BNL-82390-2009

Federal Response Assets for a Radioactive Dispersal Device Incident
Task 2
Urban Remediation and Response Project Prepared for New York City Department of Health and Mental Hygiene

Terry Sullivan

June 30, 2009

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DISCLAIMER

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1.0 INTRODUCTION

If a large scale RDD event where to occur in New York City, the magnitude of the problem would likely exceed the capabilities of City and State to effectively respond to the event. New York State could request Federal Assistance if the United States President has not already made the decision to provide it.

The United States Federal Government has a well developed protocol to respond to emergencies. The National Response Framework (NRF) describes the process for responding to all types of emergencies including RDD incidents. Depending on the location and type of event, the NRF involves appropriate Federal Agencies, e.g., Department of Homeland Security (DHS), the Department of Energy (DOE), Environmental Protection Agency (EPA), United States Coast Guard (USCG), Department of Defense (DOD), Department of Justice (DOJ), Department of Agriculture (USDA), and Nuclear Regulatory Commission (NRC).

The Federal response to emergencies has been refined and improved over the last thirty years and has been tested on natural disasters (e.g. hurricanes and floods), man-made disasters (oil spills), and terrorist events (9/11). However, the system has never been tested under an actual RDD event. Drills have been conducted with Federal, State, and local agencies to examine the initial (early) phases of such an event (TopOff 2 and TopOff 4). The Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) incidents issued by the Departmnet of Homeland Security (DHS) in August 2008 has never been fully tested in an interagency exercise. Recently, another exercise called Empire 09 that was situated in Albany, New York was conducted. Empire 09 consists of 3 different exercises be held in May and June, 2009. The first exercise, May 2009, involved a table top exercise for phase 1 (0 – 48 hours) of the response to an RDD incident. In early June, a full-scale 3-day exercise was conducted for the mid-phase response (48 hours +). A few weeks later, a one day full-scale exercise was conducted for the late phase (recovery) response to an RDD event. The lessons learned from this study are not available as of June 30, 2009.

The objective of this report is to review and summarize anticipated Federal and State response actions and the roles and responsibilities of various agencies (DHS, EPA, DOE, NY-DEP, NY-DEC) with respect to decontamination issues that would arise from a radiological dispersion device (RDD), e.g., dirty bomb attack. These issues arise in the late phase of the response (48 hours and beyond) after the area has been stabilized and forensic information has been obtained. Much of the information provided in this report is taken directly from published guidance that is readily available.

2.0 AUTHORITIES

President Carter issued an executive order in 1979 that called for merging many of the separate disaster-related federal functions into one agency, Federal Emergency Management Agency (FEMA). FEMA, which has subsequently been incorporated within DHS, will take the lead role in the Federal response to an RDD incident. FEMA's statutory authority comes from the *Robert T. Stafford Disaster Relief and Emergency Assistance Act*, as amended (P.L. 100-707) (*Stafford Act*), which was signed into law in 1988 and amended the *Disaster Relief Act of 1974* (P.L. 93-288). To access federal assistance under the *Stafford Act*, states must make an emergency or major disaster declaration request that is reviewed by FEMA for presidential approval. The *Post Katrina Emergency Management Reform Act of 2006*, (P.L. 109-295, Title VI – National Emergency Management, of the *Department of Homeland Security Appropriations Act of 2007*) (*Post Katrina Act*) contained many changes that have long-term consequences for FEMA and other federal entities. In the aftermath of Hurricanes Katrina and Rita, it became apparent that the federal government might need to put resources into place proactively when state and local governments delay or are unable to request assistance. The *Post Katrina Act* authorizes FEMA to provide accelerated federal assistance to respond to a disaster. We would suggest revising the sentence to recognize that accelerated federal assistance is allowed by the post-Katrina Act. In emergencies that involve National Security or several Federal Agencies, the President may decide to invoke the Stafford Act prior to a formal request from the State.

On May 22, 1998, President Bill Clinton issued PDD-62, "Protection Against Unconventional Threats to the Homeland and Americans Overseas." PDD-62 addresses Consequence Management and names EPA as the lead agency for responding to the release of hazardous materials in a terrorist attack and gives EPA specific responsibility for indoor remediation. (Newman, 2007) Shortly after 9/11, then–EPA Administrator Christine Whitman confirmed EPA's responsibility under PDD 62: "Under the provisions of PDD 62 . . . EPA is assigned lead responsibility for cleaning up buildings and other sites contaminated by chemical or biological agents as a result of an act of terrorism." (Whitman, 2001). This also extends to radiological agents released as a result of terrorism.

2.1 Homeland Security Act

The Homeland Security Act of 2002 as Amended in 2007 (DHS, 2002) transferred the FEMA to the newly formed Department of Homeland Security (DHS). FEMA's primary role is to reduce the loss of life and property and protect the Nation from all hazards, including natural disasters, acts of terrorism, and other man-made disasters. FEMA accomplishes this by leading and supporting the Nation in a risk-based, comprehensive emergency management system of preparedness, protection, response, recovery, and mitigation. As such, DHS is the lead government agency in responding to any emergency including an RDD event.

The Homeland Security Act defines the responsibilities of FEMA and DHS in preparing for and responding to an emergency. Key authorities assigned to the Secretary of DHS that are important for preparing and responding to an RDD event include:

(1) with respect to the Nuclear Incident Response Team
    (A) establishing standards and certifying when those standards have been met;
    (B) conducting joint and other exercises and training and evaluating performance; and
    (C) providing funds to the Department of Energy and the Environmental Protection Agency, as appropriate, for homeland security planning, exercises and training, and equipment;

(2) providing the Federal Government's response to terrorist attacks and major disasters, including—
    (A) managing such response;
    (B) directing the Domestic Emergency Support Team, the National Disaster Medical System, and (when operating as an organizational unit of DHS) the Nuclear Incident Response Team;
    (C) overseeing the Metropolitan Medical Response System; and
    (D) coordinating other Federal response resources, including requiring deployment of the Strategic National Stockpile, in the event of a terrorist attack or major disaster;

(3) aiding the recovery from terrorist attacks and major disasters;

(4) building a comprehensive national incident management system with Federal, State, and local government personnel, agencies, and authorities, to respond to such attacks and disasters;

(5) assisting the President in carrying out the functions under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5121 et seq.) and carrying out all functions and authorities given to the Administrator under that Act;

(6) carrying out the mission of the Agency to reduce the loss of life and property and protect the Nation from all hazards by leading and supporting the Nation in a risk-based, comprehensive emergency management system of—
    (A) mitigation, by taking sustained actions to reduce or eliminate long-term risks to people and property from hazards and their effects;
    (B) preparedness, by planning, training, and building the emergency management profession to prepare effectively for, mitigate against, respond to, and recover from any hazard;
    (C) response, by conducting emergency operations to save lives and property through positioning emergency equipment, personnel, and supplies, through evacuating potential victims, through providing food, water, shelter, and medical care to those in need, and through restoring critical public services; and
    (D) recovery, by rebuilding communities so individuals, businesses, and governments can function on their own, return to normal life, and protect against future hazards;

(7) administering and ensuring the implementation of the National Response Plan[1], including coordinating and ensuring the readiness of each emergency support function under the National Response Plan;
(8) maintaining and operating within the Agency the National Response Coordination Center or its successor;
(9) developing a national emergency management system that is capable of preparing for, protecting against, responding to, recovering from, and mitigating against catastrophic incidents;

2.2 Homeland Security Presidential Directive 5

In 2003 President Bush issued Homeland Security Presidential Directive 5 (HSPD-5) which provides the authority to establish a comprehensive national incident management system. Major tasks assigned to DHS in this Presidential Directive include:

- The DHS Secretary shall develop, submit for review to the Homeland Security Council, and administer a National Incident Management System (NIMS).
- The DHS Secretary shall develop, submit for review to the Homeland Security Council, and administer a National Response Plan (NRP)[1]. The Secretary shall consult with appropriate Assistants to the President (including the Assistant to the President for Economic Policy) and the Director of the Office of Science and Technology Policy, and other such Federal officials as may be appropriate, in developing and implementing the NRP.

In HSPD-5 the Federal Government recognizes the roles and responsibilities of State and local authorities in domestic incident management. Initial responsibility for managing domestic incidents generally falls on State and local authorities. The Federal Government will assist State and local authorities when their resources are overwhelmed, or when Federal interests are involved. The DHS Secretary is obligated to coordinate with State and local governments to ensure adequate planning, equipment, training, and exercise activities. The DHS Secretary is also tasked with providing assistance to State and local governments to develop all-hazards plans and capabilities, including those of greatest importance to the security of the United States, and will ensure that State, local, and Federal plans are compatible.

The Federal Government also recognizes the role that the private and nongovernmental sectors play in preventing, preparing for, responding to, and recovering from terrorist attacks, major disasters, and other emergencies. The DHS Secretary is obligated to coordinate with the private and nongovernmental sectors to ensure adequate planning, equipment, training, and exercise activities and to promote partnerships to address incident management capabilities.

