# Board of Scientific Counselors Meeting

## Examples of Research Supporting Field Ops

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# Response and Recovery Actions

**As defined by the Office of Science and Technology Policy (OSTP)**

| RESPONSE AND RECOVERY ACTIVITIES | | | | | |
|---|---|---|---|---|---|
| (CRISIS MANAGEMENT) | | (CONSEQUENCE MANAGEMENT) | | | |
| Notification | First Response | Remediation/Cleanup | | | Restoration (Reoccupancy) |
| | | Characterization | Decontamination | Clearance | |
| Receive information on biological Incident<br><br>Identification of suspect release sites<br><br>Notification of appropriate agencies | Initial threat assessment<br><br>HAZMAT and emergency actions<br><br>Forensic investigation<br><br>Public health actions<br><br>Screening sampling<br><br>Determination of agent type, concentration, and viability<br><br>Risk communication | characterization of biological agent<br><br>Characterization of affected site<br><br>Site containment<br><br>Continue risk communication<br><br>Characterization environmental sampling and analysis<br><br>Initial risk assessment<br><br>Clearance goals | Decontamination strategy<br><br>Remediation Action Plan<br><br>Worker health and safety<br><br>Site preparation<br><br>Source reduction<br><br>Waste disposal<br><br>Decontamination of sites or items<br><br>Decontamination verification | Clearance environmental sampling and analysis<br><br>Clearance decision | Renovation<br><br>Reoccupation decision<br><br>Long-term environmental and public health monitoring |


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# US EPA – Special Team for CBRN

## CBRN Consequence Management Advisory Team (CMAT)

***Mission:*** provides scientific and technical expertise for all phases of CBRN consequence management and is available to support the On-Scene Coordinators (OSC) 24/7

***Focus:*** Operational preparedness for CBRN agents. Maintain ASPECT and PHILIS

***Support:*** All phases of CBRN response, including characterization/analytical, decontamination, clearance and waste management

*Buildings, infrastructure, indoor and outdoor environments, transportation sectors*

# CMAT Mission (cont.)

- Facilitate transition of the latest science and technology to the field response community, constantly promoting more efficient and effective consequence management through knowledge, tools, technology, playbooks/SOPs, policy, and guidance.

- Serve as the hub of leadership in OEM for all CBRN homeland security initiatives related to consequence management operations planning, specifically by fostering partnerships with other key players in the homeland security arena, especially (but not limited to) NHSRC, DHS, FBI, USSS, and DOD

# Research Supporting Response

- Ebola
- Ricin
- Burkholderia pseudomallei
- Underground Transportation Restoration Project (UTR)
- International Partnerships

# Ebola

- EPA developed Decon Strategy, Health and Safety Plan, Decon Line SOP and PPE Recommendations
  - Focus outside of a healthcare setting
- Partnered with EPA research community to ensure Decon Guidance efficacious for Ebola
  - Recommend appropriate disinfectants (enveloped viruses v. non-enveloped)
  - Contact times
  - Porous v. nonporous materials (use of a sterilant)
  - Pre-cleaning step

# NHSRC draft report: The Decontamination Line Protocol Evaluation for Biological Contamination Incidents Assessment and Evaluation Report

- Report Findings Integrated into Operational Guidance:
  - liquid can be a contaminant carrier, so unless a completely effective liquid decontaminant (e.g., diluted bleach or registered disinfectant) is used, large amounts of liquids and scrubbing should be avoided, due to the potential of cross-contaminating personnel through their PPE.
  - Use of a secondary protective Tyvek suit, under the main Tyvek™ or Tychem™ suit, along with a light mist or spray, and careful doffing (with attendant help, wearing multiple gloves, frequently doffed) can reduce, or potentially eliminate cross contamination to the personnel.
  - Because total elimination of cross contamination cannot be guaranteed 100% of the time, all personnel exiting the biological decon line should thoroughly shower with a disinfectant soap immediately after removing PPE, and before exiting to uncontrolled areas.

# Ricin

- From 2013-2015: EPA responded to 4 Ricin Incidents (NCR, Mississippi Oklahoma, & Wisconsin)
- Advise on and conduct sampling, decon and clearance operations
- Analytical issues:
  - CDC doesn’t support providing reagents to the LRN for ricin analysis
  - Time-Resolved Fluorescence Immunoassay (TRF): used for characterization but can’t be used for clearance due to bleach interference

# On-Going Efforts for Ricin Analyses

1. Coordination with OEM ERLN and CDC LRN to develop EPA access to LRN labs directly (Currently ERLN labs with Ricin capability are also LRN members and need authorization from LRN to analyze samples for EPA- roadblock).

