

Laboratory Preparedness

The Role of the MLS in: *“Protecting, maintaining, and improving the health of all Minnesotans”*

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Minnesota Department of Health
Public Health Laboratory
Emergency Preparedness & Response Unit



Objectives

- Summarize the goals of the MN Laboratory System
- Describe the LRN-B and LRN-C
- Illustrate examples of “unknown sample” responses by the MDH Laboratory EPR Unit



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Minnesota Laboratory System



An integrated network of public and private clinical laboratories working together to protect and improve the health of all Minnesotans



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Goals of the MLS

- **Enhance quality of microbiology practice**
 - Infectious disease outbreak detection
 - Antimicrobial susceptibility surveillance
 - “Every-day” disease detection
- **Improve Emergency Readiness**
 - Bioterrorism
 - Chemical terrorism
 - Influenza (pandemic and seasonal)
 - Other public health emergencies



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MLS Communication



Communication

- MLS Lab Alert
- [MLS: e-LAB] – Listserv
- www.health.state.mn.us/mls



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MLS Educational Resources

Educational Resources

- Challenge Set
- CLSI Guidelines
- BT Binders
- LRN Sentinel Lab BT Wet Workshops
- “Education and Training” link
www.health.state.mn.us/mls
- Regional Conferences



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MN Healthcare System Preparedness Program

MHSPP = MN Healthcare System Preparedness Program

Goal: to upgrade the capacity of the MN healthcare system to respond to bioterrorism, other outbreaks of infectious disease and other public health threats and emergencies



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MHSPP Laboratory Past Efforts - Deliverables

- Emergency preparedness of clinical labs
 - Biosafety cabinets (BSCs)
 - Phlebotomy carts
 - Point of care devices (ie: I-Stats®)
 - Regional conferences
 - Reference books
- Communication enhancement
 - MLS email alerts - database
- Laboratory participation in exercises/drills



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MHSPP Laboratory Deliverables

- MN Responds/MRC lab registrants $\uparrow$ 25%



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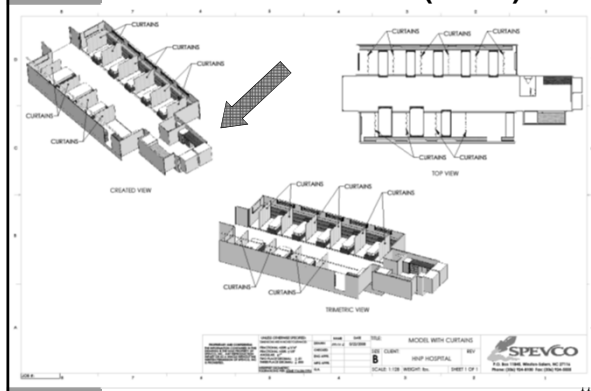
MHSPP Laboratory Deliverables

- Alternate Laboratory Settings: protocols in place in each region
 - Alternate Care Sites (ACS)
 - Hospital Response Teams (HRT)
 - Mobile Medical Unit (MMU)
 - Mobile Field Medical Teams (MFMT)



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Mobile Medical Unit (MMU)





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MHSPP Laboratory Deliverables

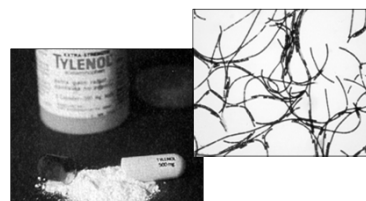
- Completed functional lab exercise/AAR
- Challenge Set participation

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Laboratory Response Network

- LRN – B = Bioterrorism
- LRN – C = Chemical terrorism



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Laboratory Response Network (LRN) - Bioterrorism

Detect → Confirm → Report → Investigate → Control

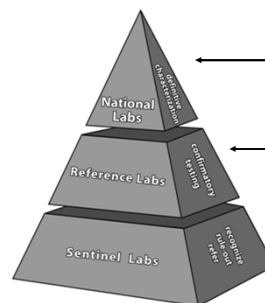
Essential Features:

- LRN standardized reagents and protocols
- Three-tiered network of collaborating labs
- Designed for emergency preparedness & response
- Cooperative agreement funds to build and sustain
- Requires lab connectivity and interdependency
- Sentinel and Reference lab connections are essential



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Laboratory Response Network (LRN-B)



National Labs: CDC, USAMRIID
(definitive characterization)