2.3 National Incident Management System

[1] Now the National Response Framework

The NIMS is designed with the objective of providing a consistent nationwide approach for Federal, State, and local governments to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents. The NIMS provides a standard command and management structure that applies to response activities. All Federal Agencies are required to follow the NIMS when addressing emergencies. All State and local governments are required to adopt NIMS if they are to receive Federal aid to prepare for emergency response.

The foundation of the NIMS is the Incident Command System (ICS). The ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in response to a domestic incident. The NIMS structure is modular in nature and contains four major elements: Operations, Planning, Logistics, and Finance/Administration. Other modules may be added as needed on an incident specific basis.

The Operations Section is responsible for managing tactical operations at the incident site directed toward reducing the immediate hazard, saving lives and property, establishing situation control, and restoring normal conditions.

The Planning Section is responsible for collecting, evaluating, and disseminating tactical information related to the incident. This section maintains information and intelligence on the current and forecasted situation, as well as the status of resources assigned to the incident. The Planning Section prepares and documents incident assessment plans and incident maps and gathers and disseminates information and intelligence critical to the incident. The Planning Section will have five units that track: Resources, Situation, Demobilization, Documentation, and Environmental, which will include technical specialists (e.g., meteorologists, *decontamination specialists*, radiation health physicists, etc).

The Logistics Section meets all support needs for the incident, including ordering resources through appropriate procurement authorities from locations that were not impacted. It also provides facilities, transportation, supplies, equipment maintenance and fueling, food service, communications, and medical services for incident personnel. An important role for this section is to provide for most effective use of the communications equipment and facilities assigned to the incident, installs and tests all communications equipment, supervises and operates the incident communications center, distributes and recovers communications equipment assigned to incident personnel, and maintains and repairs communications equipment on site.

In large, complex scenarios involving significant funding originating from multiple sources, the Finance/Administrative Section is an essential part of the ICS. In addition to monitoring multiple sources of funds, the Section Chief must track and report to the Incident Commander (IC) the financial “burn rate” as the recovery progresses. This allows the IC to forecast the need for additional funds before operations are affected negatively. This is particularly important if significant operational assets are under contract from the private sector. The Section Chief may also need to monitor cost

expenditures to ensure that statutory rules that apply are met. Close coordination with the Planning Section and Logistics Section is also essential so that operational records can be reconciled with financial documents.

In complex scenarios several State and Federal Agencies may be involved. In this case, a Unified Command Structure is used. State and Federal Agencies bringing assets to support the incident response are incorporated within the ICS. To the extent possible, the Agencies manage the assets they bring within the ICS.

The NIMS was initially released in 2004 and the latest version was released in December 2008 and is available at www.fema.gov/emergency/nims

2.4 National Response Framework

The National Response Framework (NRF, 2008) integrates Federal Government domestic prevention, preparedness, response, and recovery plans into one all-discipline, all-hazards plan. It replaces and improves upon the National Response Plan issued in 2004, which was developed after 9/11 to integrate various Federal response plans to ensure a more coordinated response to terrorist attacks.

The NRF contains five subject areas:

- Roles and Responsibilities
- Response Actions
- Response Organization
- Planning
- Additional Resources.

2.4.1 Roles and Responsibilities

Roles and responsibilities in preparing for and responding to an emergency are defined for local, state, Federal agencies, individuals, and for private sector and Non-government organizations.

2.4.2 Response Actions

Response Actions are divided into four actions:

- Attain Situational Awareness
- Deploy Resources
- Coordinate Response
- Demobilize

The demobilize action briefly discusses long term recovery and suggests that this may require months or years depending on the severity of the incident. Although long term recovery is outside the scope of the NRF, the following information is provided.

Initially, the Joint Field Office (JFO) remains the central coordination point among local, State, and Federal governments, as well as private-sector and non-governmental agencies involved in the recovery response. Figure 1 shows the structure of the JFO with linkages

to State and Local Officials. The four major functions of the NIMS (Operations, Planning, Logistics, Financial/Administrative) are at the bottom of Figure 1. These areas are supported through Emergency Support Functions that address specific response actions (e.g. Firefighting, Communications, Remediation, Public Health and Medical Services, etc). Emergency Support Functions are discussed below in Section 2.4.5

After the JFO closes, ongoing activities transition to individual agencies with primary recovery responsibilities. Presumably this would be the EPA for decontamination activities as spelled out in Emergency Support Function 10 (Section 2.4.5. 1.1 below).

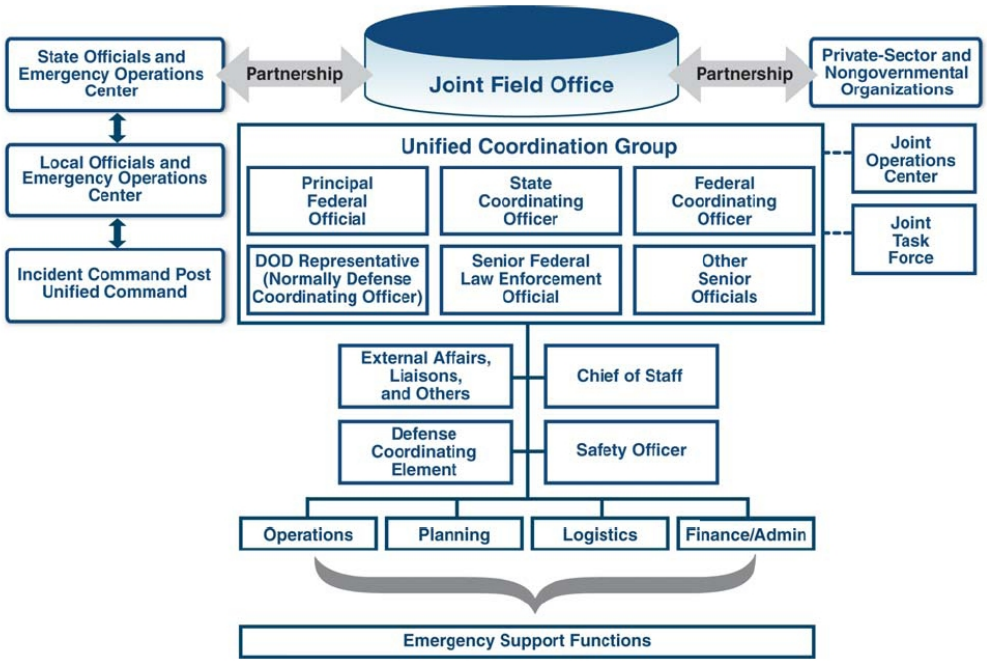

Figure 1 Joint Field Office Command Structure (from NRF, 2008)

Federal partners then work directly with their regional or headquarters offices to administer and monitor recovery programs, support, and technical services.

2.4.3 Response Organization

Homeland Security Presidential Directive (HSPD) 5 calls for a single, comprehensive system to enhance the ability of the United States to manage domestic incidents. *NIMS* provides a consistent nationwide template to enable all levels of government, the private sector, and nongovernmental organizations to work together during an incident. Integrating these *NIMS* principles into all phases of an incident and throughout all levels of government provides a common set of principles from which to operate during and in response to an incident for all stakeholders.

The response will be managed using the Incident Command System laid out in NIMS. For a large scale incident, a Unified Command Structure will be used with all responsible parties integrated into a single structure. To address integration among different agencies a MultiAgency Coordination System (MACS) is used. The primary function of MACS is

to coordinate activities above the field level and to prioritize the incident demands for critical or competing resources, thereby assisting the coordination of the operations in the field.

2.4.4 Planning

Planning includes all aspects of preparation for an emergency. Planning covers pre-positioning of resources, identifying equipment needs and developing plans to obtain major pieces of equipment needed in response, training in all aspects of incident response and conducting exercises to determine the effectiveness of the response.

For planning purposes DHS has developed a set of reference scenarios of different emergencies. Planning Scenario 11 (Appendix A) is designed to test the response system for an RDD event. This scenario has RDD attacks in 3 separate cities and was used in the TopOff 4 exercise conducted in October, 2007.

Another planning exercise, Empire 09, will be conducted in Albany New York in May – June of 2009. This exercise will include separate drills for the Early, Intermediate, and Late Phase of the response.

2.4.5 Additional Resources

2.4.5.1 Emergency Support Function (ESF) Annexes

The ESFs are coordinated by FEMA and resources activated to support the ESF are integrated into the Incident Command Structure. During a response, ESFs are a critical mechanism to coordinate functional capabilities and resources provided by Federal departments and agencies, along with certain private-sector and nongovernmental organizations. There are 15 ESFs.

- ESF #1 - Transportation
- ESF #2 - Communications
- ESF #3 - Public Works and Engineering
- ESF #4 - Firefighting
- ESF #5 - Emergency Management
- ESF #6 - Mass Care, Emergency Assistance, Housing, and Human Services
- ESF #7 - Logistics Management and Resource Support
- ESF #8 - Public Health and Medical Services
- ESF #9 - Search and Rescue
- ESF #10 - Oil and Hazardous Materials Response
- ESF #11 - Agriculture and Natural Resources
- ESF #12 - Energy
- ESF #13 - Public Safety and Security
- ESF #14 - Long-Term Community Recovery
- ESF #15 - External Affairs

Two ESFs (10 and 14) are particularly important to response to an RDD incident. Other ESF's that are important are ESF #3, which supports removal of contaminated debris and ESF #8 which will be important in helping state and local governments perform external decontamination of potentially contaminated individuals.

