

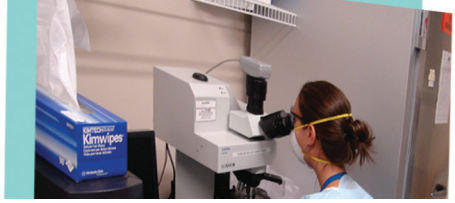


ASSOCIATION OF PUBLIC HEALTH LABORATORIES MODEL PRACTICE:

Algorithm and Guidelines for Responding to an Incident Involving a Suspicious Non-Clinical Sample

VERSION 2.0, JUNE 2015











APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES

THE ASSOCIATION OF PUBLIC HEALTH LABORATORIES (APHL) IS A NATIONAL NON-PROFIT ORGANIZATION DEDICATED TO WORKING WITH MEMBERS TO STRENGTHEN GOVERNMENTAL LABORATORIES THAT PERFORM TESTING OF PUBLIC HEALTH SIGNIFICANCE. BY PROMOTING EFFECTIVE PROGRAMS AND PUBLIC POLICY, APHL STRIVES TO PROVIDE MEMBER LABORATORIES WITH THE RESOURCES AND INFRASTRUCTURE NEEDED TO PROTECT THE HEALTH OF US RESIDENTS AND TO PREVENT AND CONTROL DISEASE GLOBALLY.

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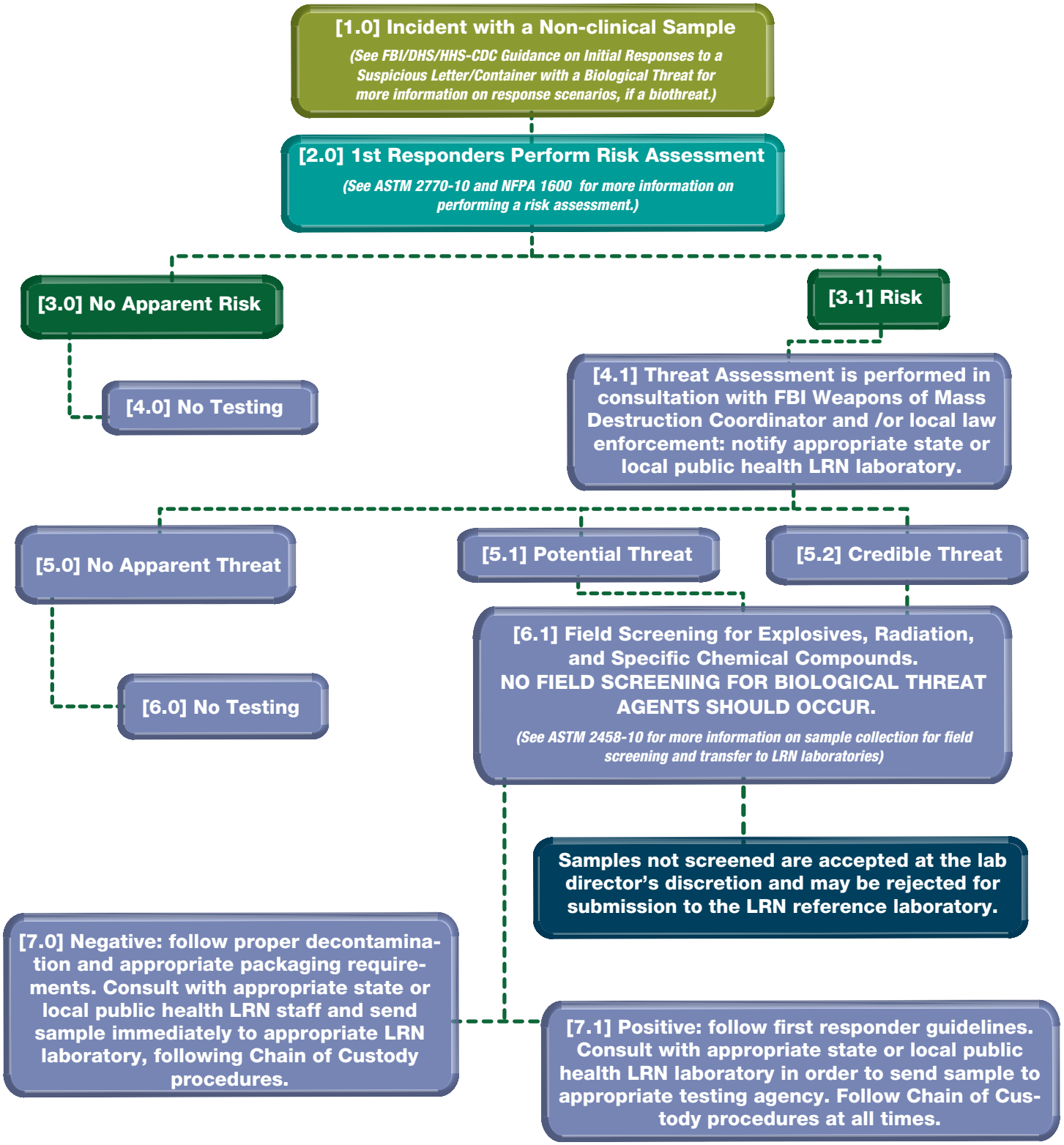
USING THE APHL MODEL PRACTICE:

ALGORITHM AND GUIDELINES FOR RESPONDING TO AN INCIDENT INVOLVING A SUSPICIOUS NON-CLINICAL SAMPLE

The purpose of the response and testing algorithms is to provide guidance to state and local public health Laboratory Response Network (LRN) member laboratories working with multiple organizations and agencies to respond to an incident involving a suspicious non-clinical sample. This guidance should be a starting point for communication between the laboratory and response communities and should supplement other guidance documents currently available in the field. It is critically important for laboratories to understand the roles of all partners involved in a suspicious incident event to ensure a timely and effective response. The algorithms should be followed step by step until a resolution point has been reached. The accompanying guidelines in this document should be used for further clarification on how to follow the algorithm. These are minimal guidelines, and APHL anticipates that state and local public health LRN member laboratories will adapt these algorithms to best fit their needs and protocols. These practices are not meant as a standalone protocol, and it is strongly recommended that laboratorians work closely with their first responder communities to provide additional guidance.

This document is available online at http://www.aphl.org/AboutAPHL/publications/Documents/PHPR_2015June_AlgorithmandGuidelinesWhitepaper.pdf.

FIRST RESPONDER ALGORITHM



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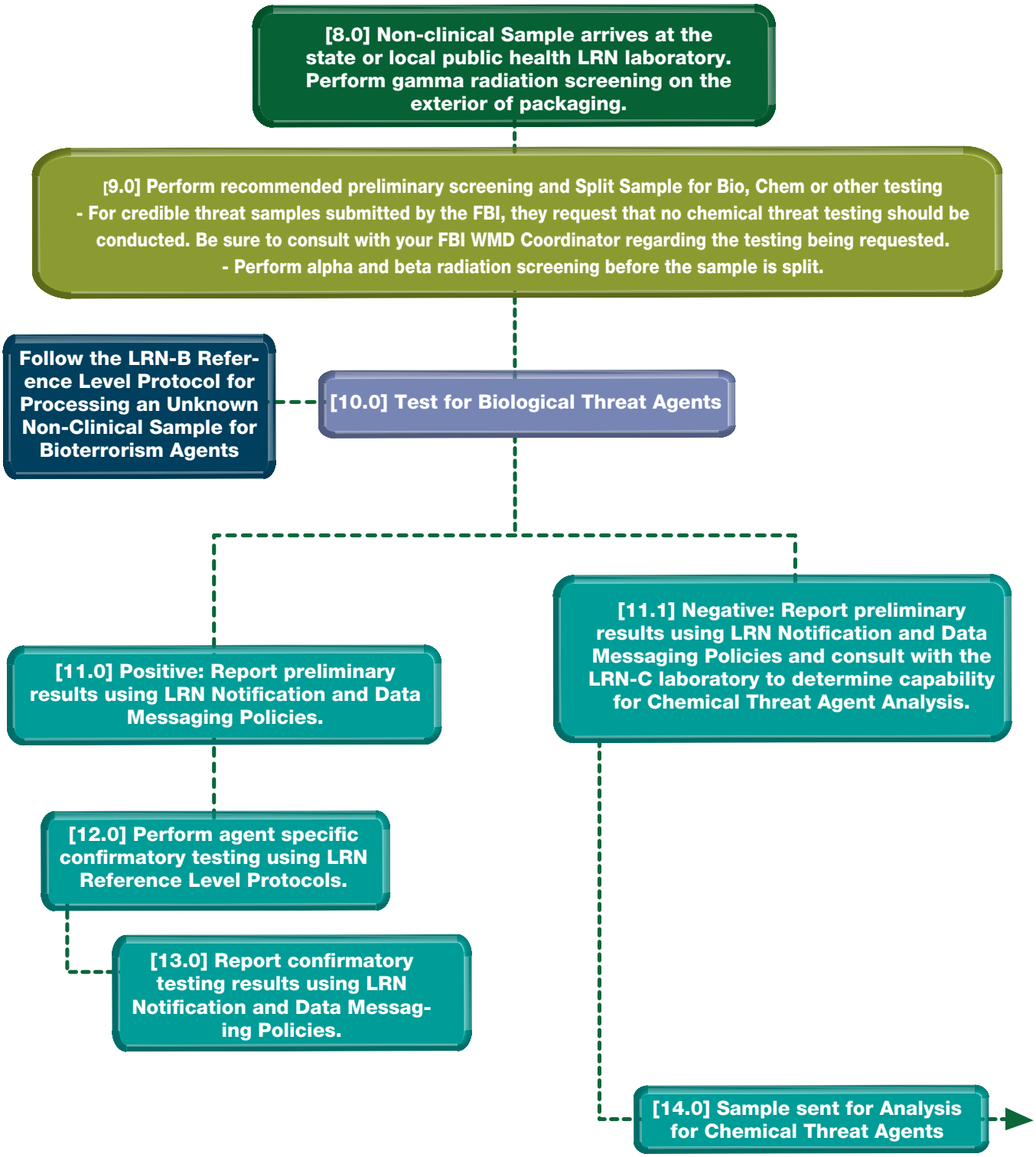

