Washington.

4.3 Fatality Management

While the fatality management process works well in the case of a single death, medium to high fatality rates may require that processes and procedures be amended; these changes will only be intensified in a wide-area anthrax incident. One of the biggest challenges for fatality management in an anthrax incident is the spread of spores from contaminated bodies and clothing to workers such as public health, mortuary, and other fatality management professionals.

Considerations and Assumptions:

- An anthrax incident will likely lead to delayed recovery and processing of the remains because of the need to use PPE and ensure worker safety. A decision will need to be made as to who and what level of PPE or countermeasures will be necessary for recovering remains.
- Virtual Family Assistance Centers may be needed to curtail the amount of person-to-person contact, not so much as to prevent the spread of disease (anthrax cannot be spread person to person) but to minimize fears. These centers will still need to be staffed appropriately, and supportive services (e.g., behavioral health, death benefits information) may also need to be provided via other media such as TV, Internet, and phone.
- Crisis standards of death care, such as complete and timeliness of death certificates, will likely need to be established and communicated to the general public. A team comprising mass fatality experts, public health experts, public officials, and public information officers (PIOs) will need to convene to develop these messages.
- During the initial recovery activities, the Disaster Mortuary Operational Response Team (DMORT) may be available to provide assistance. DMORT is a federal-level response team designed to provide mortuary assistance in the case of a mass fatality incident or cemetery-related incident. The DMORT team members work under the local jurisdictional authorities such as the coroner/medical examiners, law enforcement, and emergency managers.[23]
- Appropriate procedures for final disposition will need to be established and conveyed to funeral directors/mortuary workers to ensure their safety.
- Safe management of body fluids for final disposition should be considered to prevent contamination of mortuary workers.
- Hospital fatality management issues such as surge capacity will become a critical concern with contamination issues. Traffic patterns within the hospital for movement of decedents as well as staff safety and behavioral health concerns will need to be appropriately handled.
- For one or two contaminated fatalities, cremation and embalming is the preferred choice. However, it is not a likely option for significant numbers of contaminated fatalities. Capacity for cremation is limited and requires a lot of time and a significant amount of fuel. Embalming may

[23] See http://www.dmort.org/index.html for more information.

lead to an issue of contaminated fluids and greater exposure of mortuary workers to contamination. Temporary internment should be considered as an option for temporary (or permanent, depending on the length of time bags are effective) storage. Note that transporting of the deceased across state lines requires that the bodies be embalmed.

- Dialogue must occur with the spiritual care community to address multiple religious preferences for final disposition.
- A plan will need to be developed to work with families of the deceased to address unidentified remains.
- A plan will need to be developed for the decedents from outside the country and their family members who wish to claim their remains. Bodies leaving the country will require certification if they are not contaminated.
- Criteria should be established to determine which personal effects will be decontaminated (e.g., wedding rings, photographs, and clothes) and returned to legal next-of-kin, and the manner in which contaminated/non-claimed personal effects will be disposed.

The following chart provides recommended procedures for an isolated incident (one or two bodies) for anthrax: [24]

Bio Agent	General Handling	Autopsy	Burial	Cremation
Anthrax	• Standard precautions • Additional respiratory personal protective equipment (PPE) when performing activities that generate aerosols	• Wear additional respiratory PPE • Bio-Safety Level (BSL) 3 practices when performing activities with high potential for aerosols • Regulated by 42 Code of Federal Regulations (CFR)	• Contact with corpses should be limited to personnel wearing PPE • Package in leak-proof containers • Avoid embalming • Bury without reopening	• Recommended

[24] "Fatality Management for Incidents Involving Weapons of Mass Destruction" a capstone document. August 2005. Developed by the Department of Defense U.S. Army Research Development and Engineering Command, Military Improved Response Program, and Department of Justice, Office of Justice Programs, Office of Domestic Preparedness.

4.4 Identification, Stabilization, and Maintenance of Infrastructure and Property

An incident involving anthrax may result in abandonment of property, whether voluntarily or as a result of death and illness. Much of the property may be infrastructure to support economic recovery or a potential hazard if allowed to degrade. Degradation could occur as the result of improper rendering of the facility before evacuation or normal wear and tear over several years. Additionally, if structures are not properly maintained, secondary risks from mold, structural degradation, or fire could add to the challenges.

Considerations and Assumptions:

- The zone of contamination will not be known for several days and will likely change frequently based on monitoring and sampling. This information must be shared with the public to aid repopulation and avoid recontamination.
- Decontamination of buildings may take years to complete and the cost of decontaminating even a single building will be enormous.
    - Experts in cleanup procedures need to be consulted.
    - The cost of cleanup versus abandonment will need to be considered.
    - Resolution of economic issues associated with the long-term closure of buildings should be a top priority.
- Consumer fraud has occurred in similar situations, and organizations and individuals interested in hiring a qualified cleanup firm for their property should take care to ensure they are working with appropriately qualified and experienced companies. Some of the things to consider when hiring contractors include the following:
    - Are they bonded and insured?
    - Do they meet local and state licensing and certification?
    - Are they able to provide proof of training for employees working on the job?
    - Do they meet Occupational Safety and Health Administration requirements for hazardous waste operations and emergency response training as outlined 20 Code of Federal Regulations (CFR) 1910.20?
    - Can they show that they have a medical surveillance program as outlined 20 CFR 1910.120(b)?
    - Can they show that they have a respirator protection program as outlined in 20 CFR 1910.134?
    - Can they provide proof of biological/chemical agent training?
    - Do they have experience with decontamination procedures?
    - Have they been trained to use the specific decontamination technologies to be applied?

  - Do they use National Institute of Occupational Safety and Health-certified chemical, biological, radiological, nuclear, and explosives respiratory equipment?[25]

- A site-specific health and safety plan will be needed for each location before cleanup can begin.
- The process for determining individual property rights under emergency conditions will need to be defined and established.
- Cleanup contractors should also receive medical countermeasures.
- The acceptable level of risk for reoccupation will need to be determined. For example, the current EPA and CDC clearance goal for re-entry and reoccupation following an anthrax incident is no detectable viable spores on post-decontamination samples. A process and a team for certifying contaminated buildings for reoccupancy will need to be established in conjunction with the lead public health official. [26]
- Specialized training may be required for the additional independent verification contract (ICV) inspectors needed to confirm and verify that decontaminated properties are ready for final approval by the local health authority.
- Buildings that are "clean" will need to be tracked and monitored for recontamination. As buildings are reoccupied, the individuals and materials going back in will need to be monitored to prevent recontamination. Recontamination will be an ongoing issue with the potential for more waste generated.
- Precautions will need to be taken for workers who operate critical infrastructure like wastewater treatment plants that are contaminated. These precautions may include vaccinations, PPE and/or working shorter shifts.

[25] Judd, K.S., and A.M. Lesperance. October 2009. *List of Contractors to Support Anthrax Remediation*. PNNL-18933, Pacific Northwest National Laboratory, Richland, Washington.

[26] See the attached document *Interim Clearance Guidance for Environments Contaminated with Bacillus anthracis* for more information.

4.5 Public Health and Medical Services

A wide-area anthrax incident will significantly impact the health care community and require massive logistical coordination over the long term for medical distribution, hospital supplies, and other needs. The demand of resources (i.e., beds, supplies, and staff) will increase, likely resulting in the adjustment of the standards of care. Further, health care workers will need to be protected to prevent exposure, burn out and trauma.