2.4.5.1.1 ESF #10

Emergency Support Function (ESF) #10 – Oil and Hazardous Materials Response provides Federal support in response to an actual or potential discharge and/or uncontrolled release of oil or hazardous materials (including chemical, biological, or radiological substances). Response to oil and hazardous materials incidents is generally carried out in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300.

Appropriate general actions can include, but are not limited to: actions to prevent, minimize, or mitigate a release; efforts to detect and assess the extent of contamination (including sampling and analysis and environmental monitoring); actions to stabilize the release and prevent the spread of contamination; analysis of options for environmental cleanup and waste disposition; implementation of environmental cleanup; and storage, treatment, and disposal of oil and hazardous materials.

The National Contingency Plan (NCP) is an operational supplement to the *NRF*. It provides more detailed information regarding the roles and responsibilities, organizational structures, and procedures described in ESF #10.

The NCP is authorized by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Federal Water Pollution Control Act (FWPCA) as amended by section 311 of the Clean Water Act and the Oil Pollution Act of 1990 (OPA 90).

When ESF #10 is activated, the NCP typically serves as the basis for actions taken in support of the *NRF*. NCP structures and response mechanisms, discussed further below, remain in place when ESF #10 is activated, but coordinate with *NRF* mechanisms.

The NCP describes the National Response System (NRS), which is an organized network of agencies, programs, and resources with authorities and responsibilities in oil and hazardous materials response. Key components of the NRS include the National Response Center, National Response Team (NRT), Regional Response Teams (RRTs), Federal On-Scene Coordinators (OSCs), Regional and Area Contingency Plans, and State and local plans. States and tribes participate in the NRS at the regional and local levels. The NCP requires that oil and hazardous materials releases be reported to the National Response Center. (See 40 CFR 300.125.) The National Response Center provides notifications of such reports to the National Operations Center (NOC) to promote situational awareness.

The National Response Team is the national-level organization for coordinating Federal interagency activities under the NCP. The NRT is comprised of national representatives of the primary *(EPA for RDD incident)* and support agencies for ESF #10. The NRT carries out national preparedness and response planning for oil and hazardous materials incidents and works in coordination with the ESF Leaders Group regarding ESF #10 preparedness with other *NRF* elements. *For an RDD incident-specific NRT activation, the NRT Chair would be from EPA and EPA will provide the Federal OSC. The NRT provides support, assistance, and advice to the Federal OSC and RRT as requested.*

Thirteen Regional Response Teams coordinate NCP interagency activities at the Federal regional level. The RRTs are comprised of regional representatives of the primary and support agencies for ESF #10 as well as a representative from each State within the region. The RRTs serve as planning and preparedness bodies before a response. As needed during a response, RRTs convene to address interagency response issues and provide assistance and advice to the Federal OSC(s), including resource acquisition support as requested.

At the tactical, on-scene Incident Command Post (ICP) level, the Federal OSC carries out the responsibilities under the NCP to coordinate, integrate, and manage overall oil and hazardous materials response efforts in accordance with existing delegations of authority. For hazardous substance emergencies, the agency providing the OSC may be EPA, DHS/USCG, the Department of Energy (DOE), or the Department of Defense (DOD), depending on the location and source of the release. DOE and DOD are generally responsible for hazardous substance emergencies involving their facilities, vessels, materials, and weapons, including transportation-related incidents. For an RDD incident, EPA serves as the primary agency for ESF #10 actions.

At the Joint Field Office level, ESF #10 typically provides a representative(s) to coordinate ESF #10 mission assignments and provide information to the JFO on ESF #10 on-scene activities. In addition, for a chemical, biological, or radiological WMD incident, ESF #10 may also provide, as needed, Technical Specialists to provide scientific and technical expertise and to coordinate scientific and technical issues with other responding agencies and with other ESF #10 headquarters, regional, and on-scene response elements. For incidents in which ESF #10 plays a major role, the primary agency may also provide a senior official to participate in the JFO Unified Coordination Group.

The general technical roles addressed under ESF #10 include the following assessments: Assess the situation, including the nature, amount, and locations of actual or potential releases of oil and hazardous materials; pathways to human and environmental exposure; probable direction and time of travel of the materials (e.g., trajectory and analysis); potential impact on human health, welfare, safety, and the environment; types, availability, and location of response resources, technical support, decontamination, and cleanup services; and priorities for protecting human health and welfare and the environment through appropriate response actions. These assessments require working with State, tribal, and local governments, other Federal agencies, and the private sector to

maximize use of available regional assets and identify resources required from outside the region.

EPA's responsibilities as the lead agency for ESF #10 include:

- Maintains close coordination between EPA Headquarters and the affected regional office(s), DHS/USCG (as appropriate), the DRG, the NRCC, other ESFs, and the NRT.
- Provides damage reports, assessments, and situation reports to support ESF #5 – Emergency Management.
- Facilitates resolution of conflicting demands for hazardous materials response resources and ensures coordination between NRT and DRG/IMPT activities, and RRT and JFO activities, as appropriate. Coordinates (through headquarters) the provision of backup support from other regions to the affected area.
- Provides technical, coordination, and administrative support and personnel, facilities, and communications for ESF #10.
- Coordinates, integrates, and manages the overall Federal effort to detect, identify, contain, decontaminate, clean up, dispose or minimize discharges of oil or releases of hazardous materials, or prevent, mitigate, or minimize the threat of potential releases.
- Provides OSCs for incidents within its jurisdiction.

In general EPA will:

- Provide expertise on the environmental effects of contaminant releases due to the incident and environmental pollution control techniques.
- Provide Chair for NRT and Co-Chairs for RRTs.
- Manage EPA's special teams under the NCP, including the Environmental Response Team, *National Decontamination Team*, and Radiological Emergency Response Team, which provide specialized technical advice and assistance to responders.
- Coordinate, integrate, and provide investigative support, intelligence analysis, and legal expertise on environmental statutes related to oil and hazardous materials incidents, including regarding criminal cases, in support of responders.
- Manage the National Counter-Terrorism Evidence Response Team, composed of investigative and scientific personnel to provide investigative, scientific, and forensic technical advice, assistance, and other threat assessment in support of responders.

Other Federal Agencies that might have responsibilities related to long-term recovery in an RDD event include:

U.S. Army Corps of Engineers: Provides response and recovery assistance to incidents involving contaminated debris, including chemical, biological, radiological, and nuclear contamination. *The scope of actions may include waste sampling, classification, packaging, transportation, treatment, demolition, and disposal.*

DOE: Provides advice in identifying the source and extent of radioactive releases relevant to the NCP, and in the removal and disposal of radioactive contamination.

DOE radiological support to local, State, and other Federal agencies is provided primarily by the DOE/National Nuclear Security Administration (NSSA). After 9/11 DOE provided radiological support at the site for over one year.

DHS Science and Technology: Provides coordination of Federal science and technology resources. Through the IMAAC, provides predictions of hazards associated with atmospheric releases for use in emergency response when activated for incidents requiring a coordinated Federal response.

2.4.5.1.2 ESF #14

Emergency Support Function (ESF) #14 – Long-Term Community Recovery provides a mechanism for coordinating Federal support to State, tribal, regional, and local governments, nongovernmental organizations (NGOs), and the private sector to enable community recovery from the long-term consequences of extraordinary disasters.

ESF #14 recognizes "the primacy of affected State, tribal, and local governments and the private sector in defining and addressing risk reduction and long-term community recovery priorities, and in leading the community recovery planning process." ESF #14 long-term community recovery and recovery planning efforts will be coordinated with State/tribal/local-level stakeholders.

Federal agencies continue to provide recovery assistance under independent authorities to State, tribal, and local governments, the private sector, and individuals, while coordinating assessments of need for additional assistance and identification and resolution of issues through ESF #14. This implies that EPA will provide assistance with decontamination issues during long-term recovery.

FEMA serves as the national ESF #14 coordinator among primary and support agencies. ESF #14 provides representatives to the National Response Coordination Center as requested.

Post-Event Planning and Operations for the Coordinating Agency (FEMA) include:

- Gathering information from Federal departments and agencies and State, tribal, and local governments to assess the impacts and needs.
- Convening interagency meetings to develop an incident-specific Federal action plan defining specific agency participation to support specific community recovery and mitigation activities and to avoid duplication of assistance to recipients.
- Facilitating sharing of information among agencies and ESFs and coordinating early resolution of issues and the timely delivery of Federal assistance.
- Coordinating identification of appropriate Federal programs to support implementation of long-term community recovery plans under current authorities

and funding. This process identifies programs, waivers, funding levels, requests for additional authorities, and possible new legislation needed to address identified program gaps.

- May provide technical assistance such as impact analyses, economic revitalization, and recovery planning support.
- Coordinating with ESF #6 – Mass Care, Emergency Assistance, Housing, and Human Services, ESF #8 – Public Health and Medical Services, and the State(s) to identify long-term recovery needs of special needs populations and incorporate these into recovery strategies.
- Coordinating with ESF #3 - Public Works and Engineering, ESF #10 - Oil and Hazardous Materials Response, and the State(s) to identify long-term environmental restoration issues.
- Coordinating with animal welfare and agricultural stakeholders and service providers in long-term community recovery efforts.
- Coordinating implementation of the recommendations for long-term community recovery with the appropriate Federal departments and agencies if the recommendations include program waivers, supplemental funding requests, and/or legislative initiatives.
- Facilitating recovery decision making across ESFs and increases awareness of communities' existing development and hazard mitigation plans.