2. OEM working on agreement with DoD for access to DoD laboratory network and DoD reagents/assays.

3. OEM/NHSRC working on further TRF method development with Lawrence Livermore National Lab – to resolve bleach interference issue.

# Burkholderia pseudomallei (Bp)

- Incident Background:
- Tulane National Primate Center, Covington LA: biomedical research facility with Select Agents from CDC; maintains colonies of non human primates but does not expose to select agents
- 2 primates ill, test positive for exposure to Bp in November 2014
  - Note: Bp is the bacteria that causes melioidosis
- CDC conducts investigation of lab to determine nature of select agent exposure
- Notified EPA late February, mobilized week of March 2

# EPA Actions

- CMAT served as Scientific Support Coordinator (SSC)

- Formed a Technical Working Group (TWG) with NHSRC partners

    - Determine if contamination exists outside of the field cages
    - IF it does exist outside field cages, define extent of contamination
    - Decontamination strategy for 2 field cages
    - Decontamination strategy for area outside of field cages if samples are positive

# Decon of Soil if Samples are Positive

| Option | Used commercially for soil | Contact Time required | Aeration time | Can use on concrete & gravel | Effective against vegetative bacteria | Ability to reach depth | Other issues, notes |
|---|---|---|---|---|---|---|---|
| **MeBr** | Y | 36 hours | 3-7 days??? … aerate until concentration below 5 ppm | Y | A few articles in literature suggest yes | Thought to penetrate materials well; may take longer contact time | Efficacy improves with increased soil moisture content. May take longer contact time to reach depth, and then desorb afterwards for aeration |
| **Metam sodium** | Y | 7 days | 21 days | N | Not tested | Typically used for soils, so should not be a problem | Requires sufficient soil moisture, break up of clods. Contact time and aeration time depend on how metam sodium is applied; see attached pesticide label and application guide. |
| **Sodium persulfate activated with aqueous hydrogen peroxide** | Y | 7 days | None? | Y | Not tested, but acts as an oxidant, so should not be an issue | Applied as a liquid; will need sufficient liquid to reach depth | |

# Soil Options Continued

| Option | Used commercially for soil | Contact Time required | Aeration time | Can use on concrete & gravel | Effective against vegetative bacteria | Ability to reach depth | Other issues, notes |
|---|---|---|---|---|---|---|---|
| **$ClO_2$ fumigation** | N | 3 hours | ? | Y | Y | May not be able to based on previous tests showing inability to inactivate anthracis at 2 cm soil depth | May be able to reach depth if longer contact time is provided |
| **Excavation followed by autoclave treatment of soil** | N | Typically just a few hours per batch | none | N (concrete)<br>Y (gravel) | Y | NA | We have minimal info on size and capacity of autoclave/chemclave at Tulane; after treatment soil and gravel could be returned to initial location |
| **Excavation followed by chemical treatment** | N | Depends on chemical; see above | | N (concrete)<br>Y(gravel) | Y? | NA | |

# Bp Summary

- All samples tested negative
- EPA transitioned into a strictly advisory role
- The close coordination of the operational and research personnel ensured EPA proposed a scientifically sound approach that was practical for field implementation

# Underground Transportation Restoration (UTR)

# Subway recovery challenges


Problem:

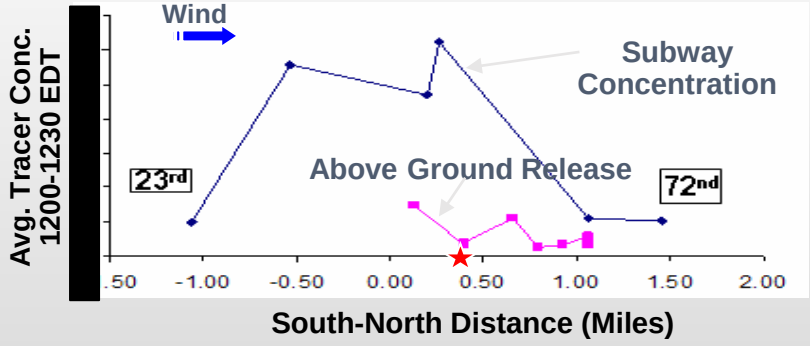
Subway systems not prepared to quickly remediate and re-open after bioterrorism event

