WARRP Waste Management Workshop

Denver, Colorado
March 15–16, 2012

PREPARED BY
EPA Office of Homeland Security

The following paper summarizes the issues and discussion of the workshop participants. This paper is not intended to provide technical, operational, or regulatory guidance or be a prescriptive document in how to dispose of waste generated in a wide-area chemical, biological, or radiological incident. It does not substitute for the Comprehensive Environmental Response, Compensation, and Liability Act, Resource Conservation and Recovery Act, other statutes or EPA's regulations, nor is it a regulation itself. Any decisions regarding disposal of a particular waste at a particular facility will be made on a site-specific basis based on the applicable statutes and regulations.

A copy of this report can be found on U.S. EPA's web site:

http://www.epa.gov/waste/homeland

Table of Contents

Acronyms

AFSCME	American Federation of State, County and Municipal Employees
APHIS	Animal and Plant Health Inspection Service
BOTE	Bio-Response Operational Testing and Evaluation
BP	British Petroleum
CBR	Chemical, biological, or radiological
CDA	Colorado Department of Agriculture
CDC	Centers for Disease Control and Prevention
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIPAC	Critical Infrastructure Partnership Advisory Council
CORRAL	Colorado Rapid Response for Agriculture and Livestock
CRCPD	Conference of Radiation Control Program Directors
DC	District of Columbia
DHS	Department of Homeland Security
DoD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
DRCOG	Denver Regional Council of Governments
EJ	Environmental justice
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
EREF	Environmental Research and Education Foundation
ESF	Emergency Support Function
FAD	Foreign Animal Disease
FEMA	Federal Emergency Management Agency
FMD	Foot and mouth disease
HHW	Household hazardous waste
HVAC	Heating, ventilating and air conditioning
IAEA	International Atomic Energy Agency
IBRD	Interagency Biological Restoration Demonstration
ICS	Incident Command System
I-WASTE	Incident Waste Assessment & Tonnage Estimator
LLRW	Low-Level Radioactive Waste
LLW	Low Level Waste
MOU	Memorandum of understanding
mSv	Millisievert
NARAC	National Atmospheric Release Advisory Center
NDRF	National Disaster Recovery Framework
NRC	Nuclear Regulatory Commission
NRF	National Response Framework
NHSRC	U.S. EPA National Homeland Security Research Center
NSWANA	National Solid Waste Association of North America
NTS	Nevada Test Site
OAR	U.S. EPA Office of Air and Radiation
OHS	U.S. EPA Office of Homeland Security
ORCR	U.S. EPA Office of Resource Conservation and Recovery
ORIA	U.S. EPA Office of Radiation and Indoor Air
ORD	U.S. EPA Office of Research and Development

OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
OSWER	U.S. EPA Office of Solid Waste and Emergency Response
OW	U.S. EPA Office of Water
PCBs	Polychlorinated Biphenyls
PM	Particulate Matter
POTWs	Publically Owned Treatment Works
PPE	Personal Protective Equipment
RCRA	Resource Conservation and Recovery Act
RDD	Radiological Dispersal Device
SONS	Spill of National Significance
SOP	Standard operating procedures
SOW	Statement of Work
SWANA	Solid Waste Association of North America
TAD	Threat Agent Disposal
TSDF	Treatment, Storage, or Disposal Facility
UASI	Urban Area Security Initiative
USDA	United States Department of Agriculture
UV	Ultraviolet
VOC	Volatile organic carbons
WARRP	Wide Area Recovery and Resiliency Program
WEST	Waste Estimation Support Tool
WMP	Waste Management Plan

Section 1. Introduction

The Wide Area Recovery and Resiliency Program (WARRP) Waste Management workshop, hosted by the Department of Homeland Security (DHS), was a two-day workshop, held in Denver, Colorado, on March 15-16, 2012. The purpose of the workshop was to advance the planning of federal, state, and local officials in the area of waste management (segregation, temporary storage, transportation, treatment, and disposal) following a chemical, biological, or radiological (CBR) wide-area incident in the Denver, Colorado, urban area. The objectives of the workshop included:

- Understanding the importance of preparedness for waste management in the case of an urban, wide-area CBR incident.
- Identifying the significant issues involving the management of CBR threat agent wastes and exploring efforts underway to address the priority issues.
- Learning about a draft all-hazards waste disposal management template, its application to an urban, wide-area CBR incident, and providing critical feedback to the developers.

The target audience for this workshop included:

- State/local Participants: emergency response, waste, water, agriculture and health officials and associations.
- Federal/Regional Participants: emergency response, waste, water, agriculture and health officials.

The first day of the workshop was designed to provide an overview of the complexities of waste management and the challenges facing local, state and federal response officials in the aftermath of a wide-area CBR incident. Participants heard an overview of the WARRP CBR scenarios and descriptions of the anticipated waste estimates in terms of types and volumes. Participants also benefitted from an overview of the statutory, regulatory and policy framework underlying CBR waste management. The Environmental Protection Agency (EPA) experts shared a summary of previous findings of workshops and lessons learned from a series of actual incidents.

The second day of the workshop was designed to provide the participants with a proactive approach to prepare for the waste management challenges associated with a wide-area CBR incident. Participants were provided an overview of the waste management planning process, from preplanning activities and development of a waste management plan to maintenance and implementation of the plan. Participants were given the opportunity to discuss in breakout groups the contents of a waste management plan for a CBR scenario. Waste management planning tools were introduced to the participants to assist in developing a waste management plan.

This report is intended to provide a summary of the workshop participants, presentations and discussions. This report is not intended to provide technical, operational, or regulatory guidance or be a prescriptive document in how to dispose of waste generated in a wide-area CBR incident. It does not substitute for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), other statutes or EPA's regulations, nor is it a regulation itself.

Any decisions regarding disposal of a particular waste at a particular facility will be made on a site-specific basis based on the applicable statutes and regulations.

The following report is organized in several sections:

- Section 2 – Summary of Day 1 discussions.
- Section 3 – Summary of Day 2 discussions.
- Appendix A – A listing of all citations used to reference information throughout this report.
- Appendix B – The contact information for workshop participants.
- Appendix C – A consolidated list of website resources referenced during the workshop.
- Appendix D – Summary of Day 2 Breakout Sessions.
- Appendix E – Summary of findings from EPA threat agent disposal workshops.
- Appendix F – Summary of power point slides from the presentations.

The two-day workshop consisted of a series of presentations from various personnel from state offices and federal levels. The following agenda provides the specific sessions, the presenters and their respective affiliations.

Day 1 – March 15, 2012 Topics	Speakers
Introduction/Overview	Cayce Parrish, EPA OHS Debbie Dietrich, AA OHS
CBR Waste Management Complexity • RDD scenario/waste estimates (type/volume) • Chem scenario/waste estimates (type/volume) • Anthrax scenario/waste estimates (type/volume)	 Bill Steuteville, EPA Region 3 Paul Lemieux, EPA ORD/NHSRC Paul Peronard, EPA Region 8
Statutory, Regulatory, and Policy Framework Underlying CBR Waste Management **Summary of Previous Findings** • WARRP and IBRD Systems Study • EPA Threat Agent Disposal Workgroup	James Michael, EPA OSWER/ ORCR Doug Knappe, CDPHE Jared Torstenson, CDPHE Chris Russell, DHS Cayce Parrish, EPA OHS
EPA Workshops/Guidance • Water Disposal Guidance • Threat Agent-Specific Workshops • CBR Disposal Workshop	 Marissa Lynch EPA OW/WSD Cayce Parrish, EPA OHS Paul Lemieux, EPA ORD/NHSRC
Case Studies • Hurricane Katrina • BP Spill • Japan • Ag Incident • Region 8 incident – Minot Flood	 James Michael, EPA OSWER/ORCR James Michael, EPA OSWER/ORCR Tom Peake, EPA OAR/ORIA Lori Miller, USDA/APHIS and Dr. Nick Striegel, CDA Paul Peronard, EPA Region 8
Wrap Up	Cayce Parrish, EPA OHS

Day 2 – March 16, 2012 Topics	Speakers
Importance of Planning for Waste Mangement in a Homeland Security Incident	Anna Tschursin, EPA ORCR Melissa Kaps, EPA ORCR
Waste Management in Four Easy Steps	Anna Tschursin, EPA ORCR Melissa Kaps, EPA ORCR
Developing a Waste Management Plan (Part One: The Wastes Generated)	Anna Tschursin, EPA ORCR Melissa Kaps, EPA ORCR
Waste Management Planning Aids	Paul Lemieux, EPA ORD/NHSRC
Developing a Waste Management Plan (Part Two: Management of Wastes)	Anna Tschursin, EPA ORCR Melissa Kaps, EPA ORCR
Group Breakout Session (CBR groups)	Paul Lemieux –Chem James Michael/Lori Miller – Bio Tom Peake – Rad
Group Breakout Sessions	All
Implementation: What to do with the Plan When an Actual Incident Occurs?	Anna Tschursin, EPA ORCR Melissa Kaps, EPA ORCR
Wrap Up	Cayce Parrish, EPA OHS

Section 2. Summary of Day 1, March 15, 2012

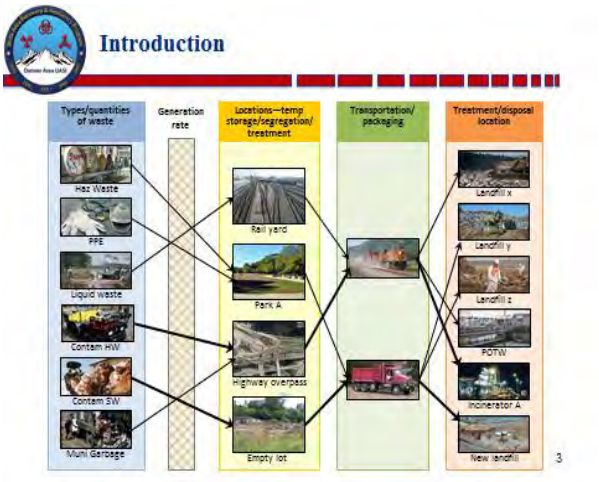
Introduction
Debbie Dietrich, USEPA Associate Administrator for Homeland Security, Office of the Administrator

Ms. Dietrich welcomed the workshop participants and conveyed her appreciation of their time and energies spent to address the important issue of CBR waste management. She made special mention of her appreciation of the participation of the state and local participants. She noted that the workshop will provide an excellent opportunity for EPA to learn from the Agency's state and local partners.

Ms. Dietrich thanked DHS for their sponsorship of the WARRP project and the Federal Emergency Management Agency (FEMA) for the use of their facilities. She recognized the important relationship between DHS and EPA in addressing important CBR wide-area response issues. Finally, Ms. Dietrich acknowledged EPA Region 8 for serving as the lead region for homeland security for the past year and for their assistance in coordinating the workshop.

Ms. Dietrich explained that after the 9/11 and the District of Columbia (DC) anthrax incidents, EPA became more focused on homeland security issues such as decontamination (including waste management), and water security. EPA has been investing resources and dedicating personnel to work on these issues and address remaining gaps. She stated that programs like WARRP are excellent opportunities for stakeholders to come together and make progress on resolving difficult issues, such as waste management following a wide-area CBR incident. Waste management is always going to present a number of challenges. Following Hurricane Katrina, EPA had to address numerous waste management issues including regulatory status, treatment and disposal capacity, transportation logistics, and environmental justice (EJ) concerns. Ms. Dietrich emphasized to the workshop participants that one lesson she learned from Hurricane Katrina was that waste management is an important issue that requires immediate attention from the beginning of the incident and is likely to be an issue years after the incident.

Cayce Parrish, USEPA Office of Homeland Security (OHS)



Mr. Parrish welcomed the participants and requested that they introduce themselves, identify their affiliation and describe their role(s) in waste management. Mr. Parrish introduced Mr. Chris Russell to provide introductory remarks as the DHS WARRP Program Manager.

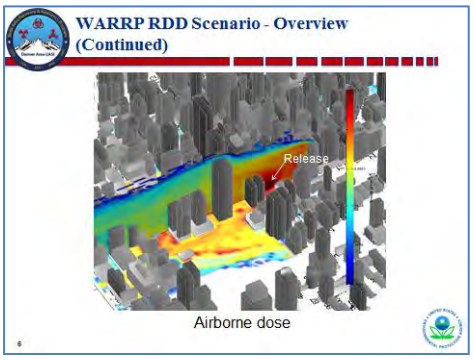
Following Mr. Russell's remarks, Mr. Parrish provided a brief overview of the challenges and importance of waste management. He described the major components of waste management – (1) types/quantities of waste; (2) waste generation rates; (3) locations for temporary storage/treatment/segregation; (4) transportation/packaging; and (5) treatment/disposal locations. Mr. Parrish acknowledged all of the waste management discussions occurring as part of the WARRP project

and local Denver planning. He highlighted the number of issues/barriers that need to be addressed; however, he encouraged the workshop participants to move forward with waste management planning and not wait for all of the issue/barriers to be resolved. Finally, Mr. Parrish provided a quick overview of the two-day agenda and introduced the first speaker.

CBR Waste Management Complexity

WARRP RDD Scenario, Radiological Waste Disposal

Bill Steuteville, USEPA Region 3



Mr. Steuteville described the WARRP Radiological Dispersal Device (RDD) scenario, which included two RDD attacks: one at the U.S. Mint in downtown Denver, Colorado, and another at the Anschutz Medical Campus in Aurora, Colorado. The scenario assumes tens of thousands of people are exposed and hundreds die from blast trauma, not radiation. The fallout area is within tens of miles of the blast and some of the radiological agent may be carried hundreds of miles. The model used to simulate the incident calculates in three dimensions and waste tools were used to estimate building contents, outdoor areas, decontamination waste and demolition waste. The types of radiological waste that will be generated include a variety of liquid and solid wastes, the vast majority of which will be Class A low-level radioactive waste (LLRW) with minimal levels of contamination.

The solid waste resulting from the RDD scenario would fill 500,000 to 656,000 tri-axle dump trucks. If they were put end to end, would be 3700 miles long or cover the distance from Los Angeles, to New York to Atlanta and then some.

Mr. Steuteville went on to compare the WARRP RDD scenario with EPA's Liberty RadEx Exercise that was also an RDD scenario based in Philadelphia, Pennsylvania[1]. He described the scenario, waste volumes, and tools used, and discussed the dependent relationship of cleanup and waste management activities. Tools were used to estimate the waste to an order of magnitude, including the Waste Estimation Support Tool (WEST), Incident Waste Assessment & Tonnage Estimator (I-WASTE) Tool, and preliminary results from the Bio-Response Operational Testing and Evaluation (BOTE) project (see Day 2 presentation entitled *Waste Management Planning Aids*). Such a scenario can generate a substantial amount of liquid waste estimated to be: 1.5 billion to 3 billion gallons, or 50,000 to 100,000 railroad tank cars (30,000 gallon capacity) or 275,000, to 550,000 tanker trucks (5,500 gallon capacity). The amount of solid waste generated in an RDD incident is also significant. Solid waste estimated can approach 16 million to 21 million tons, or 160,000 to 210,000 railroad hopper cars (100 ton capacity) or 400,000 to 525,000 semi-trailer (64,000 pound net capacity) or 500,000 to 656,000 tri-axle dump trucks.

Mr. Steuteville explained how various factors (e.g., selection of various decontamination technologies, cleanup levels/strategies) are related to the amount of waste generated. Decontamination technologies considered during Liberty RadEx included cleaning agents, acids, and foams, which reduce radiation but do not eliminate it. Cleanup strategies considered include: roof replacement; soil removal; street and sidewalk surface removal; disposal of carpets, furnishings, possessions, drywall; and building demolition if there is higher contamination. Philadelphia citizens were included in the exercise and after reviewing

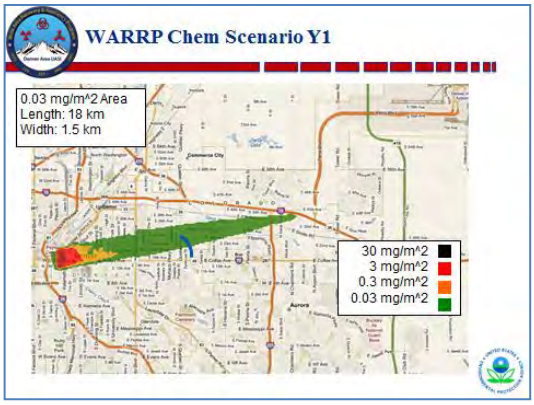
the scenario and the numerous decisions that had to be made, they had no difficulty with concepts of cleanup prioritization, local storage and disposal. Given several options, the citizens favored their own cleanup prioritization; they placed a higher priority for cleanup on the areas around the Liberty Bell and the outer area of the contamination plume where people were not relocated as part of the response and still living with the contamination.

Estimated Waste Volume Generated/RDD Scenario		
LIQUID Waste ≈ 1.5 -3 billion gallons	SOLID Waste ≈ 16-21 million tons	
Waste Distribution	**Limited Decon. (tons)**	**Extensive Decon. (tons)**
Brick, Wood, and Other Structural materials	388,000	388,000
Reinforced Concrete & Steel	1,000,000	1,000,000
Coating Waste	595	595
Asphalt	81,100	301,000
Concrete	146,000	557,000
Soil	1,280,000	5,680,000
Interior Floor Materials	1,600	1,600
Carpet	1,330,000	1,330,000
Electronic Equipment	2,850,000	2,850,000
Paper and Office Supplies	9,050,000	9,050,000
Medical Supplies	78.5	78.5
Pharmaceuticals	10.3	10.3
Food	10,200	10,200
Linens	6,150	6,150
Medical Waste	4.4	4.4
Bathroom and Kitchen Materials	34,500	34,500

One of the WARRP workshop participants raised the issue of on-site burial of material as a waste management option. The participant also raised the issue of the lack of financial resources to conduct advance waste management planning.

Chemical Scenario

Dr. Paul Lemieux, USEPA Office of Research and Development (ORD)



Dr. Lemieux described the WARRP chemical scenario, which included the release of Agent Yellow (a mustard agent and Lewisite mixture) from small airplanes over a packed Coors Field. As a result, contaminants were tracked into nearby residences, onto public transportation, and into hospitals. In this scenario, the contamination plume is smaller than the RDD scenario, there is little structural damage as result of the attack, and decontamination of some materials may be difficult or impossible. There are many remediation options and they vary between the contaminants and the substrates upon which they are bound. Tools were used to estimate the waste to an order of magnitude, including the WEST, I-WASTE Tool, and preliminary results from the BOTE project[2] (see Day 2 presentation entitled *Waste Management Planning Aids*). He described potential waste

management pathways including on-site treatment, natural attenuation, incineration, landfill disposal and local publicly owned treatment works (POTWs) for treated waste.

Estimated Waste Volume Generated/Chemical Scenario		
LIQUID Waste ≈ 15 - 36 million gallons	SOLIDS Waste ≈ 3-8 million tons	
Waste Distribution	**Surface Decon. (tons)**	**Volumetric Decon. (tons)**
Ceiling Tiles	42,000	
Carpet	29,000	29,000
Wood Flooring	160	
Electronic Equipment	610,000	610,000
Furniture	50,000,000	
Paper and Office Supplies	19,000,000	19,000,000
Medical Supplies	190	190
Pharmaceuticals	25	25
Food	2,200	2,200
Linens	1,300	1,300
Medical Waste	97	97
Arts and Music Equipment	190	
Bathroom and Kitchen Materials	34,000	34,000

Anthrax Scenario

Paul Peronard, USEPA Region 8

Mr. Peronard described the WARRP biological scenario, which included a *Bacillus anthracis* (anthrax) release into downtown Denver, Colorado. The release goes undetected for 48 hours before it is detected by BioWatch samplers and people begin to show signs of being exposed. There is little infrastructure damage as a result of the attack. Heating, ventilating and air conditioning (HVAC) systems likely transmit aerosolized anthrax indoors. Tools were used to estimate the waste to an order of magnitude, including the WEST, I-WASTE Tool, and preliminary results from the BOTE project[3]. As part of the waste estimate, a number of assumptions were made including: ultraviolet (UV) exposure will kill off spores; no outdoor materials will enter waste stream; and there is no demolition of buildings. Many of these outdoor waste generation assumptions were used since the waste estimation tools that were used do not currently incorporate considerations for outdoor remediation of biological contamination. Such a scenario can generate a substantial amount of liquid (15 to 36 million gallons) and solid waste (3 to 8 million tons). Potential waste management pathways include: surface decontamination, fumigation and decontamination of buildings, monitored natural attenuation, incineration, disposal in a RCRA subtitle C landfill, and potential disposal in a RCRA subtitle D landfill.

Estimated Waste Volume Generated/Biological Scenario		
LIQUID Waste ≈ 21 - 48 million gallons	SOLID Waste ≈ 11-34 million tons	
Waste Distribution	**Surface Decon. (tons)**	**Volumetric Decon. (tons)**
Ceiling Tiles	1,700,000	
Carpet	1,100,000	1,100,000
Wood Flooring	160	
Electronic Equipment	2,400,000	2,400,000
Furniture	20,000,000	

Paper and Office Supplies	7,800,000	7,800,000
Medical Supplies	280	280
Pharmaceuticals	37	37
Food	8,900	8,900
Linens	5,300	5,300
Medical Waste	15	15
Arts and Music Equipment	190	
Bathroom and Kitchen Materials	34,000	34,000

Statutory, Regulatory, and Policy Framework Underlying CBR Waste Management
James Michael, USEPA Office of Solid Waste and Emergency Response (OSWER) Office of Resource Conservation and Recovery (ORCR)
Doug Knappe, PE, Colorado Department of Public Health and Environment (CDPHE)

Mr. Michael provided a regulatory overview of EPA federal regulations that govern waste related to a wide-area CBR incident. He described waste management as a *process* that occurs throughout response and recovery phases. Waste management must be integrated with the overall incident response and recovery approach. It is expected that during a wide-area CBR incident, local and regional waste management facilities will be overwhelmed and potentially unable and/or unwilling to handle all waste types and/or quantities of waste streams. Limiting or minimizing waste generation would expedite recovery and reduce cost. Mr. Michael also pointed out that waste management expertise is limited and needs to be expanded at all levels of government.

For a wide-area CBR incident, some wastes would be hazardous wastes and some would not be hazardous wastes, as defined by RCRA. Since most states are authorized to manage the RCRA Subtitle C program in lieu of the federal government, waste management decisions will be made at the state level. Mr. Michael noted that since states can be more stringent some waste streams may be managed differently than under the federal program. States are approved to manage the RCRA Subtitle D program and enforce the program through state-issued permits and state solid waste management plans. EPA would provide any assistance to the states when requested. However, in the WARRP scenarios, the extremely high volumes of waste will make the management of waste very challenging. EPA will play a significant role in each type of CBR incident, but may not be the lead. Mr. Michael also described a homeland security incident waste management decision tree as a potential resolution to streamline the process. In closing Mr. Michael pointed out that no single method of waste management can be used at all locations for all CBR agents.

Doug Knappe, PE, CDPHE
Mr. Knappe reviewed Colorado hazardous waste regulations, which included chemical warfare agents. This is an example of where a state program is more stringent than the federal program. Hazardous wastes in Colorado also include commercial chemical products, wastes from non-specific sources, wastes from specific sources; characteristic hazardous wastes (e.g., corrosive, reactive, flammable or toxic wastes); and products such as those listed as hazardous waste constituents identified in 6 CCR 1007-3, Part 261 Appendix VIII. If there is an incident, CDPHE would manage a release in two phases: 1) emergency response and 2) recovery. DHS would be the coordinating agency with EPA and the Department of Energy (DOE) providing assistance.

Summary of Previous Findings

WARRP Systems Study and IBRD Systems Analysis Study
Chris Russell, DHS Program Manager

Mr. Russell explained the goal of WARRP is to work with interagency partners, including federal/state/local/tribal governments, military, private industry and non-profit organizations, to develop solutions to reduce the time and resources required to recover wide-area urban releases and other critical infrastructure following a catastrophic CBR incident[4].

The WARRP Systems Study identified 25 key gaps, including waste management which is considered a high-priority gap.

The WARRP Systems Study identified 25 key gaps and potential solutions within urban wide-area CBR recovery planning and operations. These gaps covered regional risk management, site-specific recovery, and long-term public health issues. Through qualitative and quantitative analyses, the project team categorized and prioritized gaps in terms of their impact on the time and cost to recover an area and on the time frame required to develop a solution to a gap. Results, particularly presented in an easy-to-use table that clusters gaps by priority and solution development time frame, will contain other WARRP program activities as well as the national research agenda for improving long-term recovery from domestic CBR incidents. The waste management gap will be a significant challenge in a wide-area scenario and will be recognized as a high-priority gap.

A workshop participant asked a question about how a county will have the necessary funds to prepare for an incident in advance and whether approaches are being institutionalized from Interagency Biological Restoration Demonstration (IBRD) to WARRP. Mr. Russell stated that FEMA is taking this framework, generalizing it, and providing funding to Urban Area Security Initiative's (UASI) throughout the country to exercise it along with the National Disaster Recovery Framework (NDRF)[5]. Each state and UASI has to have a recovery plan and framework.

EPA Threat Agent Disposal Workgroup
Cayce Parrish, USEPA OHS

EPA has recognized that waste management is a challenge based on CBR incident responses and exercises. For example, EPA has responded to a radiological incident at Three Mile Island nuclear power plant (1979); cleanup efforts following the 9/11 terrorist attack; anthrax mail incidents on Capitol Hill and other Washington, D.C., areas (2001); the ricin incident on Capitol Hill (2004); and naturally occurring anthrax incidents (New York City [2006] and Danbury, Connecticut [2007]). EPA has participated in many exercises and addressed waste management, including TOPOFF4, White House Principal Level Exercise 3-10, and internal tabletop exercises.

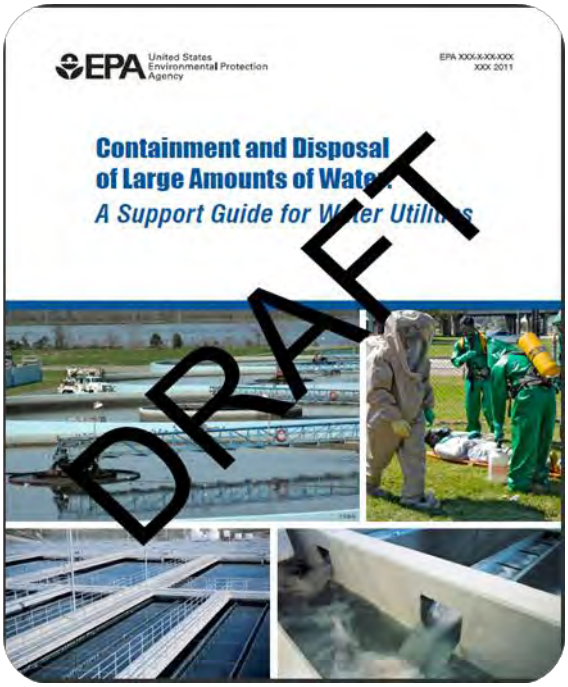
EPA identified waste management as one of the three fundamental preparedness gaps related to terrorist incidents involving CBR threat agents. As a result, they formed the Threat Agent Disposal (TAD) Workgroup, which performed a literature review, identified potential types of waste streams requiring decontamination and disposal, estimated quantities likely to be generated, and identified potential barriers to disposal. The potential barriers included: regulatory/statutory; policy/guidance; technical/scientific; sociopolitical; and capacity/capability. In addition, the TAD workgroup created a list of recommendations:

1. Address concerns of multiple stakeholders who object to disposal of CBR wastes based on perceived health and/or liability concerns.
2. Increase the number and capacity of facilities willing to accept CBR wastes.
3. Improve regulatory and statutory processes to expedite effective disposal of CBR wastes.
4. Develop sufficient capacity and guidance to dispose of waste from a radiological attack, particularly for waste whose radionuclide concentrations are above Class A limits.
5. Evaluate existing/develop new guidance on management and disposal of contaminated or treated water.
6. Develop protocols to determine residual CBR levels in waste, particularly in biological and radiological-derived waste.
7. Explore the efficacy of treatment/disposal technologies to reduce/contain CBR threat agent levels.

EPA Workshops/Guidance

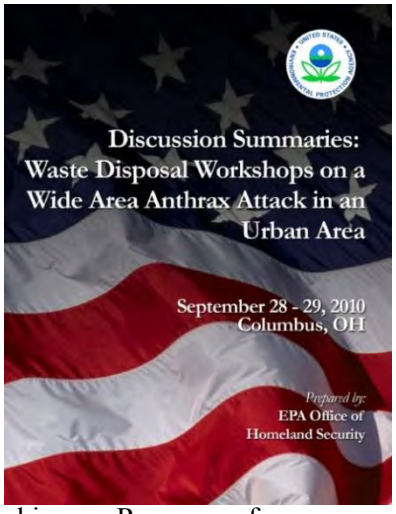
Waste Disposal Guidance
Marissa Lynch, USEPA Office of Water (OW)

EPA's Critical Infrastructure Partnership Advisory Council (CIPAC) Decontamination Workgroup developed a strategic plan in October 2008, which includes 16 priority issues and 35 recommendations[6]. One of the recommendations resulted in EPA developing a disposal guide for large amounts of water from a CBR incident, targeted for the water sector. The *Containment and Disposal of Large Amounts of Water: A Support Guide for Water Utilities*[7] is a decision-making framework for containment, treatment, and disposal of CBR contaminated water and a reference guide for the development of a system-specific disposal plan for contaminated water.



The primary audience for the guide is drinking water, wastewater, and storm water utilities, along with decision makers involved with planning and disposal at the federal, state, local and tribal levels. The guide and a corresponding webinar are potentially scheduled to be released in Spring 2012.

Threat Agent-Specific Workshops
Cayce Parrish, Senior Advisor, USEPA OHS



EPA participated in and/or hosted three agent-specific waste disposal workshops: 1) Wide-Area Anthrax, Seattle, Washington, hosted by DHS/Department of Defense (DoD) as part of IBRD[8]; 2) RDD Attack, hosted by EPA Region 3 in Philadelphia, Pennsylvania[9]; and 3) Wide-Area Anthrax Attack, hosted by EPA Region 5 in Columbus, Ohio[10]. At each of the workshops, stakeholders included federal, state, local, and private participants. Each of the stakeholder groups participated in half-day workshops designed to foster a more open dialogue. EPA presented the scenario and anticipated waste streams, volumes, and waste management barriers. The stakeholder groups identified and prioritized waste disposal issues. Responses from pre-workshop stakeholder interviews reflected a number of topics, ranging from scientific/technical issues/barriers to socio-political issue/barriers. The responses were summarized and provided a foundation to facilitate discussion during the workshops. EPA is in the process of reviewing each of the high-level barriers, compiling what was discussed during the workshops and performing an analysis to identify the highest-priority projects. Appendix E of this report contains the findings, by barrier, from each of the workshops and the issues raised by participants. The next steps are to continue analyzing the workshop recommendations, develop priority activities to address barriers, and implement new projects.