ESF #14 lists EPA as a supporting Agency with the responsibility to provide technical assistance in contaminated debris management, environmental remediation, and watershed protection, planning, management, and restoration. DOE is also tasked with providing assistance on radioactive debris management.

2.4.5.2. Support Annexes

Critical Support Annexes describe the roles of Federal Agencies for aspects that are common to all incidents and are listed below.

- Critical Infrastructure and Key Resources
- Financial Management
- International Coordination
- Private-Sector Coordination
- Public Affairs
- Tribal Relations
- Volunteer and Donations Management
- Worker Safety and Health

The latest version of these ESFs can be obtained from
http://www.fema.gov/emergency/nrf/index.htm#

2.4.5.3 Incident Annexes

The response to an emergency will depend upon the initiating event. DHS has identified and provided guidance for the seven broad categories listed below:

- Biological Incident
- Catastrophic Incident
- Cyber Incident
- Food and Agriculture Incident
- Mass Evacuation Incident
- Nuclear/Radiological Incident
- Terrorism Incident Law Enforcement and Investigation

The latest version of these Annexes can be obtained from
http://www.fema.gov/emergency/nrf/incidentannexes.htm

2.4.5.3.1 Nuclear/Radiological Incident Annex

The Nuclear/Radiological Incident Annex addresses describes the concepts of operations, and responsibilities of the Federal departments and agencies governing the immediate response and **short-term** recovery activities for incidents involving release of radioactive materials to address the consequences of the event. Depending on the source of the radioactive material and the location of the release, different government agencies have different roles. For an RDD event, DHS is the lead agency in the response. EPA will support DHS and will be the lead agency for environmental protection and remediation response.

A nuclear incident will require support from a number of Agencies that possess assets and manage staff with capabilities in this area. The Annex lists the support groups in

Table 1 Support Groups and Functions (from Nuclear Radiological/Incident Annex)

Federal Agency	Support Group	Function
Interagency/DOE lead	Federal Radiological Monitoring and Assessment Center (FRMAC)	FRMAC is responsible for coordinating all environmental radiological monitoring, sampling, and assessment activities for the response.
DOE	Aerial Measuring System (AMS)	Characterizes ground deposition of radionuclides from aerial platforms.
DOE	Accident Response Group	Responds to the scene of a U.S. nuclear weapon accident to make the weapon safe for shipment.
DOE	National Atmospheric Release Advisory Center	NARAC provides a computer-based emergency preparedness and response predictive modeling capability.
DOE	Radiation Emergency Assistance Center/Training Site	REAC/TS provides medical advice, specialized training, and on-site assistance for the treatment of all types of radiation exposure accidents. Additionally, through the Cytogenetic Biodosimetry Laboratory (CBL), REAC/TS provides for post exposure evaluation of radiation dose received.
DOE	Radiological	RAP teams provide first-responder

	Assistance Program (RAP) Team	radiological assistance to protect the health and safety of the general public, responders, and the environment and to assist in the detection, identification and analysis, and response to events involving radiological/nuclear material. Deployed RAP teams provide traditional field monitoring and assessment support as well as a search capability.
DOE/EPA	Nuclear Incident Response Team (NIRT)	Includes DOE assets described above and EPA entities that perform similar support functions (including radiological emergency response functions).
Interagency	Interagency Modeling and Assessment Center (IMAAC)	IMAAC is an interagency center responsible for production, coordination, and dissemination of the Federal consequence predictions for an airborne hazardous material release. NARAC is the interim IMAAC.
Interagency (EPA, USDA, FDA, CDC)	Advisory Team for Environment, Food, Health and Safety	(see below)
EPA	Radiological Emergency Response Team (RERT)	The RERT provides resources, including personnel, specialized equipment, technical expertise, and labor services to aid coordinating and cooperating agencies and State, tribal, and local response organizations in protecting the public and the environment from unnecessary exposure to ionizing radiation from radiological incidents.
EPA	RADNET	Provides a system of fixed and deployable radiation monitoring stations.

The Advisory Team is an important asset that acquires the necessary expertise to provide Federal advice in matters related to the following:

- Environmental Assessments (field monitoring) required for assessment with advice from State, tribal, and local governments and/or the FRMAC.
- Protective Action Guides (PAGs) and their application to the emergency.
- Protective Action Recommendations (PARs) using data and assessment from the FRMAC.

- Protective actions to prevent or minimize contamination of milk, food, and water, and to prevent or minimize exposure through ingestion.
- Recommendations for minimizing losses of agricultural resources from radiation effects.
- Availability of food, animal feed, and water supply inspection programs to ensure wholesomeness.
- Relocation, reentry and other radiation protection measures prior to recovery
- Recommendations for recovery, return, and cleanup issues.
- Health and safety advice or information for the public and for
- Estimated effects of radioactive releases on human health and the environment.

Examination of Table 1 shows some duplication of resources between DOE and EPA. Coordination of these resources will be accomplished through the Unified Command structure.

The Nuclear Incident Annex acknowledges that State, local and tribal governments primarily are responsible for planning the recovery of the affected area and that, upon request, the Federal Government will assist with developing and executing recovery plans.

2.4.4.4 Partner Guides

Response Partner Guides are designed to provide a ready reference of key roles and actions for local, tribal, State, Federal, and private-sector response partners. Partner guides are being prepared by DHS. The following Partner Guides are under preparation:

- Local Government Response
- State Response
- Private-Sector and Nongovernmental Response
- Federal Response

The guides are targeted for any emergency. This may provide an opportunity to provide input to DHS on needs from the customer (e.g., NYC DOHMH) perspective. Interested parties can sing up for e-mail notification when the reports will be completed at http://www.fema.gov/emergency/nrf/responsepartnerguides.htm.

2.5 Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents

August 1, 2008 DHS published Planning Guidance for Recovery following an RDD or IND incident (FR, 2008). This Guidance is intended for Federal agencies, State and local governments, emergency management officials, and the general public who should find it useful in developing plans for responding to an RDD or IND incident. The Guidance recommends “protective action guides” (PAGs) to support decisions about actions that should be taken to protect the public and emergency workers when responding to or recovering from an RDD or Improvised Nuclear Device (IND) incident. The Guidance

outlines a process to implement the recommendations, discusses existing operational guidelines that should be useful in the implementation of the PAGs and other response actions, and encourages federal, state and local emergency response officials to use these guidelines to develop specific operational plans and response protocols for protection of emergency workers responding to catastrophic incidents involving high levels of radiation and/or radioactive contamination.

The guidance divides the response into an early, intermediate, and late phase. In the early phase (0 – 48 hours) local agencies provide emergency response to the incident to protect the health and safety of the public and, identify the event as being from an RDD or IND.

The intermediate phase will begin shortly after a determination is made that the event is either from an RDD or IND. The first Federal responders will arrive within four hours and major Federal support should be in place within 24 – 48 hours. The focus during the intermediate phase will be to make the initial decisions to recover from the accident and re-open critical infrastructure. These decisions should consider long-term effects, but may need to be modified as recovery progresses.

The late phase is the period when long term actions to clean-up from the incident and reduce radiation levels to below pre-defined limits. This phase ends when all of the remediation is completed and may take several years. Early phase decisions will be made by Elected Officials. Long term decisions should take stakeholder input into account and the decision process itself may require weeks or months on difficult decisions. Long term decisions may also include incident-specific technical working groups to provide expert advice to decision makers on alternatives, costs, and impacts.

2.5.1 DHS Protective Action Guides (PAGS)

Protective Action Guides are the projected dose to a hypothetical reference individual at which protective actions to reduce or avoid that dose should be taken. PAGS are suggested for the Early/Intermediate Phase of the Response. During the Late Phase of the Response an optimization process with stakeholder involvement is recommended to set the dose at which protective action should be taken. Table 2 (from FR, 2008) provides the recommended dose action levels during the Early/Intermediate Phase for the public. Separate guidance is provided for Emergency Response workers.

Table 2 Protective Action Guides for the Public.