Considerations and Assumptions:

Public Health

- The Strategic National Stockpile will be deployed, and patient decontamination will be ongoing during the initial stage of recovery.
- Public health capacity may be an issue. Mutual aid agreements with jurisdictions outside of the affected area should be considered.
- Psychological effects and trauma from fear of being exposed may be some of the major consequences of a biological incident, especially for an anthrax attack. Public education and information about the symptoms of exposure must be made available to ensure the "worried well" will not further overstress the public health system.
- Consistent messaging will be needed regarding the importance of prophylaxis and taking prescribed medications, for the community and the health care system. The long-term side effects of taking the prescribed medication such as cipro (the strongest broad-spectrum antibiotic) also need to be appropriately communicated along with the potential of contributing to the growing problem of antibiotic resistance.
    - Surveillance and monitoring programs will be needed for clinical or environmental issues. Public health could monitor indefinitely or at minimum until sometime after the last case, which may cause significant funding concerns. Insurance costs will need to be considered and addressed for long-term care.
    - Mental health needs may increase significantly for both workers and the public. Educating the public on the signs and symptoms will be key, as there is no surveillance for mental health. Public health officials should coordinate with the Joint Information System (JIS, see Public Information and Messaging RSF) to communicate an appropriate message to the public. Trusted agents of the community such as volunteers, faith-based organizations, non-government organizations, and the private sector can assist with communication and provide support to those suffering.
    - The management and care of individuals who are immunocompromised will be a concern.
    - Previously contaminated individuals may be shunned in public places, causing additional psychological concerns. Public messaging to address this should be considered.

Environmental Health

- Labs for sample analysis other than those in the LRN should be identified to provide additional surge capacity.
    - Early on, samples will be limited to confirmation and definition of the impacted area. After 1 to 2 weeks, environmental samples will increase.
    - LRN surge will be reimbursed with federal funding.

Medical Services

- Medical supplies, diagnostic tests, and hospital beds will quickly become scarce.
    - The Colorado Department of Public Health and Environment (CDPHE) will be the lead agency to determine if standards of care should be redefined to accommodate the increase in demand or reduction in medical supplies.
    - If key medical facilities in the Denver UASI are contaminated, patients may need to be evacuated outside the area, although it is unknown whether potentially contaminated patients will be accepted. Similar concerns may exist with limited-care and assisted-living facilities.
    - Cross-contamination and tracking could be a potential issue, particularly in hospitals. The problem will be amplified if confirmation of the biological agent is delayed.
- Limited medical resources and antibiotics will need to be prioritized. Currently there is a process for distributing medical supplies, but it is unclear at what volumes and how long this process can be sustained. One option for prioritization is to use the Governor's Expert Emergency Epidemiological Response Committee (GEEERC), which already has a process in place for a biological incident. The committee utilizes federal resources and consults with the CDC as appropriate. Ultimately, the decision will be made by local and state authorities with input from federal partners. A distribution plan that identifies the affected population as well as provides for health care workers will need to be created.
- Staffing issues and burn out may occur, resulting in personnel leaving. Normal primary care will still need to be maintained.
- A system for tracking patients and what treatments they received will need to be established.

4.6 Public Information and Messaging

A wide-area anthrax incident will require extensive coordination of information, both with the public and in the interagency process. Effective risk communication will be vital to shortening recovery time. Conflicting information on decontamination, vaccinations, and general prophylaxis from non-authoritative sources may present a significant challenge. Public anxiety related to an anthrax incident will require a coordinated delivery of information from all the region's jurisdictions and through a variety of communication venues.

Considerations and Assumptions:

Interagency Message Coordination

- A Joint Information System (JIS) will be implemented to provide timely, accurate public information.
    - The JIS may operate from the state emergency operations center and should include hospital PIOs or public affairs staff.
    - The GEEERC may be activated, which would bring together the chief medical officer and other public health officials for decision-making.
- Messaging should be coordinated among all jurisdictions (local, state, and federal) and presented by authoritative voices to maintain public confidence.
- Tools such as Web EOC can be used to collect and document information about the incident.
- There is an activation process in place, although an anthrax incident may need more coordination with the healthcare system.
- A credible public leader in the community should be identified as a spokesperson.

Official Communication to the Public

- The local health authorities would be the lead agency in overall communications.
- Regular press releases must be provided regarding anthrax and the basic precautions and actions the public should take.
- Answers to frequently asked questions related to anthrax should be provided to the public. Distribution methods will include the same channels used in other disasters (for example, social media, websites, public broadcasting messages, and the news media).
- Pre-planned messages regarding recommended actions individuals should take, including those for children and pregnant women should be considered.
- It's important for local and state health departments to coordinate messaging. Input from CDC will also need to be included.

  - CDPHE would be the lead agency for toxicology statements, with the local health authorities issuing the guidance. To ensure accuracy, experts at CDC and other health networks should be consulted.
  - The state would use the health alert network (HAN).

- The rapid spread of information and misinformation will be a challenge because of the access of smart phone videos and pictures.
- The use of an editorial board to convince the media to not repeatedly show disturbing images can help alleviate some of the vicarious trauma.
- Requests for information by the public will need to be coordinated. One option is to establish a central repository for all information including resource fact sheets from multiple agencies.
- Consumer protection regarding fraudulent companies, bulk distribution sites for cleanup, and medical supplies and guidance also needs to be provided.
- A key public message will be that anthrax is not contagious.
- Public messaging should include statements regarding the use of medical countermeasures if citizens choose to stay. Some antibiotics must be taken for long periods of time to ensure effectiveness.
- A website with guidance regarding cleanup procedures should be made available and publicized to affected residents.
- There will need to be firm but encouraging messages on how to avoid being re-contaminated.

5.0 Clinical Presentation of Anthrax[27]

Anthrax Infection	Incubation Period	Signs and Symptoms	Lethality
Inhalation	Ranges from as little as 2 days following exposure to spores to as long as 6 to 8 weeks after exposure	Initial symptoms are fever, headache, and muscle aches. If untreated, the disease progresses to shortness of breath, chest discomfort, shock, and death. Meningitis may complicate the clinical course. Chest imaging reveals widening of the mediasinum, enlargement of and bleeding into lymph nodes, and bloodily fluid collections around the lungs.	Historical data suggest that the case fatality rate of untreated inhalation anthrax may be as high as 90%. With appropriate treatment, a fatality rate of approximately 50% or less may be expected.
Cutaneous	Ranges from 1 to 12 days following exposure but is typically closer to 1 day	The first symptom is a small sore at the point of infection that develops into a blister and later into a painless ulcer covered by a black scab. Often there is marked swelling around the ulcer.	Approximately 20% of persons with cutaneous anthrax may die if not treated with appropriate antibiotics. With appropriate antibiotic treatment, the death rate is less than 1%.
Gastrointestinal	Typically 1 to 6 days following exposure	Oropharyngeal: Symptoms are fever, ulcers in the back of the mouth and throat, severe sore throat, difficulty swallowing, and lymph node and neck swelling. Intestinal: Initial symptoms are nausea and vomiting. The disease may progress rapidly to bloody diarrhea, abdominal pain, and shock.	Without antibiotic treatment, gastrointestinal anthrax results in the death of more than 40% of affected persons.

