



*KNOWLEDGE ENHANCEMENT EVENTS:  
WASTE MANAGEMENT WORKSHOP  
AFTER ACTION REPORT*

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# 1.0 Executive Summary

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This After Action Report (AAR) was developed following the Waste Management Knowledge Enhancement Workshop, which occurred on March 15-16, 2012 at the FEMA Region VIII, Longs Peak Classroom, Denver Federal Center, Lakewood, CO. This AAR incorporates information from recorder notes, including questions, comments, recommendations, and includes information from the feedback forms. The AAR was distributed to the planning team and members from the WARRP Leadership Team for review and comment prior to final release.

The purpose of the WARRP Waste Management Workshop was to advance the understanding of waste management (i.e. segregation, temporary storage, transportation, treatment, and disposal) following a CBR wide-area event in the Denver, CO urban area, identify issues significant to waste management, explore and determine waste management priorities, and review a draft of a waste disposal management template being developed by the EPA. There were approximately fifty people in attendance representing local, regional, state and federal emergency management officials EPA and CDC representatives, law enforcement, CDPHE, public works, building officials, FEMA, private sector.

Debbie Dietrich, EPA Assistant Administrator for Homeland Security, opened the event thanking state and local partners for attending. She stated her goal for attending the event was to learn from the locals and take that information back to Washington DC.

**Day one** provided an overview of the complexities of waste management and including making waste estimates following a CBR incident. Various expert presenters covered subjects such as statutory, regulatory, and policy framework underlying CBR waste management and a summary of previous findings. Experts also presented case studies on Hurricane Katrina, The British Petroleum (BP) Oil Spill, Fukushima Japan, Foot and Mouth Disease (FMD), and Minot, North Dakota floods.

**Day two** included a discussion of an overview of the waste management planning process from pre-planning activities to development of a waste management plan and maintenance of that plan. The participants broke into groups to discuss local planning for waste management based on the WARRP scenarios; chemical, biological, or radiological. Additionally, the EPA presented planning tools to allow participants to develop their own waste management plan.

The KEWG participants' had discussion and questions on the cost of disposal, budget restrictions and lack of funding for disposal site construction, location of disposal sites, federal funding during CBR incidents, regulatory roadblocks, private sector concerns, socio-economic issues surrounding disposal sites, and disposal methods for different contaminants. Participants' acknowledged the value of having a waste management template to take back for to their local jurisdiction for future planning.

The results of this meeting will be used to further validate or eliminate the need for Waste Management guidance in the State and Region. The WARRP Framework Writing Team will incorporate findings from this report into the *Denver UASI and State of Colorado All-Hazards Regional Recovery Framework with CBR Annexes* as part of the Wide Area Recovery and Resiliency Program (WARRP).

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

## 2.0 Background

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The Departments of Defense and Homeland Security, in close coordination with the Denver Urban Area Security Initiative (UASI), have partnered to establish the Wide Area Recovery and Resiliency Program (WARRP). The purpose of this collaborative program is to study, develop and demonstrate frameworks, operational capabilities and interagency coordination, enabling a timely return to functionality and re-establishment of socio-economic order and basic services through execution of recovery and resiliency activities, as applicable. This program will explore a coordinated systems approach to the recovery and resiliency of wide urban areas, including meeting public health requirements and restoring all types of critical infrastructure, key resources (both civilian and military) and high traffic areas (transit/transportation facilities) following a chemical, biological or radiological (CBR) incident.

## 3.0 Goal & Objectives

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### **Goal**

The goal of the workshop is 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 CBR wide-area event in the Denver, CO urban area.

### **Objectives**

- Provide education to participants regarding the waste management complexities to expect following a CBR event, including waste estimates.
- Provide participants with lessons learned regarding waste management from past studies, symposiums and real-world events.
- Introduce a draft waste management plan that can be adopted by local, regional and state agencies.

## 4.0 Scope & Format

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### **Scope**

The WARRP Waste Workshop, hosted by Department of Homeland Security, was a two day event. **Day 1** provided an overview of the complexities of waste management, including waste estimates in terms of types and volume. Participants heard an overview on the statutory, regulatory, and policy framework underlying

CBR waste management. EPA experts shared a summary of previous findings and lessons learned from a series of real life case studies. **Day 2** provided an overview of the waste management planning process, from pre-planning activities and development of a waste management plan to maintenance and implementation of the plan. Participants were given the opportunity to begin outlining the contents of a waste management plan for a chemical, biological, or radiological scenario. Waste management planning tools were introduced to the participants to assist them in developing a waste management plan.

### ***Format***

This was a two day workshop. For additional information on format, see [Annex A – Agenda](#). Participants from various organizations attended and are listed in [Annex B – Participants](#). Feedback was captured using a standard feedback form and a summary of workshop findings are found in [Annex C – Participant Feedback](#). For information on the planning team, or to get more information on this after action report, see [Annex D – Key Points of Contact](#).

This event used the standard WARRP scenarios to base workshop content. For a summary of these scenarios, see [Annex E – WARRP Scenarios](#).

For additional resources, such as event presentations and relevant waste management planning links, see [Annex F – Resources](#). Acronyms may be found in [Annex G – Acronyms](#).

## ***5.0 Key Discussion Areas & Outcomes***

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### ***Introduction***

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

Debbie welcomed the workshop participants and thanked DHS for their sponsorship, state and local representatives for their participation and FEMA for their wonderful facilities. She thanked EPA's Region 8 for serving as the lead region for Homeland Security for the past year. She noted that as we interact during this workshop, EPA headquarters will learn from state and local partners.

After the events of 9/11 and the DC anthrax events, EPA got involved in homeland security issues as they related to environmental protection, including disposal/waste management, decontamination, and water security. EPA has been working on these issues and addressing gaps; programs like WARRP are good for stakeholders to come together and move forward. Waste is always going to be an issue. One example is the magnitude of waste generated from Hurricane Katrina. Waste needs to be managed from the beginning of the event and can/has continued to be an issue even years after the event.

**Cayce Parrish**, USEPA OHS

Cayce, workshop lead facilitator, introduced the participants, discussed the challenges and importance of waste management, and reviewed the agenda. Some of the challenges with waste management include understanding the issues, lab capacity, worker training, fate and transport research, indemnification, and many others. EPA has been engaged in analyzing the waste management issues, identifying barriers and developing strategies to overcome these barriers. EPA and its partners continue to work on these and help inform the planning process.

## *WARRP Scenarios*

**Bill Steuteville**, USEPA Region 3 reviewed the radiological scenario, **Dr. Paul Lemieux**, USEPA Office of Research and Development (ORD) reviewed the chemical scenario, and **Paul Peronard**, USEPA Region 8 reviewed the biological scenario. Details of these scenarios are listed in [Annex E: WARRP Scenarios](#).