Phase	**Protective action recommendation**	**Protective action guidance**
Early	Sheltering-in-place or evacuation of the public.[a]	1 to 5 rem (0.01–0.05 *Sv*) projected dose.[b]
	Administration of prophylactic drugs - potassium iodide[c,e] Administration of other prophylactic or decorporation agents[d]	5 rem projected dose to child thyroid
Intermediate	Relocation of the public	2 *rem* (0.02 *Sv*) projected dose first year Subsequent years,

		0.5 *rem*/y (0.005 *Sv*/y) projected dose[b]
	Food interdiction	0.5 *rem* (0.005 *Sv*) projected dose, or 5 *rem* (0.05 *Sv*) to any individual organ or tissue in the first year, whichever is limiting
	Drinking water interdiction	0.5 *rem* (0.005 *Sv*) projected dose in the first year.

a) Should normally begin at 1 *rem* (0.01 *Sv*); take whichever action (or combination of actions) that results in the lowest exposure for the majority of the population. Sheltering may begin at lower levels if advantageous.
b) Total Effective Dose Equivalent (TEDE)—the sum of the effective dose equivalent from external radiation exposure and the committed effective dose equivalent from inhaled radioactive material.
c) Provides thyroid protection from radioactive iodine only.
d) For other information on other radiological prophylactics and medical countermeasures, refer to *http://www.fda.gov/cder/drugprepare/default.htm*, *http:/www.bt.cdc.gov/radiation*, or *http://www.orau.gov/reacts*.
e) Committed Dose Equivalent (CDE). FDA understands that a KI administration program that sets different projected thyroid radioactive dose thresholds for treatment of different population groups may be logistically impractical to implement during a radiological emergency. If emergency planners reach this conclusion, FDA recommends that KI be administered to both children and adults at the lowest intervention threshold (*i.e.*, >5 *rem* (0.05 *Sv*) projected internal thyroid dose in children).

Although dose limits are provided for the Early/Intermediate Phase of response, State and local Governments may decide to implement lower levels. Acceptance of the intermediate term PAGS may not be consistent with public desires for long term clean-up. For example, it may be decided that in order to return to normal activities, people and businesses will be allowed to occupy their homes if the dose does not exceed 2 rem/year in the first year with the long-term annual dose restricted to 0.1 rem/year. While it is not necessary for the intermediate PAGs (whatever value is used) to be consistent with long term remediation goals, if they are different, the difference will require explanation. Another issue with the 2 rem relocation standard is that it does not take into account the possibility for pregnant women or children who will have lower dose tolerance than adult males. State and local authorities may want to consider lower standards for relocation because of this. Although limits are not set for long term remediation, International Standards may be higher than the public desires. For example, after the Chernobyl incident International Standards suggested a 1 rem/yr exposure level as the criteria for protective actions. However, Russia set the standard at 0.1 rem/yr for action.

Specific dose limits are not prescribed for the late phase of response due to the wide range of impacts that may occur, the greater availability of information, time to collect more data, the wide range of potential response options, and the need to consult stakeholders. This document recommends that the an optimization process which

incorporates cost, cost effectiveness, public acceptability, and technical feasibility should be used to in order to select the most acceptable criteria. State/local agencies will help set the final dose criteria for long-term recovery as part of the unified command structure.

Appendix 2 of this document (FR, 2008) describes the risk management plan for late phase response. The "Framework for Environmental Health Risk Management" has six stages which are discussed in detail in the Appendix:

1. Define the problem and put it in context
2. Analyze the risks associated with the problem in context
3. Examine options for addressing the risks
4. Make decisions about which options to implement
5. Take actions to implement the decisions
6. Evaluate results of the actions taken.

Appendix 3 (FR, 2008) provides the recommended approach to Federal Implementation for remediation under the assumption that this is a major incident and that the Federal Government will be responsible for the majority of cleanup costs. This site cleanup approach is intended to function under the NRF with Federal agencies performing work consistent with their established roles, responsibilities, and capabilities. Agencies should be tasked to perform work under the appropriate Emergency Support Function, as a primary or support agency, as described in the NRF. This plan is also designed to be compatible with the Incident Command/Unified Command (IC/UC) structure embodied in the National Incident Management System (NIMS).

The general management structure in Appendix 3 suggests that planning for the long-term cleanup should begin during the intermediate phase, and at that time, a traditional NIMS response structure should still be in place. However, NIMS was developed specifically for emergency management and may not be the most efficient response structure for long-term cleanup. If the cleanup will extend for years, the Incident Command/Unified Command (IC/UC) may decide to transition at some point to a different long-term project management structure.

Day-to-day tactical management, planning, and operations for the RDD/IND cleanup process will be managed at the IC/UC level, but for large-scale cleanups, it is expected that the Joint Field Office Unified Coordination Group will review proposed cleanup plans and provide strategic and policy direction. The agency(s) with primary responsibility for site cleanup should be represented in the JFO Unified Coordination Group. The IC/UC will need to establish appropriate briefing venues as the cleanup process proceeds, including the affected mayor(s) and Governor(s). FR, 2008 recommends that long term remediation decisions be presented for public comment. This will increase the time for remediation but will enhance public acceptability

Appendix 4 (FR, 2008) discusses operational guidance for implementation of PAGS. Seven topic areas listed in Table 3 are covered. These guides are under preparation and will be published in the Federal Register for public comment when completed.

Table 3 Operational Guidance for Groups/Subgroups (FR, 2008)

Groups	Subgroups
A. Access control during emergency response operations	1. Life- and property-saving measures 2. Emergency worker demarcation
B. Early-phase protective action	1. Evacuation 2. Sheltering
C. Relocation from different areas and critical infrastructure utilization in relocation areas (Early/Intermediate Phase)	1. Residential areas 2. Commercial and industrial areas 3. Other areas, such as parks and monuments 4. Hospitals and other health care facilities 5. Critical transport facilities 6. Water and sewer facilities 7. Power and fuel facilities
D. Temporary access to relocation areas for essential activities. (Early/Intermediate Phase)	1. Worker access to businesses for essential actions 2. Public access to residences for retrieval of property, pets, records
E. Transportation and access routes	1. Bridges 2. Streets and thoroughfares 3. Sidewalks and walkways
F. Release of property from radiologically controlled areas	1. Personal property, except wastes 2. Waste 3. Hazardous waste 4. Real property, such as lands and buildings
G. Food consumption	1. Early-phase food guidelines 2. Early-phase soil guidelines 3. Intermediate-phase soil guidelines 4. Intermediate- to late-phase soil guidelines

Topic F is particularly important for long-term response actions Topic F will address release of property from radiologically controlled areas. The objective of the operational guidelines in this group is to provide reasonable assurance that the cleared property is acceptable for long-term, unrestricted use (or appropriate disposition, in the case of wastes) without further radiological reassessment or control. This guidance is currently under preparation by the Department of Energy with guidance from DHS (http://www.ogcms.energy.gov/).

Operational guidelines for real property (buildings and lands) (Topic F) are designed to assist on-scene decision-making, and in development of the cleanup options. "Long-term cleanup incorporates the principle of site-specific optimization, and highlights stakeholder involvement and shared accountability. The guidelines for real property are

unique in that there is no one specific, predefined numeric criterion (i.e., expressed in terms of concentration, dose, or risk) on which to base decisions. The guidelines prepared for this task are intended to be utilized in the optimization process, which will likely consider the magnitude and extent of the contamination and the radionuclide(s) involved, the proposed long-term land and building use in the affected areas, the need for expedited recovery, public welfare issues, the cost impacts for each proposed cleanup option, the ecological considerations, and other factors. Real property operational guidelines are provided as reference values **(**e.g., soil and building-surface concentrations or risks) that can be used as a starting point for evaluating options and impacts relative to a range of dose or risk-based benchmarks (e.g., 500, 100, 25, or 4 millirem per year; lifetime risk ranges, and others) that could be considered as part of cleanup options analysis. Thus, they are not regulatory dose limits or criteria, but serve as concentration values that provide support to the optimization analyses." (FR, 2008).

2.5.2 EPA Protective Action Guides

In 1992 EPA issued Protective Action Guides for radiological incidents. The focus of these guides was protection of the health and safety of the public for radiological releases anticipated at that time (e.g., accidents at nuclear facilities) and was not geared towards long term clean up issues that could arise from nuclear terrorism incidents. The EPA's PAGs have been updated and revised to include this threat and are undergoing Federal review prior to release for public comment. By agreement with the EPA, the substance of the DHS guidance will be incorporated without change into the 1992 EPA Manual of Protective Actions Guides and Protective Actions for Nuclear Incidents (the PAG Manual). The revised PAGs do not provide a single numeric cleanup level for remediation due to the range of impacts and costs associated with cleanup. The PAGs do provide a framework to include stakeholder involvement into a decision process that considers all relevant decision factors.

3.0 ASSETS

The focus of this report is remediation actions and long term recovery from an RDD incident. Long term remediation will be managed by the EPA with assistance from DOE, U.S. Army Corp of Engineers, DHS, and other Federal Agencies as needed. The assets that these agencies will bring for this task are discussed below.

3.1 Federal Assets

The Federal Radiological Monitoring and Assessment Center (FRMAC) will lead the early and intermediate phase response for radiological issues arising from an RDD incident. The structure and assets of the FRMAC are described below and include all of the DOE assets discussed in the Nuclear Incident Annex (Section 2.4.5.3.1).

The EPA will be the lead agency for environmental clean up after an RDD incident. They will be supported in the remediation efforts primarily by DOE and the U.S. Army Corp of Engineers. Many of the response teams are designed for a rapid response to an emergency and not on the long term remediation efforts. However, the States can request Federal Assistance for the long term and these assets may be retained. For example, DOE RAP team members provided radiological support for more than a year after the 9/11 incident and EPA provided radiological support at Three Mile Island for almost a decade.