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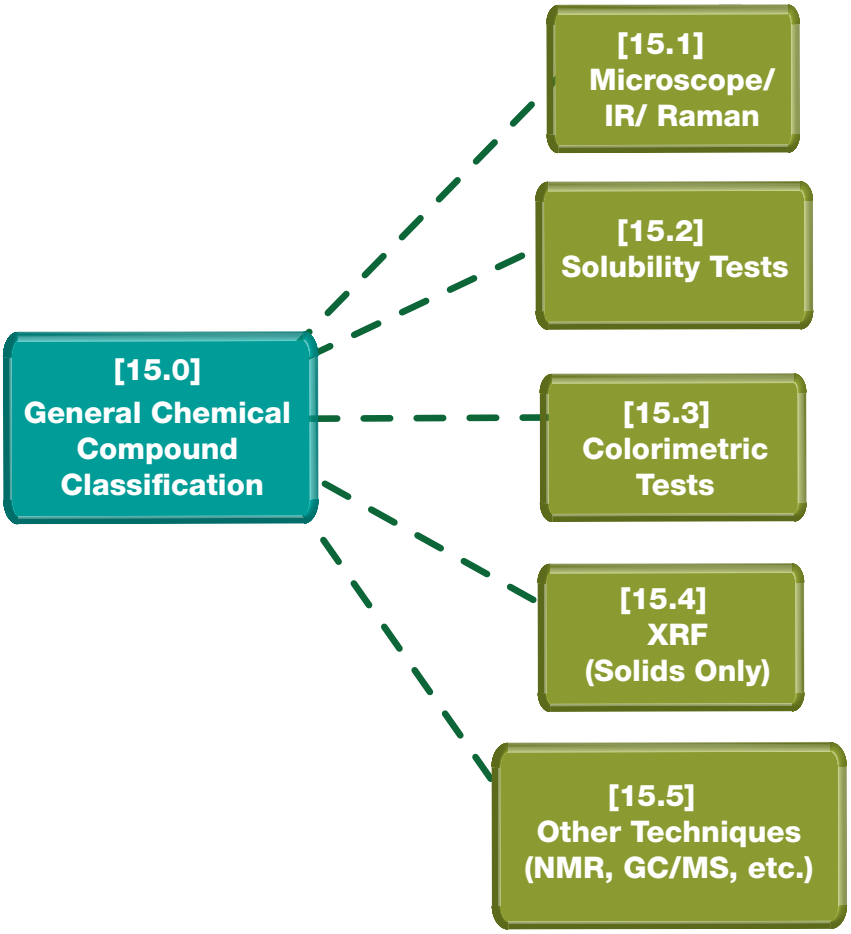
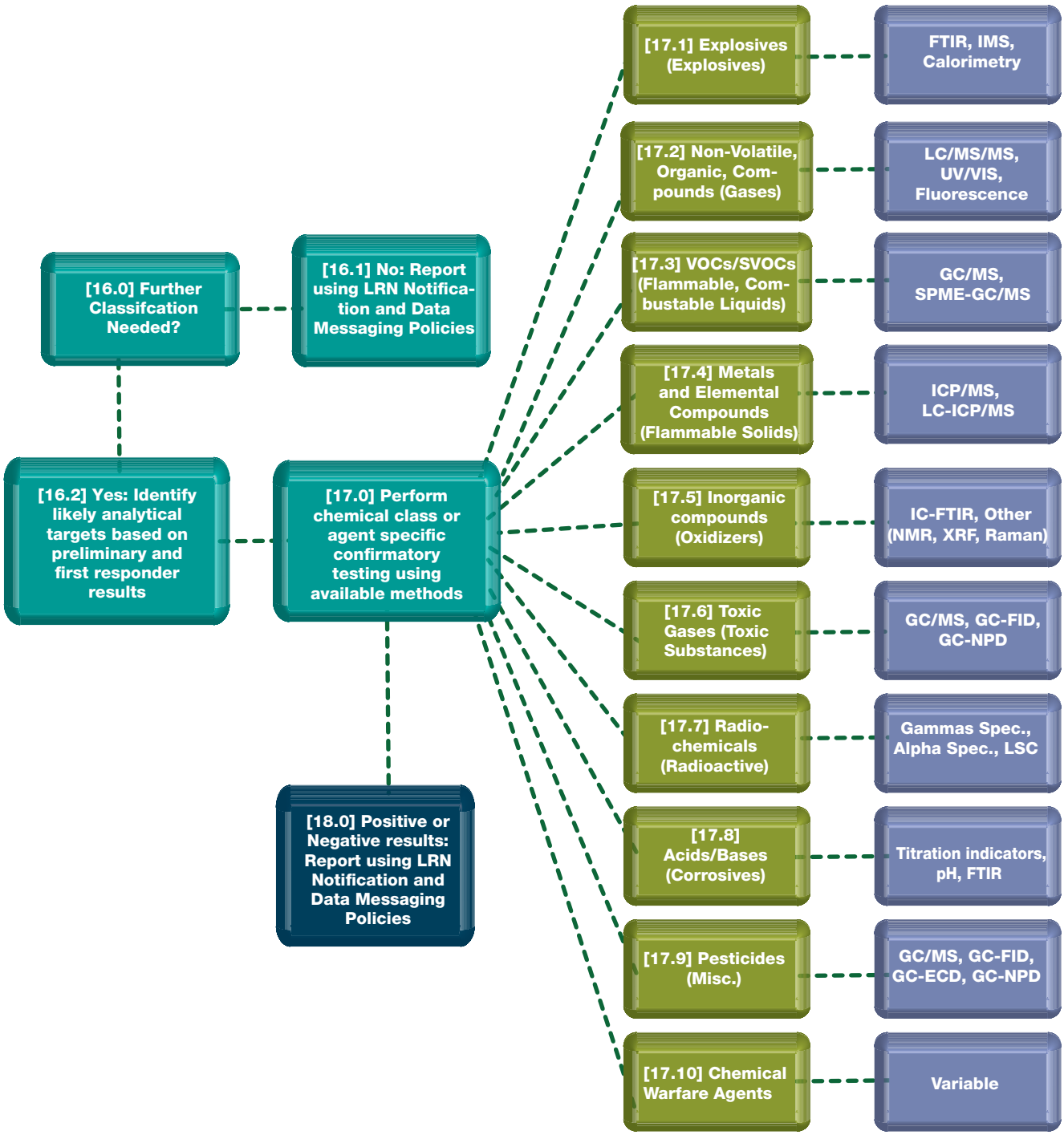