CBR Disposal Workshop
Dr. Paul Lemieux, USEPA ORD/National Homeland Security Research Center (NHSRC)

Participants from the previous waste workshops (such as Seattle, Philadelphia, and Columbus) recommended developing local options (i.e., new capacity) as a way to address waste capacity/acceptance concerns. Because existing facilities may have inadequate capacity or be unavailable in a large scale incident, the goal of this workshop was to identify the technical and scientific requirements to site, construct, operate and incidentally close landfills so that the policy discussions are based on the best available science.

EPA's ORD/NHSRC organized and implemented a workshop in Washington, D.C., on June 14-15, 2011[11]. Participants included federal department/agencies, state government officials, owner/operators of treatment and disposal facilities, and national associations. Insights from the workshop included:

- CBR incidents are generally not expected to result in large debris fields of comingled wastes.
- CBR incidents will more likely result in contaminated surfaces and structures from which highly homogeneous waste streams will be generated, which can be handled individually or mixed in a fashion most suitable for disposal (or other waste management option).
- Biodegradable wastes that can lead to formation of landfill gases will generally be separated from inert material to avoid subsequent migration.
- Waste quantities will likely exceed the capacity of existing landfills. New landfills or new landfill cells could take several months to construct and construction season must be addressed.
- Staging areas are important and can provide a temporary location while landfill capacity is being constructed or negotiated; especially to facilitate moving the waste from the downtown area as remediation activities progress.

There are pre-incident planning opportunities, including specifying criteria for landfill siting; identifying specific locations prior to an incident; and identifying siting and criteria for unacceptable sites. Technical issues included: siting; construction quality assurance; fill progression plans; landfill gas control systems; leachate control systems; long-term monitoring; and post-closure care.

Based on the presentations and discussions, EPA produced a final report titled: *Report on the 2011 Workshop on Chemical-Biological-Radiological Disposal in Landfills.* Copies can be found on the website at http://www.epa.gov/nhsrc/pubs.html[12].

WARRP Workshop participants expressed the concern that scoping new sites as part of preplanning activities has a cost associated with it and changes in land development could take pre-identified sites out of consideration.

Case Studies

Case Study: Hurricane Katrina

James Michael, USEPA OSWER/ORCR

Disaster debris from Hurricane Katrina is estimated to have been in excess of 55 million tons, the largest in U.S. history. There were many types of waste streams, including curbside debris; white goods; electronic goods; waste containers (e.g., drums, propane tanks,); electronic goods; household hazardous waste (HHW); vehicles and vessels, etc. There were approximately 3,740,000 individual waste containers that needed to be managed.

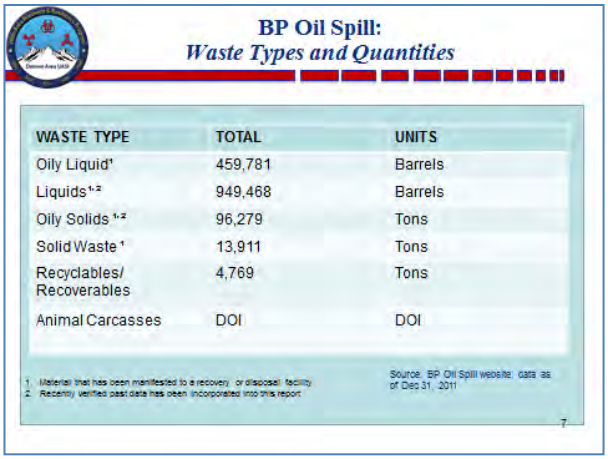
Waste management issues and lessons learned included:

- Inadequate storage, treatment, and disposal capacity for disaster debris.
- Open burning of vegetative debris resulted in public health concerns regarding smoke.
- Questions as to how to handle polychlorinated biphenyls (PCBs) and Asbestos-containing materials.
- Use of "No action assurance" letters.

Mr. Michael compared some of the waste volume, such as debris volume of 10 million to 100 million cubic yards in southeast Louisiana and debris volume less than 2 million cubic yards in southwest Louisiana. Waste management issues and lessons learned included: lack of waste/debris management plans and the lack of stakeholder involvement in the management of waste/debris. As a result of the lessons learned, EPA updated its *Planning for Natural Disaster Debris Guidance*[13] and the development of a waste/debris management decision support tool.

WARRP Workshop participants raised the issue of the political challenges of siting the waste management facilities in certain locations and the importance of incorporating best management practices so as to avoid creating new CERCLA Superfund sites.

Case Study: BP Spill
James Michael, USEPA OSWER/ORCR



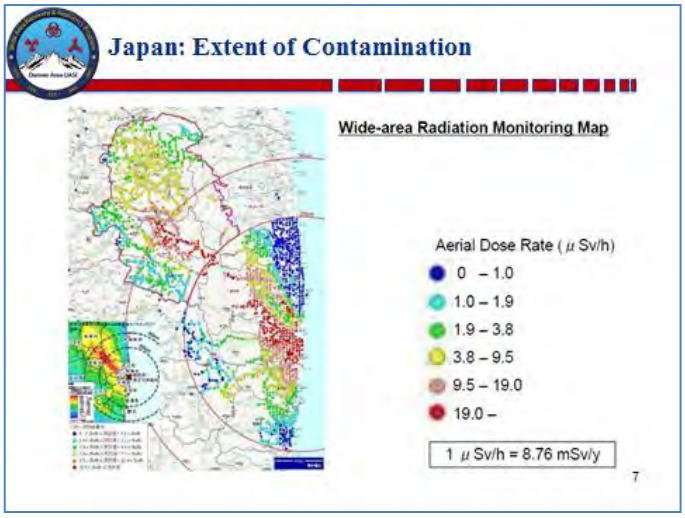
On April 20, 2010, British Petroleum's (BP) Deepwater Horizon Drill Rig Platform in the Gulf of Mexico had a massive explosion. The incident was designated a Spill of National Significance (SONS). The US Coast Guard had the lead with EPA providing a supporting role. Area commands were established in Mobile, Alabama covering EPA Region 4 states (Alabama, Florida, and Mississippi) and Houma, Louisiana for Region 6 states (Louisiana and Texas). Prior to the incident, BP had a very generic spill plan to serve as a guide for an oil spill, which lacked the specificity to address the management of the magnitude of waste that would eventually be generated by the spill.

It was quickly determined that specific Waste Management Plans (WMP) needed to be developed to manage the waste that would be generated. During the response EPA and the states reviewed and commented on over 40 WMP submittals that addressed the management of recovered oil, contaminated materials, liquid and solid wastes, waste sampling, community engagement activities, transportation and waste tracking. EPA conducted waste management operational oversight and performed independent waste characterization sampling and analysis as well as performed site visits to staging areas and waste management facilities. EPA also developed a waste management tracking format (cradle to grave), addressed community/EJ concerns (e.g., Pecan Grove, Mississippi; River Birch, Louisiana; landfill violations), reviewed and posted several thousand waste sample results and responded to hundreds of media, and senior management requests for information.

The WARRP Workshop participants requested information about the availability of the database EPA developed. This database was used to share the information with the public and was set up to be accessed remotely, thereby minimizing the time it took to get the information available. The workshop participants were interested in getting access to the database as it would be helpful to track waste, staging areas, landfills, etc. The participants were also interested in how the database was set up so that information could be entered remotely.

Case Study: Japan

Tom Peake, USEPA Office of Air and Radiation (OAR)/Office of Radiation and Indoor Air (ORIA)



The earthquake and tsunami incidents in Japan in March 2011 resulted in a Level 7 "Major Accident" on International Nuclear Event Scale at the Fukushima Daiichi nuclear power plant, which was a major release of radioactive material with widespread health and environmental efforts requiring the implementation of planned and extended countermeasures. Some of the challenges resulting from this catastrophic incident included:

- Loss of cooling water in the reactors.
- Damage to secondary containment vessels.
- Fuel meltdown.
- Difficulty in the quantification of the exact amount of radioactivity released.

Two radionuclides are driving long-term cleanup: Cesium-137 (30-year half-life) and Cesium-134 (2-year half-life). Although it is not a long-term concern, Iodine-131 (8-day half-life) was released in significant quantities in the early stages of the incident. Management of radioactive waste was significantly complicated by the aftermath of the earthquake and tsunami. There was a variety of debris that was generated during the incident. Traditionally, Japan relies heavily on incineration to treat waste materials. Consequently, there was a concern with the ash being contaminated with concentrated levels of radioactivity.

Japan was evaluating levels of 1 to 20 millisievert (mSv) per year as benchmarks for restoration. [For comparison, typical US exposure to radiation from natural background and medical procedures is ~6 mSv per year, and EPA regulations are often established at 0.15 mSv per year from individual sources. EPA estimates that 0.15 mSv per year is associated an increased lifetime cancer risk on the order of 1 in 10,000.] By necessity, they are prioritizing areas for cleanup. High priority areas for cleanup include schools, other child-sensitive areas, and agricultural areas. One of the approaches to cleanup includes covering the sea bed with cement and clay. Mr. Peake shared a wide-area radiation monitoring map showing the areas and levels of contamination. Early estimates from Japan include 30 million tons of soil to be removed in Fukushima Prefecture to reach cleanup level of 5 mSv/year. This represents about 13 percent of the land area in the Prefecture (around the size of the state of Connecticut). Due to contamination concerns, there are restrictions on distribution of food and other materials produced in the area of Fukushima.

While the scale of the Fukushima accident likely exceeds the anticipated impacts from an RDD, there are a number of issues that are relevant to an RDD incident. These issues include: cleanup goals and decontamination strategies will affect the volume of wastes generated; there is likely to be public pressure

to accelerate cleanup, especially for certain populations, such as children; roles and responsibilities for decision making regarding cleanup and waste management may create tension; and the importance of interim staging.

WARRP Workshop participants asked if there was any concern to the U.S. from ocean contamination resulting from the accident. Mr. Peake stated that some contaminated debris will likely reach U.S. shores based on predictions using the prevailing ocean currents. There are also RadNet monitors deployed at various sites in the U.S. that were used right away after the Japan incident. The monitors indicated that contamination was barely detectable and occurred at very low levels.

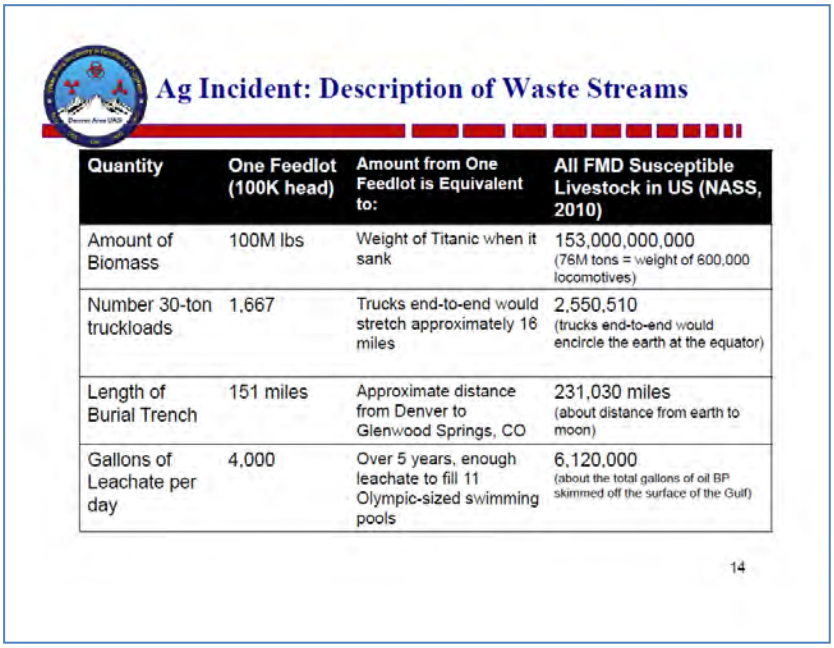
Case Study: Agriculture Incident

Lori Miller, United States Department of Agriculture (USDA)/Animal and Plant Health Emergency Services (APHIS)

Dr. Nick Striegel, Colorado Department of Agriculture (CDA)

The example used by the presenters for a wide-area agricultural incident was a foreign animal disease (FAD) incident, specifically Foot and Mouth Disease (FMD). FMD has the potential to become a rapidly spreading disease of all cloven-hoofed animals. FMD results in severe disease and can result in up to a 50 percent loss in some herds. The traditional approach to containing this disease is termed "stamping-out." Upon confirmation of the disease, stamping-out entails the culling of the animals that are affected and all cloven-hoofed animals within a given radius around the affected farm. Where appropriate, it also includes the culling of those in other herds that have been exposed to infection by direct animal-to-animal contact or by indirect contact of a kind likely to cause the transmission of the causal pathogen.

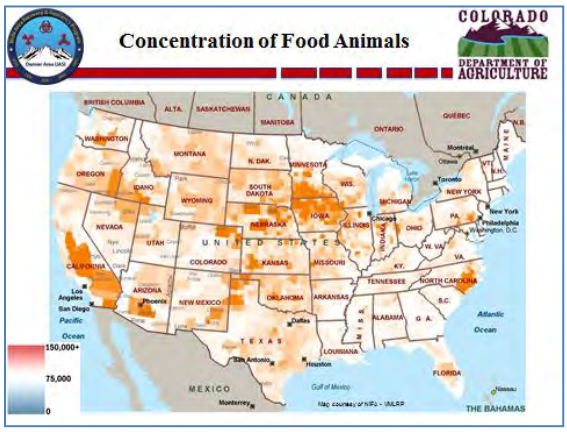
The international terrestrial animal health code (OIE Article 8.5.9) has requirements for recovery of free status after an FMD outbreak. In situations termed "Stamping Out Without Vaccination," three months are required after the last case where a stamping-out policy and serological surveillance are applied. For "No Stamping Out With Vaccination," it is 18 months after the last case where a stamping-out policy is not applied, but emergency vaccination and serological surveillance are applied.



Quantity	One Feedlot (100K head)	Amount from One Feedlot is Equivalent to:	All FMD Susceptible Livestock in US (NASS, 2010)
Amount of Biomass	100M lbs	Weight of Titanic when it sank	153,000,000,000 (76M tons = weight of 600,000 locomotives)
Number 30-ton truckloads	1,667	Trucks end-to-end would stretch approximately 16 miles	2,550,510 (trucks end-to-end would encircle the earth at the equator)
Length of Burial Trench	151 miles	Approximate distance from Denver to Glenwood Springs, CO	231,030 miles (about distance from earth to moon)
Gallons of Leachate per day	4,000	Over 5 years, enough leachate to fill 11 Olympic-sized swimming pools	6,120,000 (about the total gallons of oil BP skimmed off the surface of the Gulf)

When stamping out is used, for every infected premises, a 6.2-mile radius is drawn around it, and typically all infected, contact or exposed cloven-hooved animals within the radius are euthanized to control the pathogen. An animal could have the disease for 6 to 10 days before

signs are shown, which can allow the pathogen to spread undetected. Modern U.S. agricultural practices involve frequent transportation of animals around the country. Approximately 80 percent of beef cattle production is located in the mid-west. A typical large feedlot may contain 100,000 head of cattle, which if euthanized and buried, would require a trench 151 miles long.



Ms. Miller's slides provided an overview of lessons learned from other countries in terms of responding to an FMD outbreak. In evaluating other countries' ability to respond to the disease, it was the lack of burial sites that slowed the response and a lack of medicine to kill the cows. Improper burial site designs frequently resulted in leachate contaminating drinking water supplies. Ms. Miller's slides explored other lessons learned from other countries.

Dr. Nick Striegel, CDA

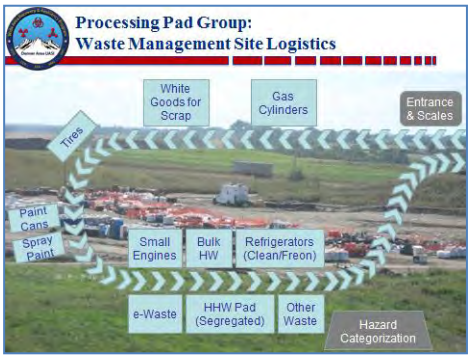
Dr. Striegel provided the CDA perspective on the response to an agricultural incident. There are many causes to a significant livestock emergency incident, including disease outbreaks, agroterrorism, and natural disasters. There are vulnerabilities to animal agriculture in Colorado, including intensive production units; frequent movement and mixing of livestock; transportation of animals and animal products; and immunologically naïve livestock population to foreign animal diseases. The impacts from such an incident include: negative effects on livestock health and welfare; possible adverse public health consequences; environmental health risks; effects on food supply and safety; public fear; loss of trade markets and negative effects on local, state and U.S. economy.

Dr. Striegel discussed the impact on livestock resulting from the Colorado Blizzard of 2007 in southeast Colorado. There were 50,000 to 60,000 head of livestock lost, many due to natural freezing. Another major FMD incident occurred in 1929. Fortunately, relatively few animals were involved. If such an incident happened today with the high concentration of animals in feedlots, it would not be possible to dispose of the carcasses in the same manner as 1929.

Colorado cattle and calves contribute over $3 billion to the Colorado economy and nationally result in approximately $61B in sales annual. The biggest concentration of hoofed animals is in eastern Colorado. In Colorado, the Colorado Rapid Response for Agriculture and Livestock (CORRAL) system was developed for early detection and rapid response to a foreign animal disease. CORRAL includes six components: community capability, operations center, resources, relationships, agreements, and livestock emergencies. There is a memorandum of understanding between CDA and CDPHE-CDA Carcass Disposal, which was completed in 2011. Sector specific plans, can be found on http://www.colorado.gov/cs/Satellite/Agriculture-Main/CDAG/1167928197091[14].

Case Study: Souris River Flooding – Minot, ND

Paul Peronard, USEPA Region 8 On-Scene Coordinator (OSC)



Mr. Peronard described the Souris River flooding incident in June 2011. The Souris River crested 10 feet above previous record flood stage from runoff. The resulting flooding inundated more than 4,000 homes and businesses. Over 2,000 structures were completely submerged and water rose more than 8 feet in less than 12 hours. The flooding caused multiple levee breaches and wide-spread evacuations along the river.

A natural disaster was declared. OSCs removed HHW from the impacted area. They decontaminated and prepared white goods and e-waste for recycling. They also collected and processed orphaned containers and conducted environmental monitoring. Waste streams included HHW (e.g., oil, gasoline, pesticides); other materials (e.g., batteries, light bulbs, ammunition); e-waste recycling; and white goods (e.g., air conditioning units, refrigerators).

Mr. Peronard described how waste management tasks were organized. EPA Waste Operations personnel were divided into the following groups: a container collection group, a processing pad group, an asbestos group, and an environmental group. He described waste management site logistics that were developed for the responses. Logistics included the use of a mobile laboratory to accelerate sample analyses and defining procedures of how to sort, segregate, recycle, and package unknown material. EPA collected real-time air monitoring with data telemetry for particulate matter (PM) 2.5, PM 10, and volatile organic carbons (VOCs) at six locations throughout Minot, North Dakota. EPA shared this data to the public via a website.

Mr. Peronard described some of the key lessons learned from the incident. He stressed the importance of early coordination with locals about public information and the need for ongoing public communication and transparency with data. He advised that the benefits of the near real-time public website were twofold: (1) providing the local/state and federal agency officials up to date on the status of the incident; and (2) keeping the public informed without the distraction of numerous inquiries. Mr. Peronard advised that responders would be prepared for changes in waste stream composition over the course of the response and that staging and segregation of areas must be scalable. Finally, he recommended the tracking of costs and progress to assist in determining when the federal response was achieving diminishing returns and could be turned over to the locals.

Section 3. Summary of Day 2, March 16, 2012

Importance of Planning for Waste Management in a Homeland Security Incident
Anna Tschursin, EPA ORCR
Melissa Kaps, EPA ORCR

The purpose of Day 2 Workshop Sessions was to provide an outline of a waste management plan and help the workshop participants begin to develop the major components of their own plans. The workshop was structured to present information to the audience, extract information/answers from the group and combine the information into an outline of an actual waste management plan. The EPA presenters elicited the audience's desired outcomes and goals for the session. The workshop participants expressed their interests in learning what elements should be included in a plan and began the process of drafting their own plan. They thought that it would be useful to develop a high-level Table of Contents that could be scaled up or down depending on the time and resources available to prepare plans in advance. Participants thought it would be useful to have a waste plan that rolls up to an emergency operations annex. They wanted to know how to address water issues and would like to know about the availability of tools that could help with planning. Finally, they wanted a better understanding of local plans and a suggested path to move forward.

Trying to develop an outline for a simple high-level plan individually can be overwhelming. However, planning ahead for a wide-area incident is important because such incidents will result in a large quantity of waste, a wide variety of waste, wider areas of impact, and changes in public perception.

Ms. Tschursin explained the importance of planning ahead for wide-area incidents. These types of incidents are likely to result in a large quantity and wider variety of waste. Wide-area incidents by definition will have a much wider geographic area of impact and have a significant impact on the public. She explained that waste generation will commence at the start of an incident and continue through all stages of the incident. Ms. Tschursin acknowledged that planning in advance has some challenges. One challenge could be a lack of planning resources available. Another challenge could be the lack of cooperation amongst internal planning components. Despite the best planning, some aspects of the actual site-specific incident are not likely to have been anticipated and therefore unplanned. Plans that are completed and stored on the shelf typically lose value over time. Plans must be continually exercised and updated.

Ms. Kaps explained that the planning process can be initiated by identifying organizations and personnel to work on the plan and reviewing other plans that might already exist. It may prove useful to prioritize the development of certain sections of the plan, perhaps by starting with elements that would likely mitigate community hazards or may be eligible for FEMA grant funding. To assist planners, Ms. Tschursin identified publically available resources, which can be found on EPA's website: http://www.epa.gov/waste/homeland[16].

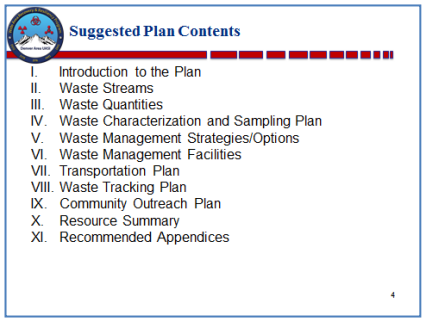
Waste Management in Four Easy Steps
Anna Tschursin, USEPA ORCR
Melissa Kaps, USEPA ORCR

Rather than develop individual plans for different types of incidents (e.g., hurricanes, earthquakes, CBR attacks), EPA believes that there are many advantages to an all-hazards approach to waste management planning. A large amount of the required planning information will be the same across multiple hazards. For example, regardless of the type of material/debris, it will be important to identify temporary storage areas to store and segregate the material prior to its ultimate management. A single, all-hazards document is easier to maintain and scenario-specific details can be developed for prioritized threats and added as appendices to the larger plan.

Ms. Tschursin presented a four-step process which breaks the planning task into manageable parts. The four-step process helps delineate the difference between the plan and its implementation. Finally, the four-step process emphasizes that waste management is a process and not an incident. She identified the four steps as:

1. Perform pre-planning activities.
2. Develop a WMP.
3. Review, maintain, exercise, and train.
4. Implement the WMP.

Developing a Waste Management Plan (Part One: The Wastes Generated)
Anna Tschursin, USEPA ORCR
Melissa Kaps, USEPA ORCR



Step 2 of the "Four Step Process" focuses on the waste that is generated. The plan outline presented is a suggested structure and will contain baseline information common to all scenarios and additional sections on CBR. Ms. Tschursin and Ms. Kaps presented suggested plan chapters.

This presentation addressed the first four chapters of a WMP. Ms. Tschursin and Ms. Kaps discussed each of these chapters in detail and what may be included in them. The suggested content for Chapter 1 - Introduction to the Plan, is to describe the scope of the WMP and other information of a general nature. Some things to consider when developing Chapter 1 include: review existing plans and applicable regulations; the Incident Command System[17]; and the National Planning Scenarios[18].

The suggested content for Chapter 2 - Waste Streams, is to include a listing and description of possible waste streams, information that would help decision makers, and how each waste stream should be handled. The plan will need to address the differences between federal and state regulations. A useful tool for identifying waste streams is the I-WASTE tool[19] *(*see Day 2 Presentation on *Waste Management Planning Aids*).

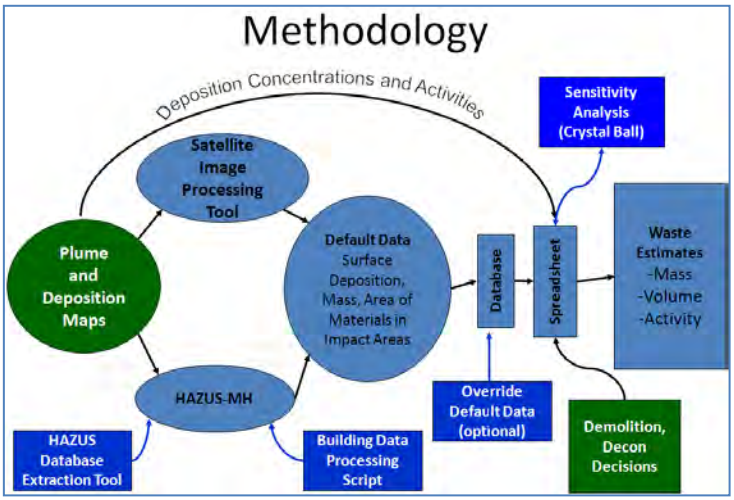
The suggested content for Chapter 3 - Waste Quantities, is to include forecast of the quantity for each waste stream and methods for estimating waste quantities during an incident. The plan will need to address the method used to forecast waste quantities; I-WASTE[20] and the WEST[21] may be useful tools for doing this.

The suggested content for Chapter 4 - Waste Characterization and Sampling Plan includes a description of how to characterize each waste stream, the sampling that will be necessary, and how the sampling will be conducted. Some of the considerations for waste characterization and sampling are cost, time to wait for results, laboratory capacity and access, and community concerns.

ORCR is in the process of developing a "toolbox" of resources that will help state and local governments, as well as companies, develop waste management plans for homeland security incidents. The toolbox may include such elements as: Four Easy Steps Handout; waste stream-specific factsheets; a waste management decision diagram; a waste stream comparison chart; an all hazard risk assessment planning aid (prioritization); and, a waste treatment technology comparison chart.

Waste Management Planning Aids
Dr. Paul Lemieux, USEPA ORD/NHSRC

Dr. Lemieux discussed decision-making needs for waste management, which include: estimation of waste quantity and characteristics; number and characteristics of affected buildings; relevant regulatory requirements; key decision makers; potential treatment/disposal facilities; potential transportation issues/routes; impact of remediation/decontamination decisions on waste management and vice versa. Two tools are currently under development:



- **Tool 1: Incident Waste Assessment and Tonnage Estimator (I-WASTE) online decision support tool.** The target audience includes EPA responders, state and local agencies, and

treatment/disposal facility operators. This tool[22] is available to the public at: **http://www2.ergweb.com/bdrtool/login.asp.**

- **Tool 2: RDD Waste Estimation Support Tool**. The target audience is EPA responders and state and local agencies. The objective of the tool[23] is to generate 1st order estimates of waste from radiological incidents and be used for planning and response. The tool uses commercially available software/databases and incorporates the National Atmospheric Release Advisory Center (NARAC) plume models. The tool can adjust parameters based on different options for decontamination technologies and demolition strategies. The tool can also conduct sensitivity analysis on results.

Developing a Waste Management Plan (Part Two: Management of Wastes)

Anna Tschursin, USEPA ORCR
Melissa Kaps, USEPA ORCR

This presentation addressed the following chapters of the Waste Management Plan:

V. Waste Management Strategies/Options
VI. Waste Management Facilities
VII. Transportation Plan
VIII. Waste Tracking Plan
IX. Community Outreach Plan
X. Resource Summary
XI. Recommended Appendices

Ms. Tschursin and Ms. Kaps discussed each of these chapters in detail and what may be included in them. The suggested content for Chapter 5 - Waste Management Strategies/Options includes a description of how the materials and waste will be managed from the point of generation to their final disposition. Some points to consider when developing this chapter are: how to minimize the waste generated; cost; off-site versus on-site management; facility requirements and capacity; and, EJ and community concerns.

The suggested content for Chapter 6 - Waste Management Facilities includes basic information on specific facilities and information that would aid decision-makers when choosing waste management facilities during an incident. Some issues to consider when developing this chapter include: the existence and location of facilities in different states; capability of facilities (including compliance); preparation of pre-negotiated contracts; disposal costs; and, anticipated EJ and community concerns.

The suggested content for Chapter 7 - Transportation Plan includes a description of how waste will be transported from its point of generation to staging areas, storage areas, and/or waste management facilities and the required documentation. Some issues to consider when developing this chapter include: security requirements; applicable regulations; preparation of pre-negotiated contracts; facility requirements and capacity; and, anticipated EJ and community concerns.

The suggested content of Chapter 8 - Waste Tracking Plan includes a description of how to ensure waste is being transported to its intended location, document where it goes, and has the tracking information publically available. Some considerations for this chapter include maintaining consistency of the information that is reported and that it is kept as current as possible.

The suggested content for Chapter 9 - Community Outreach Plan includes how to address community concerns. Considerations when developing this chapter include: perceived risk versus actual risk; community characteristics; preparation of fact sheets: and, the potential need for translators.

The suggested content for Chapter 10 - Resource Summary includes a list and description of the resources that will be needed and how they will be obtained. Finally, Chapter 11 contains the recommended appendices.

The Workshop participants suggested including an additional appendix covering standard operating procedure(s) (SOPs) for primary tasks for field personnel.

Group Breakout Sessions

At this point in the agenda, workshop participants were split into three separate subgroups each focusing on CBR issues related to the WMP. Each of the groups was tasked to develop an outline of a notional WMP and what specific CBR issues should be considered. Later in the day, each of the subgroups reported back to the workshop participants as to their findings/recommendations. For the summary of the discussions, please see Appendix D.

Implementation: What to do with the Plan When an Actual Incident Occurs?
Anna Tschursin, EPA ORCR
Melissa Kaps, EPA ORCR

Step 3 of the "Four Step Process" in developing a working WMP involves "review, maintain, exercise, and train." Step 3 is designed to ensure that a plan continues to be relevant (i.e., does not become obsolete prior to its use), is continually improved through periodic reviews and exercises, and is well understood by the relevant organizations/personnel. This step of the Four Step Process includes: review and update the WMP regularly; meet with involved parties; schedule exercises; develop a training plan to address training needs; and incorporate waste management lessons learned (e.g. After Action Reports); and, improvement plans.