## *Statutory, Regulatory, and Policy Framework Underlying CBR Waste Management*

**James Michael**, USEPA OSWER ORCR & **Doug Knappe**, CDPHE

Jim provided a regulatory overview of EPA federal regulations that govern waste they may result from a chemical, biological or radiological incident. He described waste management as a process that occurs throughout response and recovery phases. Waste management must integrate with the overall incident response and recovery approach. Expect a typical waste management facility to be overwhelmed and potentially unable and/or unwilling to handle all waste types and/or quantities of waste streams.

In a CBR event, some wastes would be hazardous wastes and some would not be hazardous wastes, as defined by RCRA. EPA would use existing regulatory framework to identify the particular waste. In the WARRP scenarios, scale makes it very challenging. While RCRA subtitle C established a program to manage hazardous waste “cradle-to-grave”, state programs can be more stringent, such as regulations for how biological wastes can be managed. EPA will play a significant role in each type of CBR event, but may not be the lead. Jim described a homeland security incident waste management decision tree.

WARRP Program Manager, Chris Russell, indicated that a goal is to get city infrastructure and industry back up and running within six months or the private sector will not continue to reside in the impacted area.

Doug reviewed Colorado hazardous waste regulations, which include listed solid wastes (e.g., Mustard agent, commercial chemical products, non-specific source wastes, specific source process wastes); characteristic solid wastes (e.g., corrosive, reactive, flammable or toxic wastes); and products. Hazardous waste constituents identified in 6 CCR 1007-3, Part 261 Appendix VIII. CDPHE manages releases in two phases: emergency response and recovery.

Participants asked who would be taking the lead to determine appropriate cleanup levels. (i.e. is the cleanup levels tied to background levels?) It was shared that DHS would be the coordinating agency with EPA and DOE providing assistance.

## *Summary of Previous Findings / WARRP Systems Study and IBRD Systems Analysis Study*

**Chris Russell**, DHS Program Manager

Chris welcomed the participants. 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 chemical, biological or radiological incident. He emphasized the WARRP program is not only a technical program, but additionally a political, emotional, and economic concern. He stated it is imperative to educate the political leaders to say the right things as a CBR incident

becomes a public health exposure risk issue from day one. The Department of Health and Human Services is heavily involved in this process.

Chris described a key component of the WARRP Program; the Systems Study report. It identified 25 key gaps and potential solutions within urban wide-area chemical, biological and radiological recovery planning and operations. These gaps covered regional risk management, site-specific recovery, and long-term public health issues. Through the WARRP System Study, i.e. 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 an easy-to-use table that groups gaps by priority and solution development time frame, will inform other WARRP program activities, as well as the national research agenda for improving long-term recovery from domestic chemical, biological, and radiological events. The waste management gap is a significant challenge in a wide-area scenario, and is recognized as a high-priority gap. Evidence shows the struggle with small scale events thus far, so WARRP is looking how to scale up for a wide area event.

There was a questions posed about how is the county going to have money to prepare for an event in advance and if approaches are being institutionalized from IBRD to WARRP. Chris stated that FEMA is taking this framework and “generalizing” it and providing funding to UASI’s throughout the country to exercise it along with the NDRF. Each state and UASI is required to have a recovery plan and framework.

One local participant expressed concern that they have a two million dollar emergency fund set aside but that they would burn through the money quickly in a recovery effort such as this. It was noted the Stafford act will come into play and there will be some federal funding.

Chris mentioned that a framework, part of the WARRP Program, is being developed to assist the region and other UASI’s further plan/exercise their recovery needs. It is called the *Denver UASI & State of Colorado All-Hazards Regional Recovery Framework with CBR Annexes*. It is scheduled to be delivered to the State of Colorado in May 2012.

### *EPA Threat Agent Disposal Workgroup*

#### **Cayce Parrish, USEPA OHS**

EPA recognizes waste management is a challenge from having responded to many CBR events and participated in CBR exercises. Examples of CBR events EPA has responded to include: radiological response efforts (e.g., Three Mile Island in 1979); cleanup 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); and naturally occurring anthrax incidents (New York City (2006) and Danbury, Connecticut (2007)). EPA has participated in many exercises and addressed waste management.

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

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

## *Waste Disposal Guidance*

**Marissa Lynch**, US EPA Office of Water

EPA's CIPAC Decontamination Workgroup developed a Strategic Plan in October 2008, which includes 16 priority issues and 35 recommendations. One of the recommendations resulted in EPA developing a disposal guide for large amounts of water from a CBR event, targeted for the water sector. The *Containment and Disposal of Large Amounts of Water: A Support Guide for Water Utilities* 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 scope of the Guide 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. Marissa reviewed the organization of the guide and said that the Guide and a corresponding Webinar is scheduled to be released in spring 2012.

## *Threat Agent-Specific Workshops*

**Cayce Parrish**, USEPA OHS

EPA participated and hosted several agent-specific waste disposal workshops: Anthrax, Seattle, WA hosted by DHS/DOD IBRD; RDD Attack, hosted by EPA Region 3 in Philadelphia, PA; and Wide Area Anthrax Attack, hosted by EPA Region 5 in Columbus, OH. At each of the workshops, stakeholders included federal, state/local, and private participants and they participated in half-day workshops with each, other, resulting in a more open dialogue. EPA presented the scenario, anticipated waste streams, volumes, and waste management barriers, and the stakeholder groups identified issues and prioritized them. In the process of reviewing each of the high-level barriers, determining key content from the workshops and pulling together and performing an analysis to identify the highest-priority projects. EPA's intentions are to continue analyzing the workshop recommendations, develop priority activities to address barriers, and implement new projects.

## *CBR Disposal Workshop*

**Dr. Paul Lemieux**, USEPA Office of Research and Development (ORD)/National Homeland Security Research Center (NHSRC)

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

The final report is entitled: Report on the 2011 Workshop on Chemical-Biological-Radiological Disposal in Landfills and copies can be found on the web at <http://www.epa.gov/nhsrsrc/pubs.html>.

Discussion around the feasibility of doing pre-planning for this as scoping sites costs money and land identified could get developed over time.

### *Case Study: Hurricane Katrina*

**James Michael**, USEPA OSWER/ORCR

Disaster debris from Hurricane Katrina is estimated in excess of 55 million tons, the largest in US history. Waste streams included curbside debris, white goods, Freon removal, PCB's, Asbestos, electronic goods, waste containers, electronic goods, vegetative debris, household hazardous waste, vehicles, etc. Jim described some of the waste volume issues and controversial use of two landfills: disposal of white goods and household hazardous waste in landfills not meeting RCRA criteria and lack of community involvement/transparency. Some key lessons learned were the general lack of waste/debris management plans, lack of stakeholder involvement, and the need to update *EPA Disaster Debris Planning Guidance*. Debbie added EPA wants to avoid creating more superfund sites; it is very political and complicated. She also indicated it is important to involve private sector in waste management issues when possible. She stated that Dell took all of the electronic waste from Katrina.