Reference Labs: MDH-PHL
(confirmatory testing)

Sentinel Labs
(recognize, rule-out, refer)
"Advanced" and "Basic"



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LRN-B Basic Sentinel Lab Definition

- Physician Office-based labs
- Hospital- or clinic-based labs that do not do high complexity microbiology
- Labs are at least CLIA certified
- Have policies for referring suspicious specimens to LRN Reference Labs



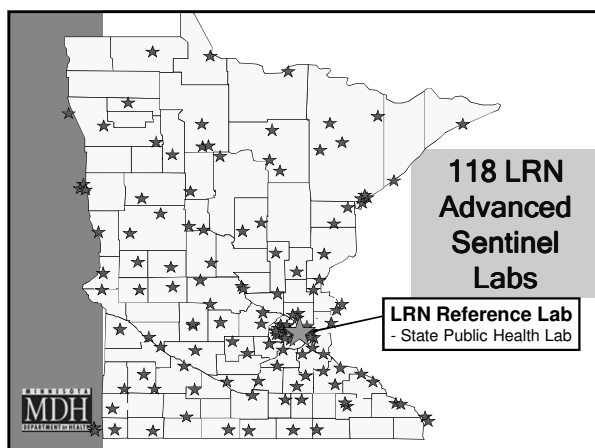
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LRN-B Advanced Sentinel Lab Definition

- Labs are at least CLIA certified and meet the requirement for high complexity testing in microbiology
- Have a Class II certified BSC
- Biosafety Level II practices
- Additional characteristics



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Advanced Sentinel Lab Preparedness

Develop and maintain the capability of Sentinel Labs to:

- Perform rule-out testing
- Safely package and handle specimens
- Refer to LRN Reference Lab
- LRN Guidelines binders



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Agents of Bioterrorism

Level A

- *Bacillus anthracis*
- *Francisella tularensis*
- *Yersinia pestis*
- *Clostridium botulinum* toxin

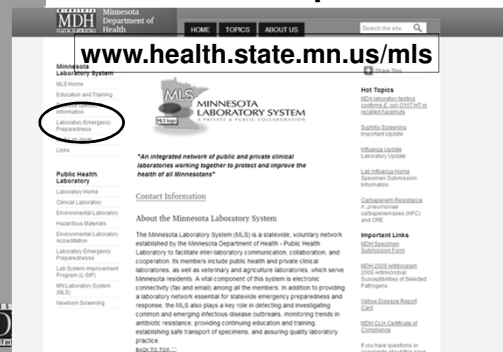
Level B

- *Brucella* spp.
- *Burkholderia mallei/pseudomallei*

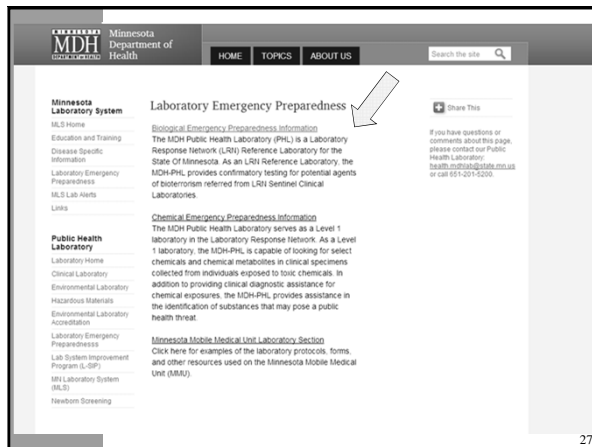


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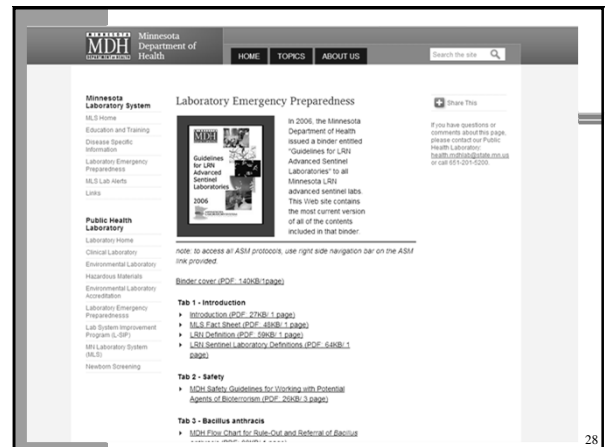
Sentinel Lab Preparedness