Step 4 of the "Four Step Process" is implementation. Although everyone hopes that this step will never be necessary, implementation includes: identifying the WMP that closely aligns to the specific incident, if applicable; revising the WMP with incident-specific information; presenting the revised plan to the appropriate Incident Command staff ; notifying waste management facilities; exercise contract support

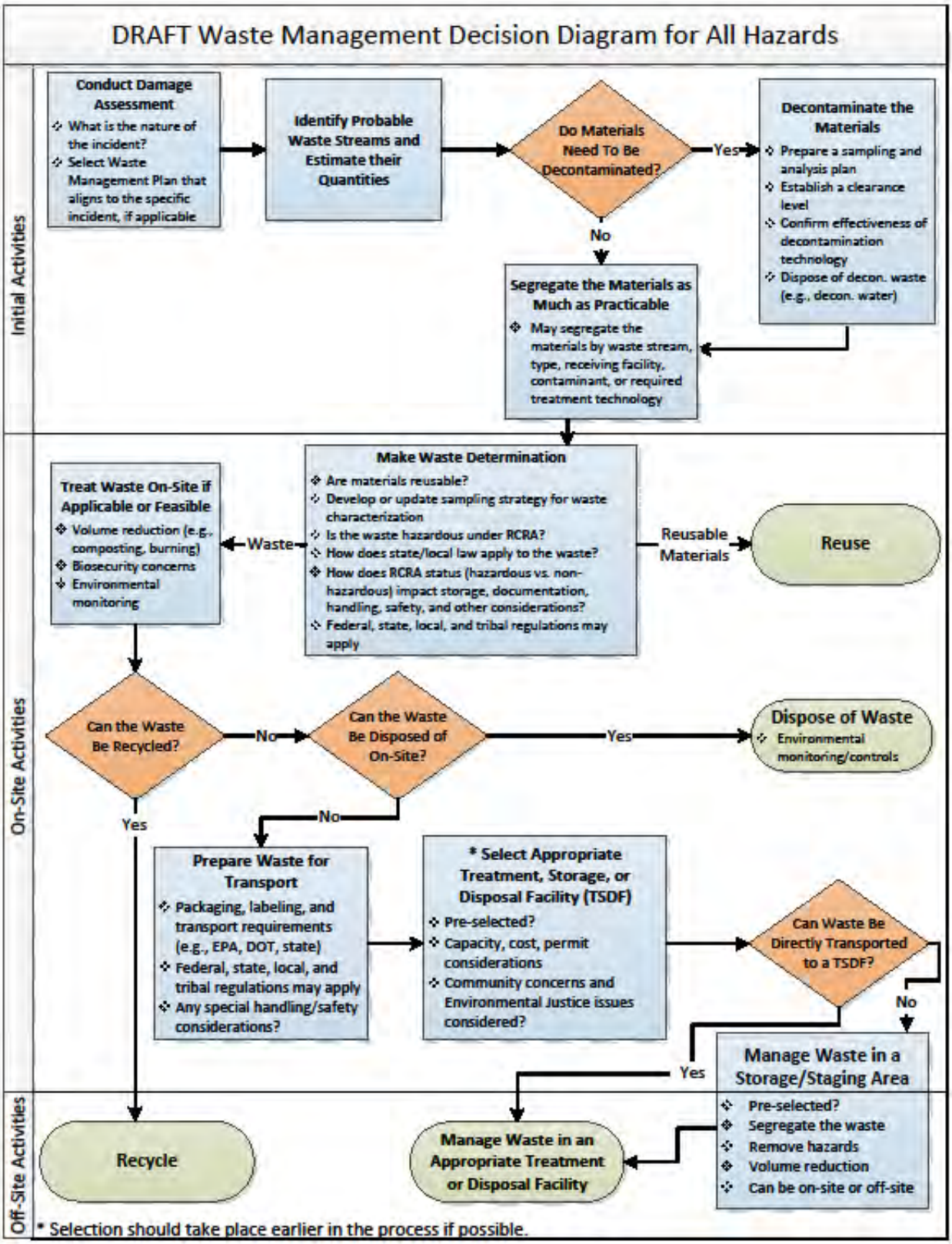
where necessary; implementing the community outreach plan; notifying laboratories of anticipated sampling/analysis needs; identifying waste management policy or implementation issues that require resolution; and, tracking waste management operational monitoring. Ms. Tschursin and Ms. Kaps presented a flowchart that illustrates the waste management decision-making process during an actual incident and is divided into three parts: initial activities, on-site activities and offsite activities.

Ensuring that the waste goes to the appropriate treatment or disposal facility could be expedited by maintaining facility data. Waste management facility data could include data on the staging areas, landfills, and other facilities receiving waste. Specific data details could include: name and type of facility, permit status, capacity, compliance status, etc. Waste tracking should start at the beginning of the incident and in order to provide the desired level of transparency. EPA provided a sample waste tracking form to demonstrate the type of information that should be tracked. An exit strategy should identify a process for transitioning waste management oversight activity 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. Long-term monitoring may be necessary.

Closing remarks

Ms. Dietrich concluded the workshop with a few remarks. She thanked the presenters, the local representatives who participated, and other guests for their time, energy and enthusiasm for the workshop. She noted that workshops like this one were of tremendous value to the EPA to ensure that the work that we are engaged in is of value for our important stakeholders. Ms. Dietrich also complimented Ms. Tschursin and Ms. Kaps and noted that this was the first time they had presented this information. She hoped that they continue to share their efforts with others around the country.

Mr. Russell added his words of appreciation and particularly noted the contributions of the State of Colorado, and especially Denver as part of the WARRP project. All of the parties have come together to make the country more prepared for a wide-area incident. All of the stakeholders are learning from each other and all are gaining from the process.



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Appendix C: List of Resources

Website	Topic
http://www.epa.gov/waste/homeland/	EPA's website for waste management during homeland security incidents
http://www.warrp.org/	DHS' WARRP website
http://epa.gov/katrina/	U.S. EPA's response to the 2005 Hurricanes
http://www2.ergweb.com/bdrtool/login.asp	U.S. EPA's I-WASTE Tool
http://www.dhs.gov/xabout/laws/editorial_0607.shtm	DHS' site on Homeland Security Presidential Directives
http://www.fema.gov/emergency/nrf/	DHS' National Response Framework(NRF), Food & Ag Incident Annex, Rad Incident Annex, Emergency Support Functions (ESF)
http://www.fema.gov/emergency/nims/	FEMA's NIMS resource center
http://www.epa.gov/radiation/waste-management-overview.html	Radiological Waste Management, Waste Management for Homeland Security Incidents
http://www.epa.gov/homelandsecurityportal/pdf/Final_Food_and_Ag_CONOPS.pdf	EPA's Federal Food and Agricultural Decontamination and Disposal Roles and Responsibilities report from March 2005
http://www.colorado.gov/cs/Satellite/Agriculture-Main/CDAG/1167928197091.	Colorado's Department of Agriculture

Appendix D: Summary of Day 2 Breakout Sessions

The participants broke out into three groups, each focusing on CBR issues related to the Waste Management Plan. Each of the groups discussed the basic outline of the Waste Management Plan and what specific CBR issues should be considered. A summary of the discussions are as follows:

Radiological Scenario

- A debris management plan would address the needs of a wide-area rad incident.
- Identification of disposal locations would be needed in an all-hazards plan. While Colorado has landfills, disposal of contaminated material, above some level, would need to go to a rad facility. There are a limited number of rad waste facilities in the country. There is a RCRA Subtitle C in Eastern Colorado, but limited by its permit. It can take some radioactive material (naturally occurring) and there is a process that whereby the NRC can do a waiver to allow radioactive material from (e.g., a Superfund cleanup).
- There are different regulatory acceptance criteria for rad waste facilities, depending on the level of radioactivity. If the waste is a Class B or C then have one path, if Class A another path.
- The workgroup discussed the possibilities of opening RCRA Subtitle C or D facilities for slightly contaminated rad waste.
- A suggestion was made to create a decision tree to determine the path waste must take and what to consider in making those decisions.
- If referring to a high volume, low activity radioactive waste, then some disposal options could be considered: Subtitle C facility; New facility when (at the end of the incident, before?); Must be physical alternative of when the incident would occur.
- Denver needs to make a decision if it wants an options plan or a predetermined plan; if a local jurisdiction plan is driving this, then it would be best to have a predetermined plan.
- There is a need to have a strategy for long-term storage. If there are pre-determined locations identified, then things that must apply to staging and disposal need to be considered and other jurisdictions need to be involved. Some of receiving facilities have rail access and some do not.
- One participant stated that sometimes plans drive too much detail too soon. Perhaps it is better to take a broad brush and incrementally drill into more detail. Not going to be undertaken if considering all aspects.
- Denver would want to know that EPA has capability and resources available to support the local response. Coordination would go through Incident Command System (ICS) structure and FEMA would already have the coordinating officer present.
- Sharing of the Waste Management Plan would be important and would drive locals to talk to start regulator.
- Everyone agrees that Stafford act is the assumption of FEMA.

- Decision on contaminated FEMA ESF 10 not ESF 3, but first must go through the state.
- Decontamination strategy has a huge impact on debris management.
- If there is an explosion that is limited to three blocks, cleanup is easy, but the scenario is a 20-mile wide incident.
- The criteria under which facilities could receive exemptions/waivers were discussed; need to reach out to CDPHE and other jurisdictions and have a broader dialogue and communication for viability, acceptance criteria for landfill, etc.
- Consider opening up closed landfills. Discussion included the viability of taking rad-contaminated waste to rocky flats facility.
- Communicate and involve jurisdictions/agencies; the planning process is iterative.
- Communicate with all levels (e.g., city, county, state, fed), including Rocky Mountain Compact, regarding roles and responsibilities.
- EPA has contracts with waste disposal facilities already; Colorado could leverage these.

Chemical Scenario

- Waste Stream list resulting from a chemical scenario would include: residential homes, businesses, industry, contents of building/Coors field, construction materials, medical waste. Some issues to address are sorting by contamination, such as low level, high level, (bins of levels).
- Description of Waste includes waste water, sludge, personal effects, roll offs, secondary waste (e.g., personal protective equipment [PPE]).
- Factors influencing quantities of waste include decontamination methods, operating parameters of affected facilities, wastewater generated.
- Estimate number of samples, types of analysis needed: Screening level analysis (Porous/non-porous); Statistical vs. non statistical; PPE needed; How data from initial characterization will inform WMP QA.
- Sample lobbies of buildings to determine if additional sampling is required.
- Collection strategy issues: separate by porous and non-porous and headspace analysis; prioritizing facilities/who gets cleaned up first; develop a decision flow-chart; determine staging areas; chain of command; create groups to look at each sub group specific areas such as waste; develop standard operating procedures (SOP's); key players, contacts, resources; determine treatment and disposal options; contact lawyers; credentialing. Regulation roadblocks need to be considered.
- Waste management facility types include: wastewater treatment plant; temporary/permanent.

- Facilities: railroad yards; Coors field; Subtitle C landfills (e.g., Clean Harbors); and railway types.

- Information for the site manager and support staff contact information: location information (e.g., latitude/longitude, address); permits/types of waste accepted; copy of pre-negotiated contracts; and facility map. Issues to consider: capacity of the facility we are requesting (e.g., if waste management has 100 trucks and we need 1000, then we will need to consider additional groups); social/economic; containment; and permit limits.

- Issues related to transportation include: responders, types of waste, general public impacted, transportation routes to minimize spread of contaminant; and railway availability.

- Community outreach issues include contact information of key stakeholder groups (community groups, media).

Biological Scenario

Item for Plan	Issue to Consider	Missing Information	Available Tools
Introduction to the Plan			
Using Existing Plan (NCR) w/detailed annexes	Nuclear Power Plants? Identified hazards (natural) Use the Hazard Vulnerability Plan Identify Key Stakeholders and Players Annexes Detailed Use Historical and cultural experts in the planning Insurance capabilities	Jurisdictions Covered in existing plans When do the federal partners get involved? Identified Local Requirements - legal authorities	EPA local Federal Partners Local DRCOG Plan (Denver Regional Council of Government) Many of the relationships and discussions have already started and key participants already at the table. ICS Structures Recovery Framework
Waste Streams			
Bio	Agriculture types - Livestock Fowl ETC. Buildings & Construction Material Vehicles Electronics Food Supplies Public water supplies Storm Water Soil PPE Clothing Hospital waste Car Wash waste water	Weaponized Anthrax vs. non Mass Fatality Hospital capacity for waste	BioWatch Monitors
Waste Quantities			

Item for Plan	Issue to Consider	Missing Information	Available Tools
Forecasting the volume	Using the estimator tools precalculate the units of waste Temporary contamination Units		Access to the estimator tools
Waste Characterization and Sampling Plan			
	Has it been treated or not Regulatory Status Wipes Lab Capacity		
Waste Management Strategies/Options			
	Staging Areas Decon vs. Demolish Water issues - pre-treatment? Recycle? Demo Permits expedited Waste Minimization Advanced Agreements/contracts w/ disposal facilities	Advance Permits Personal DeCon kits	Advance Permits FEMA Funding if hits threshold
Waste Management Facilities			
	Identify existing capacity Permit limitations for existing facilities Treat it on-site or open an new landfill Re-open closed landfills	Limited medical incinerators Mobile incinerators	Nebraska closest hazardous waste incinerator
Transportation Plan			
	Where to get transport Vehicles Do you have sufficient Quantity The types of haulers you will need. Will they require lining? DOT Standards - Permits Rail Car availability Routes The equipment need to load trucks National response contractors Drivers Commercial Driver License (PPE trained) Drive time limitations Fuel & maintenance availability for this incident Decon Vehicles (both ends)		
Waste Tracking Plan			
	Manifest Bill of Lading Hauler - amount of load - where it traveled - contents		

Appendix E: Workshop Findings

The following table summarizes participant recommendations at a number of EPA TAD workshops. The recommendations are organized in five previously-identified barriers to waste disposal: Socio-political, Capacity/Capability, Technical/Scientific, Regulatory/Statutory, and Policy/Guidance. The recommendations were compiled from the TAD Workgroup and participant feedback during the IBRD, RDD, and anthrax waste disposal workshops, and are presented in no particular priority order.

RECOMMENDATIONS BY BARRIER			
TAD Workgroup	**IBRD Workshop**	**RDD Workshop**	**Anthrax Workshop**
Socio-Political			
Address the concerns of multiple stakeholders who object to disposal of CBR derived wastes based on perceived health and/or liability concerns.	1. Include in the worker education process specific provisions for timeframe and material so they could begin work.	1. Mass communications.	1. Solicit subject matter experts to assist in developing accurate preparedness outreach information.
Engage states, waste management industry, and the public to identify and address industry concern in accepting such waste, as well as public perceptions (e.g., NIMBY attitudes) associated with disposal of CBR derived wastes (e.g., develop educational information packages for the industry and public).	2. Educate communities where the waste would be transported and housed through the waste disposal process.	2. Plan for public inclusion/open public discussion/education/transparency.	2. Train and equip specialized state/local teams to assist in waste disposal related to emergency response (including PPE).
Plan and conduct exercises with waste treatment/disposal stakeholders to properly address disposal issues in response and recovery activities.	3. Educate stakeholders on risks associated with disposal following a TAD incident.	3. Communicate EPA's response contracting strategy.	3. Prepare a framework/planning presentation for corporate HQ/leadership to raise awareness about anthrax disposal in the private sector.
	4. Develop and have ready to deploy a worker training to handle, collect, and dispose of the waste	4. Public/agency education.	4. Share and disseminate knowledge with Solid Waste Association of North America (SWANA), Environmental Research and Education Foundation (EREF), National Solid Waste Association of North America (NSWANA), Healthcare Waste Institute, Decon Conference.
	5. Educate stakeholders on anthrax 101 and provide health and safety communications.	5. Coordinate public messages.	5. USEPA should develop a webinar to outline framework/template/plan that will be shared with state/local actors.

RECOMMENDATIONS BY BARRIER			
TAD Workgroup	**IBRD Workshop**	**RDD Workshop**	**Anthrax Workshop**
	6. Provide education/training: operational info to POTW, worker safety, perception/stigma issues.		6. Develop risk and handling information to help states talk to transportation and owners/operators to increase their willingness to transport or accept the waste.
	7. Determine how the response and recovery effort's message will be created and communicated to the relevant stakeholder groups; educate stakeholders about the dangers of anthrax, how prophylaxis works and its effectiveness, what steps can be and are being taken, the roles the each stakeholders has to play in the overall effort.		7. Anticipate what types of messages should be shared with communities; draft messages and share with state and local planners.
			8. Develop pre-packaged training materials for workers (transportation, handling, treatment, disposal) that can be rolled out after an incident.
			9. U.S. EPA should host a meeting and invite all landfill companies to discuss the issue of disposing anthrax-derived waste.
			10. Look into public perception issues and workers around decontamination and if anthrax-derived waste is really clean.
			11. EPA solicits input from associations/unions (e.g., teamsters for trucking or public unions American Federation of State, County and Municipal Employees (AFSCME) on anthrax disposal preparedness issues.
Capacity/Capability			
Increase the number and capacity of facilities willing to accept CBR derived wastes.	1. Identify the capacity of on-site treatment to allow EPA On-Scene Coordinators to define the site boundaries for staging and treatment before material becomes waste and is subject to regulatory timelines and tracking requirements.	1. Engage LLW Forum and compacts in discussion with state radiation officials about LLW capacity and access.	1. Explore options for buying or building landfills that would be owned by the state or federal government (and privately operated). Develop guidance for states or feds to use emergency landfills or DoD landfills as waste disposal options (government back-up plan).

RECOMMENDATIONS BY BARRIER			
TAD Workgroup	**IBRD Workshop**	**RDD Workshop**	**Anthrax Workshop**
Initiate dialogue with DoD, DOE, DHS, and other federal and state level stakeholders to examine the feasibility of accessing existing and/or developing new federal disposal/treatment assets to increase capacity.		2. What rate of removal/handling is expected?	2. Determine transportation capacity issues (training, package, PPE drivers need, turnaround time).
Develop sufficient capacity and guidance to dispose of waste generated from a radiological attack, particularly for waste whose radionuclide concentrations are above Class A limits.		3. Local siting versus out-of-state for both disposal and material handling, facility should be purpose-built.	3. Determine capacity to handle other types of waste (e.g., waste water).
In partnership with DOE, DoD, Nuclear Regulatory Commission (NRC) and/or other relevant federal agencies and states, develop guidance or criteria that would allow DOE and/or RCRA facilities that meet relevant design and operational requirements to be eligible to manage LLRW.		4. Plan for short-term waste staging.	4. Determine physical landfill capacity versus permitted capacity.
Coordinate with NRC and the states to identify conditions in existing regulations under which potentially radioactively contaminated material may be released from regulatory control without further restriction (i.e., "free release"), as well as conditions for restricted release, particularly for waste whose radionuclide concentrations are above Class A limits.		5. Use multiple sites and disposal options.	5. Investigate the option of government buying landfills, requesting that they be built or designating DoD site(s) for landfills.
Identify available disposal capacity and potential gaps for radiologically contaminated waste from an RDD incident, including an assessment of existing DOE facilities.		6. Use of public/private facilities for waste transfer.	
		7. Develop strategies for segregation in staging/storage.	
		8. Establish temporary storage options for an RDD incident.	
		9. Identify issues associated with sending wastes to Nevada Test Site (NTS).	
		10. Identify temporary storage options.	

RECOMMENDATIONS BY BARRIER			
TAD Workgroup	**IBRD Workshop**	**RDD Workshop**	**Anthrax Workshop**
		11. Determine rate of removal expected.	
Technical/Scientific			
Develop protocols to determine residual CBR threat agent levels in waste, particularly biological and radiological-derived waste.	1. Conduct extensive research on the survivability and viability of anthrax through the waste disposal process. Need to determine how anthrax behaves in the natural and landfill environments and how this can impact the destruction of the spores.	1. Develop long-term research/exercise program to develop guidance for RDD exercises (similar to what DHS Science and Technology Directorate has done for chemical/biological incidents at airports).	1. U.S. EPA needs to determine decontamination criteria prior to incident ("how clean is clean") so state can use the criteria to determine if the material is no longer infectious waste.
Develop representative sampling methodologies for biologically contaminated wastes and include waste characterization as an additional desired outcome for ongoing efforts to develop sampling and analytical methodologies for biological agents from porous materials.	2. Verify what constitutes "clean" with different types of material and in different environments.	2. Need for preplanning for analysis and characterization.	2. Perform research in the following areas: [1] determine fate and transport of anthrax in landfills; [2] determine criteria for determining waste to be considered non-infectious; [3] determine how to sample waste for spores and develop necessary technology; and [4] determine the fate and transport of anthrax-derived waste in landfills by working collaboratively with SWANA.
Determine the level of residual chemical, biological, and radiological agents at which waste can be properly disposed of in existing facilities (e.g., RCRA hazardous or non-hazardous waste landfills).	3. Understand how spores behave under standard landfill conditions, including temperature/ pressure, leachate treatment, effects of gas flaring, and cross-waste contamination.	3. Identify initial disposal site options.	3. Obtain dose-response data to assess what concentration of anthrax spores are acceptable before workers or others in contact with the waste.
Explore the efficacy of treatment/disposal technologies to reduce/contain CBR threat agent levels.	4. Research decontamination protocols, the availability of technology and its effectiveness, sampling and clearance methodologies, and estimated timeframes for completion based on "acceptable" levels of "clean" to determine the viability of treatment in place to minimize the amount of waste produced.	4. Establish standards for cleanup.	4. Provide more information about fate and transport of waste water systems and what liquid anthrax-derived waste will do to the drinking water systems, employees, and treatment plants.
Evaluate the behavior/fate/transport of threat agents and/or treatment by-products bound to porous materials in treatment/disposal processes.	5. Determine what packaging is acceptable to prevent leakage.	5. Identify/locate IAEA body of knowledge, especially on Brazil incident.	

RECOMMENDATIONS BY BARRIER			
TAD Workgroup	**IBRD Workshop**	**RDD Workshop**	**Anthrax Workshop**
Evaluate the long-term effectiveness based on design and operation of landfill disposal for all types of waste contaminated with CBR threat agents.	6. Determine how clean is clean enough for different treatment and disposal pathways and if there are flexible tolerances for levels of clean, and where they exist.		
	7. Research the types of technology available, their effectiveness, and what can be developed and pushed out to first responders and cleanup crews in order to speed up the decontamination process.		
	8. Provide more efficient sampling and clearance analysis regarding the waste itself.		
	9. Answer the research questions - How clean is clean?, How do you verify clean?, How does anthrax behave in a landfill environment?, What are the lessons learned from previous experiences with anthrax?, What is the best available way to treat contaminated material in place, and what types of technologies are being investigated to make that process more efficient and effective?		
Regulatory/Statutory			
Encourage DHS and Congress to amend the SAFETY Act to allow its limited liability procedures to apply to waste treatment/disposal facilities.	1. Use proclamations to clarify the regulatory status of the waste and address who can and would be handling it through the disposal process while also providing the leverage to bring historically hesitant participants to the table.	1. Identify processes for obtaining exceptions to regulations governing RDD waste disposal.	1. Develop a common naming convention for waste classification (limit state-to-state changes) for how waste is defined.
Improve the regulatory and statutory processes to expedite effective disposal of CBR derived wastes.	2. Determine how to classify contaminated waste and waste that had been decontaminated and needed disposal; determine regulatory ownership.	2. Define cut-offs for "low-level waste" and de minimis levels.	2. Government approval on granting authorizations or operating exemptions or exceptions; including rules and criteria for temporary authorization to accept material.

RECOMMENDATIONS BY BARRIER			
TAD Workgroup	**IBRD Workshop**	**RDD Workshop**	**Anthrax Workshop**
Evaluate current regulations to better understand the status of the waste generated in a CBR threat agent attack and how that waste would be classified for disposal following an attack.	3. Address coordination among counties under common regulatory authority.	3. MOUs/legislation on waste acceptance at DOE facilities, not to short-circuit compact system.	3. EPA and Centers for Disease Control and Prevention (CDC) work together on classifying the waste
Initiate dialogue with states and other federal stakeholders to assess potential regulatory approaches to disposal, such as speaking with Department of Transportation (DOT) regarding manifesting and tracking of biological contaminated wastes as is currently done for hazardous and radiological waste.	4. Establish a waste treatment and disposal pathway triggered with the classification of the waste.	4. Establish exemption/de minimis levels.	4. Develop guidelines for new landfill requirements.
Work with the State of New York to evaluate its regulatory program for handling biological threat agent derived wastes and recommend effective provisions for adoption by other states.	5. Clarify the regulatory status of contaminated waste and the materials used in the decontamination process in order to establish a clear waste treatment and disposal pathway.	5. Making changes to existing regulations due to the anticipated magnitude of RDD incidents.	5. In multistate incidents, owners and operators would prefer a single regulatory approach that could be implemented by a federal preemptive authority.
		6. Establish ownership of waste.	6. Occupational Safety and Health Administration (OSHA) and DOT provide clarity on worker safety and transportation regulations.
		7. Establish special-purpose de minimis levels for RDD incidents.	7. Get regulatory determination from CDC on whether or not anthrax-derived waste could be considered a "select agent" under CDC regulations.
			8. Work with DHS and others to develop federal statute to provide liability protection for treatment and disposal facilities (e.g., Safety Act).
Policy/Guidance			
Evaluate an indemnification protocol as a strategy to increase the acceptance of CBR derived wastes; and investigate the required statutory/regulatory process to implement required actions.	1. Address economics: indemnification, current tariff structures, and pre-existing contracts.	1. Establish interagency workgroup to develop recovery framework or "national waste management strategy" using existing waste disposal regulations with provisions for emergencies.	1. Establish indemnification for parts of the process (facilities or communities or others).

RECOMMENDATIONS BY BARRIER			
TAD Workgroup	**IBRD Workshop**	**RDD Workshop**	**Anthrax Workshop**
Work with states to develop management plans to address disposal of CBR derived wastes and leverage available resources, such as those available from other federal agencies (i.e., FEMA) to develop such plans.	2. Address requirements for continuous monitoring at disposal site and long-term liability of disposed waste.	2. Make sure limited liability is included in contracting for RDD response (especially if Subtitle C and D facilities will be used for disposal).	2. Develop federal guidance to assist states in making waiver decisions.
Evaluate existing or develop new guidance on the management and disposal of contaminated or treated water.	3. Address planning questions - What is the process for disposal?, What is the threshold for transition from emergency response to recovery?, What is the process for waste handling and collection?, What is the waste consolidation strategy?	3. Establish that there will be indemnification, look at what is being done at DOE and elsewhere.	3. Resolve the issue of whether or not federal indemnification is possible to ensure adequate disposal capacity.
Revise existing guidance or develop new guidance for the water and wastewater sector on containment and disposal of decontamination wastes, including large amounts of water and associated solid wastes.	4. Determine what is required for transportation: packaging/encapsulation of materials for transport, monitoring en route, mitigation en route.	4. Determine government liability/role in long-term care (is EPA the waste generator?).	4. Incorporate unique elements of anthrax incident into a concept of operations that could be included in existing plans.
Evaluate/develop technical guidance and policy regarding the storage and management of large quantities of decontamination-derived wastewater.	5. Explain roles and who is in charge.	5. EPA should complete its plans for RDD to provide decision frameworks for private sector to make business decisions.	5. Develop a tool with decision trees that provides options for handling, treating, transporting and disposing of anthrax-derived waste (use CDC website or APHIS foreign animal disease tool as models).
Evaluate/develop guidance and policy on discharge of CBR contaminated wastewater to POTWs, storm water collection systems, combined sanitary sewers, or ambient waters.	6. Create a "loose" template or decision framework that shows who the key players are, who sits at the table, who makes decisions and how, and what questions need to be asked and when.	6. Emergency provisions – integrated federal/state/compact/local decision making.	6. CDC and EPA working together to define pretreatment options prior to disposal and sharing this information with the private sector.
Develop guidance on discharge treated decontamination derived wastewater to POTWs.	7. Take lessons learned from cleanup following previous large-scale disasters and determine where those efforts met bottlenecks, areas for process improvements, and any other positive or negative similarities in the cleanup execution that should be avoided.	7. States should create and add a local landfill/disposal site inventory to debris management plans, even for non-radiological incidents (requested for Liberty RadEx).	7. Develop federal guidance to identify decontamination performance standards that could be used to replace analytical results to "prove waste is clean." Develop performance-based cleanup standards to minimize the need for lab sampling.
	8. Provide federal guidance on POTW issues/policy on wastewater treatment.	8. Make local disposal efforts part of the waste management framework.	

RECOMMENDATIONS BY BARRIER			
TAD Workgroup	**IBRD Workshop**	**RDD Workshop**	**Anthrax Workshop**
		9. Details of NRF - second and third tier of details.	
		10. It should be a federal and state action to raise issue of siting RDD waste disposal facilities locally with states, the Conference of Radiation Control Program Directors (CRCPD), compacts, and state solid waste managers.	
		11. Contracting strategy for response.	
		12. Reevaluate statements of work (SOWs) for emergency response contracts.	
		13. Set preparation levels/establish readiness contracts.	
		14. Will there be agreements between federal agencies to use existing contracts? For example, if DOE had a contract for radioactive waste disposal could another agency use it?	
		15. Determine acceptable levels and practices for alternative disposal strategies (handling low-activity waste locally).	
		16. Identify processes available for handling RDD wastes and their protocols for acceptance.	
		17. Free release criteria for building materials and sludges.	