[27] Center for Biosecurity of UPMC. *Bacillus anthracis* (Anthrax) Fact Sheet. Updated 9/21/2011. http://www.upmc-biosecurity.org/website/our_work/biological-threats-and-epidemics/fact_sheets/anthrax.html#xray

6.0 Points of Contact

Organization	Contact Number
Colorado Department of Public Health and Environment	(303) 692-2000 or 1-800-886-7689
Tri-County Health Department	(303) 220-9200
U.S. Environmental Protection Agency–Region VIII	(800) 227-8917 (Region VIII states only); (303) 312-6312 for all calls outside Region VIII
U.S. Centers for Disease Control and Prevention	(800) 232-4636

7.0 Additional Information

CDC's fact sheet on anthrax: http://www.bt.cdc.gov/agent/anthrax/.

CDC's information on bioterrorism and biological agents in general: http://www.bt.cdc.gov/bioterrorism/.

Colorado Department of Local Affairs' Disaster Recovery page: http://www.colorado.gov/cs/Satellite/DOLA-Main/CBON/1251595685691

EPA's Emergency Management page: http://www.epa.gov/oem/

EPA's National Homeland Security Research Center: http://www.epa.gov/nhsrc/

EPA's Office of Resource Conservation and Recovery Waste Management for Homeland Security Incidents page: http://epa.gov/waste/homeland/

Santa Clara County Public Health's Managing Mass Fatalities: http://www.sccgov.org/sites/sccphd/en-us/HealthProviders/BePrepared/Pages/Managing-Mass-Fatalities.aspx

Annex 3 – Denver UASI Radiological Incident Annex for Cesium-137

FOREWORD:

The *"Denver UASI Radiological Incident Annex for Cesium-137"* is a document prepared by Pacific Northwest National Laboratories (PNNL) under contract to Department of Homeland Security, Science & Technology Directorate in collaboration with local, state, and federal partners. It is one of three specialized annexes to be delivered with the *"Denver UASI All-Hazards Regional Recovery Framework"* to the State of Colorado Office of Emergency Management. The annex is designed to identify the unique challenges of a Cesium-137 incident to the recovery support functions as identified in the *"Denver UASI All-Hazards Regional Recovery Framework"* core document.

The content represents the best efforts of the participants based on the information available at the time of publication, but is not intended to convey formal guidance or policy of the federal government or other participating agencies. The views and opinions expressed herein do not necessarily state or reflect those of their respective organizations or the US Government.

Contributors: We would like to recognize the Denver UASI and the State of Colorado who were instrumental in the development of this document.

Performers: We further recognize our dedicated performers from Pacific Northwest National Laboratory who had the task of coordinating the various local, state, regional and federal teams, and then consolidating the efforts.

Reviewers: We would also like to acknowledge the Environmental Remediation Operations Working Group and agency comments from EPA and CDC.

Our Sincere Thanks,

-Doug Hardy, SPAWAR, WARRP XM

-Lori Miller, DHS S&T, WARRP PM

Denver UASI Radiological Incident Annex for Cesium-137

This annex outlines the Recovery Support Functions (RSFs) and responsibilities that govern the various recovery[1] activities of the organizations comprising the Denver Urban Area Security Initiative (UASI) as well as any outside organizations providing assistance in an incident involving a radiological agent. The information in this annex relies on existing policies, plans, and procedures where applicable. Bear in mind the following when using this annex to support recovery planning:

- The considerations and assumptions addressed in each RSF augment those of the main Denver UASI All-Hazards Recovery Framework, which was designed to be used as the starting point for developing recovery plans for any hazard.
- This annex is specific to recovering from an incident involving the release of cesium-137 through the use of radiological dispersal devices (RDDs); however, many of the considerations can be applied to planning for recovery from other radiological incidents.

This annex focuses on recovery from an incident involving the release of cesium-137 through the use of RDDs. Each radionuclide can behave differently, in how it affects humans and the environment, the types of treatment options, how long it persists in the environment, and whether it decays into other long-lived daughter products. The specific characteristics of various radioactive materials should be considered when developing broader recovery plans.

The following sections lay out the scenario used in developing this annex, characteristics of cesium-137, general considerations and assumptions, and considerations and assumptions specific to the RSFs included. A list of points of contact and additional resources is provided at the end of the annex.

Also attached to this annex is a document describing a possible interim clearance strategy for a radiological incident. The *Interim Clearance Strategy for Environments Contaminated with Cesium-137* was developed by the Environmental Remediation Operations Working Group (EROWG) as a separate, stand-alone deliverable to the Wide Area Resiliency and Recovery Program (WARRP). It has been

[1] This document uses the term recovery as defined in the National Disaster Recovery Framework (see the main All-Hazards Framework for the definition). Recovery was also defined in the Draft *Planning Guidance for Recovery Following Biological Incidents*, a joint 2009 U.S. Environmental Protection Agency (EPA)/U.S. Department of Homeland Security (DHS) report (http://www.regulations.gov/#!documentDetail;D=EPA-HQ-ORD-2009-0331-0002) as, in the short term, an extension of the response phase in which basic services and functions are restored. In the long term, recovery is a restoration of both the personal lives of individuals and the livelihood of the community. Recovery can include the development, coordination, and execution of service- and site-restoration plans; the reconstitution of government operations and services; programs to provide housing and to promote restoration; long-term care and treatment of affected individuals; and additional measures for social, environmental, and economic restoration. Recovery generally includes actions taken after Notification and First Response activities have been initiated.

published by WARRP and is listed in the WARRP Product Reference Guide. The interim clearance strategy was developed with input from the combined membership from the EROWG, which included federal, state, and local partners and was designed specifically for the scenario of a release of a cesium-137 from an RDD in Denver, Colorado. The actions are representative of what the Denver community might do under this scenario and should not be considered policy or guidance. It may be a useful starting point for other local governments to develop their own clearance strategies, but the EROWG highly recommends that anyone developing a clearance strategy consult with federal, state, local, private sector, and volunteer organizations to develop an appropriate strategy. Any clearance strategy should also be based on the radiological agent that is released, the nature and extent of the release, and the site-specific conditions of the region where the release takes place. New policies or guidance may also be more relevant than those referenced in that attachment.

1.0 Scenario Used for Annex Development[2]

To create this annex, the Denver UASI agencies and partners relied on a scenario based on the National Planning Scenario #11: Radiological Attack–Radiological Dispersal Devices, tailored for the region. This scenario was utilized during several workshops and discussions to help frame the context of this annex and includes the following characteristics:

- **Two RDD attacks at the U.S. Mint (downtown) and the Anschutz Medical Campus (Aurora).** Tens of thousands of people exposed and hundreds of deaths.
- **Evacuations/displaced persons:** 10,000 evacuated to shelters in safe areas (decontamination required before entering shelters); 25,000 in each city are given shelter-in-place instructions. Hundreds of thousands self-evacuate from major urban areas in anticipation of future attacks.
- **Most radioactive fallout is within tens of miles**; some may be carried up to hundreds of miles. Hundreds of buildings are contaminated.
- **Basic services** are affected and **governmental operations** relocated.
- **Local military installations, businesses, and mass transit** (East-West rail line) are all affected.