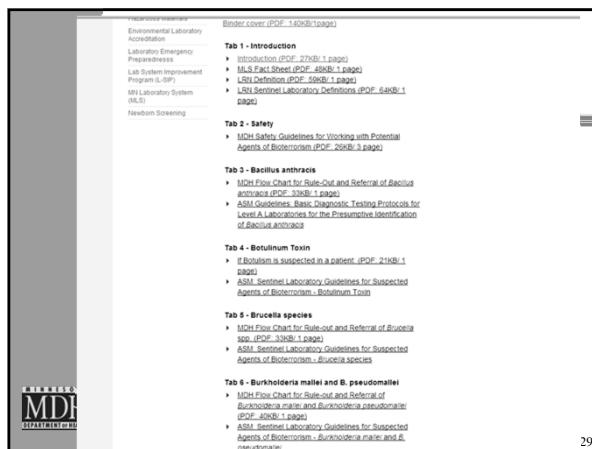
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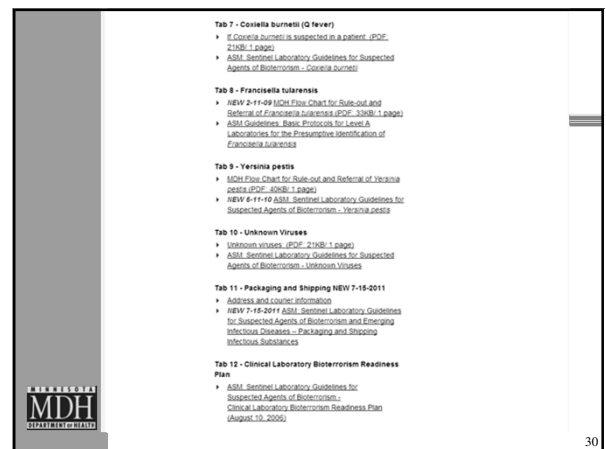
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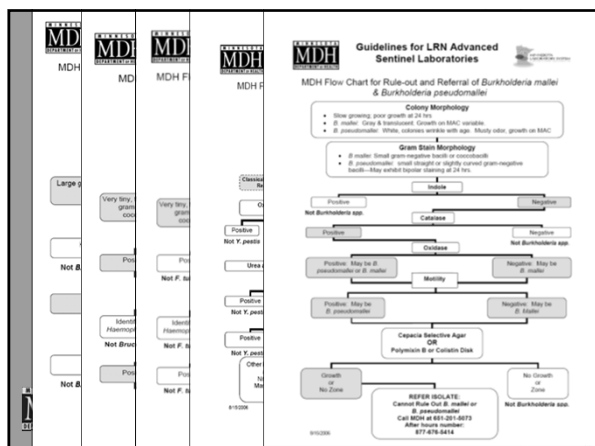
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Chemical - Laboratory Response Network (LRN)

Essential Features

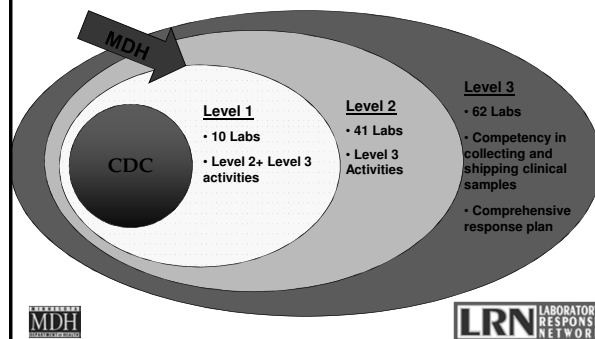
- Three-tiered network of collaborating labs
- Use of validated, standard methods
- Provide surge capacity for CDC
- Provide standard protocols for collection of specimens



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Chemical - LRN Testing Capacity



MDH Roles and Responsibilities

- National asset – CDC surge capacity
- Method Development
- Educate about chemical agents and health effects
- Assist hospitals with proper collection and shipping procedures



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MDH Analytical Capabilities

- Equipment expensive
- Very low levels of detection (LOD)
- Highly trained staff
- Extensive proficiency testing program