Appendix F: Presentations

WARRP Waste Management Workshop

WARRP Waste Management Workshop
March 15, 2012

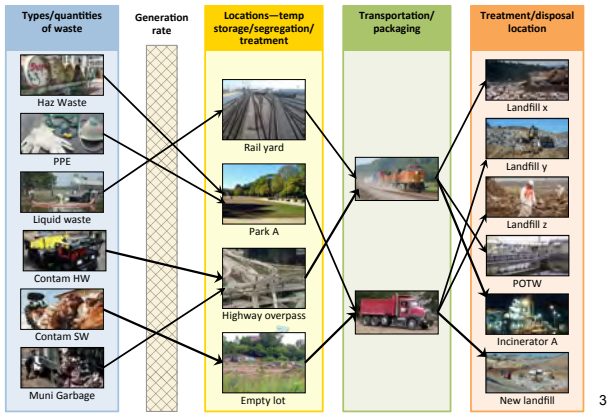
Homeland Security
Science and Technology

Introduction

- Welcome
- Introduction of participants
- Introductory remarks
- Overview of Agenda

2

Introduction



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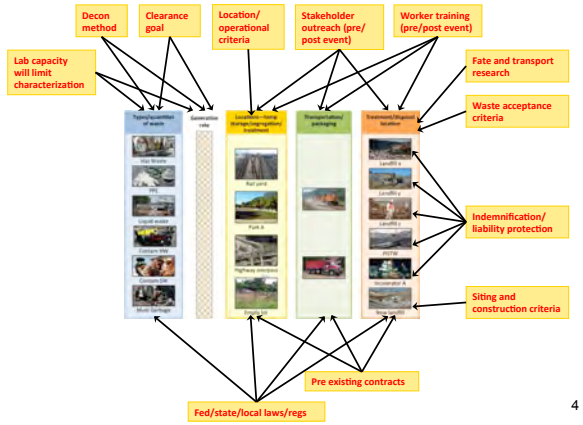
Introduction



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WARRP RDD Scenario – Radiological Waste Disposal

Bill Steuteville, Homeland Security Coordinator
U.S. Environmental Protection Agency Region 3

WARRP Waste Management Workshop
Denver, Colorado
March 15, 2012

Homeland Security
Science and Technology

WARRP RDD Scenario - Overview (Continued)

- Terrorists obtain approx. 2,300 curies of cesium-137 (CsCl) and 1.5 tons of ANFO and make 3000 pound truck bomb
- Terrorists detonate truck bomb containing the 2,300 curies of cesium outside the U.S. Mint in the downtown business district
- The explosion collapses the front of one building and causes severe damage to three others and blows out window of 5 other buildings
- Second explosion in Aurora a short time later outside Children's Hospital

2

WARRP RDD Scenario - Overview

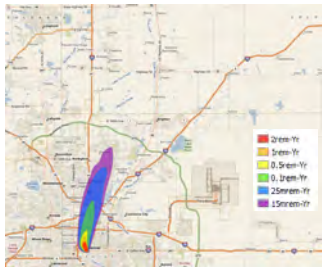
- Two Radiological Dispersal Device (RDD) attacks:
  - U.S. Mint (downtown Denver)
  - Anschutz Medical Campus (Aurora).
- Tens of thousands of people exposed, hundreds dead
  - Died of trauma from blast not radiation
- Evacuations/Displaced Persons
  - 10,000 evacuated to shelters in safe areas (decontamination required prior to 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

3

WARRP RDD Scenario – Overview Downtown Release

Most radioactive fallout is within tens of miles of blast, some may be carried up to hundreds of miles

- Hundreds of buildings contaminated
- Basic services affected
- Local businesses affected
- Government operations relocated
- Mass Transit (East-West rail line) affected
- Local military installations affected



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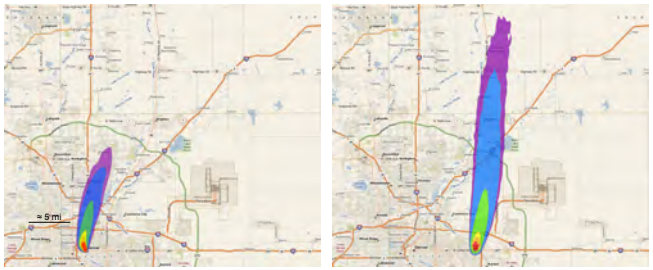
Twin Explosions; Two Plumes

Downtown: Tall buildings **Aurora: Flat terrain**



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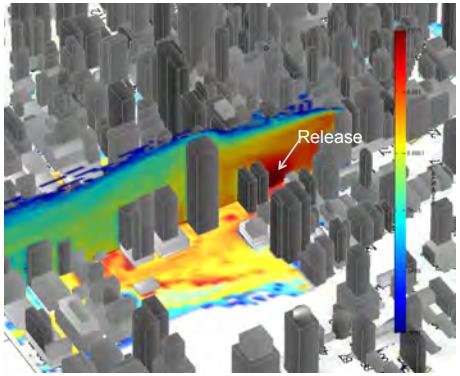
WARRP RDD Scenario - Overview (Continued)



Airborne dose

6

Waste Estimation – Tools that were used

- RDD Waste Estimation Support Tool (WEST)
  - Building Stock and Outdoor Areas
  - Decon and Demolition Waste
- I-WASTE Tool
  - Building Contents
- Bio-response Operational Testing and Evaluation (BOTE) Program Personnel Decontamination Waste Generation Data
- Tested by Exercise Players at Liberty RadEx

7

Waste Classification

1. Class A Low Level Radioactive Waste (LLRW).
2. Class B/C LLRW (higher activity levels from blast zone or onsite concentration efforts)
3. LLRW with Asbestos (i.e., old steam pipes from demo buildings)
4. LLRW with PCB's (i.e., PCB transformer oils coating demolished building exteriors)
5. Low Level Mixed Waste (LLMW) (RCRA hazardous waste and low level radioactive waste)
6. Personal Protective Equipment (PPE) waste
7. Sludge from onsite decontamination efforts
8. Sludge from WWTPs
9. Laboratory samples
10. Contaminated clothing from off-site health facilities
11. Non-radiological solid or hazardous waste for disposal in RCRA C or D landfills

8

What Types of Radiological Waste Will be Generated?

NRC Classification of Low Level Radioactive Waste (LLRW) as it relates to Cs-137:

NRC Class	% of Scenario Waste Volume
Class A: 0-1 Ci/m^3	100% of liquid waste (1-3 billion gallons) >95% of solid waste (16-21 million tons)
Class B: 1 – 44 Ci/m^3	Minimal (<1% of solid waste)
Class C: 44 – 4600 Ci/m^3	Only in immediate blast zone Negligible (<1% of solid waste)

9

Translation into Number of Railcars/Dump Trucks

- Liquid Waste (Total ≈ 1.5 - 3 billion gallons)
  - 50,000 to 100,000 railroad tank cars (30,000 gallon capacity)
  - 275,000, to 550,000 tanker trucks (5,500 gallon capacity)
- Solid Waste (Total ≈ 16-21 million tons)
  - 160,000 to 210,000 Railroad hopper cars (100 ton capacity)
  - 400,000, to 525,000 semi-trailer (64,000 pound net capacity)
  - 500,000 to 656,000 tri-axel dump trucks
    - Put end to end 3700 miles long! (LA to NY to Atlanta and some…)

10

Liberty RadEx Exercise Comparison

Same scenario;
Single detonation;
Philadelphia, PA

11

LRE Relocation and Cleanup Areas

140,000 Temporarily Displaced

200,000 Must Have Property Cleaned

12

LRE – Cleanup Tactics and Technologies

Current Decontamination Technologies:

- Cleaning agents, acids, foams:
- Reduce radiation; do not eliminate radiation
- Most effective on non-porous surfaces or areas of marginal contamination and/or short-term exposures
- Quickly Clean and reopen CI/KR

Most Effective Wide-Area Cleanup Strategies:

a) Roof Replacement
b) Soil Removal
c) Street and Sidewalk Surface Removal
d) Interior: dispose carpets, furnishings, possessions, drywall
e) Building demolition if higher contamination

13

LRE – Cleanup Tactics and Technologies

14

Cleanup, Waste, Waste Handling, Disposal & Costs

- Day One: Begin generating solid and liquid wastes
  - Responder, public, & hospital PPE & decon
- First Week: Begin generating significant liquid and solid wastes with CI/KR decontamination activities
  - Temporary storage locations
- First Month: Begin generating huge volumes of liquid and solid wastes with initial cleanup operations
  - Soils, demolition wastes, furnishings, office materials, etc.
  - Roofing materials, asphalt & concrete scarification
  - Need long-term storage locations and/or permanent disposal
- Cleanup can not proceed without waste handling options
- Cleanup will be prohibitively costly and snail-pace slow without local waste solutions

15

LRE Citizen Stakeholder Panel: Cleanup prioritization & Waste storage

Philadelphia citizens had no difficulty with concepts of cleanup prioritization, local storage and disposal, and difficult choices

16

State Leadership: Cleanup Criteria, Waste Disposal, Community Involvement

- Pennsylvania Department of Environmental Protection
  - Bureau of Radiation Protection
  - Led by David Allard, Director Radiation Programs
- Evacuation recommendations, cleanup criteria, waste storage and disposal decisions
- Leading Technical Advisory Panel
- Working with Community Advisory Panel
- Radiation Expertise and Leadership

17

WARRP Chem Scenario Waste Estimates

Paul Lemieux
Associate Division Director
EPA/ORD/NHSRC/DCMD

WARRP Waste Management Workshop
March 15-16, 2012

Homeland Security
Science and Technology

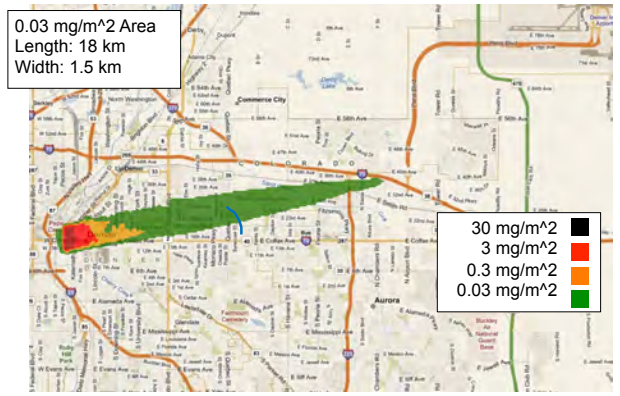
Chem Scenario Description

- **National Planning Scenario #5: Chemical Attack – Blister Agent**
- **Blister agent attack on a packed Coors Field (capacity 55,445)**
  - 95 fatalities
  - Over 1000 hospitalized
  - Tens of thousands evaluated
  - Thousands seeking shelter
  - Decon of affected victims/displaced persons seeking shelter
- **Significant contamination in affected areas**
  - Downwind vapor hazard
  - Approx. contamination area = over 5 miles downwind
  - Several high value properties contaminated (Coors Field, Pepsi Center, Invesco Field Mile High)
  - Basic services affected
  - Local businesses affected

Release Information

- **175 gallons of Agent Yellow (HL)**
  - Mixture of Sulfur Mustard (HD) and Lewisite (L)
  - Blister agents
  - Contains arsenic
- **Small airplane with sprayers**
- **Flew at low altitude over Coors Field**
- **Coarse spray of Agent Yellow released**
- **53,000 people hit by spray or inhale vapors**
- **Thousands injured including panic exiting stadium**
- **Secondary contamination tracked into nearby residences, onto public transportation, into hospitals**

WARRP Chem Scenario Y1



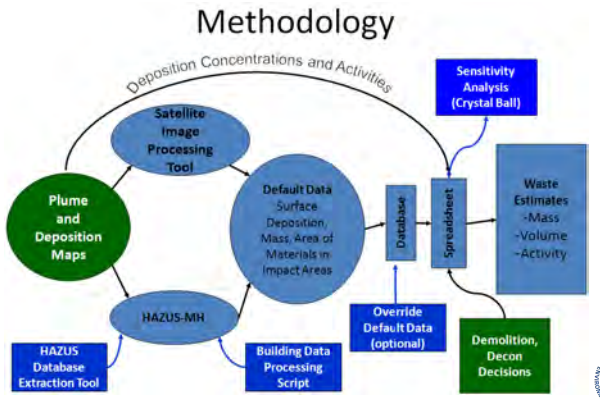
Remediation

- Little structural damage as result of attack
- Decontamination of some materials may be difficult or impossible
- Bleach for hot spots & surfaces - removes vesicant/blister properties of HL
- Monitored natural attenuation or forced air ventilation suitable for HL and may be used in combination with appropriate decontamination products
- Hot air is a valuable option to enhance evaporation but may not be effective against Lewisite component in HL
- Proprietary decon foams and gels such as DF-200®, CASCAD®, Decon Green®, or L-Gel® have been shown to be effective against HD on the order of minutes to hours, but not all have been thoroughly tested and their effect on Lewisite is unknown
- Formulations should be chosen that do not allow the formation of vinyl sulfones or mustard sulfones from decomposition of HD
- Following decontamination efforts, arsenic (from L) containing by-products will remain on surface; it would require disposal depending on the associated risk assessment
- Also, in the VX scenario, formulations should not encourage formation of EA2192

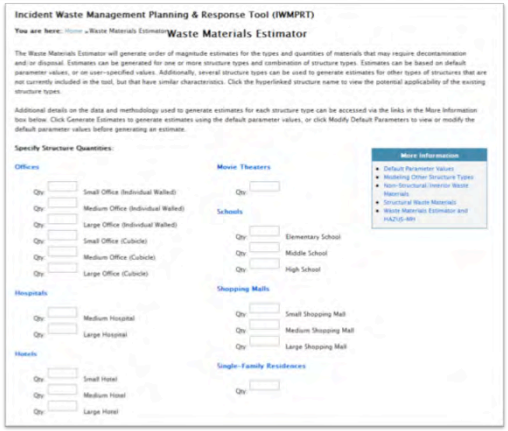
Tools that Were Used for Waste Estimate

- **RDD Waste Estimation Support Tool (WEST)**
  - Building Stock and Outdoor Areas
- **I-WASTE Tool**
  - Building Contents
- **Bio-response Operational Testing and Evaluation (BOTE) Personnel Decontamination Waste Generation Data**

RDD Waste Estimation Support Tool (WEST)



I-WASTE Tool

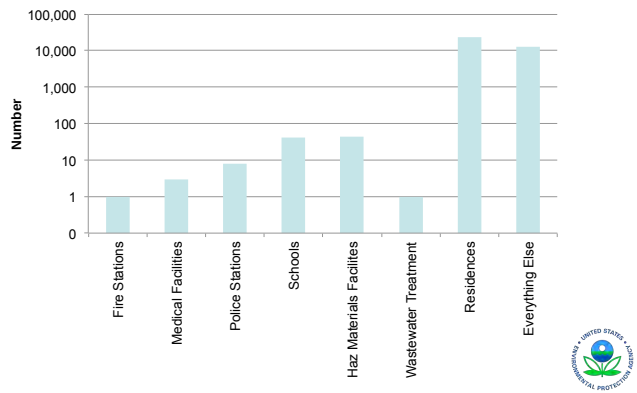


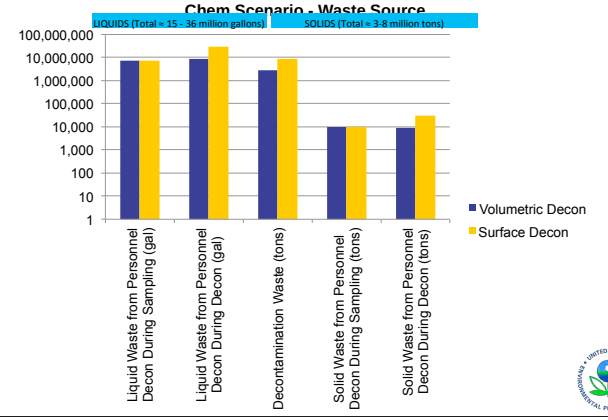
Methodology for Waste Estimation

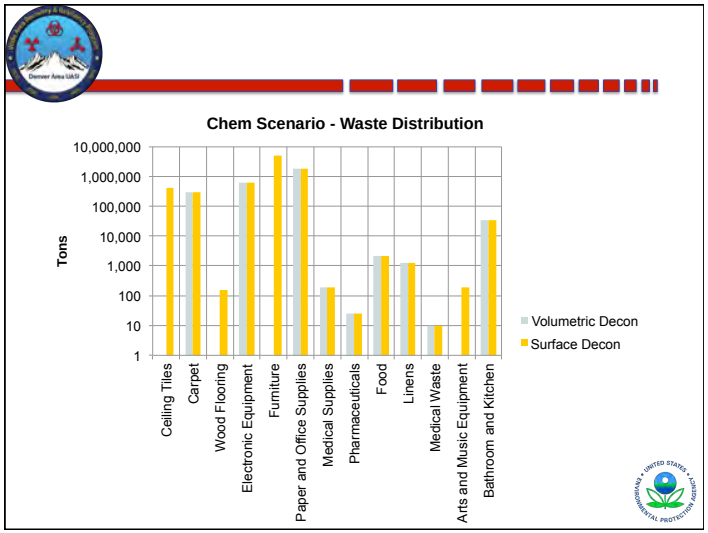
- **Used Plume Shapefiles from WARRP Planning Team**
- **Used RDD WEST GIS tools to develop inventory of building stock and infrastructure in affected area**
- **Used I-WASTE Tool's Back of the Envelope Estimator (BOEE) to estimate building contents**
  - Mapped HAZUS building types to I-WASTE BOEE building types
  - Used DRAFT data from BOTE to estimate quantity of personnel decon waste (liquid and solid) from sampling and decontamination
  - Identified building contents that would likely enter waste stream from volumetric (fumigation) or surface (liquid) decontamination
- **Counted schools, hospitals as per HAZUS output, assumed all small wood buildings and mobile homes are residences, assumed all the rest of the general building stock was offices (99%), hotels (1%); assumed small (50%), medium (30%), large (20%)**

Chem Scenario Waste Estimate Assumptions

- **Assumed chem release scenario Y1 would be used**
  - Alternate WARRP scenarios included VX as well
  - This estimate only includes HL scenario; VX has different degradate properties, persistence, sorption on materials
- **Assumed monitored natural attenuation to be used outside (i.e., no outdoor materials will enter waste stream)**
  - Waste estimation tools don't currently have capability for automatically estimating waste from a stadium
  - Stadium seats, food courts, concessions booths, jumbo-tron screens, lights, etc. all need surface decon, so "outdoor" wastes will be generated - maybe the playing field itself!! i.e.; artificial turf
- **Assumed no demolition will be done**
- **Assumed that HL infiltrated into buildings in the affected area, requiring decontamination**
- **Used personnel decontamination waste (rinsate and PPE) generation rates from BOTE data for both sampling and decon (volumetric and surface)**







Activities Generating Waste

- **Decon of affected victims**
- **Hospital PPE and personnel decon waste**
- **Sampling (PPE, personnel decon)**
- **Building/Facility/Item decontamination (PPE, personnel decon, decon residues)**
  - Some items will be decontaminated and reused
  - Some items will be decontaminated and disposed
  - Lab capacity issues may limit ability to prove presence/absence/ levels of residual agent in waste
- **Timeline for initiation of waste generation = immediate**
- **Timeline for planning and initiating waste management procedures = immediate**

Translation into Number of Railcars/Dump Trucks

- **Liquid Waste (Total ≈ 15 - 36 million gallons)**
  - 500 to 1200 railroad tank cars (30,000 gallon capacity)
  - 2700 to 6500 tanker trucks (5,500 gallon capacity)
  - May need to impound (i.e., not put down drain)
- **Solid Waste (Total ≈ 3-8 million tons)**
  - 30,000 to 80,000 railroad hopper cars (100 ton capacity)
  - 94,000 to 250,000 tri-axle dump trucks (32 ton capacity)

Potential Waste Management Pathways

- **On-site treatment**
  - Bleach dipping stations
  - Other liquid decon product dipping stations
- **Monitored natural attenuation**
- **Incineration in hazardous waste combustors**
- **RCRA Subtitle C landfill disposal**
- **RCRA Subtitle D landfill disposal (???)**
- **Use of local POTWs to handle/accept large volumes of "treated" liquid decon wastes**
- **Residual arsenic from Lewisite may be problematic**
  - Some states may have limits on As-contaminated wastes
  - Superfund has handled As-contaminated wastes in the past
- **This scenario only had HL; other WARRP chem scenarios had VX**
  - EA2192 (degradation product of VX) may create waste management issues

Chem Scenario Waste Observations

- **Waste quantity may be higher since outdoor decontamination was not accounted for in estimate**
- **Waste quantity may be lower since infiltration to building interiors may not be as significant as estimated; infiltration from VX will be much less than from HL**
- **Based on BOTE estimates, most liquid waste derived from personnel decontamination operations**
  - Dry personnel decon could help to minimize this
  - Not sure if dry personnel decon is really an option for HL/VX or any surface chem agent
  - Liquid waste generation from outdoor decontamination may be much higher since washdown may be option
- **Most solid waste generated from a few streams**
  - Ceiling tile, carpet, electronics, furniture, paper

Chem Scenario Waste Observations (cont)

- **Waste will be generated starting immediately – need for staging areas to collect waste as generated in order to expedite return of affected areas to normal operations**
- **Cleanup cannot effectively proceed without waste options**
- **State/local waste management authorities critical decision makers**
- **Use of local POTWs to help manage liquid wastes (decon wastes) by pre-treating and discharging to sewer systems**

Disclaimer

- **Reference herein to any specific commercial products, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government, and shall not be used for advertising or product endorsement purposes.**

WARRP Anthrax Scenario

Steven Merritt
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Waste & Debris Management Workshop
March 15, 2012

Homeland Security
Science and Technology

Biological Scenario Description

- National Planning Scenario #2: Biological Attack – Anthrax Aerosol
- Anthrax release into Downtown Denver
  - Release undetected for 48-hours until BioWatch samplers confirm
  - Local public health notifications and surveillance
  - Within days, hundreds of patients begin to report to hospitals
  - Tens of thousands evaluated for exposure and
  - Many given SNS prophylaxis
- Residual contamination in affected areas for days to weeks
  - Some resuspension hazard in local vicinity
  - Elevated spore concentrations over 10 miles downwind
  - Several high value properties contaminated (Downtown, State Capitol, Pepsi Center, Elitch Gardens)
  - Basic services and local businesses impacted

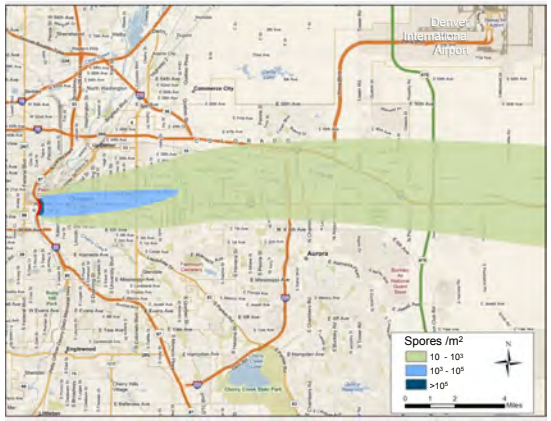
2

Release Information

- Autumn morning, modified truck driving on I-25N
- Passenger initiates covert sprayer at Auraria Parkway
- 100L of anthrax slurry released over 1.5 miles
- Prevailing winds carry plume to the east over downtown and as far as Aurora
- No reports of suspicious activity and no threat intelligence to tip off local officials

3

WARRP Biological Scenario – Plume Map



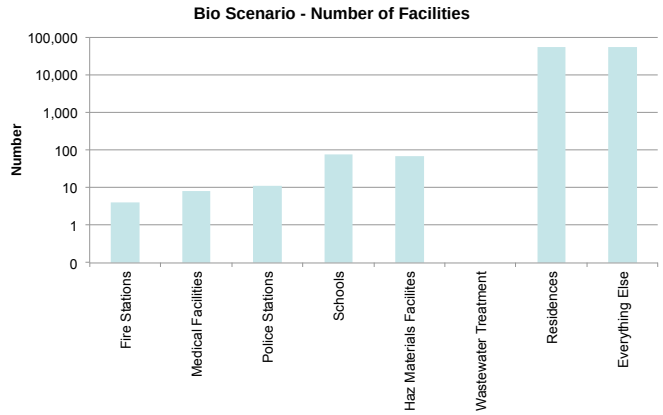
Remediation

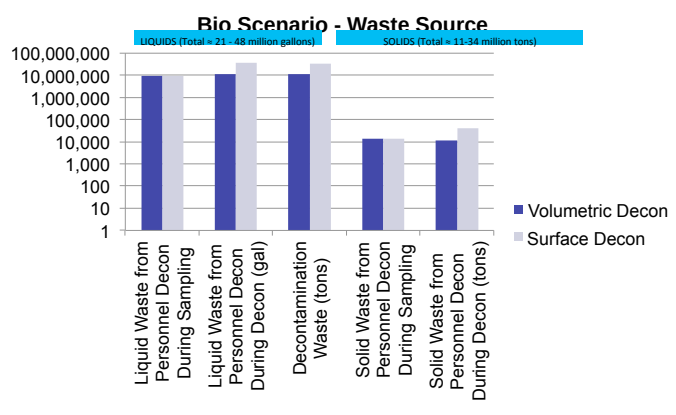
- Little infrastructure damage as result of attack
- Contagion concerns as people tracked material out of attack area
- Decontamination of porous materials may be difficult or impossible
- HVAC systems likely brought aerosolized anthrax indoors
- UV will likely destroy spores on exposed surfaces
- Bleach for hot spots & surfaces is feasible – waste generation issues
- Monitored natural attenuation may be used in combination with suitable decontamination products

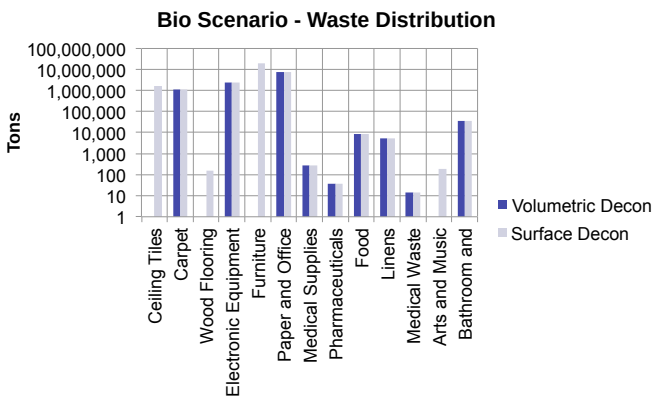
5

Bio Scenario Waste Estimate Assumptions

- Assumed monitored natural attenuation to be used outside (i.e., no outdoor materials will enter waste stream)
- Assumed no demolition will be done
- Used personnel decontamination waste generation rates from BOTE data for both sampling and decon (volumetric and surface)







Activities Generating Waste

- Personnel decon of affected victims
- Hospital PPE and personnel decon waste
- Sampling (PPE, personnel decon)
- Building/Facility/Item decontamination (PPE, personnel decon, decon residues)
  - Some items will be decontaminated and reused
  - Some items will be decontaminated and disposed
  - Lab capacity issues may limit ability to prove presence/absence/ levels of residual agent in waste
- Timeline for initiation of waste generation = intermediate

Translation into Number of Railcars/Dump Trucks

- Liquid Waste (Total ≈ 15 - 36 million gallons)
  - 500 to 1200 railroad tank cars (30,000 gallon capacity)
  - 2700 to 6500 tanker trucks (5,500 gallon capacity)
- Solid Waste (Total ≈ 3-8 million tons)
  - 30,000 to 80,000 railroad hopper cars (100 ton capacity)
  - 94,000 to 250,000 tri-axle dump trucks (32 ton capacity)

Potential Waste Management Pathways

- Surface decontamination
- Fumigation and decontamination of buildings
- Monitored natural attenuation
- Incineration of highly contaminated materials in infectious waste incinerators
- RCRA Subtitle C landfill disposal
- RCRA Subtitle D landfill disposal (???)

Bio Scenario Waste Observations

- Waste quantity may be higher since outdoor decontamination was not accounted for in estimate
- Most liquid waste derived from surface decon operations
- Surface decon produced greater amounts of solid waste
- Most solid waste generated from a few streams
  - Ceiling tile, carpet, electronics, furniture, paper
- Waste produced may or may not qualify for disposal as MSW – waste sampling may need to be done to achieve this criteria

Statutory, Regulatory, & Policy Framework Underlying CBR Waste Management (WM)

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WARRP – Waste Management Workshop
March 15, 2012

Homeland Security
Science and Technology

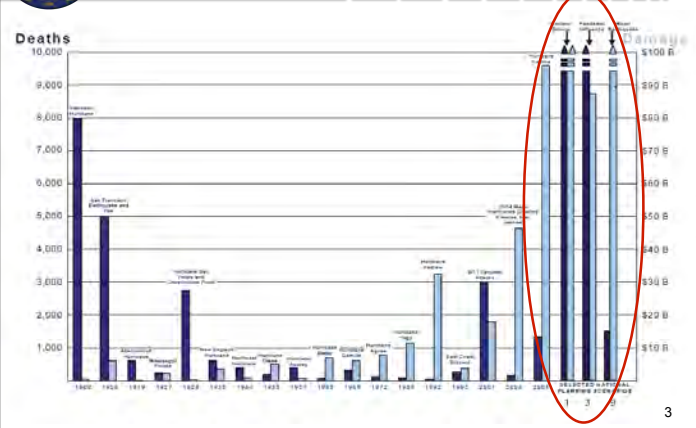
WM OVERVIEW

- Key Concepts, Principles & Core Capabilities
- Role of WM During Incidents of National Significance
- WM Statutory, Regulatory & Policy Framework
- WM Decision Making & Considerations
- Additional WM Resources & References
- Colorado Department of Public Health and Environment

2

Disasters Cause Death, Damage, Waste & Debris

The trend is clear!



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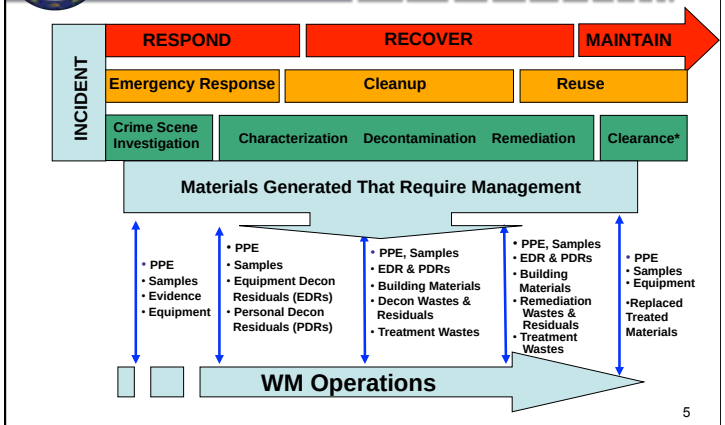
Key WM Concepts & Principles

- WM is a *process* that occurs throughout response & recovery (R & R)
- WM must integrate with the overall incident R & R approach
- Limiting or minimizing waste generation expedites recovery & reduces cost
- Treatment/Disposal capacity is limited for CBR waste
  - Expect your typical WM facilities to be overwhelmed & will be unable and/or unwilling to handle all waste types and/or quantities of waste streams
- WM expertise is limited, needs to be expanded at all levels of government

4

Role of WM in a HS Incident Response



5

*To Reoccupy or How Clean is Clean?

EPA's Core Capabilities

EPA's mission: Protect human health & the environment

- **EPA has certain authorities & capabilities in core programs directly related to homeland security (HS)**
  - **RCRA (Resource Conservation and Recovery Act)** authorizes EPA and the States to regulate the treatment and disposal of solid and hazardous waste, as well **as low-level mixed waste**
  - **CERCLA (Comprehensive Emergency Response, Compensation, & Liability Act)** authorizes response to releases **(or substantial threats)** of hazardous substances, or of pollutants/contaminants that may present an imminent & substantial danger.
  - **FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act)** authorizes EPA to regulate the manufacture, sale, and use of pesticides in U.S.
  - **CWA (Clean Water Act)** - governs the management and disposal parameters for sludge following wastewater treatment in a POTW

6

EPA's Core Capabilities – II

EPA's mission: Protect human health & the environment

- **EPA has certain authorities & capabilities in core programs directly related to HS**
  - **SDWA (Safe Drinking Water Act) –** outlines minimum federal requirements for injection wells for the disposal of hazardous or radioactive waste (Class I, II, and IV injection wells).
  - **TSCA (Toxic Substances Control Act)** – regulates the land disposal of certain industrial chemicals, mainly lead paint, asbestos and PCB's. TSCA includes an approval process for chemical waste landfills for PCB's.
  - **CAA (Clean Air Act)** – establishes emission standards for incineration (hazardous, municipal, radiological and medical wastes).
- **EPA Emergency Response Authorities**
  - **RCRA Section 7003**
  - **CERCLA Section 106**
  - **SDWA Section 1431**

7

Waste Management: *RCRA*

- Resource Conservation & Recovery Act (RCRA) of 1976, as amended by the Hazardous & Solid Waste Amendments of 1984 (HSWA)
- EPA Regulations are in Title 40 of the Code of Federal Regulations (40 CFR 239-282)
- Authorizes EPA to regulate the management of **hazardous waste (Subtitle C)** and disposal of **non-hazardous waste (Subtitle D).**
- The Office of Resource Conservation and Recovery is EPA's lead office on developing regulations for hazardous & non-hazardous wastes, and for providing guidance/assistance to states.

