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Issues Surrounding Chemical and Biological Agent Response and Recovery

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The Events of 2001 Demonstrated the Difficulties of Rapidly Restoring Critical Infrastructure Facilities

- **Uncertainty regarding the effectiveness of decon methods**
- **No national clean-up standards or consensus**
- **Unknown vulnerabilities and contamination patterns**
- **An integrated response and restoration systems approach did not exist**

Few facilities have plans for recovery after CBW incidents

LLNL's Homeland Security Response and Restoration Programs have three major strategic objectives

- **Enhance rapid recovery from release of biological/chemical agent in key indoor or semi-enclosed facility and/or from a wide-area urban attack**
- **Minimize economic impact from a CW or BW agent release**
- **Have capability to make defensible public health decisions concerning re-opening of key areas/infrastructure facilities following an agent release**

Requirements are verified with key stakeholders (e.g., local, State) including interagency representatives (e.g., EPA, CDC)

All projects in this area have interagency committees to vet and further define requirements

Overall program goal has been to better prepare U.S. to respond to potential CB-incidents at key transportation nodes

- **Assist major facilities and related agencies in planning and preparation activities needed to rapidly and effectively respond to a CB-incidents**
- **Improve preparedness to better restore the area to normal operations in the shortest timeframe and at the lowest cost possible**
- **Understand the existing technology/knowledge base and how to most effectively implement key procedures**
- **Establish a better understanding of interagency roles and responsibilities**
- **Establish ConOps including response flowchart and restoration plan template that can be used at all transportation facilities**

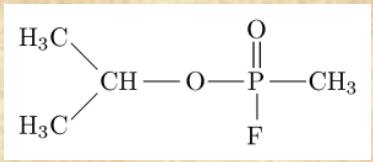
Pre-planning and preparedness are the key to success and California is in a unique position to lead the country in this area

To approach this problem requires an understanding of the threat, plans/procedures, specific capabilities, and technologies

Response and Recovery Activities					
Crisis Management		**Consequence Management**			
Notification	**First Response**	**Remediation/Cleanup**			**Restoration (Recovery)**
		Characterization	**Decontamination**	**Clearance**	
Receive and assess information Identify suspect release sites Relay key information and potential risks to appropriate agencies	HAZMAT and emergency actions Forensic investigation Public health actions Screening sampling Determination of agent type, concentration, and persistence Risk communication	Detailed characterization of chemical agent Characterization of affected site Site containment Continue risk communication Characterization environmental sampling and analysis Initial risk assessment Clearance goals	Worker health and safety Source reduction Decontamination strategy Remediation Action Plan Site preparation Waste disposal Decontamination of sites, items, or both Verification of decontamination parameters	Clearance sampling and analysis Clearance decision	Renovation Reoccupation decision Long-term environmental and public health monitoring

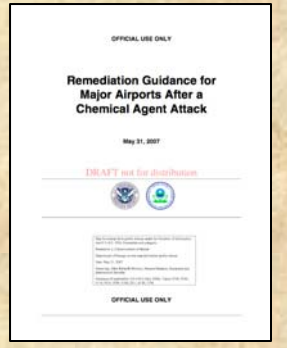
Requirements to successfully implement a systems approach to recovery