### *Case Study: British Petroleum (BP) Spill*

**James Michael**, EPA OSWER/ORCR

On April 20, 2010 BP's Deep-water Horizon Drill Rig Platform in the Gulf of Mexico had a massive explosion; noted as a Spill of National Significance. Coast Guard had the lead, EPA supported. Area commands were established in Mobile, AL covering several states. BP had a very generic spill plan; specific waste management plans needed to be developed to manage generated waste. Subsequently, EPA coordinated with the region and states to review 40 waste management plan submittals/directives making the plans enforceable. EPA conducted waste management operational oversight, developed WM tracking format, and addressed community concerns. Participants suggested this would be helpful to track waste real-time. Information and lessons learned from this case study are located on the EPA website. A participant asked if BP will have to pay for the spill. Debbie Dietrich indicated, yes, they are paying and are in the process of settling litigation as EPA sued BP for violation of the clean water act.

### *Case Study: Japan*

**Tom Peake**, EPA OAR/ORIA

Tom Peake provided a case study overview for the March 11, 2011 level 7 earthquake in Fukushima, Japan. There was a major release of radioactive material with widespread health and environmental impacts.

Technically, two radionuclides still drive long-term cleanup; Cesium, 137 (30 year half-life) and Cesium-134 (2-year half-life). Iodine-131 (8-day half-life) was released in significant quantities in the early stages. Management of radioactive waste is significantly complicated and Japan took first steps to prioritize clean ups. Major concerns were schools and other child sensitive areas and agricultural areas. One cleanup approach is to cover the ocean floor with cement and clay. Tom shared a wide-area radiation monitoring map containing early estimates including the 30 tons of soil scheduled to be removed in Fukushima Prefecture; i.e. 13% of land area (around the size of the state of Connecticut) to reach clean up level of 5mSv/year. While the scale of this incident likely exceeds the impacts from a RDD (WARRP scenario), several aspects are relevant: 1) clean up goals will affect the volumes of waste generated; 2) decontamination strategies affect waste volume; 3) public pressure to accelerate cleanup; 4) roles and responsibilities for decision making on clean up and waste management may create tension; and 5) interim staging methods.

A current concern is ocean contamination. The currents can carry debris and deposit radioactive waste in harbors. In the US, shortly after incident, radiation monitors were used to review contamination; levels were very low and barely detected.

A key lesson learned from this event was that citizen trust was lost in the beginning. Public officials lied about the impact and subsequently the Japan government lost credibility with the Japanese citizens. This becomes part of the social dilemma. As a result, cleanup standards have to be exceptionally high yet must be balanced with the need to clean-up within a given period of time.

### *Ag Incident*

**Lori Miller**, USDA/APHIS & **Dr. Nick Striegel**, Colorado Department of Agriculture

Lori Miller discussed a different scenario: foot and mouth disease (FMD). This disease once apparent is a rapidly spreading disease of all cloven-hoofed animals. The traditional approach for depopulation, decontamination, and disposal (3D) is “stamping-out.” For every infected cow, the process is to identify a 6.2 mile radius, and all infected, contacted or exposed clove and hoof are killed to control the pathogen. An animal could have the disease for 6 to 10 days before signs are shown; animals are transported throughout the country. 80% of beef cattle production is in the middle of the country; and a typical feedlot is 100,000 heads of cattle, equivalent to 151 miles if animals are laid down placed head to head. This process historically slows recovery e.g. adding liners/lime; not enough burial sites, depleting pharmaceutical supply to kill infected animals, and concerns that contaminated leachate got into drinking water system. Lori discussed the USDA matrix and decision tree that are both used to help make the best 3D determination based on the current situation. A new study from 2009 deems composting an option and this will be added to the tables. A suggestion was to add a vaccine regime to farms after they become aware of the impacts of an outbreak.

Nick Striegel presented information on the Colorado Department of Agriculture Perspective on 3D. He indicated “mass mortalities are a challenge; from disease outbreaks: emerging disease, re-emerging diseases, foreign animal disease; agro-terrorism intentional introduction; to natural disasters. The state of Colorado has vulnerable animal agriculture concerns. The state has intensive production units; frequent movement and mixing of livestock; and transport animals/animal products. The impacts of an outbreak are great. For example, there are public fears, possible adverse public health consequences, environmental health risks,

and risk to the US/Global world economy. In Colorado, this second most prevalent industry has \$61B in agricultural annual sales.

Nick mentioned the six component “CORRAL system” which is an early detection/rapid response to disease outbreaks. They are: 1) Community capability; 2) Operations center; 3) Resources; 4) Relationships; 5) Agreements; and 6) Livestock Emergencies. Last year a memorandum of understanding between CDPHE-CDA for Carcass Disposal was enacted. The state has a multitude of sector specific plans that can be found at [Annex F – Resources](#).

### *Minot, SD River Flood*

**Paul Peronard**, USEPA OSC

Paul provided an overview of the Souris River flood June 26, 2011. The flood waters crested 10 feet above previous record flood stage. This incident swallowed more than 3,000 homes and displaced more than 12,000 Minot-area residents. A natural disaster was declared. Thousands of items of household waste were removed from the impacted area. EPA had to decontaminate and prepare white goods and e-waste for recycling; collect and process orphaned containers, conduct environmental monitoring. The waste streams were very organized into distinct categories. 1) oil, gasoline, pesticides, 2) batteries, light bulbs, ammunition, 3) E-waste recycling, and 4) white goods (ac units, refrigerators). Residents of this area were exceptionally helpful and involved; which aided in the rapid recovery of this community.

## *Day 2 - Waste Management Planning*

**Anna Tschursin**, EPA ORCR & **Melissa Kaps**, EPA ORCR

On day two of this workshop, Anna and Melissa shared current tools, protocols, and procedures available in developing a waste management plan. They discussed the importance of planning for a wide-area incident as impact could result in large quantity of waste, wider variety of waste, wider areas of impact, and change in public perception. They suggested waste generation starts immediately and continues throughout all stages of an incident. Some things can have contingencies, and some things remain unplanned. They emphasized that off-the-shelf plans lose value over time and cooperation amongst internal parties is essential long before an incident. Anna and Melissa suggested initiating the planning process by prioritizing plan development; identifying personnel; reviewing other plans; mitigating community hazards; and determining FEMA eligibility. Specific tools on the EPA website were shared. See [Annex F - Resources](#).

Melissa and Anna suggested that Waste Management Planning can be helpful if broken down into steps. They shared the “Four Step Process”: 1) Pre-planning activities; 2) Development of a Waste Management Plan; 3) Review, maintain, exercise, and train; and 4) Implement the plan. Each of these four steps was covered in detail at different points during day two. Participants had a breakout session on step number 2. See [Chemical, Biological, & Radiological \(CBR\) Breakout Groups](#) below.