8

RCRA Subtitle C
Hazardous Wastes (HW)

- Subtitle C establishes a program to manage HW cradle-to-grave.
- Solid Wastes are hazardous: (a) if they appear on a specific list, or (b) if a representative sample exhibits at least one of four HW characteristics (i.e., ignitability, corrosivity, reactivity, toxicity).
- HW is subject to management requirements for the generation, transportation, storage, treatment and disposal.
- HW regulations do several things:
  - Set criteria for determining which wastes are hazardous
  - Establish requirements for generators, transporters and TSDFs.
  - Set technical standards for safe design and operation of TSDFs.
  - Serve as basis for issuing permits required for each facility.
  - Establish procedures for authorizing States and territories to operate hazardous waste programs in lieu of the Federal government (States can be more stringent or broader-in-scope)

9

CBR Waste Management Options

- **WM Options (Depends on Agent, Decon methods & Site Specific Conditions)**
  - Fumigation
  - Decontamination
  - Burial/Landfills
  - Incineration
  - Sterilization
  - Irradiation
  - Disinfection
  - HEPA Vacuuming
  - Rendering
  - Isolation
  - Autoclaves
  - Composting
  - POTW
  - Deep Well Injection

10

Geographic Location of WM Facilities

11

Source: RCRA Info, 2008

RCRA Subtitle D
Solid Wastes

- Subtitle D focuses on state & local governments to manage solid wastes.
- **Solid wastes -** garbage, refuse, sludges from water and wastewater treatment plants, industrial wastes, and other discarded materials.
- EPA provides info, guidance, policy to state/local gov't's.
- EPA established criteria for proper design and operation of Solid Waste Disposal Facilities (40 CFR 257) and MSWLFs (municipal solid waste landfills) (40 CFR 258)
- States oversee Subtitle D programs and enforce it through state-issued permits and state solid waste management plans.

12

National Response Framework (NRF)
For a CBR Response

- **NRF Emergency Support Functions (Roles & Responsibilities)**
  - ESF #3: Public Works and Engineering (USACE)
    - Includes Debris Management
  - ESF # 10: Oil and Hazardous Material Response (EPA)
    - Oil & Hazardous Material Response & Environmental Cleanup
  - ESF #11: Agriculture and Natural Resources (USDA/FDA)
    - Animal and Plant Disease Response
- **NRF Incident Annexes (Concept of Operations)**
  - Biological Incident
  - Nuclear/Radiological Incident
  - Food and Agriculture Incident
  - Catastrophic Incident

13

Presidential Directives
Involving CBR Waste Management

- **Homeland Security Presidential Directives**
  - **HSPD 5:** Management of Domestic Incidents: National Response Framework (NRF), Annexes & Emergency Support Functions (ESF's)
    - **ESF # 3:** Public Works & Engineering
    - **ESF # 10**: Oil & Hazardous Materials Response
    - **ESF # 11:** Agriculture & Natural Resources
    - **ESF # 15:** Long-Term Community Recovery
  - **HSPD 8:** National Preparedness (Presidential Policy Directive 8)
  - **HSPD 9:** Defense of US Agriculture and Food
  - **HSPD 10:** Bio-defense for the 21st Century

14

Federal Statutory Authorities & NRF Roles
Involving CBR Waste Management

- **FSMA (Food Safety and Modernization Act) Section 208:**
  - EPA in coordination with HHS, DHS, and USDA shall provide support for, and technical assistance to, State, local and tribal governments in preparing for, assessing, decontaminating, and recovery from an agriculture or food emergency
- **Biological; Food & Agriculture; & Nuclear/Radiological Incident Annexes, and the Oil & Hazardous Waste Response Annex to the NRF**
  - EPA plays significant WM roles in almost every CBR incident, although the lead federal agency may be different depending upon the type of incident.
  - EPA is the Federal lead agency for the Oil & Hazardous Waste Response Annex, with the DHS/US Coast Guard being the lead for certain incidents (e.g., off-shore oil spills - BP Oil Spill)

15

Federal Statutory Authorities & NRF Roles
Involving CBR Waste Management

- **Nuclear Regulatory Commission (NRC) WM Related Statutory Authorities**
  - **10 CFR Part 61** – Licensing requirements for land disposal of radioactive waste
  - **10 CFR Part 62** – Criteria & procedures for emergency access to non-federal & regional low-level radioactive waste disposal facilities
  - **10 CFR Part 20.2002** - Method for obtaining approval of proposed disposal procedures
- **Nuclear/Radiological Incident Annex to the NRF**
  - NRC is the lead agency for response coordination of an Rad Release incident from a NRC licensed materials or facility (e.g., Nuclear Power Plants)
  - DOD or DOE would be the lead agency for DOD/DOE owned/operated facilities, sources or weapons
  - DHS is the lead agency for deliberate attacks involving nuclear/rad facilities or materials (i.e., RDD's or IND's)
  - EPA would be the lead for non-NRC/DOD/DOE/DHS incidents (e.g., international incidents – Fukushima Nuclear Power Plant)

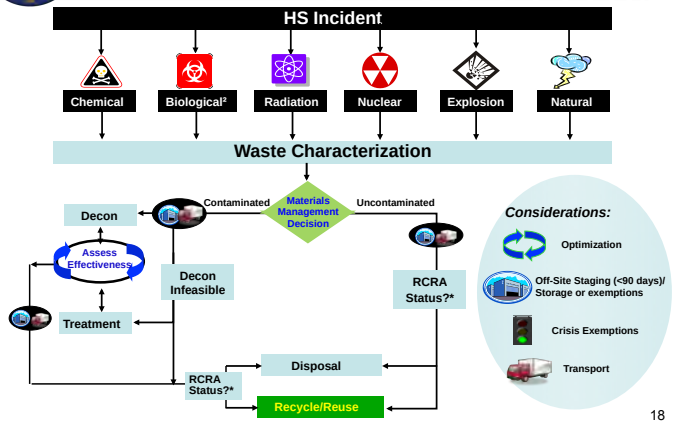
16

Federal Statutory Authorities & NRF Roles
Involving CBR Waste Management

- **USDA WM Related Statutory Authorities**
  - **Animal Health Protection Act –** for response to foreign animal diseases (e.g., FMD, Avian Influenza, BSE, etc.)
  - **Plant Protection Act –** for response to foreign plant diseases
  - **Public Health Security and Bioterrorism Preparedness and Response Act –** for intentional acts that affect animals or plants
- **Food & Ag Incident Annex to the National Response Framework**
  - USDA provides technical assistance and guidance to State, tribal, & local authorities who are coordinating the disposal of contaminated food, animal carcasses, or plants. EPA supports USDA with technical assistance.
  - USDA coordinates with Federal, State, tribal, and local authorities as well as the food and agriculture industry during the investigation, response, decontamination, disposal, and recovery efforts
  - USDA provides technical assistance and guidance to State, tribal, and local authorities who are coordinating food facility cleaning and decontamination, depending on the nature of the contaminating agent

17

Homeland Security (HS) Incident:
Waste Management Decision Tree



18

* Manage appropriately

² Includes Food & Agriculture

Waste Management
CBR Considerations

- **WM decisions are tailored to incident specific conditions**
  - No single method can be used at all locations for all CBR agents
  - Work w/ State & Local Governments, NGOs, NTAs, Private sector & the public
  - Protection of environmental media, as well as public & animal health
  - WM facility capacity, waste compatibility, compliance history, public relations/ public acceptance, state concerns, environmental justice
  - Insurance, distance from waste generation, transportation options, health & safety, environmental monitoring
  - WM facility owner/operator acceptance
  - Cost!!!!

19

Waste Management
Resources

- **DHS**
  - **Homeland Security Presidential Directives**
    http://www.dhs.gov/xabout/laws/editorial_0607.shtm
  - **NRF, Food & Ag Incident Annex, Rad Incident Annex, ESF's**
    http://www.fema.gov/emergency/nrf/
  - **National Incident Management System (NIMS) Resources Center**
    http://www.fema.gov/emergency/nims/
- **EPA**
  - **Radiological Waste Management**
    http://www.epa.gov/radiation/waste-management-overview.html
  - **Waste Management for Homeland Security Incidents**
    http://www.epa.gov/waste/homeland/
  - **Federal Food & Ag Decon & Disposal Roles & Responsibilities**
    http://www.epa.gov/homelandsecurityportal/pdf/Final_Food_and_Ag_CONOPS.pdf

20

Waste Management
Resources (Continued)

- **NRC**
  - **Low Level Radiological Waste (LLRW) Disposal**
    http://www.nrc.gov/waste/llw-disposal.html
  - **Location of LLRW Disposal Sites**
    http://www.nrc.gov/waste/llw-disposal/licensing/locations.html
- **USDA**
  - **Emergency Management Tools**
    http://www.aphis.usda.gov/animal_health/emergency_management/
  - **Disposal Operational Guidelines**
    http://www.aphis.usda.gov/emergency_response/tools/on-site/htdocs/images/nahems_disposal.pdf
  - **Guidelines for the Disposal of Intentionally Adulterated Food Products**
    http://www.fsis.usda.gov/PDF/Disposal_Decontamination_Guidelines.PDF

21

EPA Waste Management
References

- **James Michael:** Michael.James@epa.gov
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22

Conclusions

- EPA has certain WM authorities & capabilities in support of CBR incidents
- Pre-Planning for WM activities is important in effectively responding to CBR incidents
- State & Local Governments are important stakeholders in WM decision making

23

Colorado Department of Public Health and Environment (CDPHE)

Hazardous Waste Remediation and Treatment, Storage and Disposal Requirements

Colorado Department of Public Health and Environment

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Hazardous Waste Permitting Unit
Solid and Hazardous Waste Program
Hazardous Materials and Waste Management Division

24

Colorado Hazardous Waste Regulations

- Releases of hazardous waste in Colorado governed under C.R.S. Section 25-15-308(2)
- Exemptions to RCRA - 6 CCR 1007-3, §100.10(a)(8); §264.1(g)(8) [40 FCR §270.1(c)(3)(iii), §264.(g)(8)]
  - Persons who carry out activities to immediately contain or treat a discharge, or an imminent and substantial threat of a discharge, of hazardous waste or material which, when discharged becomes a hazardous waste
  - After immediate response activities are completed, any treatment, storage or disposal of discharged material or discharge residue or debris undertaken must be covered by RCRA Permit, emergency RCRA permit or interim status.

25

Hazardous Wastes

- **Listed** solid wastes like commercial chemical products, non-specific source wastes, specific source process wastes
- **Characteristic** solid wastes like corrosive, reactive, flammable or toxic wastes
- **Products** are considered waste when being disposed of, which includes being released to the environment
- Hazardous waste constituents identified in 6 CCR 1007-3, Part 261 Appendix VIII

26

Chemical Warfare Agents

- **Mustard Agent**
  - **Listed** Acute Hazardous Waste (H) – 6 CCR 1007-3, § 261.32
    - K901, P909
  - **Characteristic** hazardous waste
    - D002 **corrosive** characteristic
    - D003 **reactive** characteristic waste
    - **Toxicity** characteristic for 10 other HW codes due to metals and organic content
  - Any contaminated media, including soil, water, agriculture products, livestock or other materials would also be considered acute hazardous waste (H) - K902

27

Mustard Agent

- Hazardous waste listings are based on acute and chronic health effects of mustard agent
- **Acute health effects**
  - Vesicant causing severe burns and blisters
- **Chronic health effects**
  - Carcinogen
  - Mutagen
  - Teratogen

28

Hazardous Waste Releases
CDPHE-HMWMD Response Summary

- Releases managed in two phases:
  - Emergency Response
    - By federal, state and local entities to contain and/or isolate contaminated areas
    - CDPHE-HMWMD technical support if requested
  - Recovery
    - Responsible party(s) need hazardous waste permit/ order to complete clean-up and any hazardous waste treatment, storage or disposal
    - Responsible party(s) are owner/operator, as defined under RCRA

29

Colorado Hazardous Waste Regulations

- Hazardous Waste Releases:
  - Must be cleaned up in manner protective of human health and environment
  - Must be cleaned up to levels protective of human health and environment
- Adequate protection of human health and environment is determined through compliance with Colorado Hazardous Waste Regulations (CHWRs), which were adopted from RCRA

30

Hazardous Waste Releases

- Hazardous waste remediation sites may be permitted under a Corrective Action Plan (CAP) for cleanup and/or a Remediation Action Plan (RAP) for treatment, storage, or disposal of Hazardous Waste
- Emergency Permits or Orders may also be used
- Corrective Action Management Units (CAMUs), Temporary Units (TUs) and Staging Piles may be used for management of remediation wastes

31

Hazardous Waste Clean-up Requirements

- Clean-up Levels must be protective of human health and the environment
  - No greater than an added lifetime cancer risk of one in a million (residential or commercial use)
  - No greater than an added non-cancer hazard quotient of one
- Clean-up and waste management requirements include:
  - Waste Characterization
  - Training
  - Emergency Response
  - Record keeping
  - Waste handling procedures to minimize releases/exposures
  - Treatment, Storage or Disposal Unit Specific Conditions
  - Security
  - Inspections

32

Management of Mustard Agent wastes at Pueblo Chemical Depot

- Human Health Protection Standards
  - Worker Population Limit (WPL) for unmasked workers
  - 50 x STEL for APR (M40 only mask approved for mustard agent)
  - >50 STEL must use Level A (SCBA, Chemical Resistant Suit)
- Waste Characterization/Decontamination
  - STEL, WPL or General Population Limit (GPL) Clearance with confined volume, set temperature headspace methods
  - Non-porous wastes vs porous wastes
    - Limited data, including analytical performance data to establish head-space relationship with contamination levels in porous wastes
    - Thermal treatment may be only method for decontamination of porous wastes/materials

33

Public Involvement During HW Clean-up

- Hazardous waste permits, including CAPs and RAPs, require public comment period
- Emergency permits may be issued without public comment period
- CDPHE-HMWMD policy for public notification of HW clean-ups
- Public involvement would include input from community members, leaders and groups, state and local government, and other interested parties

34

Threat Agent Disposal (TAD) Workgroup Findings

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WARRP Waste Management Workshop
March 15, 2012

Homeland Security
Science and Technology

Recognition of the Problem

- **EPA's experience responding to CBR events includes**:
  - Radiological response efforts (e.g., Three Mile Island in 1979)
  - Clean-up efforts following the 9/11 terrorist attack
  - Anthrax mail incidents on Capitol Hill and other Washington, D.C. areas (2001)

  - Ricin incident on Capitol Hill (2004)

  - Naturally occurring anthrax incidents (New York City (2006) and Danbury, Connecticut (2007))

2

Recognition of the Problem (cont.)

- **EPA's participation in waste management exercises:**
  - ***White House Homeland Security Council workgroup (2007):*** identified response and recovery gaps from a wide-area anthrax attack

  - ***TOPOFF4 Full-Scale Exercise (2007) :*** radiological dispersal device (RDD) event resulting in decontamination and disposal issues
  - ***TOPOFF4 Large-Scale Game (2007):*** addressed waste management issues
  - ***EPA Internal Recovery Tabletop (2008):*** addressed types and quantities of waste generated by the Portland RDD event from TOPOFF4
  - ***White House Principal Level Exercise 3-10 (2010):*** waste management issues following nuclear power plant accident

3

Recognition of the Problem (cont.)

- **Waste Management is a priority gap**
  - EPA identified waste management as one of the three fundamental preparedness gaps related to terrorist events involving CBR threat agents
- **Threat Agent Disposal (TAD) Workgroup (2008)**
  - EPA's Assistant Administrator for Homeland Security convened the TAD Workgroup
  - Purpose
    - Identify waste management issues and barriers associated with wide-area or simultaneous CBR terrorist events
    - Develop priority recommendations for EPA actions to address waste management issues and barriers

4

TAD Workgroup Methodology

- Analyzed 65 documents related to environmental cleanup, decontamination, and disposal following a CBR release
- Used results of analysis to:
  - Estimate types and quantities of waste likely to be generated
  - Identify potential types of waste streams requiring decontamination and disposal
  - Identify potential barriers to disposal
- Assessed relevant importance of barriers given their ability to impede disposal efforts
- Provided recommendations based on barriers analysis
- Identified specific action items for EPA consideration

5

Potential Waste Streams

- Anticipated waste streams following a CBR release:
  - ***Personal Protective Equipment (PPE):*** Protective suits, gloves, rubber booties, respirator filters/cartridges, and other contaminated PPE materials

  - ***Decontaminated Materials:*** Decontaminated items deemed unusable following the decontamination process
  - ***Decontamination Water and Sludge:*** Water contaminated by decon and treatment operations and sludge from wastewater treatment facilities that treat the contaminated wastewater

  - ***Contaminated Materials:*** Contaminated wastes that responders did not successfully decontaminate based on technical and/or operational constraints

6

Potential Waste Categories

- Categories of waste based on contamination by CBR threat agents:
  - ***Category I – Uncontaminated Waste:*** Waste that is not considered contaminated by the threat agent
  - ***Category II – Verified Decontaminated/Treated Waste:*** Waste that was once contaminated by the threat agent, but successfully decontaminated/treated
  - ***Category III – Not Verified Decontaminated/Treated Waste:*** Waste that was once contaminated or potentially contaminated by the threat agent
  - ***Category IV – Contaminated Waste:*** Waste in which the contaminant has been identified, but the waste has not yet been classified, decontaminated, or treated

7

Potential Waste Categories (cont.)

  - ***Category V – Decontamination Effluent/By-Products:*** Wastewater collected from decontamination efforts and PPE from response actions and decontamination activities
  - ***Category VI – Problematic Waste:*** Contaminated, but unclassified material that has no clearly established or pre-determined path for disposal

8

Potential Waste Disposal Barriers

- Barriers are issues that may hinder the proper or timely disposal of CBR threat agent-derived waste
- Types of barriers identified through document analysis:
  - ***Regulatory/Statutory:*** Process-laden and/or unclear regulatory or statutory authority for disposing of CBR waste
  - ***Policy/Guidance:*** Missing or insufficient national policy or guidance regarding disposal of CBR waste
  - ***Technical/Scientific:*** Gaps in technical or scientific understanding regarding disposal options for CBR waste
  - ***Socio-political:*** Community-oriented or stakeholder concerns related to risks associated with disposal of CBR waste
  - ***Capacity/Capability:*** Lack of capacity/capability to treat/dispose of CBR waste and lack of laboratory capacity to effectively characterize the waste

9

Waste Disposal Barriers Analysis

- Disposal barriers were grouped by:
  - Barrier type (as previously defined),
  - Waste type (i.e., chemical, biological, or radiological)
  - Waste category (I – VI) that the barrier addresses
- Barriers were cross-checked against the 65 documents referenced during the document analysis and identified in clusters
- The relative importance of the barriers was determined by frequency of occurrence and linked to the priority recommendations

10

Waste Disposal Barriers Analysis

Table II. Regulatory and Statutory Barriers

Type of Waste*	Description	Category of Waste**					
		I	II	III	IV	V	VI
CBR	Burdensome requirements for modifying permits to accept waste			x	x	x	
CBR	Regulations/statutes prevent staging/storage permit authorization and use of mobile treatment technologies				x	x	
CBR	Limitations in allowing use of alternate treatment technologies				x	x	x
R	Current statute/regulation prohibits use of DOE sites/facilities for disposal of contaminated debris that DOE does not own				x		
R	Lack of finalized "Low Activity Waste" regulations				x		
R	System of regional LLRW compacts allows restriction of disposal facility access to states within the compact unless specific approval is obtained				x		

11

Priority Recommendations based on Analysis of Barriers

- ***Recommendation 1 - -*** Address concerns of multiple stakeholders who object to disposal of CBR wastes based on perceived health and/or liability concerns
  - Engage states, waste management industry, and the public to identify and address industry concern in accepting waste, as well as public perceptions regarding disposal of CBR wastes
  - Plan and conduct exercises with waste treatment stakeholders to properly address disposal issues response and recovery activities

- ***Recommendation 2 - -*** Increase the number and capacity of facilities willing to accept CBR wastes
  - Evaluate indemnification as a strategy to increase acceptance of CBR wastes; investigate required statutory/regulatory process to implement required actions

12

Priority Recommendations based on Analysis of Barriers (cont.)

- Initiate dialogue with DoD, DOE, DHS and other stakeholders to examine feasibility of accessing existing and/or developing new federal disposal/treatment assets to increase capacity
- Work with states to develop CBR waste disposal management plans; leverage available resources, such as those available from other federal agencies, to develop such plans
- Encourage DHS and Congress to amend the SAFETY Act to allow its limited liability procedures to apply to waste treatment/disposal facilities

- ***Recommendation 3 - -*** Improve regulatory and statutory processes to expedite effective disposal of CBR wastes

- Evaluate current regulations to better understand the status of waste generated in a CBR threat agent attack and how that waste would be classified for disposal following an attack
- Initiate dialogue with federal and state stakeholders to assess potential regulatory approaches to disposal

13

Priority Recommendations based on Analysis of Barriers (cont.)

- Work with State of New York to evaluate its regulatory program for handling biological threat agent derived wastes and recommend effective provisions for adoption by other states
- Identify available disposal capacity and potential gaps for radiologically contaminated waste from an RDD event

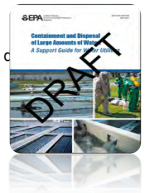
- ***Recommendation 4 - -*** Develop sufficient capacity and guidance to dispose of waste from a radiological attack, particularly for waste whose radionuclide concentrations are above Class A limits

- In partnership with DOE, DoD, NRC and other relevant stakeholders, develop guidance or criteria that would allow DOE and/or RCRA facilities that meet relevant design and operational requirements to be eligible to manage LLRW
- Coordinate with NRC and states to identify conditions in existing regulations under which potentially radioactively contaminated material may be released from regulatory control without further restriction, as well as conditions for restricted release

14

Priority Recommendations based on Analysis of Barriers (cont.)

- ***Recommendation 5 - -*** Evaluate existing/develop new guidance on management and disposal of contaminated or treated water
- Revise existing guidance or develop new guidance for the water and wastewater sector on containment and disposal of decontamination wastes
- Evaluate/develop technical guidance and policy regarding storage and management of large quantities of derived wastewater
- Evaluate/develop guidance and policy on discharge of CBR contaminated wastewater to POTWs, storm water collection systems, combined sanitary sewers, or ambient waters



- Develop guidance on discharge treated decontamination derived wastewater to POTWs

15

Priority Recommendations based on Analysis of Barriers (cont.)

- ***Recommendation 6 - -*** Develop protocols to determine residual CBR levels in waste, particularly in biological and radiological-derived waste
- Develop representative sampling methodologies for biologically contaminated wastes; include waste characterization as an desired outcome for ongoing efforts to develop analytical methodologies for biological agents materials
- Determine the level of CBR agents at which waste can be properly disposed of in existing facilities (e.g., RCRA hazardous or non-hazardous waste landfills)

16

Priority Recommendations based on Analysis of Barriers (cont.)

- ***Recommendation 7- -*** Explore the efficacy of treatment / disposal technologies to reduce/contain CBR threat agent levels
  - Evaluate behavior/fate/transport of threat agents and/or treatment by-products bound to porous materials in treatment/disposal processes
  - Evaluate long-term effectiveness based on design and operation of landfill disposal for all types of waste contaminated with CBR threat agents



17

QUESTIONS?

18

Containment and Disposal of Large Amounts of Water: A Support Guide for Water Utilities

Marissa Lynch
Environmental Engineer
U.S. Environmental Protection Agency
Office of Ground Water and Drinking Water
Water Security Division

WAARP Waste Management Workshop
March 15, 2012

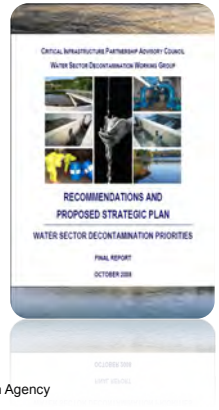
Homeland Security
Science and Technology

Outline

- Purpose
- Background
- Guide Overview
- Example of Disposal Recommendation

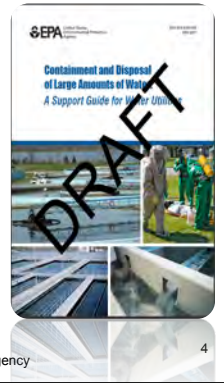
Background

- Who: CIPAC Decontamination Workgroup (WSD, SCC, GCC)
- Strategic Plan – October 2008
  - Priority Issues (16)
  - Recommendations (35)



Disposal Guidance for the Water Sector

- **CIPAC Recommendation:** Revise/ develop guidance for containment and disposal of decontamination waste, including large amounts of water and associated solid waste
- **Activity:** Developing a disposal guide for the water sector



Disposal Guidance Overview

Scope

- Decision-making framework for containment, treatment, and disposal of CBR contaminated water
- Reference guide for the development of a system-specific disposal plan for contaminated water

Audience

- Primary – drinking water, wastewater and storm water utilities
- Secondary – decision makers involved with planning and disposal at the federal, state, local and tribal levels

Disposal Guidance Organization

1. Introduction
2. Containment and Disposal as Part of Remediation and Recovery
3. Containment and Treatment of Water
4. Disposal of Water
5. Storage and Transportation of Water
6. Appendices
   - A. Risk Communication
   - B. Potential Treatment Methods
   - C. Sample Disposal Checklist
   - D. Resources
   - E. Summary of Applicable Laws and Regulations
   - F. References

Contaminants Included

Chemical	Biological	Toxin	Radiological
Hydrophobic Compounds Pesticides Heavy Metals Chemical Warfare Agents	Bacteria Viruses Protozoa	Algal Toxins Fungal Toxins Bacterial Toxins Plant Toxins	Alpha Beta Gamma

Examples of Recommendations in the Disposal Guide

- Suppose we have considered treatment, conducted all the sampling and analyses, met the clearance goals and have to decide on the suitable disposal option. The following may be taken into consideration:
  - water containing certain contaminants
  - water exhibiting certain characteristics,
  - statutes such as RCRA, CWA, and FIFRA and their implementing regulations may have additional requirements for disposal.

Examples of Recommendations in the Disposal Guide Continued

The guide provides five disposal options:

- Direct discharge to surface water
- Disposal through a wastewater treatment plant
- Transfer to a hazardous or medical/infectious waste facility
- Disposal in an underground injection well
- Volume reduction and solidification (radiological contaminants only)

Next Steps

- Release Date: Spring 2012
- Instructional Webinar : Spring 2012

Contact Information

For comments and questions on the Decontamination Strategy:

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Threat Agent-Specific Waste Disposal Workshops

Cayce Parrish
Office of Homeland Security /
Office of the Administrator
U.S. EPA

WARRP Waste Management Workshop
March 15, 2012

Homeland Security
Science and Technology

Workshop Background

- Threat agent-specific waste disposal workshops:
  - Anthrax: Seattle, WA (hosted by DHS/DoD Interagency Biological Restoration Demonstration (IBRD) project), October 2009
  - Radiological Dispersal Device (RDD) Attack: Philadelphia, PA, November 2009
  - Wide Area Anthrax Attack: Columbus, OH, September 2010

2

Workshop Background

- Purpose of workshops:
  - Identify knowledge gaps related to waste management and disposal following release of chemical, biological, or radiological (CBR) agents
  - Engage stakeholders (federal, state and local, and private sector) to assess issues and barriers to CBR waste management
  - Ground-truth Threat Agent Disposal (TAD) Workgroup findings and begin necessary steps to address issues and barriers

3

Workshop Methodology

- Identified representative federal, state and local, and private sector stakeholders with a vested interested in waste management issues
  - Federal
    - EPA, DHS (FEMA), HHS (CDC, ATSDR, FDA), DOT, DOE (national labs), NRC, ACOE, DOD, National associations (waste, water)
  - State
    - State health, environmental, emergency planning, waste, water, agriculture, transportation, State LLW compacts, State government associations (water, waste)
  - Private
    - Transportation companies, treatment facilities, disposal facilities, Trade associations

4

Workshop Methodology

- Conducted pre-workshop stakeholder interviews on a range of topics, including:
  - Defined roles and responsibilities in managing treatment and disposal-related activities
  - Availability of plans and communications detailing roles and responsibilities
  - Perceptions regarding:
    - barriers to CBR waste disposal
    - available treatment and disposal capacity
    - waste acceptance at the state and local level
  - Need for a template or tool for the treatment and disposal of CBR-contaminated waste

5

Workshop Methodology (cont.)

- Conducted separate ½ day workshop sessions with federal, state and local, and private sector stakeholders
  - Presented scenario overview
  - Reviewed findings from pre-workshop interviews
  - Facilitated discussion on key themes previously identified in TAD Workgroup findings:
    - Regulatory/Statutory
    - Policy/Guidance
    - Technical/Scientific
    - Socio-political
    - Capacity/Capability

6

Workshop Methodology (cont.)

- For each group of stakeholders, identified issues of most concern and actions to address disposal barriers
- Conducted multi-voting to prioritize issues and actions against disposal barriers
- Prepared reports detailing workshop proceedings and findings

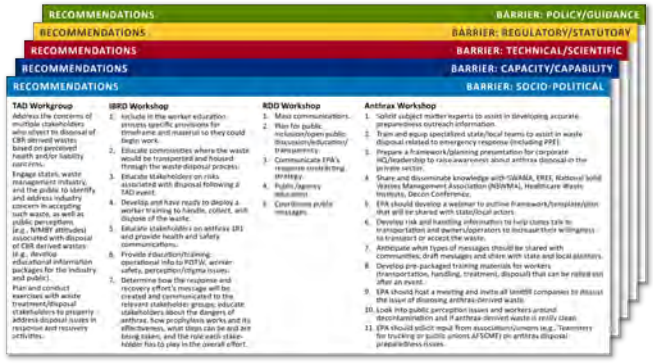
7

Next Steps

- Continue analysis of workshop recommendations
- Develop priority activities to address barriers
- Implement new projects

8

Next steps - - Workshop Priority Recommendations



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Next Steps - - Analysis of EPA Priority Waste Management Activities

10

Next Steps

QUESTIONS?