Understanding the Threat



- Threat agents
- Dissemination methods
- Likely contamination levels

Plans and Procedures

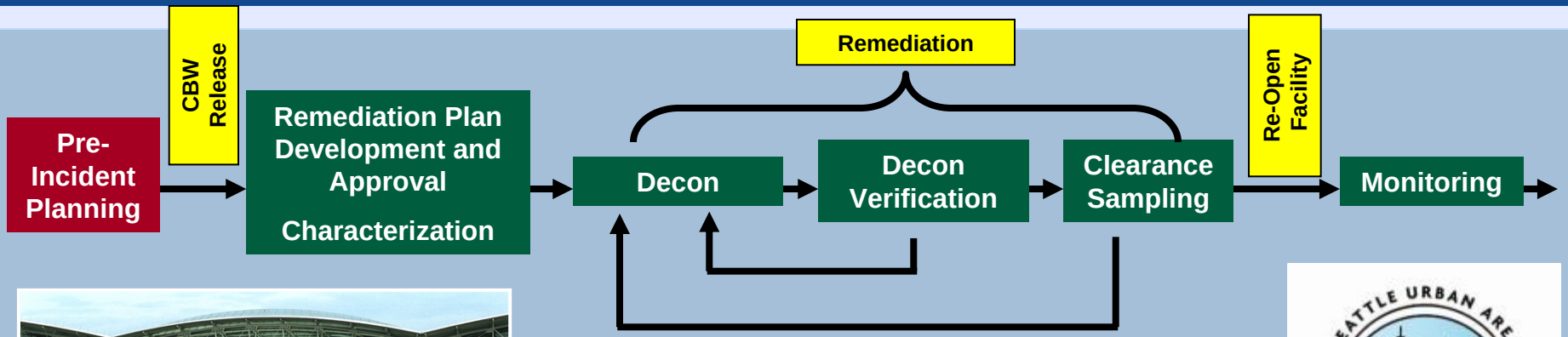


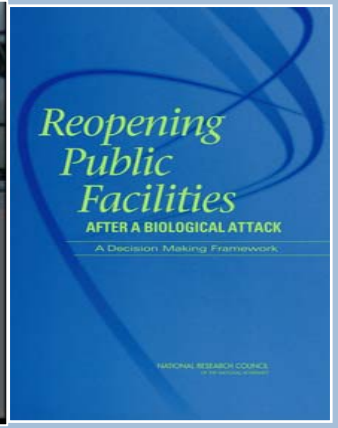
- Roles and responsibilities
- Remediation plans
- Tools to aid decision makers

Specific Capabilities

- Technologies
- Resources
- Information and data

LLNL has worked on enhanced technologies/plans for real-time hazard assessments and recovery



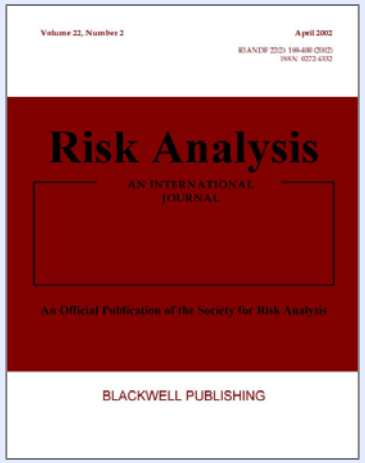


Understanding cleanup requirements is key to guide a risk-informed decision-making process

- **Determines if an actual or potential impact to health, property or the environment exists**
- **Guides necessary actions to restore essential facilities and/or operations**
- **Guides whether or not decontamination is needed**
- **Provides for understanding of potential secondary contamination and waste generation issues**
- **Impacts other decisions for long-term regulatory and stakeholder review**

A framework has been developed which serves as a tool to help guide the decision-making process

Indoor and outdoor regulatory guidelines for clearance have been evaluated & augmented as necessary with EPA/CDC input



Key deliverables for our programs are based on an interagency-developed decision framework

Response and Recovery Activities					
(Crisis Management)		(Consequence Management)			
		Remediation			
Notification	**First Response**	**Characterization**	**Decontamination**	**Clearance**	Restoration **(Recovery)**
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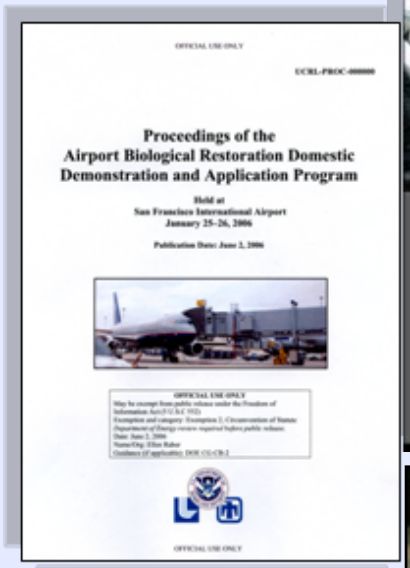
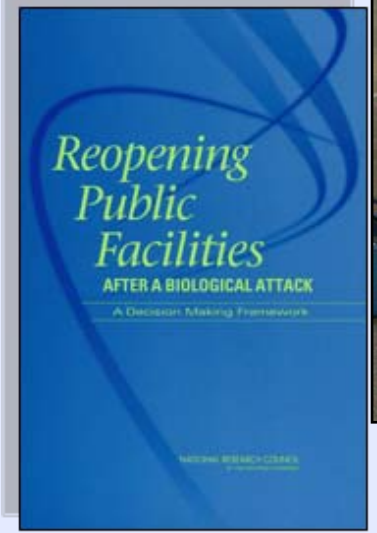
Deliverables from DHS Airport Bio Restoration project include improved tools and procedures to be used in future programs