The specific scenario is as follows: Terrorists obtain approximately **4,600 curies of cesium-137** and 1.5 tons of ammonium nitrate/fuel oil (ANFO). The explosive and the shielded cesium sources are packaged into bombs and loaded onto a truck. The total explosive yield in each RDD is approximately 3,000 pounds. At 11:15 a.m. during the school year, terrorists detonate the **3,000-pound truck bomb** containing the 2,300 curies of cesium-137 outside the U.S. Mint in the downtown business district of Denver. The explosion collapses the front of one building and causes severe damage to three others. Windows are blown out of five other buildings. Amid the destruction, cesium-137 contamination covers the scene, and the contaminated detonation aerosol is lifted more than 100 feet into the air and spread across a wide area.

[2] This scenario was developed for exercise purposes only and is available for public release per email guidance from the DHS Program Manager, Mr. Chris Russell, on May 5, 2011.

In Aurora, a second explosion is timed to go off at approximately 12:30 p.m. on the same day outside the Children's Hospital's Emergency Department, the only Level I Pediatric Trauma Center in Colorado, located in the middle of sprawling Anschutz Medical Campus. The time lag is intended to maximize press coverage and spread fear and uncertainty. Local first response capacity, however, is depleted here because many assets have been dispatched to assist nearby Denver during the response.

2.0 Overview of Cesium-137

Cesium-137 is a radioactive isotope of the metal cesium. According to the U.S. Environmental Protection Agency (EPA), "cesium undergoes radioactive decay with the emission of beta particles and relatively strong gamma radiation. Cesium-137 decays to barium-137m, a short-lived decay product, which in turn decays to a nonradioactive form of barium. The half-life of cesium-137 is 30.17 years. Because of the chemical nature of cesium, it moves easily through the environment. This makes the cleanup of cesium-137 difficult."[3]

Cesium particles in the air (for example, as the result of an explosion) can travel long distances before settling to the ground or water. If the soil is moist, cesium binds with the soil and does not travel very far into the ground. However, cesium generally dissolves easily in water. [4]

People may ingest cesium-137 with food or water or may inhale it as dust. If cesium-137 enters the body, it is distributed fairly uniformly throughout the body's soft tissues, resulting in exposure of those tissues. Slightly higher concentrations of the metal are found in muscle, while slightly lower concentrations are found in bone and fat. Compared to some other radionuclides, cesium-137 remains in the body for a relatively short time and is eliminated through the urine. Exposure to cesium-137 may also be external (a person's body may be exposed to cesium-137's gamma radiation from the outside).[5]

Like exposure to other radionuclides, exposure to radiation from cesium-137 may result in an increased risk of cancer. Everyone is exposed to very small amounts of cesium-137 in soil and water as a result of atmospheric fallout. Exposure to waste materials from contaminated sites or from nuclear accidents can result in cancer risks much higher than typical environmental exposures. If exposures are very high, serious burns and even death can result, although this type of exposure is very rare. [6]

People may become internally contaminated (inside their bodies) with radioactive materials by accidentally ingesting (eating or drinking) or inhaling (breathing) them, or through direct contact (open wounds). The sooner these materials are removed from the body, the fewer and less severe the health effects of the contamination will be. Prussian blue is a substance that can help remove certain

[3] "Radiation Protection: Cesium" http://www.epa.gov/rpdweb00/radionuclides/cesium.html

[4] ATSDR Division of Toxicology ToxFAQs™ Cesium CAS #7440-46-2. April 2004. http://www.atsdr.cdc.gov/tfacts157.pdf

[5] "Radiation Protection: Cesium" http://www.epa.gov/rpdweb00/radionuclides/cesium.html

[6] "Radiation Protection: Cesium" http://www.epa.gov/rpdweb00/radionuclides/cesium.html

radioactive materials from people's bodies. Prussian blue reduces the half-life of cesium inside the body from about 110 days to about 30 days.[7]

3.0 Situation and Assumptions

The following general assumptions can be made with regard to recovery from a radiological incident in the Denver UASI:

- Federal agencies including the Department of Homeland Security, Department of Energy (and associated Federal Radiological Management Assessment Center agencies), EPA, and Department of Defense may provide assistance to the state and local governments.
- For a terrorist incident, the Federal Bureau of Investigation will initially be the lead federal agency, and a criminal investigation will be ongoing during initial recovery activities.
- There will be ongoing assessments to characterize the extent of contamination from cesium-137, including any contamination of water, soil, vegetation, crops, animals, buildings, vehicles, and local infrastructure.
- Experts will need to be consulted regarding safe cleanup procedures in a number of areas, including cultural and historical artifacts.
- Every jurisdiction needs to obtain worker safety advice before allowing volunteers to work in or near the contaminated areas.
- Access to contaminated areas must be limited to those with proper personal protective equipment (PPE) and training. The need for PPE in addition to labor requirements may limit the duration of first responder time in the contaminated area.

4.0 Recovery Support Functions

The considerations and assumptions for each of the following RSFs are specific to recovery from an RDD incident involving cesium-137 and do not include considerations or assumptions that are more general in nature or those listed in the main section of the Denver UASI All-Hazards Recovery Framework:

- Debris Management
- Economic Redevelopment*
- Fatality Management
- Identification, Stabilization, and Maintenance of Infrastructure and Property*
- Public Health and Medical Services*
- Public Information and Messaging.

** Indicates RSFs identified in the National Disaster Recovery Framework.*

[7] "Radiation Emergencies: Fact Sheet – Prussian Blue" http://www.bt.cdc.gov/radiation/pdf/prussian-blue.pdf

4.1 Debris Management[8, 9,10,11,12]

Because of the widespread airborne contamination, the handling, treating, transporting and disposal of large amounts of waste generated by an RDD will present unique challenges. In such an incident, a wide range of material, including furniture, carpeting, sewage sludge, building material, common garbage, and animal carcasses, will likely require treatment and disposal. While many federal, state, and local agencies (including the City of Denver) have debris management plans, these plans often do not address radiological contamination. Having access to reliable information on the characterization, treatment, and disposal of radiologically contaminated waste will help to enhance decision-making and shorten restoration timelines.

Considerations and Assumptions:

Strategy

- EPA is able to provide technical resources for characterization to state and locals government who will determine cleanup and disposal options. The Unified Recovery Coordination Group can assist with developing a strategy. Establishing a debris management sub-group within the organizational structure should be considered.
- A systematic approach to waste collection will be developed, based on the strategies in the waste management plan.[13]
- Decontamination standards and clearance goals will need to be determined and established immediately (see the attachment on interim clearance strategies for guidance). The effectiveness of decontamination strategies needs to be considered.
- Public messaging will need to occur immediately and continue throughout recovery. Risk communication should be a part of the debris management plan.

[8] In this annex, as in the All-Hazards Framework, the term debris is defined as items and materials broken, destroyed, or displaced by a natural or human-made disaster. Examples of debris include, but are not limited to, trees, construction and demolition material, and personal property (Source: FEMA, 2007, FEMA 325, *Debris Management Guide*). The term waste is defined as unwanted or useless materials (Source: 2009 *Colorado Northeast Regional Debris Management Plan*).

[9] EPA considers waste management to encompass disposal, treatment, storage, reuse, recycling, segregation, transportation, and other activities.

[10] The Denver City and County Emergency Incident Debris Management Plan follows the FEMA definition of debris – items and materials destroyed, or displaced by a natural or human-made disaster.

[11] The EPA views debris as a subset of waste; while FEMA definitions and usage in Colorado is consistent with the view that waste is a subset of debris.

[12] The representatives of the Denver UASI responsible for developing this annex decided to use the term debris management to be consistent with usage in FEMA as well as the debris management plan for the city and county of Denver. Other jurisdictions may choose to use the term waste management instead for this RSF.