11

CBR Disposal Workshop

Paul Lemieux
Associate Division Director
EPA/ORD/NHSRC/DCMD

WARRP Waste Management Workshop
March 15-16, 2012

Homeland Security
Science and Technology

Outline

- Catalyst for workshop
- Workshop purpose
- Background
- Barriers to disposal
- Workshop structure
- Insights from workshop

Catalyst for Workshop

- Participants from the previous waste workshops (IBRD, Philadelphia, and Columbus) recommended developing local options (i.e., new capacity) as a way to address capacity / acceptance concerns

Workshop Purpose

- Existing facilities may be inadequate / unavailable in a large scale event
- Workshop recommendations to develop an incident-specific state or Federal facility
- No policy decision at this time
- Critical to examine technical, scientific and policy requirements to be able to:
  - Site / construct / operate / eventually close landfills
- The goal of this workshop was to identify the technical and scientific requirements so that the policy discussions are based on the best available science

Background

- **EPA tasked with the responsibility for supporting state and local decontamination actions following a CBR attack**
  - Statutory / Regulatory / Presidential Directives
- **Decontamination actions include waste management**
- **Waste Disposal Capacity is significant preparedness gap for CBR threat agents**
- **Volume of waste from a CBR incident depends on a number of factors**
- **EPA has conducted a number of workshops, exercises, investigation to examine the waste issue**

Barriers to Disposal

- **Regulatory/Statutory**
  - Process-laden and/or unclear regulatory or statutory authority for disposing of CBR threat agent derived waste
- **Policy/Guidance**
  - Missing or insufficient national policy or guidance regarding disposal of CBR threat agent derived waste
- **Technical/Scientific**
  - Gaps in technical or scientific understanding regarding disposal options for CBR threat agent derived waste
- **Socio-political**
  - Community-oriented or stakeholder concerns related to risk associated with disposal of CBR threat agent derived waste.
- **Capacity/Capability**
  - Lack of capacity/capability at treatment/disposal facilities to treat/ dispose of CBR threat agent derived waste and a lack of laboratory capacity to effectively characterize the waste

Workshop Structure

- **Context of the Problem**
- **What Do We Know Now?**
  - Existing Requirements and Capabilities of Subtitle C and Subtitle D Landfills
  - Landfill Gas Control
  - CBR Landfill Disposal Issues – A NYSDEC Perspective
  - Persistence of CB Agents in Landfill Leachate
  - Fate and Transport of CB Agents in Landfills
  - Destruction of Spores in Landfill Gas Flares
  - Waste Streams Generated from CBR Events
- **How Can We Use What We Know?**
  - Panel Discussion
  - Synthesis of Panel Discussion

Insights Identified in Workshop

- **Waste Characteristics**
  - CBR events are generally not expected to result in large debris fields of comingled wastes
  - More likely result in contaminated surfaces and structures, from which highly homogeneous waste streams will be generated
  - Can be handled individually or mixed in a fashion most suitable for disposal (or other waste management option)
  - Biodegradable wastes that can lead to formation of landfill gases will generally be separated from inert material

Insights Identified in Workshop (Cont)

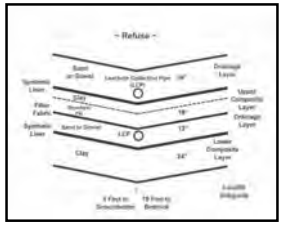
- **Waste Quantities**
  - Quantities of waste expected to be generated will likely far exceed the capacity of nearby landfills
  - New landfill cells could take several months to construct
  - Landfill cell construction can only occur during certain months of the year
  - Temporary waste staging areas will likely be critical element of the overall response – waste can be first moved to these temporary locations while landfill capacity is being constructed or negotiated

Insights Identified in Workshop (Cont)

- **Planning Opportunities**
  - Specifying criteria for landfill siting
  - Identifying specific locations prior to incident may be politically sensitive
  - Identifying criteria for siting and criteria for unacceptable sites not as politically sensitive
  - Drafting engineering and planning documents required for new landfill cells
  - Assessing transportation infrastructure based on anticipated volumes of wastes

Insights Identified in Workshop (Cont)

- **Technical Issues Identified**
  - Siting
  - Construction quality assurance
  - Fill progression plans
  - Landfill gas control systems
  - Leachate control systems
  - Long-term monitoring
  - Post-closure care
  - There will be C, B, R specific considerations for some of these criteria (e.g., leachate recirculation, landfill gas control)



Workshop Report Availability

- **Report is Publicly Available**
  - http://www.epa.gov/nhsrc/pubs.html
    - Indoor and Outdoor Decontamination Research
      - Treatment and Disposal
        - » Report on the 2011 Workshop on Chemical-Biological-Radiological Disposal in Landfills

Disclaimer

- Reference herein to any specific commercial products, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government, and shall not be used for advertising or product endorsement purposes.

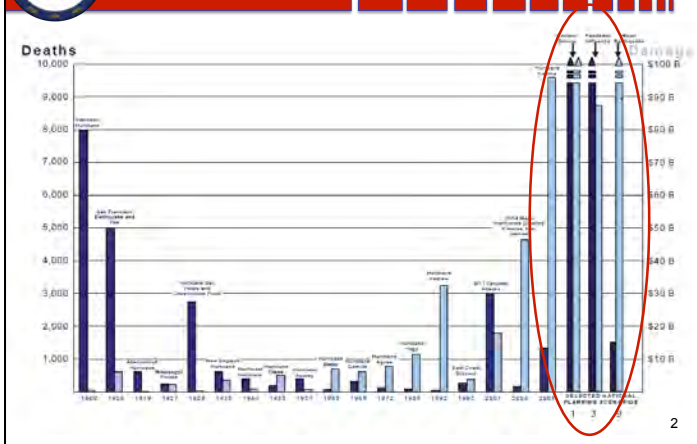
Case Studies
Hurricane Katrina

James Michael
Chief, Waste Characterization Branch
Materials Recovery and Waste
Management Division
US EPA

WARRP - Waste Management Workshop
March 15, 2012

Homeland Security
Science and Technology

Disasters Cause Death, Damage, Waste & Debris
The trend is clear!



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Hurricane Katrina: Scenario

- Aug 29th, 2005 Hurricane Katrina strikes south of New Orleans as a Category 4 Storm, 3 weeks later Hurricane Rita strikes the same area
  - Over 1.3 million people evacuated
  - Storm surge recorded as high as 30 feet
  - Multiple levees failed in New Orleans flooding 80% of the city
  - Louisiana lost 25% of its economy
  - Property damage estimated at $100B (127K homes destroyed, 240K damaged)
  - Costliest disaster in America ($43B in terms of FEMA costs incurred)
    - WTC (2001) = $7.4B, Haiti Earthquake (2010) = $800M (USD est)
- Massive Debris Field affecting 90,000 square miles
  - Disaster Debris estimated in excess of 55 million tons (Largest in US History)
    - WTC (2001) = 1.6 million tons, Haiti earthquake (2010) = 5.8 million tons

3

Hurricane Katrina: Waste/Debris Streams

TYPE OF WASTE/DEBRIS	Amount
Curbside Debris (Construction, Demolition & Vegetative/Wood Debris)	53 Million cubic yards
White Goods (Refrigerators, ranges, water heaters, freezers, a/c units, washer/dryers, etc.)	~892,000 units
Freon Removal	~325,000 units
Electronic Goods	~603,000 units
Waste Containers (drums, propane tanks, fuel tanks, etc.)	~3,740,000 containers
Household Hazardous Waste (batteries, oil, automotive products, paint, cleaners, pool chemicals, pesticides, etc.)	~16,114,495 lbs
Non-Hazardous Household Waste (furniture, mattresses, carpets, textiles, etc.)	~3,645,025 lbs
Putrescible Waste (meats, fruits, vegetables from grocery stores & residents)	~36 Million lbs
Vehicles & Vessels (cars, boats, etc.)	~410,000 units

4

Massive Quantities of Debris

5

Enormous Effort of Material, Waste/Debris Handling, Segregation, Recycling, & Disposal

6

Hurricane Katrina: EPA Waste/Debris Management Issues and Lessons Learned

- Inadequate Storage, Treatment, and Disposal Capacity
  - EPA provided guidance stating that State Directors have the authority to reopen closed C&D, and MSW Landfills for the disposal of disaster debris
  - EPA provided guidance that State Directors have the authority to establish staging/storage areas that would be considered Part 257 facilities under federal rules: http://epa.gov\katrina
- State Guidance regarding open-burning
  - EPA provided guidance stating that open-burning is an allowable option under Federal rules for debris resulting from emergency clean-up operations: http://epa.gov\katrina
- State Guidance regarding PCBs & Asbestos Containing Materials
  - EPA worked with states & the USACE to develop guidance for the handling of PCB's & Asbestos Containing Materials (ACM)
  - "No Action Assurance Letters" for ACM management
- EPA Region IV developed a Landfill Incident Response Team
  - Waste specialist deployed to Joint Field Office for the first time
  - Team assisted the ACE in diverting recyclable and HW materials away from landfills
  - Conducted site inspections of landfills, assisted MDEQ in developing Debris Plans

7

Waste/Debris Management Issues: *Hurricane Katrina & Rita*

Issue	Southeast Louisiana	Southwest Louisiana
Debris Volume	Extremely high, varied from 10M to >100M yds³	Accessible debris <2M yds³
Debris Distribution/ Access	High Volume in place debris, infrastructure obstacles	Remote areas, scattered debris – largely inaccessible
Debris Reduction	Limited vegetative grinding & isolated incineration	Open burn for vegetative only
Landfill Proximity	Nearby C&D, Subtitle D further away	Lack of permitted facilities. Approved sites – stage, disposal
Landfill Capacity	>40M yds³ Permitted C&D and Type I/II MSW	Vermilion limited. No Cameron capacity. Jeff Davis > 20M yds³
White Goods, HHW, E-Debris	Massive ongoing operation, Gentilly, Crowder, HHW sites	Small operations - < 3 weeks white goods
Special Waste	High Volume oil-coated debris, residual solids, etc.	Sparse occurrence of special waste
Wood Waste	Unable to recycle due to formosan termites	Unable to recycle due to formosan termites

8

Hurricane Katrina Findings GAO Report, June 2007*

- Controversial use of two landfills (Gentilly & Chef Menteur)
- Disposal of White Goods & Household Hazardous Waste in C & D landfills not meeting RCRA criteria
- Lack of community involvement/transparency (i.e., EJ issues)
- Impacts transferred to BP Oil Spill

*http://www.gao.gov/assets/270/262716.pdf

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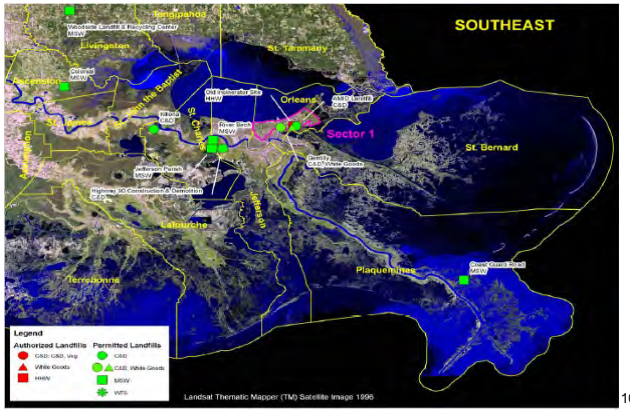
Waste/Debris Management Sites/Facilities



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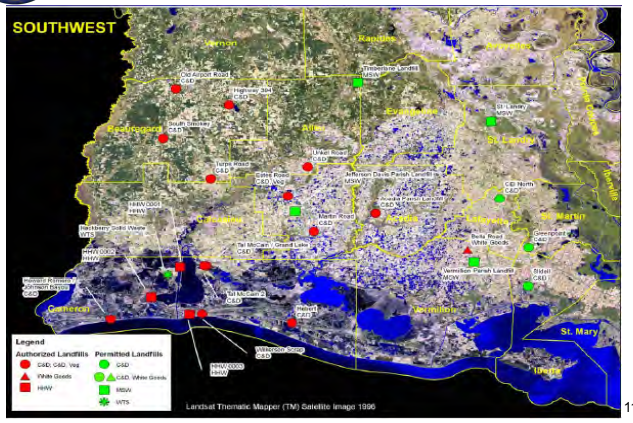
Waste/Debris Management Sites/Facilities



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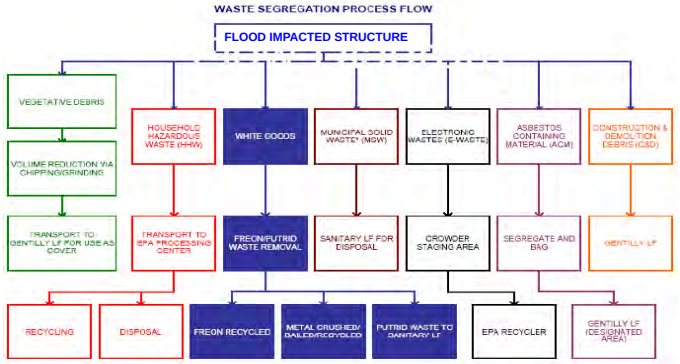
WASTE SEGREGATION PROCESS FLOW



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Hurricane Katrina: EPA Waste/Debris Management Issues and Lessons Learned

- Lack of Waste/Debris Management Plans
  - EPA reviewed & provided assistance on Waste/Debris Management Plans for LA & MS
- Lack of Waste/Debris Stakeholder Involvement
  - EPA contacted Waste Management, Inc, and American Forest and Paper Association to have their members assist in debris handling/recycling
- Update EPA Disaster Debris Planning Guidance with lessons learned
  - EPA updated its guidance, "Planning for Natural Disaster Debris", in 2008 to include lessons learned from Hurricanes Katrina & Rita
    http://www.epa.gov/waste/conserve/imr/cdm/pubs/pndd.pdf
- Development of a Waste/Debris Decision Support Tool
  - Assists in decisions regarding the handling, transport, treating & disposal of waste/debris
  - http://www2.ergweb.com/bdrtool/login.asp.

13

Case Studies
BP Oil Spill

James Michael
Chief, Waste Characterization Branch
Materials Recovery and Waste
Management Division
US EPA

WARRP – Waste Management Workshop
March 15, 2012

Homeland Security
Science and Technology

BP Oil Spill: National Scenario*

- On April 20th, 2010, BP's Deepwater Horizon Drill Rig Platform in the Gulf of Mexico had a massive explosion killing 11 people & initiating the largest Oil Spill in U.S. History
  - ~5 Million barrels of oil leak into the Gulf of Mexico
  - 650 miles of coastline directly affected by the spill in AL, FL, LA, MS, & TX
  - 48,000 people responded to the spill at the height of the response
  - 88,800 sq miles of the Gulf was closed to fishing/shrimping at its greatest extent
- The DHS secretary designates the spill as a Spill of National Significance (SONS)
  - Activates a federal response in accordance with the NCP (EOC, etc.)
  - US Coast Guard is identified as the Incident Commander (IC) with EPA in a supporting role
  - BP is designated as the responsible party

*Deep Water, The Report to the President on The Gulf Oil Disaster and the Future of Offshore Drilling, 2011

2

Waste Management Response Framework

- Area commands were established in Mobile, AL covering Region 4 states (AL, FL, MS) and Houma, LA for Region 6 states (LA & TX)
- BP contracted with two waste management firms
  - Waste Management Inc. for the Region 4 states and
  - Heritage Environmental Services for the Region 6 states
- BP had a generic waste plan on file to serve as a guide for an oil spill
  - Lacked the specificity to address the management of waste that would be generated by the spill

3

EPA HQ's Waste Management Involvement

- EPA's National Incident Coordinator requests that ORCR establish a full time WM function as part of the HQ EOC, these duties included:
  - Staffing the EOC 12 hrs/day, 7days/week for over 4 months (involved over 25 ORCR Staff)
  - Established communication of coordinating WM activities between EPA Regions 4 & 6, States, HQ Offices & Senior Management
  - ORCR set up daily conference calls with Regional representatives and On-Scene Coordinators at the Area Commands
  - ORCR was charged to ensure that the wastes from the spill were to be managed in a consistent manner across the Regions and States

4

Waste Management (WM) Efforts/Issues - I

- Specific Waste Management Plans (WMPs) needed to be developed to manage the waste that would be generated
- Coordinated with Regions and States the review of over 40 WMP submittals (e.g., WMPs, Sampling & Analysis Plans, Air Monitoring Plans, Environmental Justice Reviews, Liquid Management Plans, etc.)
- WMPs were to address the management of recovered oil, contaminated materials, liquid & solid wastes; waste sampling; community engagement activities, transportation & waste tracking
  - WMPs were approved June 24, 2010, WM Directives issued June 29, 2010
- Developed WM facility analysis spreadsheet

5

Waste Management (WM) Efforts/Issues - II

- EPA conducted WM operational oversight
  - Independent waste characterization sampling & analysis
  - Staging area & waste management facility visits
- Developed WM tracking format (cradle to grave)
- Community/EJ Concerns (e.g., Pecan Grove, MS; River Birch, LA; landfill violations)
- Review and posting of several thousand waste sample results
- Responded to hundreds of media, management, & White House requests for information

6

BP Oil Spill: *Waste Types and Quantities*

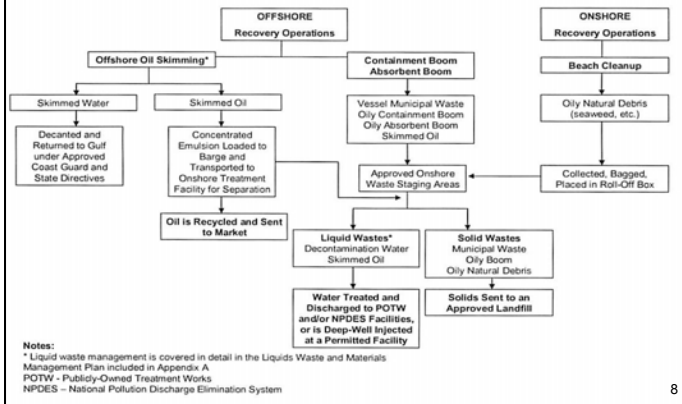
WASTE TYPE	TOTAL	UNITS
Oily Liquid[1]	459,781	Barrels
Liquids[12,]	949,468	Barrels
Oily Solids [12,]	96,279	Tons
Solid Waste [1]	13,911	Tons
Recyclables/ Recoverables	4,769	Tons
Animal Carcasses	DOI	DOI

1. Material that has been manifested to a recovery or disposal facility
2. Recently verified past data has been incorporated into this report

Source: BP Oil Spill website; data as of Dec 31, 2011

7

BP Oil Spill: *Waste Management Operations Approach*



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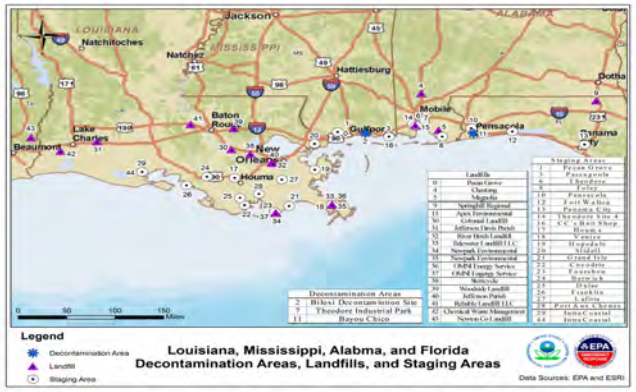
BP Oil Spill: *Waste Management Facilities Utilized**



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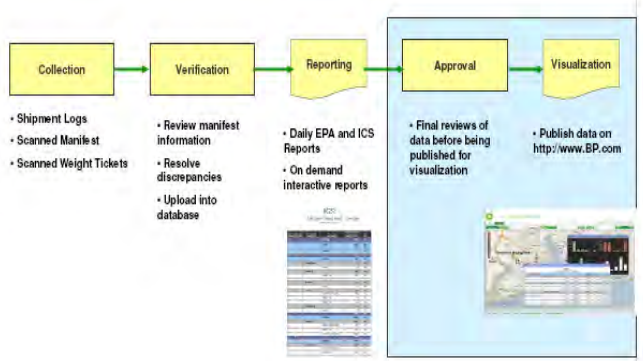
*Over 150 WM Facilities across 5 states were utilized

Waste Tracking: *Data Flow & Management*



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Waste Tracking: *Cradle to Grave*

Staging Areas

Disposal Facilities

State	WM Staging Area	WM Profile ID	Manifest Date	Manifest ID	Weight Disposed	UOM	WM Disposal Facility
AL					2.0	Tons	
	Foley				0	Tons	
		103663AL - Trash			0	Tons	
		105363AL - Crude Cont. Debris			0	Tons	
	Theodore				2.0	Tons	
		103663AL - Trash			0	Tons	
		105363AL - Crude Cont. Debris			2.0	Tons	
			6/2/2010	00063867	2.0	Tons	Chastang
FL					0	Tons	
	Pensacola				0	Tons	
		103669FL - Trash			0	Tons	
		105363FL - Crude Cont. Debris			0	Tons	
MS					2.2	Tons	
	Pascagoula				2.2	Tons	
		103663MS - Trash			2.2	Tons	
			6/2/2010	00063785	2.2	Tons	Pecan Grove
		105363MS - Crude Cont. Debris			0	Tons	
	Pecan Grove				0	Tons	
		103663MS - Trash			0	Tons	
		105363MS - Crude Cont. Debris			0	Tons	

Notes: Report summarizes the amount of waste disposed on a daily basis
Total weight disposed, by State.
Total weight disposed, by Staging Area.
Total weight disposed, by Waste Type.
Total weight disposed, by Manifest.

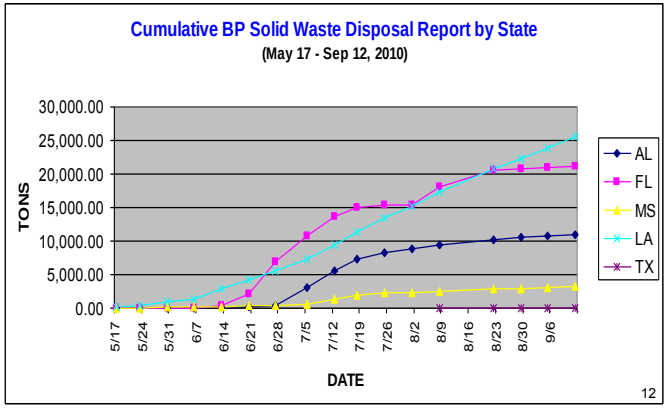
Form ICS 209 Cumulative Total to date	UOM
Liquid 0.0	BBLS
Oil 0.0	BBLS
Oily Liquid 0.0	BBLS
Oily Solid 55.6	Tons
Solid 334.3	Tons

ICS Form 209

Form ICS 209 Definitions
Oily Solids - Waste Streams sent for disposal at WM landfills containing Oil
Crude Oil contaminated natural debris (e.g. trees, seaweed)
Crude Oil contaminated shoreline substrate (e.g. beach sand)
Crude Oil contaminated industrial type waste (e.g. batteries, tires)
Crude Oil contaminated spill response equipment
Solids - Non-Oil contaminated, MSW, Trash, etc. resulting from clean-up efforts

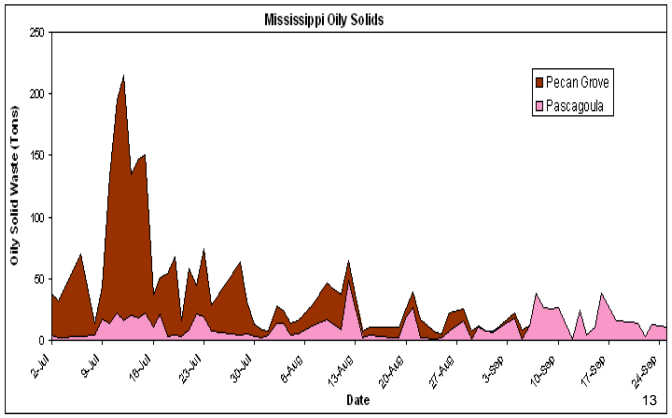
11

Waste Disposal By State



12

Waste Tracking By Staging Areas



13

Waste Management: Operational Oversight

State	Staging Area/Decon Station/Port/Doc	Waste Stream(s) Managed: Liquids: Liquid	Liquids: Oily Liquid	Solids: Solid	Solids: Oily Solid	Solids: Recyclables	# Site Visits	Status*	Site Visit/Comments
AL	Foley			x	x	x	7		Last visited on 9/7
	Theodore Site 4 SA			x	x		8		Last visited on 9/10
	Theodore Decon Station	x	x				8		Last visited on 9/17
	Theodore			x	x	x	7		Last visited on 9/17
FL	Fort Walton			x	x		5		Last visited on 9/8
	NAS Facility		x						
	Panama City			x	x	x	4		Last visited on 9/8
	Myrick Staging Area			x	x		7		Last visited on 9/17
	Pensacola Decon Station	x	x				5	8/18/2010	
	Pensacola			x	x		8		Last visited on 9/7
	Port St. Joe Decon Station	x					0	9/10/2010	Never handled oily material
MS	Biloxi Decon Station	x	x				10		Last visited on 9/20
	Pascagoula Decon Station	x					4		Began operations 8/6/10 Last visited on 9/20
	Pascagoula Staging			x	x	x	7		Last visited on 9/20
	Pecan Grove			x	x	x	8		Last visited on 9/20
	Yates	x					4		Last visited on 9/20

Status*:
8/31/10 Deactivation/Clean Closed
Open/No Waste in past 10 days
Open/Waste Received
Site Visits: From 6/9/10 To 9/20/10

14

QUESTIONS?

Now is not the time to develop your Waste Management Plan!

15

Case Studies
Japan

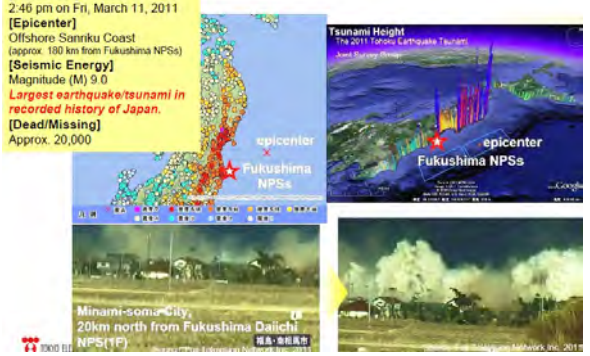
Tom Peake, Director
Center for Waste Management and Regulations
Radiation Protection Division
Office of Radiation and Indoor Air
US EPA

Waste & Debris Management Workshop
March 15, 2012

Homeland Security
Science and Technology

Japan: Scenario

[Date/Time]
2:46 pm on Fri, March 11, 2011
[Epicenter]
Offshore Sanriku Coast
(approx. 180 km from Fukushima NPSs)
[Seismic Energy]
Magnitude (M) 9.0
Largest earthquake/tsunami in recorded history of Japan.
[Dead/Missing]
Approx. 20,000



2

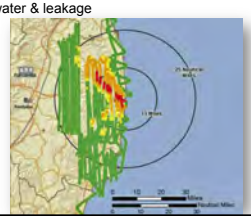
Japan: Impact of Earthquake and Tsunami

Damage to the Reactors

Level 7 – "Major Accident" on International Nuclear Event Scale
- "A major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures"
- Loss of Cooling
- Damage to Secondary Containment Vessels
- Fuel Meltdown (partial or complete – 3 of six units)

Releases of Radiation to the Environment

"More than several tens of thousands of terabecquerels of I-131" (37 TBq = 1,000 Curies)
- Air Releases – intentional venting & hydrogen explosions
- Ocean Releases – intentional release of cooling water & leakage



3

Japan – Radionuclide Releases

- Two radionuclides are driving long-term cleanup
  - Cesium-137 (30-year half-life)
  - Cesium-134 (2-year half-life)
- Iodine-131 (8-day half-life) released in significant quantities in the early stages
  - Driver for initial protective actions, but not a concern in the long term
- Some reports of Strontium-90 (29-year half-life) and Plutonium outside boundaries of nuclear plants
- Evacuation out to 20 km, restricted entry to 30 km
  - >150,000 people evacuated, ~100,000 still displaced, many will not be able to return for years
  - Zones extended beyond 20 km in highly affected areas to northwest

4

Japan: Description of Waste Streams

- Management of radioactive waste significantly complicated by aftermath of earthquake and tsunami
  - Buildings destroyed
  - Infrastructure damaged
  - Agricultural areas flooded and contaminated
  - Mixtures of toxic and hazardous substances widespread
  - Accumulation of wastes from treating power plant effluents
  - Significant ocean releases could lead to re-contamination
  - "Hot spots" found across the country
  - Might be considered comparable to nuclear device damage
- Japan relies heavily on incineration of solid waste
  - Precautions to avoid re-suspension of radioactive material
  - Concentration of radioactive material in ash

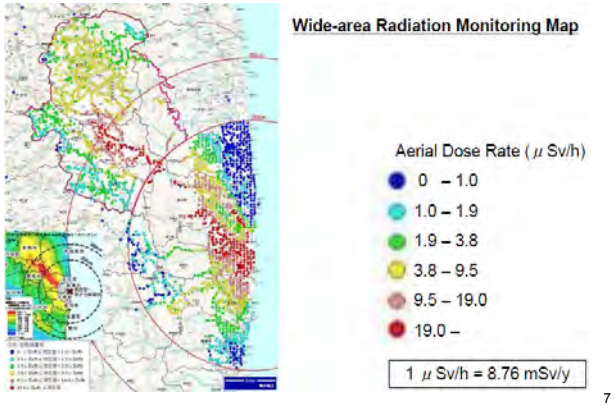
5

Japan – Path to Restoration and Recovery

- Government of Japan has spoken of adopting international reference levels of 1 to 20 mSv per year (100 mrem to 2 rem/yr) as a benchmark for restoration
  - Prioritize cleanup of areas up to 50 mSv/yr (5 rem/yr) to allow return of residents by March 2014 (>5 rem/yr may be deferred)
    - Schools and other child-sensitive areas
    - Agricultural production areas
      - Restrictions on planting in highly-contaminated areas
      - Research on effects on different plant types
  - Iterative process to reach 100 mrem/yr or lower will take years
    - Localities responsible for areas <100 mrem/yr
  - 70,000 square meters of seabed to be covered (cement & clay)
  - Next slide shows extent of contamination and significant areas above 20 mSv per year (bright green and above)

6

Japan: Extent of Contamination



7

Japan: Waste Management Issues and Lessons Learned

- Early estimates from Government of Japan
  - ~30 million tons of soil to be removed in Fukushima Prefecture
  - ~13% of land area in the prefecture
    - Estimated to reach cleanup level of 5 mSv/yr
  - ~11,000 square kilometers nationally contaminated >1 mSv/yr
    - 3% of land area in Japan
  - Storage capacity sought for ~90 million cubic meters of soil
    - ~3 billion cubic feet
    - ~20% of volume landfilled annually in US
  - Incinerator ash up to 8 Bq/g (216 pCi/g) allowed to be landfilled
- Local interim storage capacity sought to facilitate cleanup
  - Facility to be capable of storing ~280 million tons by 2015
  - Resistance from local communities/officials
  - Want assurance that facilities will not be permanent

8

Japan – Additional Considerations

- Restrictions on distribution of Fukushima products
  - Meat, milk, rice, fish, other
  - Fund of >40 billion yen (~$500 million) to restore confidence
  - Building materials (e.g., lumber, stone, aggregate)
    - One quarry found highly contaminated
- Atypical waste streams/vectors
  - Leaves from forested areas piling up (incineration concerns)
  - Wastewater treatment sludge and ash accumulating at facilities
  - River transport of contaminated sediments
  - Local citizens (not trained workers) doing cleanup/ad hoc disposal
- Uncertain future of contaminated areas
  - Power plants likely to be left in place for some period
  - Youngest evacuees considered least likely to return

9

Japan – Some Headlines

Mixed Reaction Over Plan for Fukushima County to Store Radioactive Waste (Mainichi Daily News, March 12, 2012)

Three Towns Near Fukushima No. 1 Asked to Store Radioactive Soil, Waste (Japan Times, March 11, 2012)

Disposal Sites Refuse to Accept 140,000 Tons of Tainted Waste (Yomiuri Shinbun, March 4, 2012)

86% of Municipalities Reluctant to Accept Debris from March Disasters (Mainichi Daily News, March 4, 2012)

6,800 Tons of Radiation-Tainted Straw Left Lying in 8 Prefectures (Mainichi Daily News, March 3, 2012)

Radiation Fears Behind Debris Refusal (Yomiuri Shinbun, November 4, 2011)

No-Go Zone Soil To Be Moved in 2-1/2 Years (Yomiuri Shinbun, October 12, 2011)

10

Japan – Implications for RDD Waste

- While the scale of the Fukushima accident likely exceeds the impacts from an RDD, several aspects are relevant:
  - Cleanup goals will affect the volumes of waste generated
  - Decontamination strategies will also affect waste volumes
  - Likely to be public pressure to accelerate cleanup
    - Desire to return to affected area to live or work
    - Prioritizing certain areas/functions (e.g., schools)
  - Federal, state, and local roles and responsibilities for decision-making on cleanup and waste management may create tension
    - Local management of waste will be expected
  - Initial focus on waste staging, temporary and longer-term interim storage – disposal likely will take more time

11

Case Studies
Agricultural Incident

Lori Miller
USDA/APHIS

Waste & Debris Management Workshop
March 15, 2012

Homeland Security
Science and Technology

Ag Incident: Foot and Mouth Disease in Feedlot

2

Ag Incident: Scenario

- Foot and mouth disease is a rapidly spreading disease of all cloven-hoofed animals
- FMD results in severe disease and up to 50% death loss in some herds
- Nearly 100% of the animals in an exposed herd will become ill
- Young animals may die from the disease
- Enormous international trade implications, impacting the US Gross Domestic Product

3

Ag Incident: Stamping Out

- Stamping-out …means …on confirmation of a *disease*, the *killing* of the *animals* which are affected and those suspected of being affected in the *herd* and, where appropriate, those in other *herds* which have been exposed to *infection* by direct animal to animal contact, or by indirect contact of a kind likely to cause the transmission of the causal pathogen.
- All susceptible *animals*, vaccinated or unvaccinated, on an infected premises should be killed and their carcasses destroyed by burning or burial, or by any other method which will eliminate the spread of *infection* through the carcasses or products of the *animals* killed.
- This policy should be accompanied by the cleansing and *disinfection* procedures defined in the *Terrestrial Code*.