- **Remediation Guidance Document is now vetted, approved and available for use (2007)**
- **Proceedings from Airport Bio Restoration Demonstration Project**
  - **Enhanced sampling and characterization**
  - **Decision and tracking tools**
  - **Decontamination options**
- **National Academy of Sciences "Reopening Public Facilities after a Biological Attack: A Decision-Making Framework" (2005)**
  - **Defacto cleanup level is "no growth" from any environmental sample collected and analyzed**
  - **No guidance currently exists for outdoor contamination levels**





Chemical Restoration OTD is now ongoing with LAX as partner airport

- **Many of the concepts are similar to the *Biological Restoration DDAP*, except..**
  - **Agent decay may occur**
  - **Surface interactions with chemical agents must be considered and are very important**
  - **More rapid sampling and analysis techniques are available**
  - **Decon method may vary depending on the agent**
  - **Clean-up standards are better defined, but lack consensus**
  - **Long-term air monitoring may be required**

Interagency workshop was held at LAX late September 2007; TTX scheduled early November 2008

Project will conclude with a final demonstration tentatively scheduled at the Ontario, CA airport in FY10

Response and Recovery issues are incident and site-specific and represent key challenges for public sector

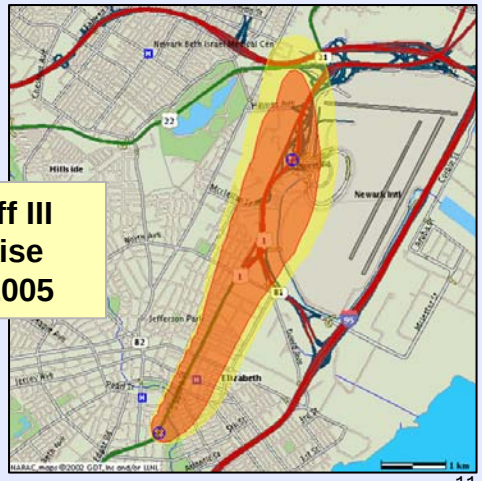
Indoor (i.e., office, hotel)
(Anthrax Cleanups)

- Public perception issues are key
- More amenable to ventilation interventions
- Alternate facilities available

Semi-enclosed (i.e., airport, subway)
(Transit and Airport DDAPS)

Outdoor (i.e., stadium, mall)
(Wide Area Urban DDAP)

- Widespread disruption is expected
- Many environmental variables must be considered
- Natural attenuation may be the solution
- Evacuation versus containment issues
- Large scale decon approaches not evaluated



Top Off III Exercise April 2005

A successful consequence management strategy must address stakeholders issues and concerns

- **Site-specific parameters are key (economic, usage, other impacts)**
- **Likelihood of effect on exposed population(s):**
  - **Potential acute and long-term chronic impact**
  - **Relevant exposure (e.g., inhalation, dermal, secondary ingestion) routes**
  - **Mobility, fate, and multimedia transport of contaminants**
- **Damage and associated costs to land, water, property and equipment**
- **Cost and availability of remediation options with time constraints**
- **Confidence in remediation methods; including sampling/verification**

Public perception and stakeholder issues will drive cleanup requirements

Economic drivers and inconvenience influence stakeholders to accept higher risks

Significant stakeholder collaborations are needed to ensure success

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