[13] For more information on developing a Waste Management Plan, see "Knowledge Enhancement Events: Waste Management Workshop after Action Report."

- Ensuring that the waste goes to the appropriate treatment or disposal facility could be expedited by maintaining facility data. Specific data details could include: name and type of facility, permit status, capacity, compliance status, etc.
- An exit strategy should identify a process for transitioning waste management oversight to its pre-incident state and address: the scale-down/close-out of the waste management oversight activities performed (e.g. site visits/ inspection of waste management facilities and sites); the transition of roles and responsibilities; and the frequency of the oversight activities.

Characterization

- The EPA has resources that can be used for characterization.
- Waste should be staged and segregated at isolated sites to facilitate waste management actions and to alleviate fear of exposure by the public. Denver has pre-designated debris management staging sites for collection and characterization of waste. These sites have already taken into account potential political and social issues. They would need to be modified to handle radiological materials.
- There are additional treatment options not discussed in this document. For more information see http://www.epa.gov/osw/homeland/options.htm.

Transportation

- Collection and transportation of debris will be coordinated through the Colorado Department of Public Health and Environment (CDPHE) but may be supported by the U.S. Department of Transportation. Colorado Department of Transportation will be responsible for cleanup on major highways.
- Federal, state, and local regulations need to be followed when transporting waste across jurisdictions.

Disposal

- Waste minimization should be emphasized to limit the impact on approved low level waste disposal sites.
- Radioactive waste will need to be disposed separately from routine household garbage.
    - Disposal sites for low-level waste and debris are in short supply, so alternative locations for disposal will need to be identified.
    - Long-term storage of waste may need to be considered until permanent waste disposal decisions can be made. Keeping the contaminated materials in the hot zone should be considered.
- The State of Colorado is required by Federal legislation to establish a radioactive waste control program within the State. This is administered by different divisions within the Colorado Department of Public Health and Environment (CDHPE). Ultimately entities involved with these

substances must obtain special permits from the State of Colorado to operate facilities or to store, transport, and dispose of these materials.

- Radioactivity may be concentrated in sewage sludge and present additional challenges to wastewater treatment facilities.
- Long-term groundwater and air monitoring will be necessary at storage sites if long-term storage is required. Baseline conditions will need to be assessed beforehand to ensure appropriate monitoring of the area.

Personnel

- Personnel should be trained to work in and around radioactive materials. The principles of ALARA (As Low As Reasonably Achievable) – should be followed.
    - Worker exposure should be monitored and documented to ensure compliance.
    - Workers should be trained in the appropriate use of PPE and, if appropriate, fitted for use of a respirator.

Regulation

- Collection, recycling, transportation, and disposal of waste will require consultation with the private sector (i.e., facility owners and haulers) and federal and state agencies (i.e., regulatory and waste management entities) to ensure regulatory compliance.
- Different federal, state, county, and local regulations need to be followed when transporting waste across jurisdictions.
- Issues associated with improper waste disposal may need to be considered and addressed.

4.2 Economic Redevelopment

Economic redevelopment will be necessary not because of loss of facilities but because the perception of an RDD incident will have a severe impact on the regional, state, and national economies and potentially the world economy. Tourism, the second-largest industry in the Denver UASI, may be significantly impacted in the short term. The presence of radiation would also likely undermine confidence in exports and products that have passed through or near the affected area.

Considerations and Assumptions:

- At this time, the Stafford Act and most insurance companies do not provide protection from a terrorist incident, but it is reasonable to expect financial support and assistance for businesses and individuals. If terrorism is the cause of the incident, a priority for recovery will be to get expert financial support and assistance for businesses and individuals.
- Downgrading bond ratings will adversely impact the region's ability to borrow funds to support recovery. The region should have appropriate plans and documentation in place to ensure that bond ratings remain intact.
- With widespread contamination, operations at key regional businesses may need to shut down for decontamination. Cleanup costs may deter businesses from reopening; businesses may choose instead to relocate outside of the area.
- In similar circumstances, building owners have indicated that their maximum limit for absorbing loss of rent is 6 months.[14] At that point, if not before, they may abandon their facilities, particularly if they are facing large decontamination costs.
- The trade-offs of cost and speed to rehabilitate the impacted area and the psychological challenges of bringing people back into facilities that were contaminated will need to be considered. In some cases, rapid demolition and rebuilding may be the best option, particularly for highly contaminated areas where cleanup costs will be greatest.
- Prior land use and community development plans may be particularly useful in determining areas that might be best demolished and rebuilt to encourage community revitalization.
- Areas that experience business growth outside but near the contaminated area may create opportunities for some businesses to relocate but stay in the region. These opportunities should be broadly promoted to keep businesses and jobs in the impacted area.
- Other parts of the nation may be concerned about goods coming from or transported through the region. A public awareness campaign will be vital for the sustainment of local businesses.

[14] Judd, K.S., and A.M. Lesperance. 2010. *Business Continuity Planning Resources for Small- and Medium-Sized Businesses*. PNNL-19067, Pacific Northwest National Laboratory, Richland, Washington.

4.3 Fatality Management

While the fatality management process works well in a majority of cases, the fatality rates from the explosion associated with an RDD incident and the challenges and concerns of managing radiologically contaminated without mortuaries being equipped to deal with them will likely require that processes and procedures be amended.

Considerations and Assumptions:

- The presence of radiation and radioactive contamination may delay the recovery and processing of the remains because of the need to use PPE and ensure worker safety. A decision will need to be made as to who and what level of PPE will be necessary for recovering remains.
- In the case of an RDD, virtual Family Assistance Centers or a "call center" will likely be needed to curtail the amount of person-to-person contact. These centers will still need to be staffed appropriately, and supportive services (e.g., behavioral health, death benefits information) may also need to be provided via other media such as TV, internet, and phone.
- Crisis standards of death care, such as complete and timeliness of death certificates, will likely need to be established and communicated to the general public. A team comprising mass fatality experts, public health experts, public officials, and public information officers (PIOs) will need to convene to develop these messages.
- If there are significantly contaminated fatalities, a plan for temporary internment with some degree of identification should be considered. Refrigerated trucks and other temporary refrigerated structures will delay decomposition but will not prevent it, and contamination control measures would need to be implemented to reduce or eliminate the possibility of contaminating the truck.
- Cremation and embalming capacity for contaminated fatalities will need to be rapidly assessed. Capacity for cremation is limited and requires a lot of time and a significant amount of fuel. Embalming will lead to an issue of contaminated fluids and greater exposure of mortuary workers to contamination. Note that transporting of the deceased across state lines requires that the bodies be embalmed.
- Morgue workers will be assigned exposure limits that may restrict the amount of contaminated decedents they are permitted to work on, and surge capacity will likely be limited. Decontaminating the decedents at the incident site will help alleviate this concern and limit the spread of contamination.
- Dialogue must occur with the spiritual care community to address multiple religious preferences for proper final disposition.
- Appropriate procedures for final disposition will need to be established and conveyed to funeral directors/mortuary workers to ensure worker safety.

- A plan will need to be developed for decedents from outside the country and their family members who wish to claim their remains. Bodies leaving the country will require certification if they are not contaminated.
- Criteria should be established to determine which personal effects will be decontaminated (e.g., wedding rings, photographs, and clothes) and returned to legal next-of-kin.
- A plan will need to be developed to work with families of the deceased to address unidentified remains.
- A location for final disposition will need to be identified if decontamination is not an option. A large plot of land may be necessary to use as a community burial site to limit contamination potential.