## *Waste Management Planning Aids*

**Dr. Paul Lemieux**, EPA ORD/NHSRC

Decision making needs for waste management include: waste quantities 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 decision on waste management and vice versa. Two tools are in development:

Tool 1: Incident Waste Assessment & Tonnage Estimator (I-WASTE) online decision support tool. The target audience includes EPA responders, state and local agencies, and treatment/disposal facility operators. This is tool is open to the public. See [Annex F – Resources](#) item number 5 under useful links.

Tool 2: Radiological Dispersal Device (RDD) Waste Estimation Support Tool. Target audience is EPA responders and state and local agencies.

## *Chemical, Biological, and Radiological (CBR) Breakout Groups*

A large portion of day two involved the local, state, and federal participants working together to brainstorm the beginnings of their waste management plan. The WARRP Scenarios, see [Annex E- Scenarios](#) were used as a baseline to frame the discussion. Participants were asked to review the following key sections of a waste management plan and populate it with data/ideas/concerns.

## *Development of a Waste Management Plan*

- 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

Comments were not uniquely distinct from each of the three (CBR) breakouts; therefore, they are consolidated recommendations and are listed in [Table 1: Key Discussion Items / Recommendations](#).

**Table 1: Key Discussion Items / Recommendations**

| Category              | Discussion Item                          | Recommendations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Waste Management Plan | Waste Management Plan Introduction       | <ul style="list-style-type: none"> <li>• Outline a scenario for CBR with identified assumptions including natural hazards</li> <li>• Determine who the recovery staff are (fed, state, local) and roles/responsibilities using ICS structure</li> <li>• Develop standard operating procedures</li> <li>• Use historical and cultural experts in the planning</li> <li>• Determine insurance capabilities</li> <li>• Use the Hazard Vulnerability Plan as an example</li> <li>• Involve jurisdictions/agencies in planning process and accept that it will not be perfect. Attempt to prioritize the most important recovery aspects now.</li> </ul>               |
|                       | Waste Streams and Waste Quantities       | <ul style="list-style-type: none"> <li>• Describe the type of waste such as agriculture, building/construction material, vehicles, electronics, food supply, public water supply, storm water, soil, PPE, hospital waste etc.</li> <li>• Determine potential levels of waste (low vs. high) and sorted by contamination metrics</li> <li>• Select a decontamination method to determine the volume of waste water that will be generated and consideration should include effectiveness and efficiency measures</li> <li>• Use estimator tools and pre calculate the units of waste</li> <li>• Accept that it may not be possible to contain all waste</li> </ul> |
|                       | Waste Characterization and Sampling Plan | <ul style="list-style-type: none"> <li>• Information should include: which labs can conduct analysis, what type of process to use (statistical vs. non- statistical), how many samples are necessary to take, PPE types, development of a quality assurance plan and in accordance with what regulations</li> </ul>                                                                                                                                                                                                                                                                                                                                               |
|                       | Waste Management Strategies and Options  | <ul style="list-style-type: none"> <li>• Consideration must be given to prioritization of what facilities get cleaned up first</li> <li>• Need to develop a decision flow chart</li> <li>• Determine staging areas, waste facilities</li> <li>• Develop a transportation plan (i.e. consider rail transport and secondary contamination issues)</li> <li>• Determine decontamination treatment, recycling, and/or disposal options</li> <li>• Pre-identify temporary contamination units</li> <li>• Pre-identify haulers contact information</li> <li>• Try to keep transportation lines open when considering waste management strategies/locations</li> </ul>   |

| Category              | Discussion Item                      | Recommendations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Waste Management Plan | Waste Management Facilities          | <ul style="list-style-type: none"> <li>• Identify existing waste capacity/capability of facilities and waste permit limits now</li> <li>• Determine if waste should be treated on site and how</li> <li>• Consider re-opening landfills and lining requirements</li> <li>• Consider socio-economic/public perception impact</li> <li>• Develop a list of all of the facilities with address, latitude/longitude, and facility map and whether or not they are close to a rail</li> <li>• For radiation, identify the local subtitle C landfills; and A/B those that are able to take radioactive waste (only a few in the country)</li> </ul> |
|                       | Waste Tracking / Transportation Plan | <ul style="list-style-type: none"> <li>• Develop a waste tracking report including information such as manifest (waste contents), bill of lading (transport location), &amp; hauler capability/capacity</li> <li>• Determine rail availability, routes, equipment needed to load the cars</li> <li>• Identify driver requirements - time limitations, availability, drivers CDL's (i.e. PPE trained)</li> <li>• Research what tracking software and databases are most effective</li> <li>• Decontamination for vehicles, rail cars, trucks, etc.</li> </ul>                                                                                  |
|                       | Community Outreach Plan              | <ul style="list-style-type: none"> <li>• Identify/appoint a Public Information Officer</li> <li>• Develop a list of contact information for key stakeholders (community groups/media)</li> <li>• Develop pre-scripted information (i.e. fact sheets and Q/A)</li> <li>• Create sample Public Service Announcements (PSA)</li> </ul>                                                                                                                                                                                                                                                                                                           |
|                       | Resource Summary                     | <ul style="list-style-type: none"> <li>• Identify specialized technical assistance contacts and notification numbers</li> <li>• Create mutual aid agreements now</li> <li>• Research emergency contracting/procurement procedures including identification of FEMA cost reimbursement forms and guidance</li> <li>• Form key interdependent relationships now rather than after incident</li> </ul>                                                                                                                                                                                                                                           |
|                       | Recommended Appendices               | <ul style="list-style-type: none"> <li>• Write waste management ordinances, orders, directives, declarations, designations, permits etc.</li> <li>• Obtain waste management facility maps, storage areas, transportation facilities, critical waste management infrastructure and key resources</li> <li>• Develop job aids for different waste management staff</li> </ul>                                                                                                                                                                                                                                                                   |