3.2 Federal Radiological Monitoring and Assessment Center

Initially radiological support will be managed through the Federal Radiological Monitoring and Assessment Center (FRMAC). The FRMAC is a mobile federal asset available on request by the U.S. Department of Homeland Security (DHS) to respond to nuclear/radiological incidents as described in the NRF (www.fema.gov/emergency/nrf/). Under the NRF the U.S. Department of Energy (DOE) has the responsibility to maintain the operational readiness of the FRMAC. In addition to DHS, coordinating agencies and State, tribal, or local governments may request a FRMAC or other support from DOE through the DOE 24 hour watch office (www.nnsa.energy.gov/emergency_ops/forrestal_watch_office.htm)

The FRMAC is an interagency organization with representatives from various federal, state, and local radiological response organizations. The purpose of the FRMAC is to assist the states, local and tribal governments in their mission to protect the health and well being of their citizens with:

- Verified radiation measurements
- Interpretations of radiation distributions based on Environmental Protection Agency (EPA), Food and Drug Administration (FDA), or local Protective Action Guidelines
- Characterization of overall radiological conditions

The DHS PAGs (FR, 2008), contain the recommended dose criteria for making several key decisions such as: evacuation, sheltering, relocation, reoccupation, and food embargo. State and local authorities may request a lower dose value to implement corrective actions than stated in the PAGs (FR, 2008) based on their authority to protect the public. Generally, they help control health risks by placing restrictions on the radiological dose received. The proposed course of action devised to reduce radiation exposure that would lead to a dose that would exceed a particular PAG is termed a Protective Action Recommendation (PAR). All radiological measurements or predictions must be interpreted in terms of the PAGs to develop Protective Action Recommendations (PARs). FRMAC Assessment will provide these interpretations as prescribed in the Federal guidance for the corresponding PAG. FRMAC Assessment will perform the interpretations as requested by the State and Lead Federal Agency; however, a default-prioritized strategy will be applied in the absence of specific tasking. However, FRMAC Assessment will not offer or develop PARs unless requested to do so. **The actual implementation of Protective Action Recommendations is solely the responsibility of the State and local governments.**

When a FRMAC is established it operates under the parameters of the Incident Command System (ICS) as defined in the NIMS construct. The operational timeline of the FRMAC response is in Figure 2.

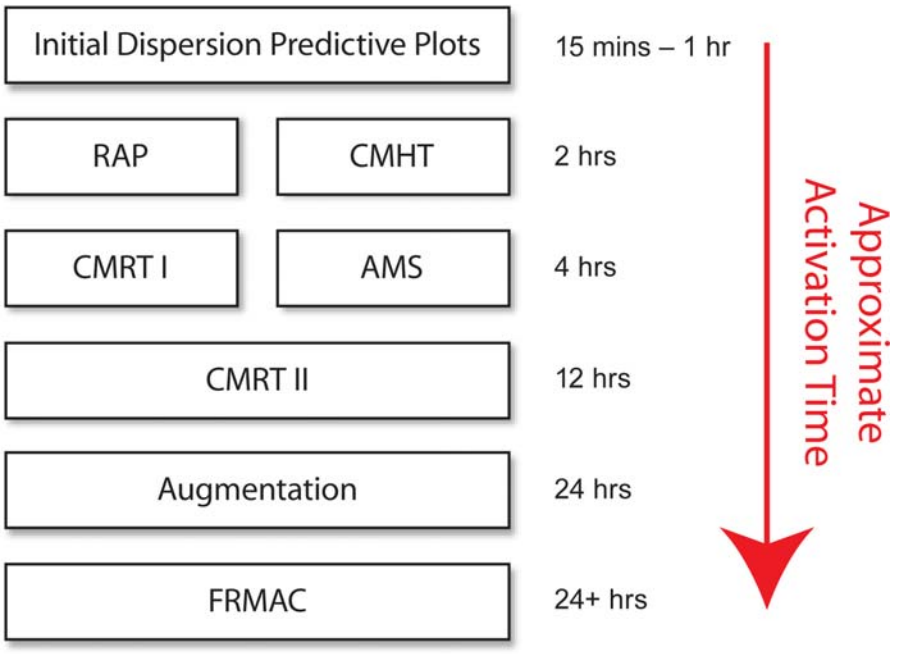

Figure 2 Response time line for setting up a FRMAC to respond to a radiological incident (from FRMAC, 2005).

The response to an incident is phased to provide a rapid response within a few hours for minimum monitoring and analysis capabilities followed by more in-depth coverage

within 24 hours. The Radiological Assistance Program (RAP) and Consequence Management Home Team (CMHT) are activated within 2 hours. RAP is a regionally based program developed to provide radiological assistance in the detection, identification, and analysis of radioactive materials. Each DOE region has at least 3 RAP teams that consist of six to eight people including a DOE lead, health physics personnel, and radiation monitoring equipment. In the New York region, RAP assets are located 60 miles from Manhattan at Brookhaven National Laboratory in Upton, New York,

The CMHT will provide remote technical support for incident response and will be activated immediately during normal business hours (Pacific Time Zone) and will be activated within 2 hours otherwise. The CMHT will be prepared to perform initial modeling and analysis based on available information. The National Atmospheric Release Advisory Center (NARAC) will be activated as part of the CMHT to provide plume migration predictions. After FRMAC has arrived and additional data are collected, the CMHT will provide technical support and analysis to supplement field activities.

The next stage of the response includes mobilization of AMS (Aerial Measurement System) and CMRT I (Consequence Management Response Team I). AMS provides fixed and rotary wing aircraft capable of making aerial measurements of radioactive materials that have been deposited as a result of an RDD incident. An instrumented plane and helicopter are based at Andrews Air Force Base near Washington D.C. and Nellis Air Force Base near Las Vegas, NV. Aircraft will be assigned to the incident within four hours of notification. The CMRT I is a small response group with 31 team members and a limited amount (2000 lbs) of equipment that will be activated from Nellis Air Force Base within four hours of notification. CMRT I is designed to provide rapid response to augment the RAP team. CMRT I is designed to provide capabilities in all phases of a response (radiation monitoring, sampling, assessment, health and safety and logistics) on a limited scale. CMRT I is equipped with on-scene communication equipment including telephones and radios to support classified and unclassified communications, data transfer capabilities, and a satellite terminal that can be connected to international telephone networks.

CMRT II (Consequence Management Response Team II) is designed to augment CMRT I. CMRT II will be activated within 12 hours of notification and brings additional equipment and personnel to the site of the incident. This response team includes 32 personnel and an additional 39,000 lbs. (2,400 cubic feet) of equipment. The CMRT II response team deploys with consumables to support operations for 96 hours without re-supply and is prepared to support 24-hour per day operations for several weeks. CMRT I and II are integrated into one team (called CMRT II) at the site. CMRT II personnel focus on accurately characterizing the spatial extent of contamination through sampling and data assessment.

CMRT Augmentation in Figure 2 has been renamed CMRT III (Consequence Management Response Team III) and brings additional personnel from DOE and other

RAP teams to support measurement and analysis. CMRT augmentation is designed to support 24 hour operations for several weeks if needed.

Another component of the CMRT is the Radiation Emergency Assistance Center/ Training Site (REAC/TS) located in Oak Ridge, TN which has the capability to respond effectively to medical emergencies involving radiological or nuclear materials. Each response team consists of a physician, nurse/paramedic, and a health physicist. All are trained in the details of managing a radiation emergency. REAC/TS is a deployable asset that responded to the 9/11 Incident.

A full FRMAC will be operational within 24 – 36 hours of notification. FRMAC provides an operational framework for coordinating all federal radiological monitoring and assessment activities during a response to a radiological emergency.

FRMAC Assets:
In addition to up to 500 highly skilled and well-trained professionals, the significant capabilities provided by the U. S. Department of Energy (DOE) and its contractors include atmospheric transport modeling, radiation monitoring, radiation analysis, data assessment, and medical advice for radiation injuries. To support FRMAC operations, the DOE also provides:

- Geographic Information Systems
- Communications
- Photo/Video
- Mechanical/Electrical
- Logistical/Administrative

Geographic Information Systems: During all phases of FRMAC activities, the DOE deploys a Geographic Information System (GIS) and staffing that is capable of capturing, storing, retrieving, analyzing, and displaying spatial (locationally defined) data. Multiple layers of information (streets, rivers, measured contamination, etc.) can be displayed on a computer screen simultaneously, allowing visualization of the extent of the problem.

Photo/Video: The DOE, Nevada Site Office is capable of fielding several teams of photographers from the FRMAC who are equipped with digital cameras, and electronic, still video cameras. Still video imagery can be printed at the FRMAC, or can be transmitted to remote centers having similar equipment, via the telecommunications lines. Other photographic capabilities include rapid copying of maps, preparing photographs for press releases, and performing long-lens and low-light photography. Capabilities to take aerial, direct vertical, and oblique photographs will depend on the availability of aircraft at the site.

Mechanical/Electrical: Mechanical/Electrical support is provided by the DOE, Nevada Site Office for setup of the FRMAC. Portable equipment is readied for deployment by air and/or ground transport. This support includes providing generators and power sources for equipment, heating and air conditioning units, and mechanically fabricated tools, and

loading and unloading equipment. Trained and certified heavy equipment operators (for trucks and forklifts) stand ready to support the FRMAC.