4

International Animal Health Code

OIE Article 8.5.9: Recovery of free status after FMD Outbreak

Stamping Out Without vaccination:

3 months after the last *case* where a *stamping-out policy* and serological *surveillance* are applied …

No Stamping Out With Vaccination:

18 months after the last *case* where a *stamping-out policy* is not applied, but emergency vaccination and serological *surveillance* … are applied…

USDA regulations at 9 CFR 53.4

Title 9: Animals and Animal Products

PART 53— FOOT-AND-MOUTH DISEASE, PLEUROPNEUMONIA, RINDERPEST, AND CERTAIN OTHER COMMUNICABLE DISEASES OF LIVESTOCK OR POULTRY

§ 53.4 Destruction of animals.

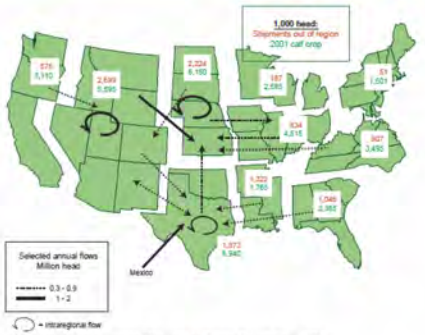
(a) Except as provided in paragraph (b) of this section, animals infected with or exposed to disease shall be killed promptly after appraisal and disposed of by burial or burning, unless otherwise specifically provided by the Administrator, at his or her discretion

Response Zones (from APHIS website)

Zone or Area	Minimum Size and Details
Infected Zone (IZ)	Perimeter should be at least 3 km (~1.86 miles) beyond perimeters of presumptive or confirmed Infected Premises. Will depend on disease agent and epidemiological circumstances. This zone may be redefined as the outbreak continues.
Buffer Zone (BZ)	Perimeter should be at least 7 km (~4.35 miles) beyond the perimeter of the Infected Zone. Width is generally not less than the minimum radius of the associated Infected Zone, but may be much larger. This zone may be redefined as the outbreak continues.
Control Area (CA)	Perimeter should be at least 10 km (~6.21 miles) beyond the perimeter of the closest Infected Premises. Please see Table 5-4 for factors that influence the size of the Control Area. This area may be redefined as the outbreak continues.
Surveillance Zone (SZ)	Width should be at least 10 km (~6.21 miles), but may be much larger.

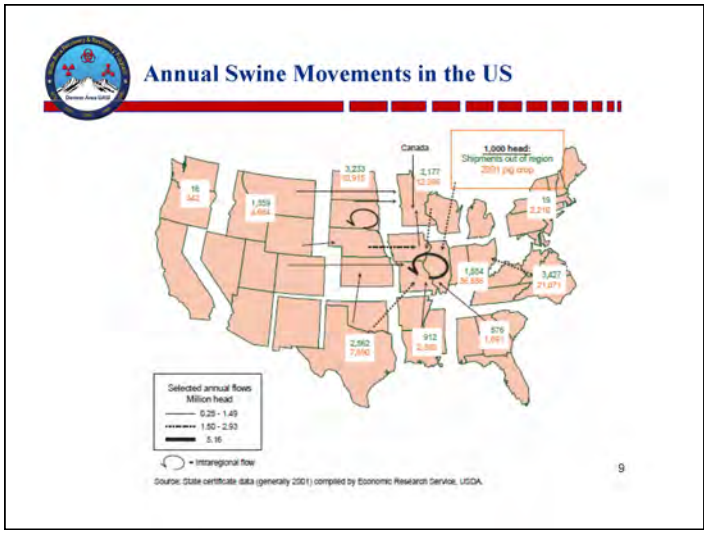
7

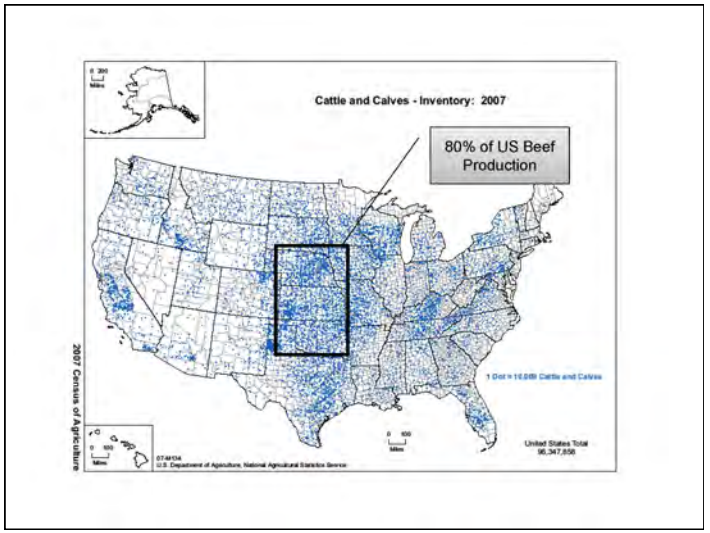
Annual Cattle Movements in US

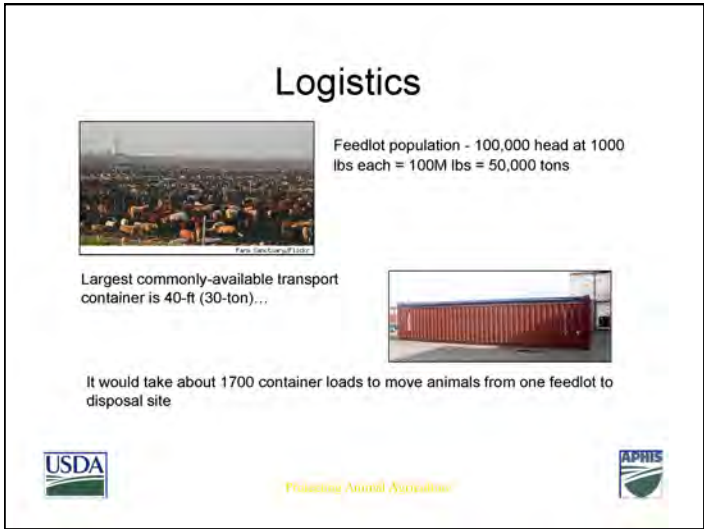


Source: State certificate data (generally 2001) compiled by Economic Research Service, USDA.

8







Beef Cattle Burial

- 100,000 head
  - 21 days to dig the trench
- 100,000 head x 8 ft = 800,000 ft = 151 miles
- Area = 151 miles x (4+3) ft = 128 acres*
- Volume = 151 mi x 4 ft x 3 ft = 207,407 yd^3
- 4000 gallons per day of leachate (assuming 100M lbs biomass with 60% rapidly degradable = 60M lbs leachate at 8.34 lbs/gallon over 5 years)

* Note: Actual land area required by Japan for FMD mortality burial in 2010 was approximately twice this estimate because of the need for a buffer zone around trenches.

Ag Incident: Description of Waste Streams

Quantity	One Feedlot (100K head)	Amount from One Feedlot is Equivalent to:	All FMD Susceptible Livestock in US (NASS, 2010)
Amount of Biomass	100M lbs	Weight of Titanic when it sank	153,000,000,000 (76M tons = weight of 600,000 locomotives)
Number 30-ton truckloads	1,667	Trucks end-to-end would stretch approximately 16 miles	2,550,510 (trucks end-to-end would encircle the earth at the equator)
Length of Burial Trench	151 miles	Approximate distance from Denver to Glenwood Springs, CO	231,030 miles (about distance from earth to moon)
Gallons of Leachate per day	4,000	Over 5 years, enough leachate to fill 11 Olympic-sized swimming pools	6,120,000 (about the total gallons of oil BP skimmed off the surface of the Gulf)

14

Ag Incident: Lessons Learned

Japan, South Korea, United Kingdom

LESSONS LEARNED FROM OTHER COUNTRIES

2010 Japan FMD Outbreak – Lack of Burial Sites Slowed Response

2010 Japan FMD Outbreak – Used Vaccinate-to-Kill to Gain Time to Find Burial Sites

South Korea Experience – Massive Environmental Impacts

SEOUL, March 29 (UPI) -- South Korean officials said Tuesday some underground water sources near burial sites of livestock culled for diseases are polluted with organic contaminants.

January 27th 2011 ~ The FAO is advocating proactive vaccination campaigns designed to stop the spread of the disease - and practices that "adequately take animal welfare and environmental impacts into account".

Philippe Mesmer, Guardian: Tuesday 15 February 2011

Public health worries after foot and mouth epidemic in South Korea - Government criticized for slow response as burial of infected carcasses threatens water supply

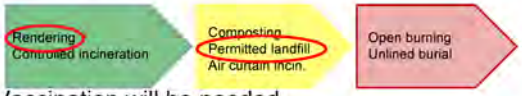
2001 UK FMD Outbreak

Potential Public Health Hazard	UK 2001 DISPOSAL OPTION RISK ASSESSMENT					Pathways of Agents to Humans
	Rendering	Incineration	Landfill	Pyre	Burial	
Campylobacter, E. coli (VTEC), Listeria, Salmonella, B. anthracis, C. botulinum, Leptospira, Mycobacterium, TB v. bovis, Yersinia						• Private water supplies • Direct contact • Recreational water use • Possibly also shellfish
Cryptosporidium, Giardia						• Water supplies • Crops, shellfish • Direct contact • Recreational water use
Clostridium tetani						• Contact with contaminated soil
Prions for BSE, Scrapie						• Water supplies via leachate, runoff, ash burial
Methane, CO2						• Migration into buildings
Fuel-specific chemicals, metal salts						• Inhalation • Deposition into food chain
Particulates, SO2, NO2, nitrous particles						• Inhalation
PAHs, dioxins						• Inhalation • Deposition into food chain
Disinfectants, detergents						• Water supply • Inhalation of products?
Hydrogen sulfide						• Inhalation

From "A Rapid Qualitative Assessment of Possible Risks to Public Health from Current FMD Disposal Options", UK Dept. of Health, June 2001.

Ag Incident: Waste Management Issues

- Stamping out strategy will generate more mortalities than we can feasibly dispose of
- Depopulation/disposal must be minimized to protect the environment and economy:



- Vaccination will be needed
- Current policies that favor stamping out and burial need to be reconsidered

Ag Incident: Colorado Perspective

COLORADO DEPARTMENT OF AGRICULTURE

Nick J. Striegel, DVM, MPH
Colorado Assistant State Veterinarian

24

Possible causes of a significant livestock emergency event

COLORADO DEPARTMENT OF AGRICULTURE

- Disease outbreaks
  - Emerging diseases
  - Re-emerging diseases
  - Foreign Animal Diseases
- Agro-terrorism – intentional introduction
- Natural disasters

25

Vulnerability of Animal Agriculture in Colorado

COLORADO DEPARTMENT OF AGRICULTURE

1. Intensive production units – large numbers of livestock in one location
2. Frequent movement and mixing of livestock
3. Transport of animals and animal products important to viability of Ag industry
4. Immunologically naïve livestock population (to foreign animal diseases)
5. Global travel of people
6. Agro-terrorism threats
7. Lax on-farm bio-security procedures
8. Local emergency management plans may not address agriculture

26

Possible Impacts of a Livestock Emergency Event

COLORADO DEPARTMENT OF AGRICULTURE

1. Negatively affect livestock health & welfare
2. Possible adverse public health consequences
3. Environmental health risks
4. Affect food supply and safety
5. Public fear
6. Loss of trade markets
7. Negative effect on local, state & U.S. economy

27

Concentration of Food Animals

COLORADO DEPARTMENT OF AGRICULTURE

Importance to Colorado & U.S. Economy

Colorado cattle and calves contributed over 3 billion dollars to the Colorado economy

Receipts from milk sales made dairy the number two commodity in Colorado

Table 2. 2007 Market Value of Agricultural Products Sold

Item	Farms	Sales ($000)
Cattle and calves	798,290	61,209,970
Poultry and eggs	148,911	37,065,947
Milk and other dairy products from cows	69,763	31,848,029
Hogs and pigs	74,789	18,056,981
Sheep, goats, and their products	121,171	704,855
Total	1,212,924	148,885,782

CORRAL System

CO lorado
R apid
R esponse for
A griculture &
L ivestock

Colorado's preparedness & response activities are organized within the CORRAL System

CORRAL System Goal:

Early Detection
&
Rapid response
to livestock emergency incidents

CORRAL System: Six Components

Component	Specifics
C ommunication Capability:	Use a **dispatch system** for alerts, warnings, and notifications
O perations Center:	Enhance our Division **Operation Center** (DOC)
R esources:	Build a roster of **CORRAL responders** and physical resources
R elationships:	Strengthen **relationships** with other governmental agencies & livestock associations
A greements:	Mutual **agreements** developed between agencies, organizations, and other states
L ivestock Emergency Plans:	**Livestock specific plans** integrated with Colorado's livestock industry & TEST them

Memorandum of Understanding (MOU) between Colorado Department of Agriculture (CDA) and Colorado Department of Health and Environment (CDPHE) regarding storage, treatment or disposal of livestock carcasses during an all-hazards event.

33

CDPHE-CDA Carcass Disposal MOU

"Based upon the duties, responsibilities and roles articulated within this Agreement, the Parties to this document, by their signatures below, agree that in the event of any all-hazards event that results in mass livestock mortality, as those terms are defined within this agreement, the Colorado Department of Agriculture shall exercise its authority as lead agency to respond to, direct, and otherwise manage any such event.

CDPHE hereby agrees that agricultural waste that is the result of an all-hazards event that results in mass livestock mortality, as those terms are defined within this document, is waste that is exempted from its regulatory oversight and that CDA shall direct and manage all activities related to any such waste that is created from any such event, from inception through clean-up."

34

Definitions used in the CDPHE-CDA Carcass Disposal MOU

- **"All-hazards event" means the occurrence of any catastrophic event or incident that is either natural, such as a blizzard, fire, flood, tornado, earthquake, or disease outbreak, or man-made and that could be of biological, chemical, radiological, nuclear or explosive origin.**
- **"Mass Livestock Mortality" means any situation that results in a large number of livestock carcasses and would be considered significantly higher than the normal death loss for that type of livestock production facility; it is not defined as death loss that is inherent within the scope of routine livestock production methods.**

35

CDA's livestock emergency disease response plans

www.colorado.gov.ag/animals

Proposed USDA-APHIS / CDA / CDPHE Project:

Geospatial and Economic Considerations in Carcass Disposal for Emergency Response

Priscilla Fitzmaurice & Eihab Fathelrahman

37

GIS Mapping Project Objectives

- Identify on-site areas that provide for safe burial of animal carcasses during a mass mortality
  - Environmental and logistical considerations
    - *Disease emergencies*
    - *Natural disasters*
- Economic implications
  - Decision support system to assess limitations, costs, and environmental consequences of various disposal methods (on-site and off-site)

38

GIS Mapping – Proposed Outcomes

- County-level analysis for targeted counties (Weld/Morgan)
  - Maps of one or two counties showing favorable disposal areas
- Economic assessment
  - Burial costs in addition to costs for other approved methods of disposal (i.e., rendering, composting, landfilling)
- Interactive training
  - Procedures and methodologies used for burial maps
  - Appropriate data layers and suggested data sources
  - Economic assessment

39

THANKS!

Thanks to the following agencies and institutions for the images and data used in this presentation:

Questions?

Case Studies
Souris River Flooding – Minot, ND

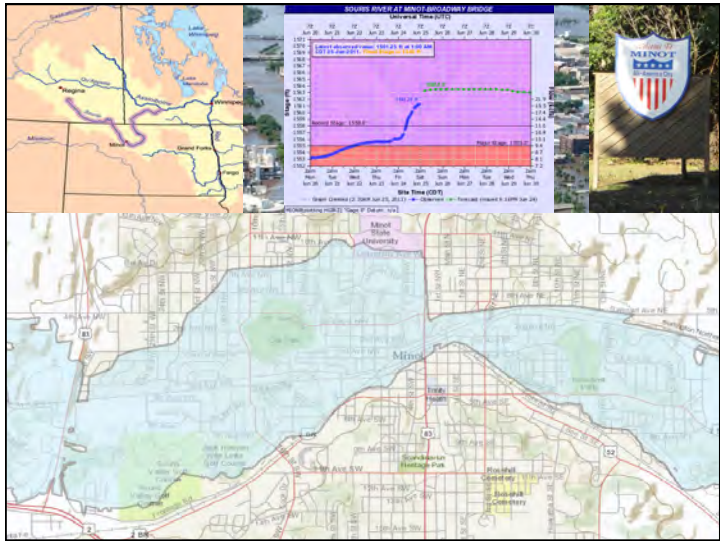
Steven Merritt
On-Scene Coordinator
Emergency Response Unit
U.S. EPA Region 8

Waste & Debris Management Workshop
March 15, 2012

Homeland Security
Science and Technology

Souris River Flooding: Scenario
Flooding Event and Aftermath – June 28, 2011

- Souris (a.k.a. Mouse) River crests 10 feet above previous record flood stage from runoff
- 4,000+ homes and businesses inundated
- 2,000+ structures completely submerged
- Water rose more than 8 feet in less than 12 hours
- Multiple levee breaches and wide-spread evacuations along river



Souris River Flooding: Scenario
FEMA ESF 10 Mission Assignment - July 8, 2011

- Remove household hazardous waste from impacted areas
- Decontaminate and prepare white goods and e-waste for recycling
- Collect and process orphaned containers
- Conduct environmental monitoring and sampling
- *Mitigate hazards posed by Zonolite Asbestos Insulation (ZAI)*

Souris River Flooding: Waste Streams

- HHW (Household Hazardous Waste)
  - Waste Oil
  - Paint and Solvents
  - Gasoline
  - Pesticides/Fertilizers
- Other Materials
  - Batteries
  - Lightbulbs
  - Ammunition
- Asbestos
  - ZAI

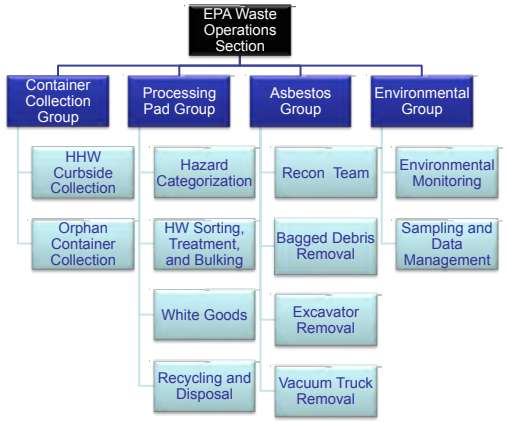
5

Souris River Flooding: Waste Streams

- e-Waste Recycling
  - Televisions
  - Computers
  - Personal electronics
- White Goods
  - AC Units
  - Refrigerators
  - Refrigerant Removal
  - Mercury Removal
  - Steel/Plastic Recycling

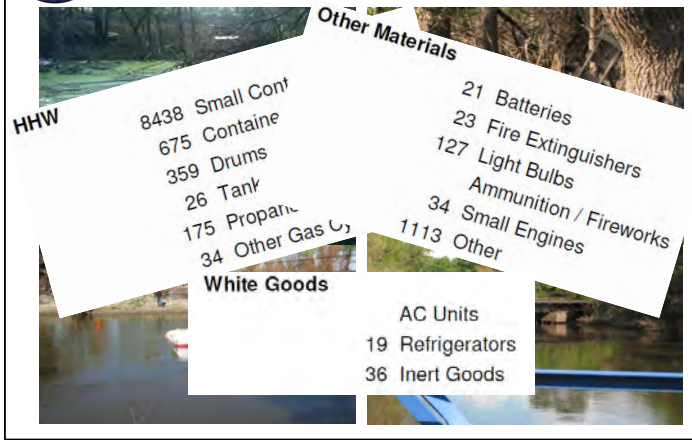
6

Task Organization for Waste Management

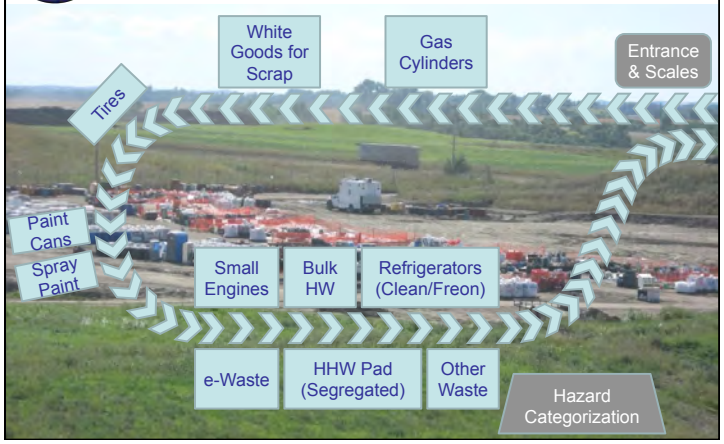


Container Collection Group: HHW Curbside Collection – "The Milk Runs"

Container Collection Group: Orphan Container Collection – "Goin' Fishing"



Processing Pad Group: Waste Management Site Logistics



Processing Pad Group: Hazard Categorization – "HAZCATing"

- Assessing unknown materials in collected containers
- Do not identify material, just hazard class for DOT
- Aides in bulking schemes, which reduce overall costs
- Resource intensive

Processing Pad Group: White Goods – "Mold, Mercury, and CFCs"

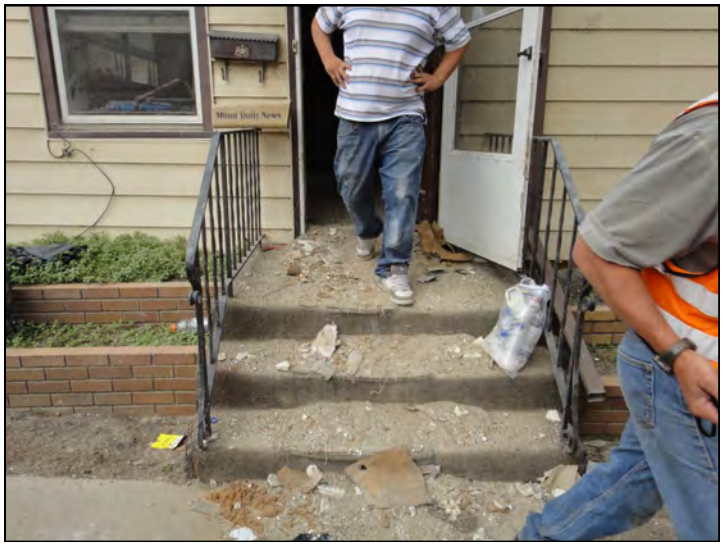
- Remove moldy contents and dispose of them as solid waste
- Remove mercury switches in AC unit thermostats and old refridgerators
- Evacuate and collect refrigerants
- Completed units scrapped for steel

Processing Pad Group: Household HazMat – "To Bulk or Not to Bulk?"

- Small containers of chemicals are costly
- Once hazards are known, material can be bulked
- Bulk shipments more economical to transport
- Energy recovery and on-site treatment options available, which also reduce cost

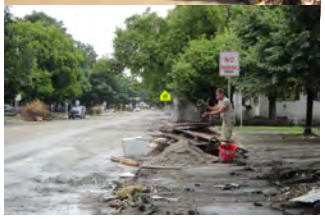
Processing Pad Group: Disposal and Recycling – "Get it Gone!"

- Electronic waste can often be shipped off at no cost
- Waste brokers can enable re-use of some products
- Need to have experts with connections to local industry and transportation



Asbestos Collection Group: Recon Team – "ZAI Hunters"

- USACE debris collectors trained to spot ZAI and notify EPA
- Public education campaign key to locating piles and knowing when demolition occurring
- Recon element would then task appropriate teams to respond



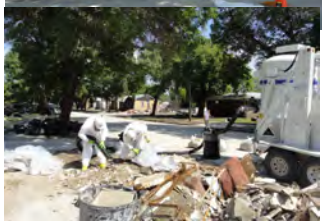
Asbestos Collection Group: Bagged Debris Removal – "Bag People"

- Public instructed to take appropriate precautions and double-bag ZAI, when possible
- EPA was able to begin collecting prepared material, reducing time spent and disposal costs
- Was most effective concurrent with demo

Asbestos Collection Group: Excavator Removal – "Track Hoes"

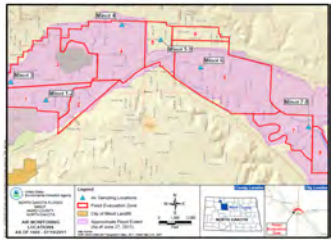
- Charged with excavating mixed ZAI and contaminated debris piles
- Asbestos placed into lined roll-off dumpsters for disposal
- Constant wetting of piles to reduce dust during excavation

Asbestos Collection Group: Vacuum Truck Removal – "ZAI Hunters"



- Vacuum truck reduces airborne ZAI hazard
- Only for "clean" piles of ZAI – no debris
- Places ZAI into drums for easy and secure disposal
- Limited number of units available

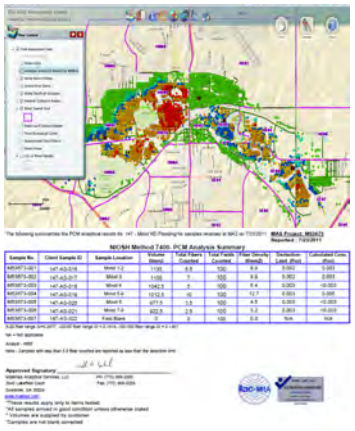
Environmental Group: Ambient Air Monitoring – "Clean Air Now!"



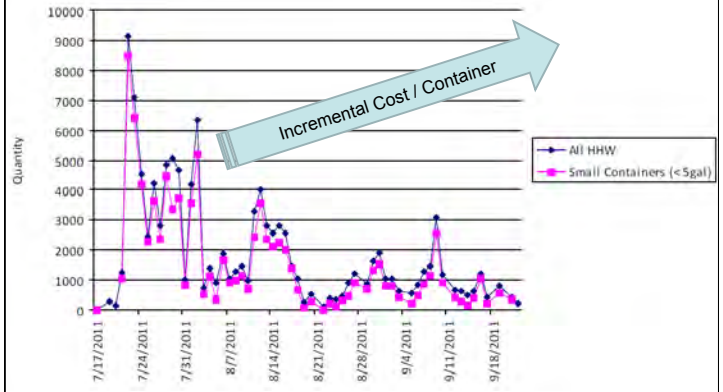
- 6 locations throughout Minot, ND
- Real-time air monitoring with data telemetry for:
  - PM 2.5
  - Volatile Organic Compounds
- Co-located air sampling pumps for asbestos analysis

Environmental Group: Sampling and Data Management – "The Nerds"

- Air samples determined no threat to public health from asbestos insulation
- Near real-time web-based viewer proved useful in tracking removal progress
- Also provided public and local officials with link to data for ongoing dialog



Final Waste Management Tally



Souris River Flooding: Waste Management Issues and Lessons Learned

- Know where to get the right tools for the job
- Early coordination with locals about public information is essential
- Need ongoing public communication and transparency with data
- Be prepared for changes in waste stream composition

30

EPA Region 8 Incident: Waste Management Issues and Lessons Learned

- Tracking costs and progress helps determine endpoints
- Having near real-time public website keeps agency and public informed without numerous inquiries
- Staging and segregation areas must be scalable

31

Importance of Planning for Waste Management in a Homeland Security Incident

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Homeland Security Team
US EPA

WARRP Waste Management Workshop
Date: March 16, 2012

Homeland Security
Science and Technology

Why Plan Ahead for Waste Management?