| Category                | Discussion Item                                                                                                          | Recommendations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Agricultural Discussion | Agricultural decontamination of infected milk/meat products may not be adequate and of transport/work vehicles on scene. | <ul style="list-style-type: none"> <li>While certain viruses can be killed with pasteurization methods a consideration is if milk is going to be fed to animals, the food supply can still potentially be impacted. Perhaps send the milk through two cycles or longer for affected for animals. However, public perception may not “buy” this and therefore impact the depopulation/decontamination/disposal method.</li> <li>Quarantine and/or decontaminate vehicles coming in and out of area. It would be great for industry to implement routine bio security countermeasures. Some do have bio security, but best if it were increased.</li> </ul> |
|                         | Vaccination of animals is essential                                                                                      | <ul style="list-style-type: none"> <li>In a recent state/industry convention, industry was educated on the impact of a FMD outbreak and how vaccines could help prevent a massive catastrophe. At the end of their discussion, industry indicated they were “ready to vaccinate today” sacrificing some export to avoid catastrophe.</li> </ul>                                                                                                                                                                                                                                                                                                           |
|                         | Decontamination Risk Assessment Matrix / Decision Tree                                                                   | <ul style="list-style-type: none"> <li>Currently, the structure doesn’t mention composting as an option, but a 2009 study encouraged it is added to the decision tools.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                         | Wash water decontamination                                                                                               | <ul style="list-style-type: none"> <li>Participant asked a question about the wash water decontamination. Nick stated, “Virus is fairly susceptible to acidic materials, but it is still a process. Haven’t validated if any pathogens in wash water that are viable.” Recommendation to conduct a test in the high level security lab on different decontamination methods; specifically the impact on wash water.</li> </ul>                                                                                                                                                                                                                            |
| General Discussion      | Criticality of developing public messaging                                                                               | <ul style="list-style-type: none"> <li>Participants suggested that public messaging standard messaging needs development in order to have a successful recovery effort; particularly the importance of maintaining citizen trust.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                              |
|                         | Incorporation of this content into the Denver UASI and State of Colorado All-Hazards Regional Recovery Framework         | <ul style="list-style-type: none"> <li>Chris Russell, DHS Program Manager, suggested that it would be beneficial to add the “<a href="#">Development of a Waste Management Plan</a>” into the framework.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## 6.0 Conclusion

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The WARRP Knowledge Enhancement Workshop on Waste Management came to a close with a few words from Chris Russell, Department of Homeland Security and WARRP Program Manager:

“Throughout this process, in each of these workshops, the Denver UASI and State of Colorado region comes together and make the country more prepared. We are learning from each other and are gaining from the process.”

Material contained in this report will:

- 1) Be used to further develop the Denver UASI and State of Colorado All-Hazards Regional Recovery Framework with CBR Annexes. Pacific Northwest National Laboratory (PNNL), responsible entity for this framework, will incorporate findings where possible in the debris management section of this framework.
- 2) Shared with the Environmental Protection Agency to further develop National level Waste Management / Debris Management Tools/Resources

In addition, as a result of this waste management workshop, a new Knowledge Enhancement Working Group meeting was added to the list of necessary research and development focus areas. Due to the local/regional agriculture industry, an Agriculture Knowledge Enhancement Working Group meeting has been scheduled for July 17, 2012. For more information, go to the WARRP website at [www.warrp.org](http://www.warrp.org).

# Annex A – Agenda

March 15, 2012

|             |                                                                                                                                                                                                                |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0730 - 0830 | Registration                                                                                                                                                                                                   |
| 0830 – 0900 | <b>Introduction &amp; Overview</b><br>Cayce Parrish, EPA OHS<br>Debbie Dietrich, AA OHS                                                                                                                        |
| 0900 - 1015 | <b>CBR Waste Management Complexity</b><br>Anthrax Scenario - Paul Peronard, EPA<br>RDD Scenario - Bill Steuteville, EPA Region 3<br>Chem Scenario - Paul Lemieux, EPA ORD / NHSRC                              |
| 1015 - 1030 | Break                                                                                                                                                                                                          |
| 1030 - 1115 | <b>Statutory, Regulatory, and Policy Framework<br/>Underlying CBR Waste Management</b><br>Jim Michael, EPA OSWER/ ORCR<br>Doug Knappe, CDPHE<br>Jared Torstenson, CDPHE                                        |
| 1115 – 1200 | <b>Summary of Previous Findings</b><br><br>WARRP Systems Study - Chris Russell, DHS<br>IBRD Systems Analysis Study - Chris Russell, DHS<br>EPA Threat Agent Disposal Workgroup - Cayce Parrish, EPA OHS        |
| 1200 – 1330 | Lunch                                                                                                                                                                                                          |
| 1330 – 1400 | <b>EPA Workshops/Guidance</b><br>Threat Agent-Specific Workshops - Cayce Parrish, EPA OHS<br>CBR Disposal Workshop - Paul Lemieux, EPA ORD / NHSRC<br>Water Disposal Guidance - Marissa Lynch EPA OW/WSD       |
| 1400 – 1515 | <b>Case Studies</b><br>Hurricane Katrina - Jim Michael, EPA OSWER / ORCR<br>BP Spill - Jim Michael, EPA OSWER / ORCR<br>Japan - Tom Peake, EPA OAR / ORIA                                                      |
| 1515 – 1530 | Break                                                                                                                                                                                                          |
| 1530 – 1630 | <b>Case Studies (continued)</b><br>Ag Incident - Lori Miller, USDA / APHIS<br>Ag Incident perspective from State - Nick Striegel, State of CO<br>Region 8 Incident – Minot Flood - Steve Merritt, EPA Region 8 |
| 1630 – 1645 | <b>Wrap Up</b><br>Cayce Parrish, EPA OHS                                                                                                                                                                       |

March 16, 2012

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|             |                                                                                                                                          |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 0800 – 0845 | <b>Review of Day 1 and Overview of Day 2</b><br>Cayce Parrish, EPA OHS                                                                   |
| 0845 - 0915 | <b>Importance of Planning for Waste Management in a Homeland Security Incident</b><br>Anna Tschursin, EPA ORCR<br>Melissa Kaps, EPA ORCR |
| 0915 – 0930 | Break                                                                                                                                    |
| 0930 – 1000 | <b>Waste Management in Four Easy Steps</b><br>Anna Tschursin, EPA ORCR<br>Melissa Kaps, EPA ORCR                                         |
| 1000 - 1015 | <b>Developing a Waste Management Plan (Part One: The Wastes Generated)</b><br>Anna Tschursin, EPA ORCR<br>Melissa Kaps, EPA ORCR         |
| 1015 - 1035 | <b>Waste Management Planning Aids</b><br>Paul Lemieux, EPA ORD / NHSRC                                                                   |
| 1035 - 1100 | <b>Group Discussion (CBR Groups)</b><br>Paul Lemieux –Chem<br>Jim Michael / Lori Miller – Bio<br>Tom Peake – Rad                         |
| 1100 – 1120 | <b>Developing a Waste Management Plan (Part Two: Management of Wastes)</b><br>Anna Tschursin, EPA ORCR<br>Melissa Kaps, EPA ORCR         |
| 1120 - 1200 | <b>Group Discussion (CBR Groups)</b><br>Paul Lemieux –Chem<br>Jim Michael / Lori Miller – Bio<br>Tom Peake – Rad                         |
| 1200 – 1300 | Lunch                                                                                                                                    |
| 1300 – 1345 | <b>Report Out by Groups</b><br>All                                                                                                       |
| 1345 - 1415 | <b>Implementation: What to do with the Plan When an Actual Event Occurs?</b><br>Anna Tschursin, EPA ORCR<br>Melissa Kaps, EPA ORCR       |
| 1415 – 1500 | <b>Wrap Up</b><br>Cayce Parrish, EPA OHS                                                                                                 |