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MDH Analytical Capabilities



- Cyanide in blood
- Tetramine – blood agent
- VOCs in blood



Gas Chromatograph-Mass Spectrometer

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MDH Analytical Capabilities

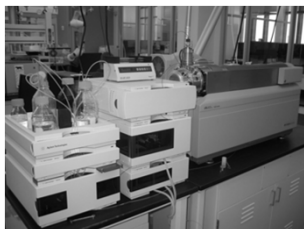
- Toxic screen in blood and urine
- Arsenic and selenium in urine
- Mercury, lead, and cadmium in blood
- Lewisite – arsenic-based blister agent



Inductively Coupled Plasma-Mass Spectrometer

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MDH Analytical Capabilities



- Nerve agents
- Nitrogen mustards
- Ricinine and Abrine
- Metabolic toxins panel
- Tetranitromethane metabolite



Liquid Chromatograph-Tandem Mass Spectrometer

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Level 3 Outreach Chemical Terrorism Poster



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Level 3 Outreach Toxic Industrial Chemical “Flip Cards”



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LRN-C Level 3: Lab Protocols MLS Laboratory Responsibilities

- Event responsibilities
- Specimen Collection
- Packaging and shipping procedure
- MDH contact information
- Forms
- References



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Chemical Response Protocols

[illegible]

Chemical Response Protocols



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Laboratory Emergency Preparedness

Biological Emergency Preparedness Information

The IDPH Public Health Laboratory (PHL) is a laboratory responsible for the State Reference Laboratory for the State of Illinois. As an IDPH reference laboratory, IDPH-PHL provides confirmatory testing for the detection of bioterrorism related from LDCS Sentinel CLIA Laboratory.

Chemical Emergency Preparedness Information

The IDPH Public Health Laboratory serves as a Level 1 laboratory in the Laboratory response network. As a Level 1 laboratory, the IDPH-PHL is capable of testing for selected chemicals and chemical metabolites in clinical specimens collected from individuals exposed to toxic chemicals. In addition to providing clinical diagnostic assistance for chemical exposures, the IDPH-PHL provides assistance in the identification of substances that may pose a public health threat.

Minnesota Mobile Medical Unit Laboratory Service

Click here for examples of the laboratory products, forms, and other resources used in the Minnesota Mobile Unit (MMU).

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Chemical Response Protocols



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Hazardous Materials Emergency Preparedness

If you are responding to a hazardous materials or chemical spill, release, or leak, please refer to the [Hazardous Materials Emergency Preparedness](#) document.

If you are collecting toxic samples in a Chemical or Radiological Emergency, see below.

Chemical Laboratory Emergency Information

On this page:
 Chemical Control and Holdings at Division Office, Division Contacts
 Chemical Containment and Detection in Office
 Substances

Unusual Chemical and Radiological Exposure Event Response Collection Procedures

This document is a group of general procedures applicable to an accident chemical or radiological exposure event. The Minnesota Department of Health lists in collaboration with the Centers for Disease Control and Prevention (CDC), the steps to take in managing the response to a chemical or radiological exposure event. The document describes the chemical or radiological control and other steps from the exposed individual to the laboratory for general information.

The document also refers to agencies and activities that support the chemical or radiological exposure response. It is imperative that specimens be collected from exposed individuals with care from the exposure event. The following documents explain the necessary steps to properly collect and store specimens in the laboratory in order to make the most of these documents.

 **How to Use This Document**

This document is a general overview of the procedures for collecting and storing specimens in the laboratory. It is imperative that specimens be collected from exposed individuals with care from the exposure event. The following documents explain the necessary steps to properly collect and store specimens in the laboratory in order to make the most of these documents.

- New Section 60-01
Chemical, Packaging and Shipping Instructions, Summary Document
[PDF Document](#)
- New Section 60-01
Exposure Scenarios (Blood Specimens, Chain of Custody, Forms)

Chemical Response:
MLS Labs - Specimen Collection

CDC Specimen Collection Protocol for a Chemical Exposure Event

An individual who is CDC study research is sometimes tested for lead. See the [Blood Lead Research Page](#).

Collect blood and urine samples for each person involved in the chemical exposure event.

Note: For venous, collect only one sample unless otherwise directed by CDC.

Blood Sample Collection

For all patients, collect blood from the following order: 1st collect three (3) purple-top (EDTA) green tubes, 2nd collect one (1) gray or green-top green tube.

1st Collect three (3) purple-top green tubes of blood.