- Loss of <u>billions</u> of dollars to city and businesses (*Super-storm Sandy - $125M – 3 days*)
- Logistical nightmare for commuters (*NYC > 5 mil riders per weekday*)
- Above-ground release can also contaminate system

**"Urban Dispersion Program"**

**Tracer Concentration versus Distance**

(Tracer Release: 1100-1130 EDT Aug. 8, 2005)

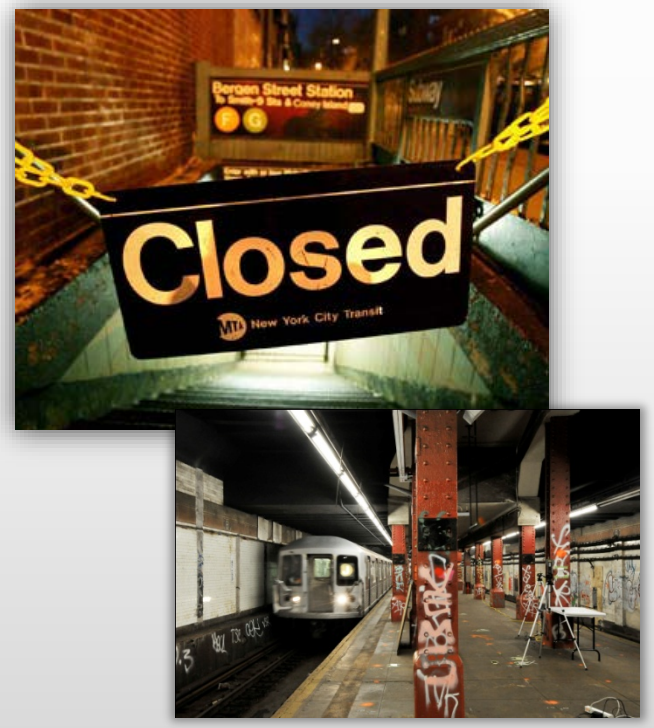



Watson / Heiser - BNL

**Subway contamination presents challenges (e. g., bio-load, grime, metal particulates, airflows, materials) unlike a 'clean', indoor environment**

# EPA knows how to ‘decon’ an office building, NOT a subway

**Gap: Translate what we know from a ‘clean’ building to a ‘dirty’ complex environment**




Project Objectives:

- Deliver first comprehensive Federal Operational Guidance to decrease time to return a subway system to service following a biological agent event
- Field-test decontamination technologies and isolation techniques
- Reduce burden on laboratory network performing sample analysis
- Earlier start of decontamination phase

→ Faster re-opening

# Customers, Stakeholders & Performers

Customers

MTA – New York City Transit

WMATA – Washington Metropolitan Area Transit Authority

BART – Bay Area Transit Authority

CTA – Chicago Transit Authority

MBTA – Massachusetts Bay Transit Authority

Stakeholders

- Transportation Security Administration; FEMA
- Office of Health Affairs (BioWatch)
- CDC
- U.S. EPA (*in-kind contribution of personnel; review test plans, field tests*)
- Local Public Health Departments (NYC, Chicago, Boston)

- DHS S&T: Project Lead
  - Invest $17.5 million FY13-FY17
- Performers include:
  - LLNL
  - Sandia
  - Argonne
  - MIT Lincoln Labs
  - EPA
  - DoD?

- Major Integration of Research and Operations to Advance National Preparedness!!!

# International Partnerships

- Leverage Abroad!!

- United Kingdom Government Decon Services and Public Health England
  - Leverage lessons learned on various R&D and guidance efforts
  - Collaborating on development of Radiation response application

- French General Secretariat for Defense and National Security
  - Decontamination technology evaluations

- Japan
  - Lessons learned on Fukushima response

- Singapore
  - Information sharing on biological sampling and decon

# Closing Themes

- Continue to collaborate on a daily basis to ensure bench scale work can be adapted to field operations
  - MeBR subway car studies (end of May)
  - Hydrogen Peroxide field study (fall 2015)
  - Operational technology demonstration planned for UTR (September 2016)
- Many examples of R&D community supporting operations in real incidents
- Leverage national and international relationships to ensure we continue to close gaps in CBRN response, especially as fiscal challenges persist

# Future Possible Projects

- Outdoor Area wide Biological Decon
- Water System Decon Strategies
- Waste Disposal Minimization (while maintaining effective decon)
- Analytical Capacity for CWA and Bio

# Questions??

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