## *Annex B –Participants*

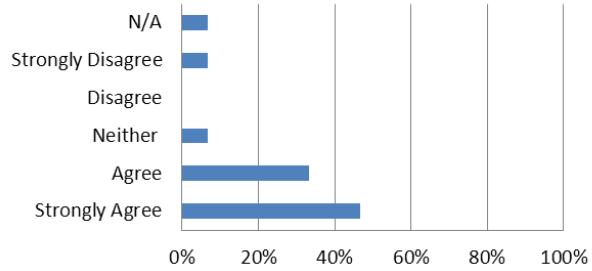
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| Last Name   | First Name | Organization                                                          |
|-------------|------------|-----------------------------------------------------------------------|
| Austin      | Craig      | Denver Water                                                          |
| Bakersky    | Pete       | FEMA RVIII                                                            |
| Baxter      | Patty      | El Paso County OEM                                                    |
| Benerman    | Bill       | Denver Environmental Health                                           |
| Briese      | Garry      | Cubic Applications Inc                                                |
| Brobst      | Robert     | USEPA                                                                 |
| Cosentini   | Chris      | EPA Region 8 - RCRA                                                   |
| Dietrich    | Debbie     | USEPA                                                                 |
| DiPaolo     | Elizabeth  | Cubic                                                                 |
| Eagleton    | Doug       | Colorado Department of Public Health and Environment                  |
| Flurkey     | Andy       | CDOT                                                                  |
| Griffin     | Michael    | Maryland Dept of Environment                                          |
| Hard        | Dave       | Colorado Division of Emergency Management                             |
| Hochman     | Charles    | DOT/PHMSA                                                             |
| Hunt        | Elbert     | Colorado Department of Transportation                                 |
| Jacobs      | Eric       | State of Colorado                                                     |
| Kang        | Jonathan   | Department of Energy                                                  |
| Kaps        | Melissa    | U.S. Environmental Protection Agency                                  |
| Knappe      | Doug       | CDPHE-HMWMD                                                           |
| Kudarauskas | Paul       | USEPA/OEM/NDT                                                         |
| Kurz        | David      | Colorado Dept of Public Health and Environment, Water Quality Control |
| Lasswell    | Gary       | City and County of Denver Environmental Health                        |
| Lemieux     | Paul       | US EPA                                                                |
| Lerardi     | Mario      | EPA                                                                   |
| Linne       | Marcel     | Denver Public Works                                                   |
| Lloyd       | Lisa       | EPA Region 8 (Lead Region Coordinator for HS)                         |
| Michael     | James      | U.S. Environmental Protection Agency                                  |
| Miller      | Lori       | USDA-APHIS                                                            |
| Morreale    | Steven     | United States Department of Energy                                    |
| Ottmer      | Tammy      | Colorado State Patrol                                                 |
| Parrish     | Cayce      | EPA/Office of the Administrator/Office of Homeland Security           |
| Peake       | Tom        | US EPA                                                                |
| Peronard    | Paul       | EPA                                                                   |
| Ridley      | Teresa     | WARRP                                                                 |
| Russell     | Chris      | DHS                                                                   |
| Schuller    | Jennifer   | EPA Region 8                                                          |
| Slosky      | Leonard    | Rocky Mountain LLW Board                                              |
| Snee        | Elizabeth  | Booz Allen Hamilton                                                   |
| Steuteville | William    | USEPA 3                                                               |
| Stewart     | David      | Denver Parks & Recreation                                             |

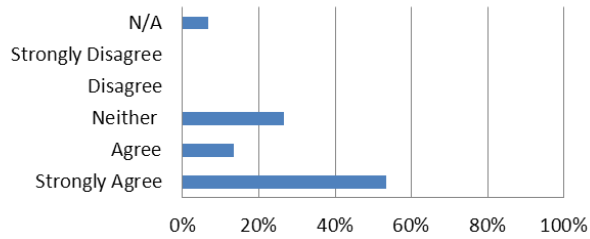
| Last Name  | First Name | Organization                                  |
|------------|------------|-----------------------------------------------|
| Striegel   | Nick       | Colorado Department of Agriculture            |
| Thomas     | Jane       | Clear Creek County OEM                        |
| Torstenson | Jared      | CDPHE                                         |
| Tschursin  | Anna       | EPA                                           |
| Tyler      | Stacey     | Cubic Applications Inc.                       |
| Walton     | Anne       | Douglas County Government - Administration    |
| Williams   | Dave       | EPA                                           |
| Williams   | Pat        | Denver Mayor's Office of Emergency Management |
| Wold       | Bob        | CDEM                                          |

## Annex C – Participant Feedback

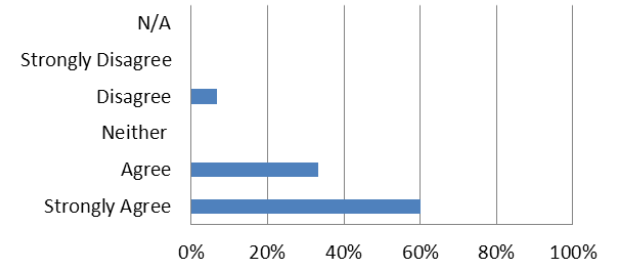
**Working Group Was Valuable Use of Time**



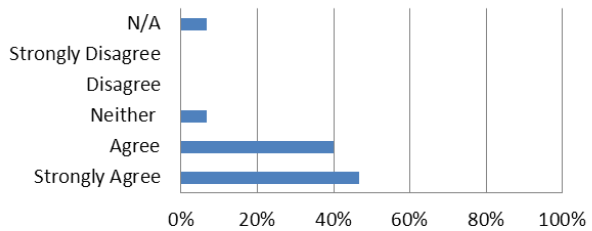
**Working Group Expanded Professional Network**



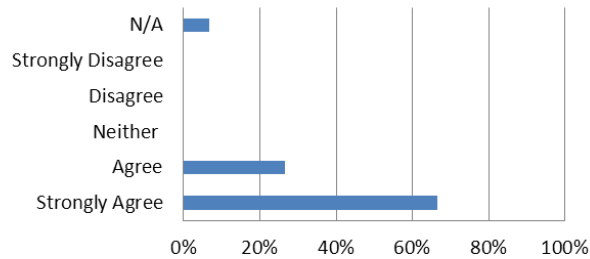
**Facilities Contributed to Success**



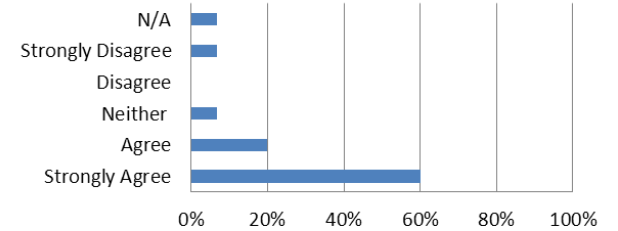
**Working Group Increased Awareness of CBR Incident**