1. Label each tube with the patient's name, date, and time.

2. Mix contents of the tube by swirling for 30 seconds.

3. Place each tube into a biohazard bag, label, and place into a cooler.

2nd Collect one (1) gray or green-top green tube of blood.

1. Label each tube with the patient's name, date, and time.

2. Mix contents of the tube by swirling for 30 seconds.

3. Place each tube into a biohazard bag, label, and place into a cooler.

Urine Sample Collection

For all patients, collect urine from the following order: 1st collect one (1) urine sample in a red-top urine tube.

1st Collect one (1) red-top urine sample.

1. Label each tube with the patient's name, date, and time.

2. Mix contents of the tube by swirling for 30 seconds.

3. Place each tube into a biohazard bag, label, and place into a cooler.

Chemical Response: Pre-Staging Packaging Kits

- MDH will have assembled kits prepared and ready to deploy
- We can get kits out quickly in an emergency
- Must collect samples immediately though!



Specimen packing kits have been assembled



- (2) Chemical Exposure Specimen Chain-of-Custody for Blood
- (2) Chemical Exposure Specimen Chain-of-Custody for Urine
- (1) "Procedure for Collecting, Packaging and Shipping Specimens Following a Chemical Exposure Event"
- (1) Gridded blood tube box
- (2) Gridded urine cup boxes
- (9) Strips of absorbent material
- (3) Clear Saf-T-Pak® "pressure bags"
- (3) White Tyvek®, Saf-T-Pak® envelopes
- (2) Zip close paperwork bags (9"x12")
- (2) Zip close large overpack bags (24"x24")
- (1) 12" strip of evidence tape



Chemical Response: CDC - Roles and Responsibilities

- Primary Reference Lab
- Rapid Toxic Screen
- Method development
- Proficiency testing program
- LRN-C program management and funding



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Chemical Response: CDC - Rapid Toxic Screen

- Identifies 150 potential agents
- Requires 14 methods
- Tested in 1995 after Tokyo Sarin attacks



Questions:

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Minnesota Department of Health
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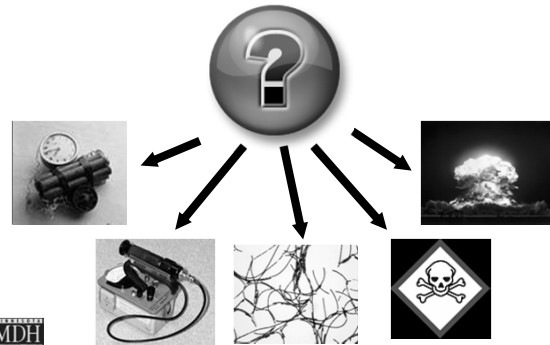
Phone: 651-201-5579