4.4 Identification, Stabilization, and Maintenance of Infrastructure and Property

An RDD incident will damage the buildings and key infrastructure of many sectors in both the short and long term. Plans will need to be developed in order to ensure key resources, infrastructures and functions are identified, stabilized or maintained to enhance recovery. Structures not properly maintained present additional risks including mold, structural degradation, or fire that could seriously impact recovery. An RDD incident may result in abandonment of property, perhaps because of damage from the explosion, cost of decontamination, or fear over radioactivity. Degradation could occur as the result of improper rendering of the facility before evacuation or normal wear and tear over time if abandoned.

Consideration and Assumptions:

- A cost/benefit analysis associated with various forms of disposition (cleanup versus demolition) will help with decision-making. EPA is developing the Waste Estimation Support Tool to support the development of cost-benefit analysis of different remediation strategies.[15]
- The effectiveness of decontaminating urban surface materials will need to be determined.
- Reoccupation and the level of acceptable risk will need to be determined.
- Cleanup contractors will need specialized training and may require PPE. A process will be needed to train and qualify contractors and verify that they use proper cleanup techniques and follow all radiation safety regulations.
- A process certifying that decontaminated buildings can be released for reoccupancy will need to be established. One option is to follow the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), which provides guidance to federal agencies, states, site owners, contractors, and other private entities on how to demonstrate that their sites are in compliance with a radiation dose or risk-based regulation.[16]
- Specialized training may be required for the additional independent verification contract (ICV) inspectors needed to confirm and verify that decontaminated properties are ready for final approval by the local health authority. It may be possible to use independent verification contractors who provide such services for the U.S. Department of Energy's decontamination and decommissioning projects.[17]

---

[15] Lemieux, P., J. Wood, E. Snyder, T. Boe, D. Schultheisz, T. Peake, M. Ierardi, C. Hayes, and M. Rodgers. 2011. "GIS-Based Tools to Identify Tradeoffs between Waste Management and Remediation Strategies from Radiological Dispersal Device Events." *Proceedings of the Conference on Waste Management, Decommissioning and Environmental Restoration for Canada's Nuclear Activities*, Toronto.

[16] See the MARSSIM website at http://www.epa.gov/rpdweb00/marssim/ for more information.

[17] For example, see http://orise.orau.gov/environmental-assessments-health-physics/resources/independent-verification-white-paper.aspx.

- Buildings that are determined clean but are adjacent to an area or buildings that are still contaminated will need to be monitored for recontamination that could be inadvertently transferred from the contaminated area/building.
- Citizens who choose to decontaminate their own property must follow state and federal regulations on both decontamination and waste disposal. The local environmental health department should consider providing a toolbox to assist them in meeting the local requirements and processes as well as protect themselves during cleanup.
- Consumer fraud has occurred in similar situations, and organizations and individuals interested in hiring a qualified cleanup firm for their property should take care to ensure they are working with appropriately qualified and experienced companies. Some of the things to consider when hiring contractors include the following:
    - Are they bonded and insured?
    - Do they meet local and state licensing and certification?
    - Are they able to provide proof of training for employees working on the job?
    - Do they meet Occupational Safety and Health Administration requirements for hazardous waste operations and emergency response training as outlined 20 Code of Federal Regulations (CFR) 1910.20?
    - Can they show that they have a medical surveillance program as outlined 20 CFR 1910.120(b)?
    - Can they show that they have a respirator protection program as outlined in 20 CFR 1910.134?
    - Can they provide proof of biological/chemical agent training?
    - Do they have experience with decontamination procedures?
    - Have they been trained to use the specific decontamination technologies to be applied?
    - Do they use National Institute of Occupational Safety and Health-certified chemical, biological, radiological, nuclear, and explosives respiratory equipment?[18]
- The process for determining individual property rights under emergency conditions will need to be defined and established.
- A site-specific health and safety plan will be needed for each location before cleanup can begin.
- Precautions will need to be taken for workers who operate critical infrastructure like wastewater treatment plants that are contaminated. These precautions may include having their dose monitored and/or working shorter shifts.

[18] Judd, K.S., and A.M. Lesperance. October 2009. *List of Contractors to Support Anthrax Remediation*. PNNL-18933, Pacific Northwest National Laboratory, Richland, Washington.

4.5 Public Health and Medical Services

An RDD incident will impact the health care community both in the short term with fears over contamination and long term with a potential increase in cancers. The demand for resources (i.e., beds, supplies, and staff) will likely increase in the short term, possibly resulting in the adjustment of the standards of care. Further, health care workers will need to be monitored to limit radiation exposure and prevent burnout and trauma.

Considerations and Assumptions:

Public Health

- The Strategic National Stockpile may be deployed per state and local plans, particularly for distribution of Prussian blue.[19]
- Secondary contamination, which can be transferred from one location to another such as from hands to face or from a contaminated tool or protective gear to one's skin, will need to be addressed during the initial stages of recovery and monitored throughout the long term. [20]
- Mental health issues may increase significantly because of overall public fear of radiation. Educating the public on the signs and symptoms will be key, as there is no surveillance for mental health. Public health officials should coordinate with the Joint Information System to communicate an appropriate message to the public.
    - To reach broad segments of the population, community resources such as religious groups, schools, and other trusted agents should be used.
    - Behavioral health issues will increase, causing additional demand for treatment and intervention services.
- Psychological effects and trauma from fear of being exposed will be major consequences of a radiological incident.
- Some staff turnover may occur if exposure limits are reached.
- The state may want to consult with EPA on self-decontamination procedures.

Environmental Health

- The EPA will be available for environmental surveillance, air monitoring, and radiological laboratory analysis. The U.S. Department of Agriculture will be the lead agency for agricultural issues. Water sources will need to be continuously monitored.

Medical Services

- The demand for some medical supplies and ability to conduct diagnostic tests may create challenges.

---

[19] U.S. Centers for Disease Control and Prevention (CDC). "Strategic National Stockpile (SNS)." http://www.cdc.gov/phpr/stockpile/stockpile.htm.

[20] Health Physics Society, Frequently Asked Questions, at http://hps.org/publicinformation/ate/q5592.html.

  - If necessary, CDPHE will be the lead state agency to determine if standards of care should be redefined to accommodate any increase in demand.
  - The amount of Prussian blue needed to treat the impacted area may be a challenge.
  - If key medical facilities in the Denver UASI are contaminated, patients may need to be evacuated outside the area. Similar issues may exist with limited-care and assisted-living facilities. Note that some facilities may not accept potentially contaminated patients.

- Medical resources and medicines may need to be prioritized. One option is to use the Governor's Expert Emergency Epidemiological Response Committee. The committee utilizes federal resources and consults with the CDC as appropriate.
- Medical personnel will need to be educated on the long-term health effects of cesium-137 exposure and treatment.

4.6 Public Information and Messaging

An RDD incident will require extensive coordination of information, both with the public and in the interagency process. Effective risk communication will be vital to shortening the recovery time. Conflicting information on decontamination and general prophylaxis from non-authoritative sources may present a significant challenge. Public anxiety related to cesium-137/RDD will require a coordinated delivery of information from all the region's jurisdictions and through a variety of communication venues.