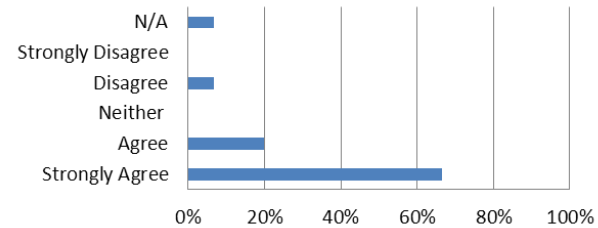
**Professional Staff**



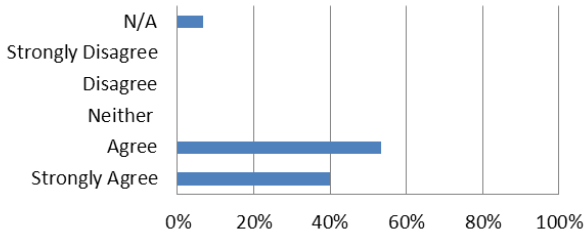
**Recommend WARRP Working Groups to Colleagues**



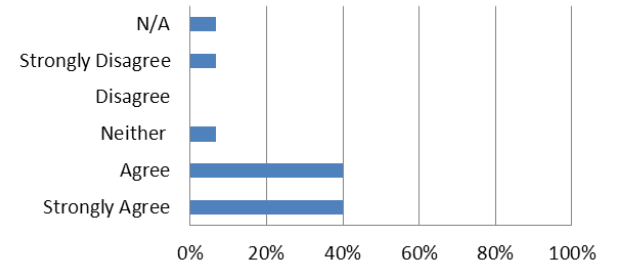
**Learned Something New From Working Group**



**Working Group Identified & Addressed Relevant Issues**



**Working Group Met Expectations**



## *Annex D – Key Points of Contact*

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### **Planning Team**

Garry Brieze, Cubic Applications Inc.

Elizabeth DiPaolo, Cubic Applications Inc.

Cayce Parrish, EPA/Office of the Administrator/Office of Homeland Security

Elizabeth Snee, Booz Allen Hamilton

Stacey Tyler, Cubic Applications Inc.

For questions about this report, contact:

### **Cubic Applications, Inc.**

Garry Brieze, WARRP Local Integrator

Phone: (571) 221-3319 (mobile)

E-mail: [gbrieze@briezeandassociates.com](mailto:gbrieze@briezeandassociates.com)

Stacey Tyler, WARRP Integrator

Phone: (858) 810 -5783 (office)

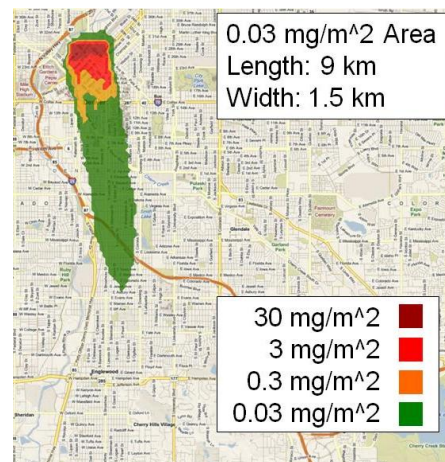
E-mail: [stacey.tyler@cubic.com](mailto:stacey.tyler@cubic.com)

# Annex E – WARRP Scenarios

## CHEMICAL SCENARIO

### National Planning Scenario #5: Chemical Attack – Blister Agent

- **Blister agent attack on a packed Coors Field (Downtown Denver).** 95 fatalities; over 1,000 hospitalized (max. capacity of field is 55,445)
- **Evacuations/Displaced Persons:** Tens of thousands evacuated and thousands seeking shelter (decontamination required)
- **Significant contamination in affected areas, including the stadium and surrounding area.** Agent has generated a downwind vapor hazard. Approx. contamination = over 5 miles
  - Several high value properties contaminated including Coors Field, Pepsi Center, and Invesco Field Mile High Stadium
  - Basic services affected
  - Local businesses affected



## Agent Background

Agent YELLOW, which is a mixture of the chemical warfare agents Sulfur Mustard and Lewisite, is a liquid with a garlic-like odor. Sulfur mustard, also known as **mustard gas**, has the ability to form large blisters on exposed skin. Lewisite is a blister agent that contains arsenic, a poisonous element. Skin irritation from sulfur mustard gradually turns into large blisters filled with yellow fluid wherever the agent contacted the skin. Temporary blindness can occur if a victim's eyes are exposed. At very high concentrations, if inhaled, mustard agent causes bleeding and blistering within the respiratory system, damaging mucous membranes and causing pulmonary edema. Severe mustard gas burns (i.e., where more than 50% of the victim's skin has been burned) are often fatal, with death occurring after some days or even weeks have passed. The blister effects of Lewisite occur sooner, and extensive eye exposure can cause permanent blindness.



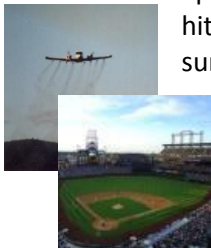
## Scenario

**Terrorist agents acquire 175 gallons of Agent YELLOW**, equip a small airplane with sprayers and fly the plane at low altitude over **Denver's Coors Field** during a Rockies baseball game. At his closest approach to the stadium, the pilot veers directly towards the target. Ignoring frantic air traffic control calls and an

approaching police helicopter, he cuts his speed and drops over the stadium, simultaneously hitting the spray release button. A coarse spray of Agent YELLOW is released. In the stadium, surprise at the appearance of the aircraft turns to panic when the spray is observed coming

out of the rear of the plane. **In total, 53,000 people have been either hit by, or breathe vapors of, the Agent YELLOW spray.** Thousands are injured and many are killed in the rush to exit the stadium. People hit in the eyes experience immediate pain, and the first ones out of the stadium are trying to get away as soon and as far as possible. Numerous auto accidents occur in the parking lot and access roads. Some people track

contamination into nearby residences, onto public transportation and into hospitals.