E-mail: stefan.saravia@state.mn.us



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MDH: All Hazards Approach



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Geiger counter

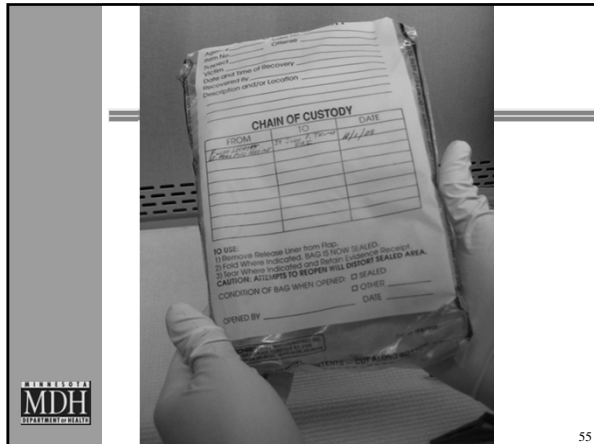
**Beta and gamma
radiation**



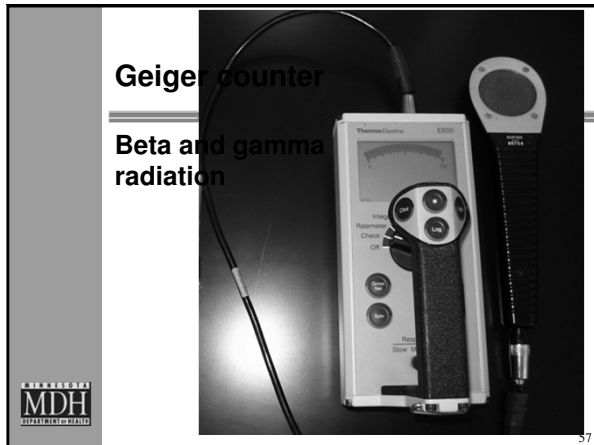
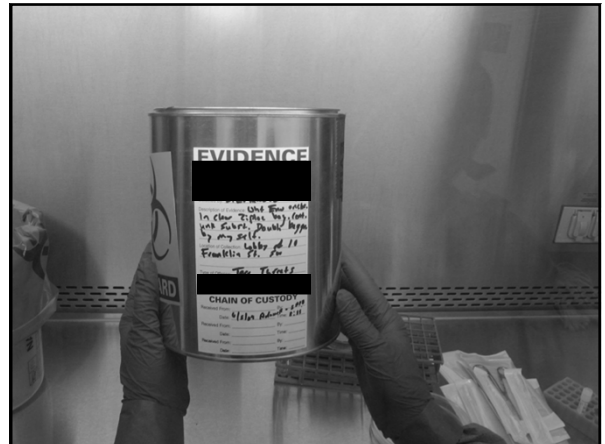
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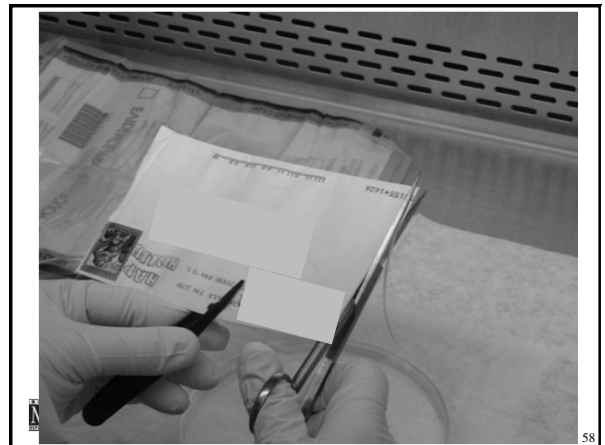
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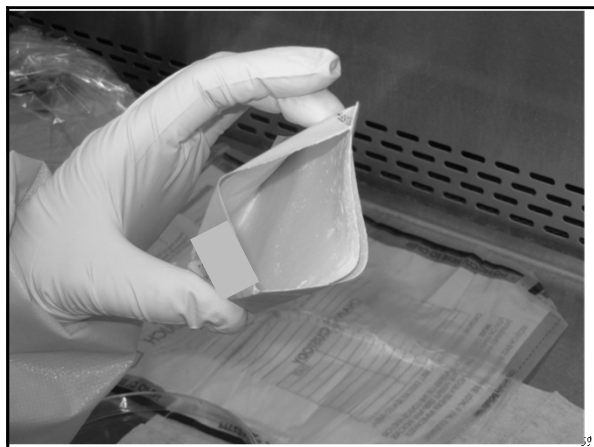
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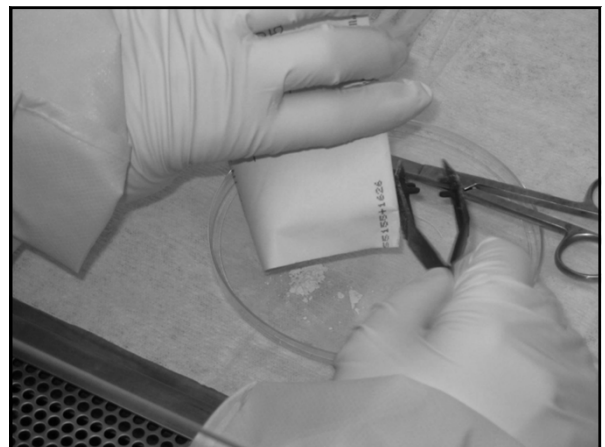
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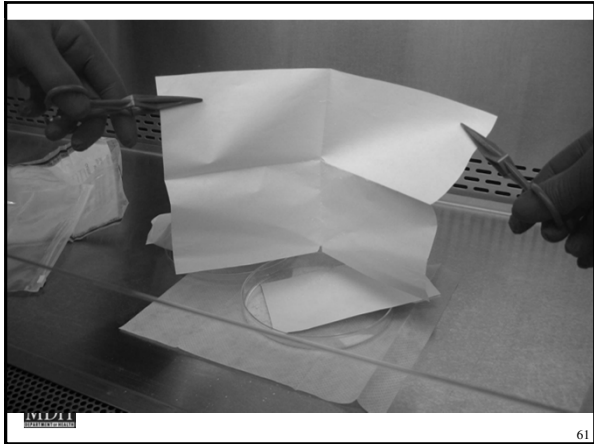
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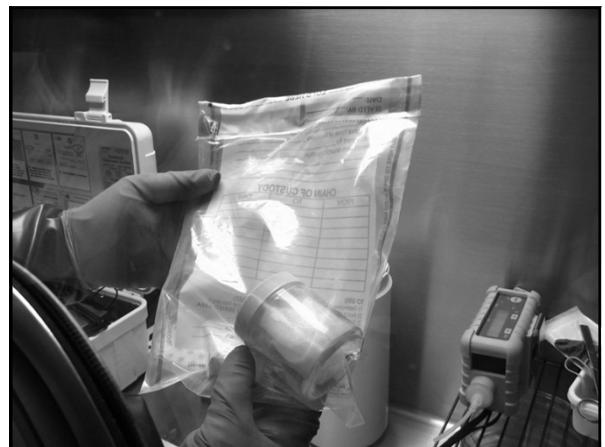
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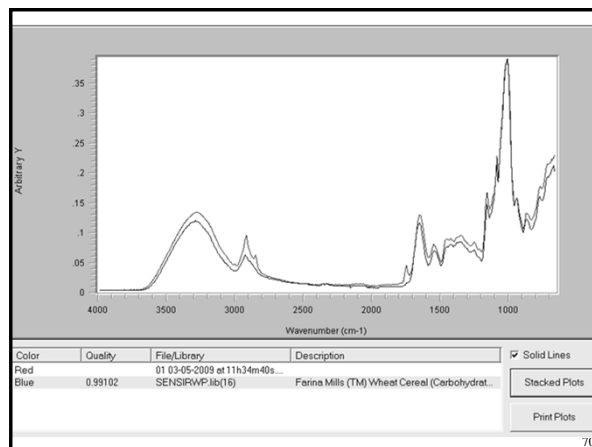
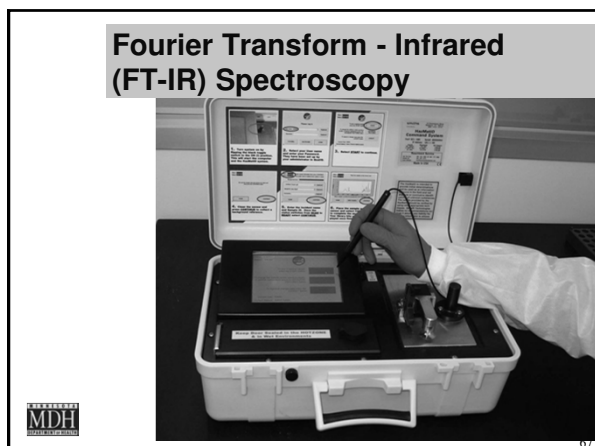