Considerations and Assumptions:

Interagency Message Coordination

- A Joint Information System (JIS) will be implemented to provide timely, accurate public information.
    - The JIS may be operated from the state emergency operations center and should include hospital PIOs or public affairs staff.
    - PIOs from the Federal Emergency Management Agency (FEMA) and other federal agencies should be included in the JIS.
- Messaging should be coordinated among all jurisdictions (local, state, and federal) and presented by authoritative voices to maintain public confidence.
- Tools such as Web EOC can be used to collect and document information about the incident.

Official Communication to the Public

- The CDPHE will be the lead state agency for public information, and that agency may consult with various federal and state agencies, including the Colorado Department of Agriculture, as appropriate.
- Pre-planned messages regarding recommended actions individuals should take, including those for children and pregnant women should be considered.
- Regular press releases must be provided regarding cesium-137 and the basic precautions and actions the public should take. Information about what to expect in the future should also be included.
- Answers to frequently asked questions related to cesium-137 should be provided to the public. Distribution methods include the same channels used in other disasters (for example, social media, websites, public broadcasting messages, and the news media).
- Messaging for coordinating the unaffiliated volunteers and donations management will need to occur.
- The rapid spread of information and misinformation will be a challenge because of the access of smart phone videos and pictures.
- Consistent and repetitive messaging will be needed to debunk incorrect information.

- Requests for information by the public will need to be coordinated. One option is to establish a central repository for all information including resource fact sheets from multiple agencies.
- The use of an editorial board to convince the media to not repeatedly show disturbing images can help alleviate some of the vicarious trauma.
- Local officials need to continue to be visible during long-term recovery, and PIOs should regularly cover events and public meetings to keep the dialogue open with the community.

5.0 Points of Contact for Planning Purposes

Organization	Contact Number
Colorado Department of Public Health and Environment	(303) 692-2000 or 1-800-886-7689
Tri-County Health Department	(303) 220-9200
Environmental Protection Agency – Region VIII	(800)-227-8917
U.S. Centers for Disease Control and Prevention	(800) 232-4636

6.0 Additional Information

ATSDR Division of Toxicology ToxFAQs™ Cesium CAS #7440-46-2
at http://www.atsdr.cdc.gov/tfacts157.pdf

CDC's Fact Sheet on Cesium-137: http://www.bt.cdc.gov/radiation/isotopes/cesium.asp

CDC's Radiation Emergency page: http://emergency.cdc.gov/radiation/

Colorado Department of Local Affairs' Disaster Recovery
page: http://www.colorado.gov/cs/Satellite/DOLA-Main/CBON/1251595685691

Department of Health and Human Services Radiation Emergency Medical
Management: http://www.remm.nlm.gov/recovery.htm

EPA's Fact Sheet, Radiation Protection:
Cesium: http://www.epa.gov/rpdweb00/radionuclides/cesium.html

EPA Office of Resource Conservation and Recovery Waste Management for Homeland Security
Incidents: http://epa.gov/waste/homeland/

EPA's Protective Action Guides for Emergencies: http://www.epa.gov/rpdweb00/rert/pags.html

EPA's Technology Reference Guide for Radiologically Contaminated
Surfaces: http://www.epa.gov/rpdweb00/docs/cleanup/402-r-06-003.pdf

FEMA's 2008 Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents: http://ogcms.energy.gov/73fr45029.pdf

National Council on Radiation Protection's NCRP Report No. 165, *Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision*
Makers: http://www.ncrponline.org/Publications/Press_Releases/165press.html

National Library of Medicine Web Wireless Information System for Emergency Responders (WISER), Ionizing
Radiation: http://webwiser.nlm.nih.gov/getSubstanceData.do;jsessionid=AB1B2873B9846FDDE3DB891

4A488EEBC?substanceID=426&displaySubstanceName=Ionizing%20Radiation&UNNAID=&STCCID=&selectedDataMenuItemID=58

Nuclear Regulatory Commission's Fact Sheet on "Dirty Bombs": http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/dirty-bombs-bg.html

Santa Clara County Public Health's Managing Mass Fatalities: http://www.sccgov.org/sites/sccphd/en-us/HealthProviders/BePrepared/Pages/Managing-Mass-Fatalities.aspx

The EPA provided the following list of additional resources for specific areas:

Survey Procedures and Measurements

Federal Radiological Monitoring and Assessment Center (FRMAC) Manuals at http://www.nv.doe.gov/nationalsecurity/homelandsecurity/frmac/manuals.aspx

The FRMAC manuals cover field monitoring and sampling, field operational health and safety, laboratory analysis, dose and risk assessment, and operation of the FRMAC.

EPA National Air and Radiation Environmental Laboratory at http://www.epa.gov/narel/

The Laboratory provides information on radiation data as well as its role in nuclear emergency response.

Multi-Agency Radiological Laboratory Analytical Protocols Manual at http://www.epa.gov/radiation/marlap/

The manual addresses the need for a nationally consistent approach to producing radioanalytical laboratory data that meet a project's or program's data requirements.

EPA Radiation Cleanup and Assessment Website at http://www.epa.gov/radiation/emcp-overview.html

The site provides tools used in EPA's Superfund Cleanup support.

Intergovernmental Data Quality Task Force Uniform Federal Policy for Implementing Environmental Quality Systems Evaluating, Assessing, and Documenting Environmental Data Collection/Use and Technology Program. DoD: DTIC ADA 395303/ DOE: DOE/EH-0667/ EPA: EPA-505-F-03-001, March 2005, at http://www.epa.gov/fedfac/pdf/ufp_v2_final.pdf

These worksheets streamline the process of documenting the systematic project planning process and data collection plans.

NUREG-1507, Minimum Detectable Concentrations With Typical Radiation Survey Instruments for Various Contaminants and Field Conditions, June 1998, at http://pbadupws.nrc.gov/docs/ML0036/ML003676046.pdf

This document provides for selection and proper use of portable radiation instruments, and an understanding of field conditions under which, and the extent to which, the capabilities of those instruments can be limited.

NUREG-1761, Radiological Surveys for Controlling Release of Solid Materials, NRC, July 2002, at http://pbadupws.nrc.gov/docs/ML0223/ML022320121.pdf

This report provides information about measuring residual radioactivity in materials that are to be cleared from nuclear facilities, including guidance about designing, performing, and documenting radiological surveys of solid materials.

General References

"Beyond Dose Assessment: Using Risk with Full Disclosure of Uncertainty in Public and Scientific Communication," F.O. Hoffman, D.C. Kocher, and A.I. Apostoaei. Health Physics. Vol. 101(5):591.

This paper discusses health risk with uncertainty in assessing impacts of radiation exposure as essential information to enable individuals and communities to participate in informed decision-making. Merits of risk rather than dose as an assessment endpoint is discussed and showing how two individuals with the same effective dose can have markedly different risk.

IAEA Safety Standards Series: Application of the Concepts of Exclusion, Exemption and Clearance at http://www-pub.iaea.org/books/iaeabooks/7118/Application-of-the-Concepts-of-Exclusion-Exemption-and-Clearance-Safety-Guide

This report provides guidance on the application of the concepts of exclusion, exemption, and clearance.

IAEA Stakeholder Involvement in Nuclear Issues at http://www-pub.iaea.org/MTCD/publications/PDF/Pub1276_web.pdf

This report provides guidance on how to include internal and external stakeholders in nuclear issue management.