LRN-B REFERENCE AND LRN-C LABORATORY TESTING ALGORITHM (CONT'D)



GUIDELINES ON HOW TO USE THE ALGORITHMS

THESE ARE MINIMAL GUIDELINES, AND APHL ANTICIPATES THAT STATE AND LOCAL PUBLIC HEALTH LRN MEMBER LABORATORIES WILL ADAPT THESE ALGORITHMS TO BEST FIT THEIR NEEDS.

GUIDELINES ON HOW TO USE THE ALGORITHMS

FIRST RESPONDERS ALGORITHM FOR RESPONDING TO AN INCIDENT INVOLVING A SUSPICIOUS NON-CLINICAL SAMPLE

1.0 INCIDENT INVOLVING A SUSPICIOUS NON-CLINICAL SAMPLE OCCURS

1.0.1 An incident here is defined as an event that initiates a call to public safety (e.g., 911) and activates first responders, such as hazardous materials (HAZMAT) personnel, local law enforcement and fire department personnel. Such incidents involve environmental samples, defined here as non-clinical samples (e.g., powders, liquids, mixtures, pastes and solids).

2.0 FIRST RESPONDERS PERFORM A RISK ASSESSMENT

2.0.1 Risk is defined as the probability of suffering a harm, trauma or peril. The risk assessment is defined here as an assessment that indicates the potential for suffering harm or peril. Factors that influence the level of risk include the nature of the hazardous material, amount of material, type of containment device and the level of available resources. The risk assessment is a fluid process that should be performed in coordination with local or federal law enforcement. **More detailed explanations are outlined in the American Society for Testing and Materials (ASTM) E2770-10, *Standard Guide for Operational Guidelines for Initial Response to a Suspected Biothreat Agent,* available at:** http://www.astm.org/Standards/E2770.htm.[i] Information for performing a risk assessment can be found in the National Fire Protection Agency (NFPA) Guidance 1600, Standard on Disaster/Emergency Management and Business Continuity Programs, available at: http://www.nfpa.org/assets/files/pdf/nfpa1600.pdf.[ii]

3.0 NO APPARENT RISK (CONTINUE TO BOX 4.0)

3.0.1 If the sample/situation is deemed to have no apparent risk, no testing is necessary and the algorithm ends. An example of a sample/situation with no apparent risk is an unknown powder found next to a box of powdered donuts in a kitchen area or a mailing from a company with a free sample of their new and improved detergent. Essentially, the potential sample (liquid, particulate matter, solid) is expected to be there and there is no articulated threat.

3.1 RISK LOW OR HIGH (CONTINUE TO BOX 4.1)

3.1.1 First responders determine there is a risk which may require the assistance of public health agencies. A sample/situation that has risk may be the presence of powder, particulate matter, or liquid with no obvious explanation, with or without an explicit threat or prior intelligence. Examples of risk may include a suspicious liquid found in a hallway of an office building or a powder found with a threat letter. Risk can be broken down into categories such as low or high, but for the purposes of this model and to simplify the equation, any risk (low or high) proceeds through the algorithm. An example of a risk assessment plan can be found in the ASTM Standard E2770-10.

4.0 NO TESTING NECESSARY

4.0.1 If a sample/situation is deemed to have no apparent risk, no laboratory testing is needed, the state or local public health LRN member laboratory is not involved and the appropriate first responder agency protocols should be followed to resolve the incident.

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4.1 THREAT ASSESSMENT

4.1.1 A critical aspect of characterizing the unknown non-clinical sample includes an evaluation of the threat, which provides an indication of potential violence, harm or danger, and may include an indication of intent and capability. The credibility of a threat is determined by evaluating all available information, including that derived from law enforcement interviews, intelligence information, hazard assessment results and communication with public health, including the state and local public health LRN member laboratory.