## BIOLOGICAL SCENARIO

### National Planning Scenario #2: Biological Attack – Aerosol Anthrax

- **Two covert anthrax aerosol attacks by an organized worldwide terrorist group.** Tens of thousands of people exposed and thousands of deaths.
- **Evacuations/Displaced Persons:** Tens of thousands evacuated, thousands seek shelter in immediate area (decontamination required)
- **Significant contamination in affected areas, including critical infrastructure, commercial, military & private property.**

Approx. contamination = 2 areas of 10 sq. miles each

- |                                         |                                         |
|-----------------------------------------|-----------------------------------------|
| ○ Hundreds of buildings contaminated    | ○ Local government operations relocated |
| ○ Basic services affected               | ○ Local businesses affected             |
| ○ Local military installations affected |                                         |



## Agent Background



Anthrax is a bacterial disease caused by *Bacillus anthracis*. There are three types of this disease: cutaneous anthrax, gastrointestinal anthrax, and inhalation anthrax. Anthrax spores delivered by aerosol spray result in inhalation anthrax, which develops when the bacterial organism is inhaled into the lungs. A progressive infection follows. In most people, a lethal infection is expected to result from inhalation of about 8,000 spores however; a small number of people (particularly the elderly, very young and immunocompromised) may become ill from an exposure as small as 2-4 spores.

Respiratory infection in humans initially presents with cold or flu-like symptoms for several days, followed by severe (and often fatal) respiratory collapse. Historical mortality was 92%, but when treated early (as seen in the 2001 anthrax attacks) observed mortality was 45%. Distinguishing pulmonary anthrax from more common causes of respiratory illness is essential to avoiding delays in diagnosis and thereby improving outcomes. Illness progressing to the fulminant phase has a 97% mortality regardless of treatment.

## Scenario

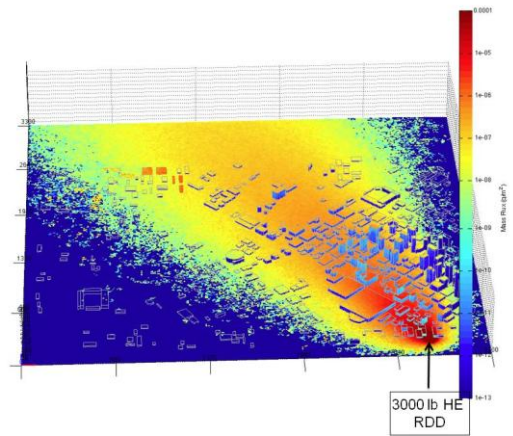
On an autumn Monday morning, a specially fitted truck drives north on I-25. When the truck reaches the Aurora section, the driver's companion turns on a concealed improvised spraying device with a conventional nozzle that rapidly aerosolizes approximately 100 liters of wet-fill *Bacillus anthracis* (anthrax)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

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

## RADIOLOGICAL SCENARIO

### National Planning Scenario #11: Radiological Attack – Radiological Dispersal Devices

- **Two Radiological Dispersal Device (RDD) attacks at the U.S. Mint (downtown) and the Anschutz Medical Campus (Aurora).** Tens of thousands of people exposed and hundreds of deaths.
- **Evacuations/Displaced Persons** 10,000 evacuated to shelters in safe areas (decontamination required 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
- **Most radioactive fallout is within tens of miles**, 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



## Radioisotope Background

**Cesium-137** ( $^{137}\text{Cs}$ ) is a radioactive isotope of cesium. **The half-life of cesium-137 is 30.17 years.** Because of the chemical nature of cesium, it moves easily through the environment. This makes the cleanup of cesium-137 difficult. People may ingest cesium-137 with food and water, or may inhale it as dust. If cesium-137 enters the body, it is distributed fairly uniformly throughout the body's soft tissues, resulting in exposure of those tissues. Exposure to cesium-137 may also be external (that is, exposure to its gamma radiation from outside the body). If exposures to cesium-137 are very high, serious burns, and even death, can result. People may become internally contaminated (inside their bodies) with radioactive materials by accidentally ingesting (eating or drinking) or inhaling (breathing) them, or through direct contact (open wounds). The sooner these materials are removed from the body, the fewer and less severe the health effects of the contamination will be.

## Scenario

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

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

# *Annex F – Resources*

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## *Useful Links*

- 1) Waste Sampling and Analysis Guidance <http://www.epa.gov/wastes/hazard/testmethods/sw846/pdfs/rwsdtg.pdf>
- 2) EPA Region 8 (Colorado) has a guidance document for Waste Sampling and Analysis:  
<http://www.epa.gov/region8/r8risk/visampling.html>
- 3) RCRA Waste Sampling Technical Guidance:  
<http://www.epa.gov/wastes/hazard/testmethods/sw846/pdfs/rwsdtg.pdf>
- 4) State Waste Characterization Guidance:  
[http://www.scdhec.gov/environment/lwm/pubs/solid\\_waste/Waste%20Characterization%20--%20Guidance%20Document.pdf](http://www.scdhec.gov/environment/lwm/pubs/solid_waste/Waste%20Characterization%20--%20Guidance%20Document.pdf)
- 5) Incident Waste Assessment & Tonnage Estimator (I-WASTE) online decision support tool:  
[www2.ergweb.com/bdrtool/login.asp](http://www2.ergweb.com/bdrtool/login.asp)  
login: gguest password: bdruser
- 6) State of Colorado Agricultural Resources/Plans  
[www.Colorado.gov/ag/animals](http://www.Colorado.gov/ag/animals)

## *Event Materials/Presentations*

All event presentations are located here:

[http://www.warrp.org/events/event\\_info/2012\\_wgms/waste\\_management/index.html](http://www.warrp.org/events/event_info/2012_wgms/waste_management/index.html)

## *Annex G – Acronyms*

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After Action Report (AAR)  
British Petroleum (BP)  
Chemical, Biological, Radiological (CBR)  
Cesium (Cs)  
Colorado Division of Emergency Management (CDEM)  
Colorado Division of Public Health and the Environment (CDPHE)  
Critical Infrastructure and Key Resources (CIKR)  
Department of Homeland Security (DHS)  
Department of Interior (DOI)  
Depopulation, Decontamination, Disposal (3D)  
Environmental Protection Agency (EPA)  
Federal Emergency Management Agency (FEMA)  
Foot and Mouth Disease (FMD)  
Frequently Asked Question (FAQ)  
Health and Human Services (HHS)  
Interagency Biological Restoration Demonstration (IBRD)  
Knowledge Enhancement Working Group (KEWG)  
National Incident Management System (NIMS)  
National Planning Scenario (NPS)  
North Central Region (NCR)  
Office of Emergency Management (OEM)  
Pacific Northwest National Laboratory (PNNL)  
Point of Contact (POC)  
Program Manager (PM)  
Public Information Officer (PIO)  
Public Service Announcement (PSA)  
Question and Answer (Q/A)  
Subject Matter Expert (SME)  
Threat Agent Disposal (TAD)  
Urban Area Security Initiative (UASI)  
Unified Command (UC)  
Waste Management (WM)  
Wide Area Recovery & Resiliency Program (WARRP)