Logistical/Administrative: The DOE, Nevada Site Office is prepared to deploy administrative personnel, equipment, and materials required to support and maintain a full-field FRMAC. This includes such items as database systems, computers, printers, software, copiers, office supplies, display boards, first-aid kits, identification badges, reference manuals, and dry food staples. These items are kept in a continual state of readiness for deployment.

DOE has prepared a series of manuals discussing various aspects of FRMAC operation and response. Individual manuals are available for Operations, Health and Safety, Monitoring and Analysis, Laboratory Analysis, and Dose Assessment (3 volumes). These manuals are available at http://www.nv.doe.gov/nationalsecurity/homelandsecurity/frmac/manuals.aspx

The FRMAC is designed to be operational for all phases of the response. DOE initially has the FRMAC lead, but the FRMAC lead will transition to EPA for recovery/remediation. The transfer will be based upon the five criteria established under the NRF/NRIA: (1) The immediate emergency condition is stabilized; (2) Off-site releases of radioactive material have ceased, and there is little or no potential for further unintentional off-site releases; (3) The off-site radiological conditions are evaluated and the immediate consequences are assessed; (4) An initial long-range monitoring plan has been developed in conjunction with the affected State, tribal, and local governments, and appropriate Federal agencies; and (5) EPA has received adequate assurances from the other Federal agencies that they are committing the required resources, personnel, and funds for the duration of the Federal response.

3.3 EPA

3.3.1 On-scene Coordinators (OSC)

EPA will provide an OSC for the remediation response to an RDD Incident. There are approximately 250 pre-designated EPA Federal OSCs and 46 pre-designated DHS/USCG Federal OSCs stationed around the country. OSCs respond to incidents year-round under their CERCLA and CWA/OPA 90 authorities, and under ESF #10 of the National Response Framework when it is activated. OSCs conduct, direct, and coordinate emergency response actions. OSCs are an important component of the response structure in ESF #10 and will be present as long as needed under ESF #10. OSCs rely on other Federal ESF #10 personnel, special teams, and contractors as needed to accomplish their mission and staff the Incident Command Post from which ESF #10 operates.

OSCs are provided training in radiological response. Examples of training materials can be found at (http://trainex.org/OSC_readiness/2004_materials.cfm). Topics include:

- Communications, Community Involvement, and Outreach – A Brief Overview
- Recommended OSC Radiation Response Standard Operating Guides
- National Response Plan & Nuclear/Radiological Incident Annex

- Health and Safety Considerations for a Radiological Response
- National Response Plan & Nuclear/Radiological Incident Annex
- RAD Playbook
- Radiation Disposition Plan
- Surveillance/Monitoring and Sampling Procedures

One of the action items from the 2008 TOPOFF 4 exercise is for DOE, NRC, USACE, and EPA to conduct a joint effort to identify available disposal capacity and potential gaps for radiologically contaminated waste from a RDD.

In anticipation of the need for a large number of people to collect environmental measurements during a large scale incident, EPA is training "volunteers" in sampling techniques. These volunteers are EPA employees that do not routinely conduct environmental sampling as part of their job, but they have agreed to do so in case of an emergency.

3.3.2 Radiological Emergency Response Team

The Radiological Emergency Response Team (RERT) has 45 field deployable members ready to respond to any radiological emergency. Additional support staff are available at EPA Headquarters and Regional Offices. Headquarters members also serve on the Advisory Team for the Environment, Food and Health, which assesses emergency monitoring data and develops protective action recommendations.

RERT has a mobile command post and laboratories (radiation and sample preparation) and a van equipped to scan for gamma irradiation that can be driven to the site of the incident.

The RERT would assist the FRMAC following a radiological incident by providing support in various forms:

- technical advice to minimize threats to public health and the environment
- advice on protective measures to ensure public health and safety
- assessments of any release for dose and impact to public health and the environment
- monitoring, sampling, laboratory analyses and data assessments to analyze and characterize environmental impact
- technical advice and assistance for containment, cleanup, restoration, and recovery following a radiological incident.

3.3.3 National Decon Team

EPA's National Decon Team is part of EPA's Office of Emergency Management. The 9/11 and Anthrax incidents of this decade highlighted a need for decontamination assets to respond to large-scale attacks using chemical/biological/radiological substances. *The National Decon Team is a technical resource that provides decontamination expertise to*

state, local, and federal agencies for WMD substances. The National Decon Team focuses on remediation of buildings, infrastructure, indoor spaces, agriculture, and environmental media. They have a staff of 15 full time multi-disciplinary employees with technical expertise in health physics, health and safety planning, radiation monitoring, heating ventilation and air conditioning systems, nanotechnology, toxicology, medicine, and risk assessment.

The National Decon team will provide technical support in the following areas:

- Health and Safety
- Site Characterization
- Sampling Plans
- Preparation of decontamination plans
- Recommendation and implementation of decontamination technologies.
- Clean up level recommendations
- Disposal options

3.3.4 Airborne Spectral Photometric Environmental Collection Technology (ASPECT)

ASPECT is an airborne screening tool for detecting chemical and radiological substances. In addition, ASPECT can obtain high-resolution digital photography and video and take thermal and night images using infrared photography. ASPECT is based out of EPA Region 7's office in Kansas City, KS, and can deploy to any part of the continental United States in less than nine hours.

3.3.5 RadNet

RadNet is a national network of monitoring stations that regularly collect air, precipitation, drinking water, and milk samples for analysis of radioactivity. The RadNet network has been used to track environmental releases resulting from nuclear emergencies and to provide baseline data during routine conditions. Data generated from RadNet's and its predecessor, Environmental Radiation Ambient Monitoring System (ERAMS), provide baseline information that can be used to support the understanding of the impacts of an RDD incident on radiation levels in a variety of media.

3. 4 Army Corp of Engineers

The Army Corp of Engineers (USACE) is tasked with assisting in debris removal and waste disposal. The USACE can perform waste characterization, classification, packaging, shipping, and treatment of wastes.

4 SUMMARY

The U.S. Government has a well developed framework for addressing emergency conditions. The framework is generic and applies to all types of emergencies and has been implemented numerous times for natural disasters (hurricanes and other weather related incidents) and man-made emergencies (oil spills). The Department of Homeland Security Federal Emergency Management Agency will be the coordinating Federal Agency in responding to any terrorist action including an RDD incident. The roles and responsibilities of all Federal Agencies are delineated in the National Response Framework (NRF). The majority of the guidance is focused on emergency response and recovery of critical infrastructure. In fact, it is made clear that the NRF does not address long term recovery.

An RDD incident has never occurred in the United States and recovery from this type of incident would have unique long-term challenges. Specific guidance is presented for RDD events (Nuclear/Radiological Incident Annex, DHS Guidance for RDD and IND Incidents, FR, 2008). Protective Action Guidelines (PAGs) are given as the projected dose to an individual above which actions to reduce or avoid the dose should be taken. Although dose limit guidance exists for the intermediate phase of the response, State authorities still have the final determination of protective dose limits. Prior to accepting Federal recommendations consideration should be given to political and public acceptability of these levels.

In response to an RDD incident, the Federal Radiation Monitoring and Assessment Center (FRMAC) will be operational approximately 24 – 48 hours after notification. The FRMAC will manage the data collection, characterization, and interpretation of radiation contamination. FRMAC can supply up to 500 trained staff to address the incident.

DHS is the Coordinating Agency under the Nuclear/Radiological Incident Annex throughout the Federal response to an RDD. EPA is expected to have a significant role in cleanup and long-term remediation under ESF #10. The DHS RDD/IND PAGs optimization process will be used to ensure that the final cleanup criteria have the input of State, Local and Federal officials. EPA will work with State and Local Officials to plan all remediation efforts. At the onset of an incident, EPA will provide the On-Scene Coordinator to manage the long-term remediation. EPA will also provide staff capable of conducting environmental measurements to support the FRMAC.

Once the situation has stabilized, at a mutually agreeable time, leadership of the FRMAC will transition to EPA. EPA may request that assets from the FRMAC (technical specialists and equipment) remain to assist in the remediation. For example, radiation surveys will be needed to verify effective decontamination efforts and EPA may request RAP team members to assist in this process. EPA has a National Decon Team that will provide technical assistance and recommendations on sampling, characterization, decontamination plans, and decontamination technologies.

Numeric criteria for dose limits are not provided in the PAGs for long-term remediation actions. The complexity of balancing societal needs, economic costs, and health have led to a recommendation that remediation goals be set on a case-by-case basis with stakeholder involvement in the decision process. EPA will work with State and Local Officials to select the optimum remediation pathway. State Authorities have the final authority to approve any protective actions.

DHS and DOE are actively working to provide increased guidance on long term clean up issues such as release of buildings from radioactive control zones and methodologies for risk assessment. These should be released in the near future for public review and comment. EPA's revision of the PAG Manual will incorporate DHS guidance.