At the incident scene, the threat assessment is coordinated by the local FBI Field Office WMD Coordinator and on-scene personnel. The state and local public health LRN member laboratory may be asked to participate by phone during the FBI-led threat assessment so they are aware that public health testing and referral support may be needed. On-scene responders, public health representatives, local law enforcement and FBI representatives should work together to determine the threat level.

Following the initial threat assessment, factors such as technical feasibility, operational practicability and behavioral resolve combined with examination of pertinent intelligence will inform the credibility level of the threat.

If the initial threat assessment determines that there is a potential threat, the FBI will perform their credibility threat procedure, which is conducted by the local FBI WMD Coordinator with guidance from the FBI Headquarters. Based on the risk and threat assessments, it may be necessary for first responders to restrict access to the area for public safety pending confirmation from the state or local public health LRN member laboratory.[i]

5.0-5.2 NO APPARENT THREAT, POTENTIAL OR CREDIBLE THREAT

After performing the threat assessment, the incident is categorized as follows:

5.0 No Apparent Threat

The assessment determines that no threat exists and as such no testing is required. **Note: In some situations, further analysis may be requested due to ongoing public safety concerns and samples could continue through the algorithm. First responders on scene will proceed as directed by supervising officials.**

5.1 Potential Threat (low risk)

The assessment determines that a threat exists and there is no readily available information that explains the presence of the unidentified substance. In these situations, communication between the first responders on scene and the jurisdictional state or local public health LRN member laboratory determines if the sample should be sent to the laboratory.

5.2 Credible Threat (high risk)

The assessment determines that a threat exists and that it is credible. On-scene information leads law enforcement officials to have a reasonable belief that an event has occurred. All credible threats should immediately be sent to the jurisdictional state or local public health LRN member laboratory for confirmatory testing.

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6.0 NO TESTING

Since there is no apparent threat, no further testing is necessary. First responders on scene will proceed as directed by supervising officials.

6.1 FIELD SCREENING (EXPLOSIVES AND RADIATION AT A MINIMUM)

6.1.1 Field screening is defined as testing performed by first responders prior to the sample being taken to the appropriate state or local public health LRN member laboratory. **Such testing should include, at a minimum, radiation and explosives screening and other basic analyses that do not consume the sample.** To perform the field screen, the sample should be collected as stated in the ASTM Standard, **ASTM E2458-10, *Standard Practices for Bulk Sample Collection and Swab Collection of Visible Powders Suspected of Being Biological Agents from Nonporous Surfaces,*** see: http://www.astm.org/Standards/E2458.htm.[iii]

Guidance on performing field screening can be found in the FBI, Department of Homeland Security (DHS), Health and Human Services (HHS)/CDC Coordinated Document, Guidance on Initial Response to a Suspicious Letter/Container with a Potential Biological Threat, available at: http://www.bt.cdc.gov/planning/pdf/suspicious-package-biothreat.pdf.[iv]

The field screen should be performed by trained HAZMAT personnel and other trained first responder teams. Responder training guidance can be found in National Fire Protection Agency (NFPA) Guidance 472: Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents, available at: http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=472&cookie%5Ftest=1.[v]

The purpose of the field screen is to rule out explosive materials and devices, limited chemical agents, radiological substances and materials that may pose significant risks to transport personnel, state and local public health LRN member laboratories and laboratorians. **Field screening for biological threat agents should occur only with field assays that have been validated by the appropriate federal agencies. The use of non-validated field testing can generate inaccurate data, including false positive or negative results, which may mislead the response efforts and consume available sample necessary for further confirmatory testing.**[vi]

In some instances and at the Governor's discretion, the National Guard Bureau Weapons of Mass Destruction (WMD) Civil Support Teams (CSTs) will be deployed to an incident. During these events, the CSTs may be called upon to provide onsite safety screening characterization of potentially hazardous environmental samples. The CSTs are equipped with mobile laboratories, referred to as an Analytical Laboratory System (ALS), which is a standardized mobile laboratory system accessible in every state and territory of the United States. The ALS is designed to apply standardized analysis to screen potentially hazardous samples and prepare them for safe transport, by the appropriate law enforcement entity, to the appropriate LRN reference laboratory for confirmatory testing and definitive analysis. State and local public health laboratories are encouraged to develop relationships with their CSTs prior to an incident. More information on the capabilities of the CSTs is available in the document, The Role of Civil Support Teams in Support of the Laboratory Response Network.[vii]

6.1.2 Samples not properly screened are accepted at the lab director's discretion and

may be rejected for submission to the LRN reference laboratory. It is up to the individual state lab director to determine if they will accept incomplete screens.