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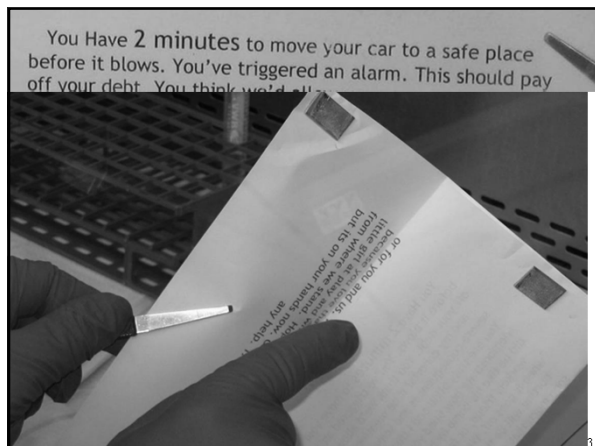


Tier One Testing

- ★ BT (culture and PCR)
 - *B. anthracis*, *Y. pestis*, *F. tularensis*, *Brucella* spp., *Burkholderia*, Orthopox, any other significant growth
- ★ CT (organic, inorganic, metals, etc.)
 - Numerous screen tests: pH, solubility, explosives etc.
- ★ Toxins (TRF and PCR)
 - Ricin
- ★ What else could it be?
 - FT-IR

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THANK YOU

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