Wide Area Incidents may result in:

Larger Quantity of Waste
The amount of waste generated may be greater than the amount of waste many communities typically handle in a year, overwhelming State and local resources.

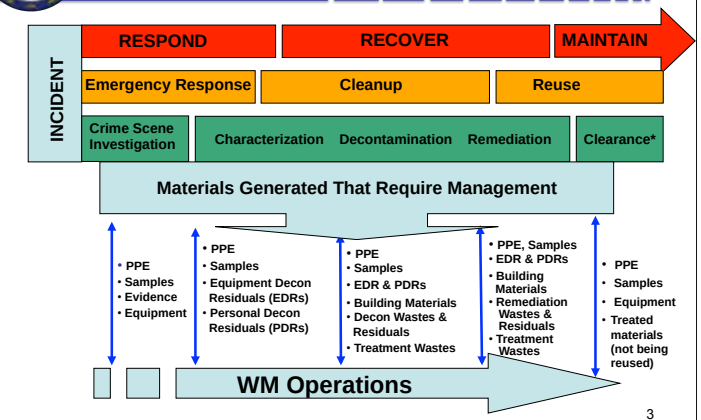
Wider Variety of Wastes
The incident may generate a broader range of waste streams, including waste streams (e.g., chemical, biological, and radiological-contaminated wastes) that are not typically handled by communities or waste management facilities.

Wider Area of Impact
In a homeland security incident, the area of impact may be extremely large (e.g., the BP Oil Spill). Multiple regulatory jurisdictions may be involved with varying approaches to waste management.

Change in Public Perception
The high visibility of the incident may result in communities resisting the treatment or disposal of generated wastes in their local facilities (e.g., landfills), including wastes that would otherwise be managed at those facilities under normal conditions.

2

Waste Generation Begins at the Start



3

*To Reoccupy or How Clean is Clean?

Overcoming Planning Roadblocks

Issues that appear to be out of the planners' control:

- Political/Socio-economic Issues
- Federal Government Oversight
- Clearance Goals?
- No Current Waste Management Solutions for Some Problems

4

Overcoming Planning Roadblocks

Issues that appear to make planning in advance difficult:

- Some Details are Unplannable
- Site-specific Issues
- Lack of Planning Resources
- Off-the-shelf Plans Lose Value Over Time
- Others?

5

Jumpstart the Planning Process

- *Attending this Workshop!*
- Prioritizing Plan Development
- Identifying Personnel
- Reviewing Other Plans
- Mitigating Community Hazards
- Determining FEMA Public Assistance Eligibility
- More?

6

Publically Available Resources

- Local, Regional, and National Plans
- FEMA's Debris Management Guide
- FEMA's Developing and Maintaining Emergency Operations Plans
- EPA's Planning for Natural Disaster Debris
- EPA/ORCR Website
- DrumTrak Database
- DHS "Lessons Learned" Database
- EPA's Communicating Radiation Risks: Crisis Communications for Emergency Responders
- EPA's Website: BP response

7

Waste Management in Four Easy Steps

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WARRP Waste Management Workshop
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Homeland Security
Science and Technology

Why an "All Hazards" Approach?

- Large percentage of information will be the same
- Development of scenario-specific elements can be prioritized
- Easier to maintain a single document

2

Why Four Steps?

- Breaks the process into manageable chunks
- Separates what is IN the plan from what you DO WITH the plan
- Emphasizes that waste management is a process and not an event

3

Waste Management Planning in Four Easy Steps

Step 1. Pre-Planning Activities

Step 2. Develop Waste Management Plan

Step 3. Review, Maintenance, Exercise, and Training

Step 4. Implementation

4

Step 1. Pre-Planning Activities

- Prioritizing Plan Development
- Identifying Personnel
- Reviewing Other Plans
- Mitigating Community Hazards
- Determining FEMA Public Assistance Eligibility
- More?

5

Step 2. Develop Waste Management Plan

- Determine the elements of a Waste Management Plan
- Incorporate considerations
- Make use of tools:
  - Published resources currently available
  - EPA/ORCR resources under development

6

Step 3. Review, Maintenance, Exercise, and Training

- Review and update the Waste Management Plan (WMP) regularly
- Meet with involved parties
- Schedule exercises
- Develop a training plan to address training needs
- Incorporate waste management lessons learned, After Action Reports, and improvement plans

7

Step 4. Implementation

- Identify the WMP that closely aligns to the specific incident, if applicable
- Revise the WMP with incident-specific information
- Present the revised plan to the appropriate Incident Command staff
- Notify waste management facilities and exercise contract support where necessary
- Implement the community outreach plan
- Notify labs of anticipated sampling/analysis needs
- Identify waste management policy or implementation issues that require resolution
- Track waste management operational monitoring

8

Planning Resources from EPA/ORCR (Under Development)

- Four Easy Steps Handout
- Waste Stream-Specific Factsheets
- Waste Management Decision Diagram
- Waste Stream Comparison Chart
- All Hazard Risk Assessment Planning Aid (Prioritization)
- Waste Treatment Technology Comparison Chart
- Waste Management Planning Toolbox

9

Waste Stream-Specific Factsheets Under Development

- Animal Carcasses
- Construction and Demolition Debris
- Cylinders and Tanks
- Electronics
- Food Residue
- Household Hazardous Waste
- Oily Debris
- Radiological Waste
- Soil, Sediment, and Sandbags
- Vegetative Debris
- Vehicles and Vessels
- White Goods
- return

Developing a Waste Management Plan: (Part 1: The Wastes Generated)

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WARRP Waste Management Workshop
Date: March 16, 2012

Homeland Security
Science and Technology

Developing Your Waste Management Plan

- Step 2 of the Four Step Process
- Divided into two parts for today's discussion
  - Part 1: The Wastes Generated
  - Part 2: Management of Wastes
- Each part is followed by a group work session
  - Identify, by scenario, specific items to be included in each section of the plan
- Report out results of both group work sessions
  - Include team suggestions for plan elements
  - Identify scenario-specific elements

Overview

- Suggested structure, not definitive
- Focus on scenario-specific additions/differences
- Each section to contain baseline information (common to all scenarios) and additional sections for C B R
- Definitions:
  - material vs. debris vs. waste
  - Hazardous Waste/Solid Waste
  - Household Hazardous Waste
  - Characterization for decontamination vs. waste characterization
  - Disposal vs. Treatment
  - Decontamination vs. Treatment

Suggested Plan Contents

I. Introduction to the Plan
II. Waste Streams
III. Waste Quantities
IV. Waste Characterization and Sampling Plan
V. Waste Management Strategies/Options
VI. Waste Management Facilities
VII. Transportation Plan
VIII. Waste Tracking Plan
IX. Community Outreach Plan
X. Resource Summary
XI. Recommended Appendices

Developing a Waste Management Plan: Part One

What wastes will be generated?

I. Introduction to the Plan
II. Waste Streams
III. Waste Quantities
IV. Waste Characterization and Sampling Plan



5

I. Introduction to the Plan

- Contents
  - Describe scope (what the plan covers)
  - Framework in which the plan is operating
  - Other information of a general nature
- Considerations
  - Review existing plans and applicable regulations
  - The response to any incident would take place within the Incident Command Structure
  - National Planning Scenarios

6

II. Waste Streams

- Contents
  - List and describe possible waste streams
  - What information should be in the plan for each waste stream to help a decision-maker?
  - How should each waste stream be handled?
- Considerations
  - Differences among Federal and State regulations
- Tools
  - Waste Stream Comparison Chart
  - Incident Waste Management Planning & Response Tool (IWMPRT)

7

III. Waste Quantities

- Contents
  - Forecast the quantity for each waste stream
  - Methods for estimating waste quantities during an incident
- Considerations
  - What method will be used to forecast waste quantities?
- Tools
  - Incident Waste Management Planning & Response Tool (IWMPRT)
  - I-WASTE
  - Others?


8

IV. Waste Characterization and Sampling Plan

- Contents
  - How should each waste stream be characterized?
  - What sampling is necessary?
  - How will sampling be conducted?
- Considerations
  - Cost
  - Time (waiting for results)
  - Lab capacity and access
  - Anticipated community concerns
- Definitions
  - Waste Characterization
  - Hazardous Waste

9

Scenario Group Assignment

Item for Plan (contents)	Issues to Consider	Unique to Scenario?	Missing Information	Available Tools
I. Introduction to the Plan				
1. 2. 3…	1. 2. 3…	(Y/N)	1. 2. 3…	1. 2. 3…
II. Waste Streams				
III. Waste Quantities				
IV. Waste Characterization and Sampling Plan				

10

Waste Management Planning Aids

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WARRP Waste Management Workshop
March 15-16, 2012

Homeland Security
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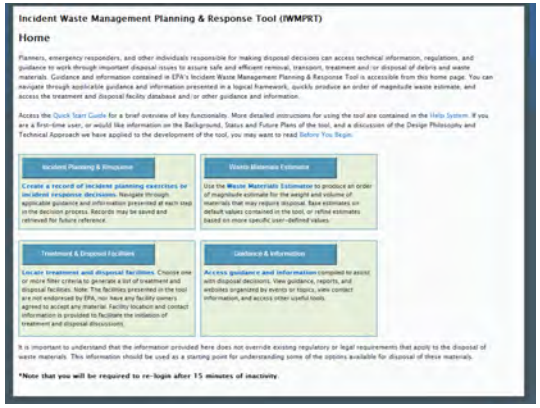
Decision Making Needs for Waste Management

- Waste Quantity and Characteristics
- Number and Characteristics of Affected Buildings
- Relevant Regulatory Requirements
- Key Decision Makers
- Potential Treatment/Disposal Facilities
- Potential Transportation Issues/Routes
- Impact of Remediation/Decon Decisions on Waste Management and Vice Versa

Tools EPA Has Developed to Support Waste Management Decisions

- **Tool 1: Incident Waste Assessment & Tonnage Estimator (I-WASTE) Online Decision Support Tool**
  - Estimation of building contents
  - Identification of key decision makers
  - Identification of potential facilities
  - Repository of relevant guidance
- **Tool 2: Radiological Dispersal Device (RDD) Waste Estimation Support Tool**
  - Identification of affected structures
  - Estimation of building structural materials
  - Estimation of outdoor media
  - Estimation of waste composition and activity as a function of decontamination and demolition strategies

I-WASTE Decision Support Tool



NOTE: The tool is undergoing a name change and was formerly known as the "Incident Waste Management Planning and Response Tool (IWMPRT)

I-WASTE Overview - Target Audience

- **EPA Responders**
  - On-scene Coordinators and Removal Managers
  - EPA Special Teams (RERT, ERT, NDT)
  - Technical Working Group (TWG) within Incident Command
- **State and Local Agencies**
  - Emergency Planners
  - Public Health
  - Environmental Protection
  - Transportation
- **Treatment/Disposal Facility Operators**
  - Combustors/incinerators
  - Landfills
  - Building owners/managers
  - Water infrastructure
  - Radiological waste disposal facilities
  - Ag facilities

I-WASTE Current Features

- **Web-based tool with restricted access**
- **Series of inputs defining scenario**
- **Calculators available to estimate mass & volume of disaster-generated waste and debris (offices, schools, theaters, shopping malls, residences, hotels, hospitals)**
- **Database of disposal facilities (location, capacity, technical information, permits)**
- **Access to contaminant and decontaminant information**
- **Guidance for worker safety, packaging and storage, and transportation**

List of Available Decision Support Tools

- **DST for the cleanup of debris from chemical or biological contamination of a building**
- **DST for the disposal of wastewater generated during decontamination of materials in the aftermath of an attack**
- **DSTs to address potential waste generated as a result of an event that introduces chemical or biological contamination in drinking water treatment plant, water supply network, water distribution system, or wastewater treatment plant**
- **DST that addresses disposal of animal carcasses or plant materials in the aftermath of an event at an agricultural site**
- **DST that addresses disposal of debris resulting from a natural disaster**
- **DST that addresses wastes resulting from the release of a radiological dispersal device (RDD) or other radiological events**

I-WASTE Disposal Facility Databases

- **Landfills**
  - MSW
  - Construction & Demolition Debris
  - Hazardous Waste
- **Combustion Facilities**
  - Municipal Waste Combustors (Waste-to-Energy)
  - Hazardous Waste
  - Medical/biohazardous Waste
  - Industrial combustion facilities (e.g., boilers, smelters, etc)
- **Decontamination Wastewater Disposal Facilities**
  - Publicly-Owned Treatment Works (POTWs)
  - Federally-Owned Treatment Works (FOTWs)
  - Liquid Hazardous Waste Combustion Facilities
- **Other Disposal Facilities**
  - Centralized Waste Treatment (CWT) Facilities
  - Commercial Medical Waste Autoclaves
  - Commercial and Federal Radioactive Waste Disposal Facilities

Access to the Tool

- http://www2.ergweb.com/bdrtool/login.asp
- **First-time users will need to request a user ID and password – the link above has directions for making the on-line request. Your request will be approved and your login ID and initial password will be emailed to you.**

RDD Waste Estimation Support Tool

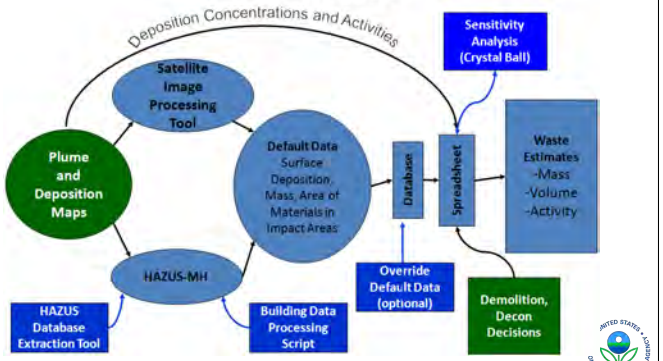
RDD WEST Overview - Target Audience

- **EPA Responders**
  - On-scene Coordinators and Removal Managers
  - EPA Special Teams (RERT, ERT, NDT)
  - Technical Working Group (TWG) within Incident Command
- **State and Local Agencies**
  - Emergency Planners
  - Public Health
  - Environmental Protection
  - Transportation

Objectives

- **Generate 1st order estimate of waste from radiological incident**
- **Develop a tool that can be used for planning and response**
- **Use commercially available software/databases, NARAC plume models**
- **Adjust parameters based on decontamination, demolition options**
- **Conduct sensitivity analysis on results**

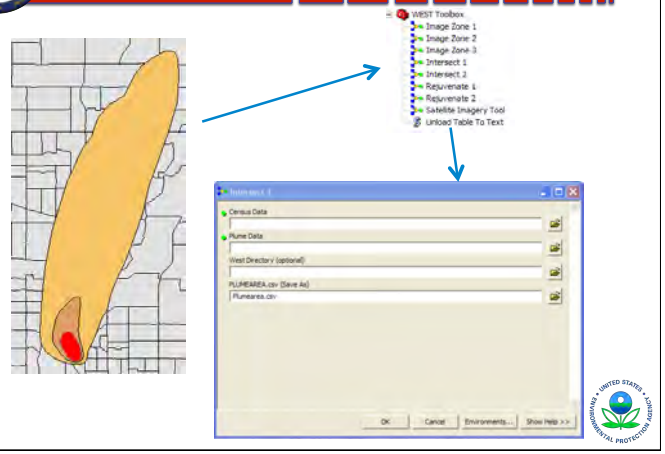
Methodology



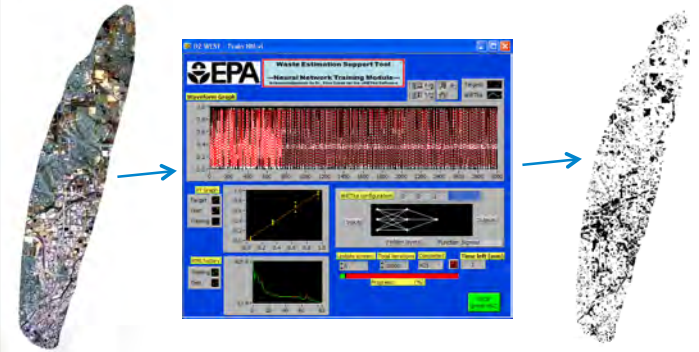
Primary Steps

- Import study regions into HAZUS-MH and export building stock data (ArcGIS Script)
- Analyze study region satellite imagery to generate outdoor media estimate (Image Segmentation Tool)
- Calculations on building parameter data to convert HAZUS-MH data into MS Access database needed for RDD Waste Estimation Spreadsheet (HAZUS Database Tool)
- Load RDD Waste Estimation application and generate waste estimate (MS Excel)

GIS Tools



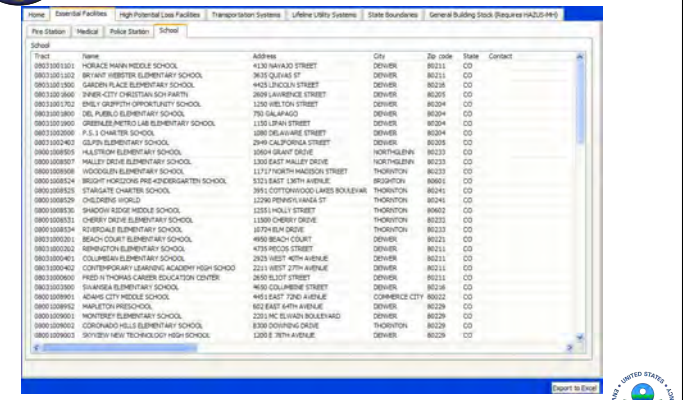
Surface Detection Application



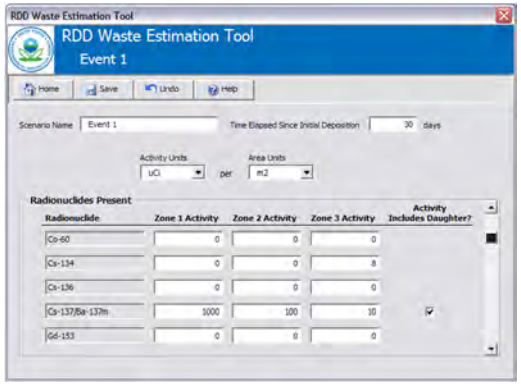
Carved Satellite Imagery

Segmented Concrete

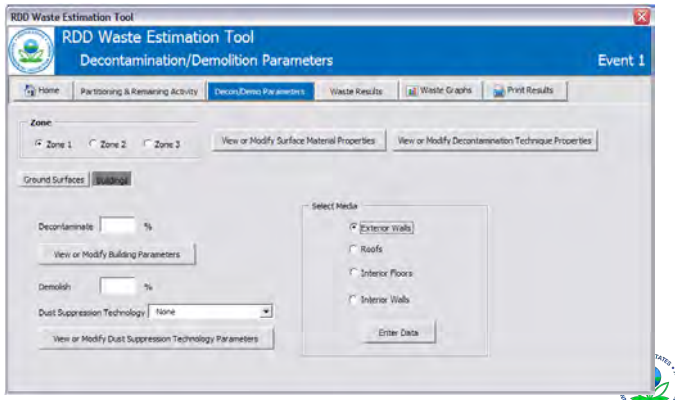
HAZUS-MH Database Tool



Example Input: Radionuclide Selection



Example Input: Decon/Demolition Parameters



LRE Default Demolition/Decon Assumptions Used

Media	Zone 1: 90% demolition, 10% decontamination	Zone 2: 10% demolition, 90% decontamination	Zone 3 10% demolition, 90% decontamination
Asphalt	1" removal	1" removal – 70% Wash – 30%	1" removal – 70% Wash – 30%
Concrete	1" removal	1" removal – 70% Wash – 30%	1" removal – 70% Wash – 30%
Soil	6" removal	6" removal	6" removal
Ext. Walls	1 mm removal	1 mm removal – 20% Wash – 80%	Wash
Roofs	1 mm removal	1 mm removal – 20% Wash – 80%	1 mm removal – 20% Wash – 80%
Int. Walls	1 mm removal	1 mm removal – 20% Wash – 30% Strip. Coat. – 50%	1 mm removal – 20% Wash – 30% Strip. Coat. – 50%
Floors	1" removal	1" removal	1" removal – 50% Wash – 50%

Example Results: "View Summary"

Demolition and Decontamination Waste Summary

	Zone 1	Zone 2	Zone 3	Total	
Solid Waste:					
Demolition	86,881	82,548	142,110	291,540	MT
Decontamination	22,060	311,441	615,162	948,664	MT
Total	88,943	393,989	757,272	1,240,204	MT
Liquid Waste *					
Demolition	52,948,845	65,350,416	112,501,382	230,802,643	L
Decontamination	--	14,480,199,150	27,591,715,972	42,071,913,122	L
Total	52,948,845	14,545,549,566	27,704,217,354	42,302,715,765	L

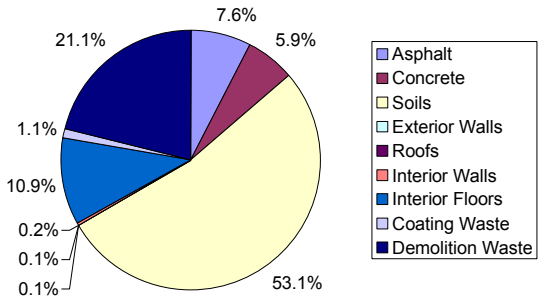
Mitigation Strategy:

- Prefer Demolition over Decontamination in Zone 1
- Prefer Decontamination over Demolition in Zone 2
- Prefer Decontamination over Demolition in Zone 3

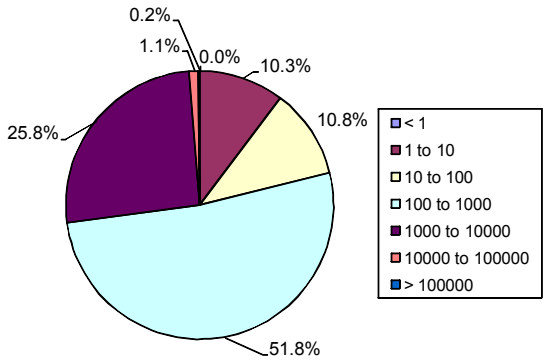
Note: The estimated results do not account for effects from the blast.

* This is an estimate for the amount of wastewater that may be generated. This may not accurately reflect the amount of water that would be available for demolition or decontamination activities.

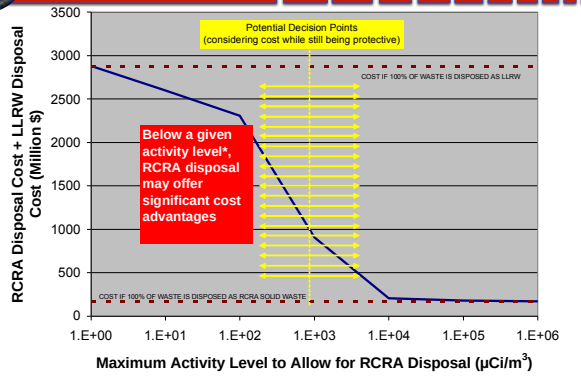
Example Results: Estimated Waste Volume %



Example Results: Estimated Solid Waste Activity by Vol % (µCi/m³)



Example Results: Cost vs. Disposal Option



NOTE: Assumed $300/m³ for RCRA disposal and $5000/m³ for LLRW disposal
* Where RCRA disposal is protective of public health and safety

Implications Identified by the Tool

- **Need to consider waste when selecting decontamination options**
- **Advantages of on-site treatment to reduce waste**
  - Soil is prime candidate for on-site treatment
  - Soil washing technology inadequacies suggest capability gap
- **Identifies starting point for policy discussions**
  - Use of RCRA-permitted disposal facilities for minimally-contaminated materials
  - Use of LLRW capacity for materials contaminated at higher levels

Summary

- **EPA developing tools to support waste management decisions as part of the overall remediation process**
- **Addresses some of the key issues associated with waste management**
- **NOTE: WARRP Decon Selection Tool (DS4) being developed as S&T project that will be another resource when available**

26

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- **Reference herein to any specific commercial products, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government, and shall not be used for advertising or product endorsement purposes.**

Developing a Waste Management Plan (Part 2: Management of Wastes)

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WARRP Waste Management Workshop
Date: March 16, 2012

Homeland Security
Science and Technology

Developing a Waste Management Plan: Part Two

How will the wastes be managed?

V. Waste Management Strategies/Options
VI. Waste Management Facilities
VII. Transportation Plan
VIII. Waste Tracking Plan
IX. Community Outreach Plan
X. Resource Summary
XI. Recommended Appendices

2

V. Waste Management Strategies/Options

- Content
  - How will the materials and waste be managed from the point of generation to their final disposition?
- Considerations
  - Waste minimization
  - Cost
  - Waste Management Hierarchy
  - On-site vs. off-site management
  - Facility requirements and capacity
  - Speed in which the waste needs to be managed
  - Anticipated community concerns
  - Environmental Justice concerns

3

VI. Waste Management Facilities

- Content
  - What information would you want to include about all the facilities?
  - What additional information would help a decision-maker choose between facilities during an incident?
- Considerations
  - Back-up facilities in different States or Regions
  - Capabilities of facility
  - Pre-negotiated contracts
  - Cost
  - Anticipated community concerns
  - Environmental Justice concerns

4

VII. Transportation Plan

- Content
  - How will you transport the waste from its point of generation to staging areas, storage areas, and/or waste management facilities?
  - What documentation may be required?
- Considerations
  - Security requirements
  - Applicable regulations
  - Pre-negotiated contracts
  - Facility requirements and capacity
  - Anticipated community concerns
  - Environmental Justice concerns

5

VIII. Waste Tracking Plan

- Content
  - How will you ensure that the waste is transported to its intended location?
  - How will you document where the waste goes?
  - How will you make the information available?
- Considerations
  - Maintaining consistency
  - Transparency vs. security

A	B	C	D	E	F	G	H	I
Point of Generation	Date	Waste Type	WM Staging Area	Amount Managed	Cumulative Amount Managed	Units	Waste Management Facility	Comments

6

IX. Community Outreach Plan

- Content
  - How do you want to address the community's concerns?
- Considerations
  - Perceived risk vs. actual risk
  - Taking place within the Incident Command System
  - Community characteristics
  - Need for interpreters/translators?



7

X. Resource Summary

- Content
  - List and describe the resources that you will need
  - How will you obtain those resources?
- Considerations
  - Pre-negotiated contracts
  - Cost





8

XI. Recommended Appendices

- Content
  - Pre-written WM emergency ordinances, orders, directives, declarations, designations, permits, etc.
  - Possible exemptions
  - Maps of WM facilities, staging/storage areas, transportation routes, critical WM infrastructure, and key resources
  - Job aids for different WM staff assignments
  - Health and Safety Plan
  - Others?

9

Scenario Group Assignment

Item for Plan (contents)	Issues to Consider	Unique to Scenario?	Missing Information	Available Tools
V. Waste Management Strategies/Options				
1…	1…	(Y/N)	1…	1…
VI. Waste Management Facilities				
VII. Transportation Plan				
VIII. Waste Tracking Plan				
IX. Community Outreach Plan				
X. Resource Summary				
XI. Recommended Appendices				

10

Implementation: What to do with the Plan When an Actual Event Occurs?

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Homeland Security
Science and Technology

Step 3. Review, Maintenance, Exercise, and Training

- Review and update the Waste Management Plan (WMP) regularly
- Meet with involved parties
- Schedule exercises
- Develop a training plan to address training needs
- Incorporate waste management lessons learned, After Action Reports, and improvement plans

2

Step 4. Implementation

- Identify the WMP that closely aligns to the specific incident, if applicable
- Revise the WMP with incident-specific information
- Present the revised plan to the appropriate Incident Command staff
- Notify waste management facilities and exercise contract support where necessary
- Implement the community outreach plan
- Notify labs of anticipated sampling/analysis needs
- Identify waste management policy or implementation issues that require resolution
- Track waste management operational monitoring

3

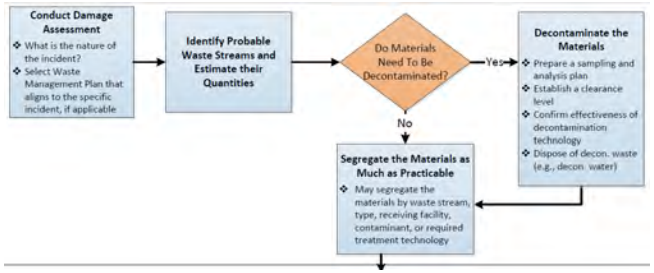
Waste Management Decision Diagram for All Hazards

- Flowchart that walks through the waste management decision-making process during an actual incident
- Divided into three sections:
  - Initial Activities
  - On-Site Activities
  - Off-Site Activities

4

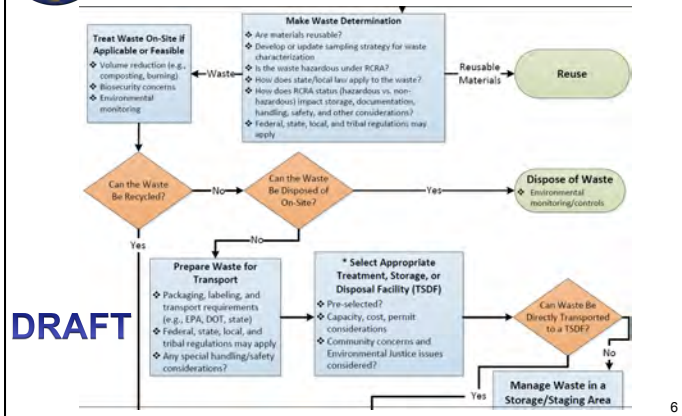
Waste Management Decision Diagram: Initial Activities

DRAFT



5

Waste Management Decision Diagram: On-Site Activities



DRAFT

*Selection should take place earlier in the process if possible.

6

Waste Management Decision Diagram: Off-Site Activities

DRAFT

7

Waste Management Facilities Data

- Maintain data on the staging areas, landfills, and other facilities receiving waste
- Sample Waste Management Facilities Data:
  - Name of Facility
  - Type of Facility
  - Waste Description
  - Permits
  - Permitted Capacity per Day
  - Total Remaining Capacity
  - History of Compliance/Permit/Groundwater Monitoring Issues
  - EJ/Community Concerns
  - Type of Liner
  - Leachate Collection System?
  - Contacts
  - Comments
- Can use the location information (i.e., name, address, latitude, longitude) to map the facilities' locations

8

Waste Tracking

- Waste generation begins at the start of an incident so waste tracking should as well
- Provides transparency
- Sample Waste Tracking Form:

A	B	C	D	E	F	G	H	I
Point of Generation	Date	Waste Type	WM Staging Area	Amount Managed	Cumulative Amount Managed	Units	Waste Management Facility	Comments

9

Exit Strategy

- Identify process for transitioning each waste management oversight activity to its pre-incident state
- 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
  - the frequency of the oversight activities
- Long-term monitoring may be necessary

10