Radiological Emergency Manual for Livestock, Poultry, and Animal Products, December 1987, at http://www.dem.ri.gov/topics/erp/nahems_radiological_emergency.pdf

This manual is intended for the use of those persons directly responsible for the protection of livestock, poultry, and animal products, from any radiation and radioactive materials that may be released in a nuclear incident.

NCRP Report No. 146, *Approaches to Risk Management in Remediation of Radioactively Contaminated Sites* at http://www.ncrponline.org/Publications/Press_Releases/146press.html

The report identifies, analyzes and summarizes the significant differences and commonalities in current practices of NRC and EPA, and future implications of current practices as they relate to issues of public perception, uncertainty, measurability, and estimation of radiation dose and risk.

Examples of Previous Radiological Incidents

IAEA Documentation on Goiania, Brazil (see below for websites)

In Brazil, a medical source containing 1,375 curies of cesium-137 was broken open and the material spread throughout the city of Goiania.

Goiania ten years later:

http://www-pub.iaea.org/MTCD/publications/PDF/te_1009_prn.pdf

Goiania twenty years later:

http://www.iaea.org/newscenter/news/2008/goiania.html

IAEA *Environmental Consequences of the Chernobyl Accident and Their Remediation: Twenty Years of Experience*, 2006, at http://www-pub.iaea.org/mtcd/publications/pdf/pub1239_web.pdf

This report presents the findings and recommendations of the Chernobyl Forum concerning the environmental effects of the Chernobyl accident.

Recovery Criteria and Guidelines

Colorado Department of Public Health and Environment. Hazardous Materials and Waste Management Division. Rules and Regulations Pertaining to Radiation Control.

CDPHE refers to the following documentation as regulation when RAM licensees are terminating and cleaning up contamination.

Part 4.61.2 section on dose levels for unrestricted release.

http://www.cdphe.state.co.us/regulations/radiationcontrol/10070104protectionagainstrad.pdf

Part 3.16 section on decommissioning plans.

http://www.cdphe.state.co.us/regulations/radiationcontrol/10070103licensingradioactivematerial.pdf)

EPA Lessons Learned from Liberty RadEX

at www.nrt.org/production/NRT/.../2010_LRE_RRT_overview.ppt

This presentation provides lessons learned from an RDD exercise that focused on recovery operations in Philadelphia, PA with Department of Homeland Security, US EPA, State of Pennsylvania, and City of Philadelphia participating in a Tier II level National Exercise.

NCRP Report 129, Recommended Screening Limits for Contaminated Surface Soil and Review of Factors Relevant to Site-Specific Studies

at http://www.ncrponline.org/Publications/Press_Releases/129press.html

The report provides screening limits that can be applied to sites where the surface soil is known to be contaminated. The use of these calculated screening limits will allow reasonable judgments to be made regarding whether additional action is needed.

ANSI/HPS N13.12-1999, "Surface and Volume Radioactivity Standards for Clearance", August 31, 1999.

This standard provides both the primary dose standard for clearance and derived screening levels, based upon a dose standard. The standard is intended to provide guidance for protecting the public and the environment from radiation exposure by specifying a primary radiation dose criterion and derived screening levels for the clearance of items that could contain radioactive materials.

OSWER Directive No. 9200.4-18

This directive states, in part, that a lifetime cancer risk of 3E-4 is equivalent to 15 mrem/year. This can be used to correlate between dose and risk cleanup levels.

NUREG-1500

This regulation uses dose-based concentration levels based on a dose limit of 3 and 15 mrem/year.

Preliminary Report on Operational Guidelines Developed for Use in Emergency Preparedness and Response to a Radiological Dispersal Device Incident, DOE/HS-0001, February 2009, at http://ctosnnsa.org/vtra/documentLibrary/22_Preliminary_Operations_Guidelines_%20for_%20RDD.pdf

This report provides preliminary operational guidelines and descriptions of their derivation, all ancillary work products, and a companion software tool (RESRAD-RDD) that facilitates their implementation into one reference source document

OSWER Directive No. 9355.0-30

This OSWER document states what risk levels would be required under Superfund cleanup.

Public Health Criteria and Guidelines

NCRP Report No. 161, *Management of Persons Contaminated with Radionuclides: Handbook*, at http://www.ncrponline.org/Publications/Press_Releases/161press.html

The focus of this report is on the medical management of individuals exposed to and potentially contaminated with radionuclides in nuclear incidents.

ICRP Report 111, *Application of the Commission's Recommendations to the Protection of People Living in Long-Term Contaminated Areas after a Nuclear Accident or a Radiation Emergency*, at http://www.icrp.org/publication.asp?id=ICRP%20Publication%20111

In this report, the Commission provides guidance for the protection of people living in long-term contaminated areas resulting from either a nuclear accident or a radiation emergency. The report considers the effects of such events on the affected population.

National Academies of Science, BEIR VII on Radiological Risk at http://www.nap.edu/catalog.php?record_id=11340&utm_medium=etmail&utm_source=National%20Academies%20Press&utm_campaign=NAP+mail+eblast+3.18.11+-+Radiation&utm_content=Downloader&utm_term=

The primary task was to develop the best possible risk estimate for human exposure to low-dose, low-LET (linear energy transfer) ionizing radiation. To do that, the committee was charged to conduct a comprehensive review of all relevant biological, physical, and epidemiological data since the previous major meeting.

Other Resources

RESRAD Family of Codes at http://web.ead.anl.gov/resrad/home2/

RESRAD is a group of computer model codes designed to estimate radiation doses and risks from residual radioactive materials, sponsored by DOE and NRC.

Radiogenic Cancer Risk Models and Projections for the U.S. Population, EPA 402-R-11-001, April 2011 at http://www.epa.gov/radiation/assessment/blue-book/index.html

This document, also known as the "Blue Book" presents estimates of cancer incidence and mortality risks due to low doses of ionizing radiation for the U.S. population, as well as their scientific basis. The 2011 *Blue Book* provides summary risk coefficients for a stationary population (defined by 2000 U.S. vital statistics). Models are provided for estimating risk as a

function of age at exposure, age at risk, gender, and cancer site, but a number of extensions and modifications to the BIER VII approach and models is presented.

NCRP Report 138, *Management of Terrorist Events Involving Radioactive Material*
at http://www.ncrponline.org/Publications/Press_Releases/138press.html

The report provides information and recommendations regarding the radiological health and safety issues related to the threat of terrorist activities involving radioactive material.

NCRP Report 139, *Risk-Based Classification of Radioactive and Hazardous Chemical Wastes*
at http://www.ncrppublications.org/Reports/139

This report presents the Council's recommendations on a new system for classifying waste that contains hazardous substances, either radionuclides or hazardous chemicals.

ICRP Report 109, Application of the Commission's Recommendations for the Protection of People in Emergency Exposure Situations at http://www.icrp.org/publication.asp?id=ICRP%20Publication%20109

This report was prepared to provide advice on the application of the Commission's 2007 Recommendations. The advice includes the preparedness for, and response to, all radiation emergency exposure situations defined as situations that may occur during the operation of a planned situation, or from a malicious act, or from any other unexpected situation and require urgent action in order to avoid or reduce undesirable consequences.

IAEA, Manual for First Responders to a Radiological Emergency, 2006, at http://www-pub.iaea.org/MTCD/publications/PDF/epr_Firstresponder_web.pdf

This manual guides first responders facing radiological threats.