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ACRONYMS

ASPECT: Airborne Spectral Photometric Environmental Collection Technology
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act
DHS: Department of Homeland Security
DOD: Department of Defense
DOE: Department of Energy
EOC: Emergency Operations Center
EPA: Environmental Protection Agency
ESF: Emergency Support Function
FCO: Federal Coordinating Officer
FEMA: Federal Emergency Management Agency
FRC: Federal Resource Coordinator
FRMAC: Federal Radiological Management and Analysis Center
FWPCA: Federal Water Pollution Control Act
HSC: Homeland Security Council
HSPD: Homeland Security Presidential Directive
ICS: Incident Command System
IMAT: Incident Management Assistance Team
IMT: Incident Management Team
IND: Improvised Nuclear Device
JFO: Joint Field Office
JIC: Joint Information Center
JOC: Joint Operations Center
JTF: Joint Task Force
MACS: Multiagency Coordination System
MERS: Mobile Emergency Response Support
NCP: National Contingency Plan
NIMS: *National Incident Management System*
NRCC: National Response Coordination Center
NRF: *National Response Framework*
NRIA: *Nuclear Radiological Incident Annex*
NRP: *National Response Plan*
NRS: National Response System
NRT: National Response Team
OPA: Oil Pollution Act
OSC: On-scene Coordinator
PAGS: Protective Action Guides
RAP: Radiological Assistance Program
RDD: Radiological Dispersal Device and (IND)
RRCC: Regional Response Coordination Center
SCO: State Coordinating Officer

APPENDIX A: NATIONAL PLANNING SCENARIO 11:
Radiological Attack – Radiological Dispersal Devices

Executive Summary

Casualties	180 fatalities; 270 injuries; 20,000 detectible contaminations (at each site)
Infrastructure Damage	Near the explosion
Evacuations/Displaced Persons	Yes
Contamination	36 city blocks (at each site)
Economic Impact	Up to billions of dollars
Potential for Multiple Events	Yes
Recovery Timeline	Months to years

Scenario Overview:

General Description –

Cesium-137 (^{137}Cs) has a half-life of 33 years. It decays by both beta and gamma radiation. It is one of several known radioactive isotopes that stand out as being highly suitable for radiological terror. This isotope causes skin damage similar to burns, but the injury may be as deep within the body as on the skin. Cesium would be particularly dangerous if accidentally ingested or inhaled, even in small quantities. Cesium mimics potassium in the body. It binds to concrete and other masonry, making decontamination of such buildings extremely difficult and possibly economically infeasible. Use of ^{137}Cs in an urban setting would seriously raise the cost of cleanup.

^{137}Cs is mostly used in the form of cesium chloride (CsCl), because it is easy to precipitate. CsCl is a fairly fine, light powder with typical particle size median at about 300 microns. Fractions below 10 microns are typically less than 1%. In a Radiological Dispersal Device (RDD), most will fall out within approximately 1 to 2,000 feet (although many variables exist), but a small amount may be carried great distances, even hundreds of miles.

In this scenario, the Universal Adversary (UA) purchases stolen CsCl to make an RDD or "dirty bomb." The explosive and the shielded ^{137}Cs sources are smuggled into the country. Detonator cord is stolen from a mining operation, and all other materials are obtained legally in the United States. Devices are detonated in three separate, but regionally close, moderate-to-large cities. The cities are physically similar with geographic topography that is flat. The results in each city are essentially the same. The contaminated region covers approximately thirty-six blocks in each city and includes the business district (high-rise street canyons), residential row houses, crowded shopping areas, and a high school. Buildings in the affected areas are principally made of concrete and brick; some are stone faced.

The entire scene is contaminated with ^{137}Cs, though not at levels causing immediate concern to first responders. Due to the size of the explosion, the radioactive contamination is blown widely such that the ground zero area is not as radioactive as might have been expected. The detonation aerosol contains 90% of the original ^{137}Cs source with radioactive particles whose sizes range from 1 micron (or micro-meter, μm) to 150 microns – the size of most of the particles is approximately 100 microns. Larger particles either penetrate building materials in the blast zone, or drop quickly to the ground as fall-out within about 500 feet.

Variable winds of 3 to 8 miles per hour carry the radioactively contaminated aerosol throughout an area of approximately thirty-six blocks (the primary deposition zone). Complex urban wind patterns carry the contamination in unpredictable directions, leaving highly variable contamination deposition with numerous hot spots created by wind eddies and vortices. Radioactivity concentrations in this zone are on the order of 5-50 $\mu Ci/m^2$, with hot spots measuring 100-500 $\mu Ci/m^2$; however, traces of the ^{137}Cs plume carry more than 3.5 kilometers (~ 2.2 miles) on prevailing winds. Air intakes contaminate interiors of larger buildings, and negative indoor building pressure draws contaminated aerosol into buildings via cracks around windows and doors. In city one, the subway air intakes contaminate the subway system.

Timeline/Event Dynamics –

The attacks have no advance notice or intelligence that indicates their possibility. The explosions are instantaneous, but plume dispersion continues for 20 minutes while breezes navigate the complex environments before particles have fully settled. First responders do not recognize radioactive contamination for 15 minutes in city one. The explosions in cities two and three are promptly identified as “dirty bombs” – this provides some advantage to first responders and government officials in managing contamination on-scene, and in communicating with the public concerning topical contamination and spread of contamination.

Secondary Hazards/Events –

Small fires from ruptured gas lines occur in the vicinity of the blasts. Unstable building facades, rubble, and broken glass create physical hazards for rescue workers. Small amounts of lead, asbestos, and Polychlorinated Biphenyls (PCBs) are present in the air and on surfaces. Human remains present a biohazard, and some of these are very radioactive.

Key Implications:

At each site, the blast results in 180 fatalities and about 270 injured requiring medical care. In addition, up to 20,000 individuals in each primary deposition zone potentially have detectable superficial radioactive contamination.

In each blast, one building and twenty vehicles are destroyed, and eight other buildings suffer varying degrees of damage, such as minor structural damage and broken windows. Radioactive contamination is found inside and outside of buildings over an area of approximately thirty-six blocks in each city. Minor contamination may be an issue further downwind as investigators perform more thorough surveys. Most of the subway system in city one is contaminated.

Over the long term, decontamination efforts are expected to be effective, but some property owners choose demolition and rebuilding. Many square blocks will be unavailable to businesses and residents for several years until remediation is completed.

Transportation is severely hampered in each city. Bus, rail, and air transport routes are altered, and officials build highway checkpoints to monitor incoming traffic for contamination. The subway system in city one is completely closed for an extended period. Hospitals in each region, already at maximum capacity with injuries from the blasts, are inundated with up 50,000 “worried well.”

The sewage treatment plant is quickly contaminated. Seventy-five businesses are closed for an extended duration while radioactive contamination is remediated. Local tax revenues plummet, and people discover that insurance claims are rejected. The schools in the contamination zones are closed and students meet in alternate locations. Nearby towns and cities close their doors to residents of the impacted cities for fear of contamination spread.

Decontamination, destruction, disposal, and replacement of lost infrastructure will be costly (i.e., hundreds of millions of dollars per site). The entire contaminated area may be economically depressed for years. An overall national economic downturn may occur in the wake of the attack due to a loss of consumer confidence.

In the long term, no one will suffer acute radiation syndrome, but approximately 20,000 individuals are likely to become externally contaminated at each site. Low-level contamination may enter food and water supplies. The sum of the cumulative exposures results in an increased lifetime cancer risk proportionate to the dose. Mental health services will be required.

Mission Areas Activated:

Prevention/Deterrence/Protection –	Efforts should include prevention of trafficking and importation of CsCl and weapon components, detection of the plot, reconnaissance of the site, protection, and deterrence measures.
Emergency Assessment/Diagnosis –	First responders are likely to be contaminated. The downwind aerosol dispersion will be a significant component of the hazard. Assessment

	and coordination efforts required are numerous.
Emergency Management/Response –	Actions required include mobilizing and operating incident command; overseeing victim triage; stabilizing the site; cordoning the site and managing and controlling the perimeter; providing notification and activation of special teams; providing traffic and access control; providing protection of at-risk and special populations; providing resource support and requests for assistance; providing public works coordination; providing direction and control of critical infrastructure mitigation; and providing pubic information, outreach, and communication activities.
Incident/Hazard Mitigation –	Actions required include isolating the incident scene and defining the hazard areas, building stabilization, providing fire suppression, conducting debris management and radioactive and hazardous contamination mitigation, decontaminating responders and equipment as well as local citizens, and conducting local site contamination control.
Public Protection –	Sheltering and/or evacuation of downwind populations will be required and must occur quickly. Protection actions required range from developing protective action recommendations and communicating them to the public to making radio-protective pharmaceutical decisions and efficiently distributing drugs.
Victim Care –	Injured people will require some decontamination in the course of medical treatment and, if possible, prior to hospital admission.

	Thousands more will likely need superficial decontamination, and both short-term and long-term medical follow-ups.
Investigation/Apprehension –	Actions required include dispatching personnel, conducting site cordoning and control, collecting field data and witness interviews, and performing tactical deployment and apprehension of suspects. Reconstruction of the attack should occur.
Recovery/Remediation –	The extent of contamination will be a major challenge because ^{137}Cs is highly water-soluble and is chemically reactive with a wide variety of materials, including common building materials such as concrete and stone. Several buildings (those most damaged) will be torn down and eventually rebuilt. Decontamination activities are undertaken for building exteriors and interiors, streets, sidewalks, and other areas.