7.0 FIELD SCREENING IS NEGATIVE

7.0.1 If the field screen is negative, complete proper decontamination, appropriately package and transport sample along with the proper Sample Submission and Chain-of-Custody Form to the appropriate state or local public health LRN member laboratory. See Appendix A for Chain-of-Custody Form or use forms which are consistent with law enforcement requirements. All samples transported to the laboratory should be triple sealed in leak-proof containers. Each container should be sprayed with 10% bleach solution to decontaminate it with a minimum of 20 minutes contact time for the outermost container. Further sample transport requirements and instructions can be found in ASTM 2770. **Note: Ensure you consult with your state or local public health LRN member laboratory. See Appendix B for acceptable sample requirements. It is at the state or local public health LRN member laboratory director's discretion to accept a sample that arrives without proper documentation or packaging according to national sampling standards such as ASTM 2458 Method A.**

7.1 FIELD SCREENING IS POSITIVE

7.1.1 If the field screening is positive for radiation or explosives, immediately consult with the state or local emergency response or public health LRN member laboratory to send the sample without delay to an appropriate testing agency capable of handling such a sample. **It is expected that both laboratory and first responders be familiar with US Department of Transportation Hazardous Materials Transportation Act and Hazardous Materials Safety Act as mentioned in the All Hazards Receipt Facility (AHRF) Screening Protocol, available at:** http://www.aphl.org/aphl-programs/phpr/ahr/Documents/AHRF_Screening_Protocol.pdf.

STATE AND LOCAL PUBLIC HEALTH LRN MEMBER LABORATORY TESTING ALGORITHM FOR PROCESSING A SUSPICIOUS UNKNOWN NON-CLINICAL SAMPLE

8.0 SAMPLE ARRIVES AT THE STATE OR LOCAL PUBLIC HEALTH LRN MEMBER LABORATORY

8.0.1 Prior to accepting the sample, the receiving laboratory must check the incoming sample to ensure that proper packaging occurred, that all accompanying documentation is included and correct, and that it comprises any field screening results to ensure that explosive, radiological and volatile organic compound (VOC) field screening was performed, at minimum.

8.0.2 Sample Preservation
Photos of the materials should be taken; minimize handling of evidence (e.g. envelopes), and store some of the original sample. The recommendation is to remove materials from the outside packaging, such

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as an envelope, and store the contents in the appropriate conditions according to your laboratory protocol. The outside packaging should be minimally handled and stored in the best possible conditions to preserve traditional forensic evidence. Secondary evidence such as growth plates can be destroyed after final testing conclusions have been made and adhering to the LRN-B Reference level protocols. The important material to save is the primary evidence, which is the original sample, so that further testing can occur if requested. **The general rule of thumb is to preserve the original sample until all legal matters have been resolved.**

9.0 PERFORM RECOMMENDED PRELIMINARY SCREENING AND SPLIT SAMPLE FOR BIOLOGICAL, RADIOLOGICAL AND CHEMICAL TESTING GROUPS FOR FUTURE TESTING

9.0.1 Preliminary Laboratory Screening: If sufficient sample is available, it is highly recommended, for the safety of the laboratorians, that state and local public health LRN member laboratories perform a preliminary laboratory screen to confirm field tests prior to further manipulation of the sample. Two trained laboratorians should perform a joint initial assessment of the sample in at least a Biosafety Level 3 (BSL-3) suite in a Class II biological safety cabinet or a BSL-2 suite with a Class III Biological Safety Cabinet (glove box) in a facility capable of filtering and protecting against chemical, radiological and biological agents. If LRN Biological and Chemical member laboratories are co-located and staff are cross-trained in basic practices, both a biologist and a chemist should work together to perform this screening process. If the laboratory has radiological capability, then a radiochemist should also be engaged in this preliminary screening process. **If the laboratory has an AHRF, then the AHRF and AHRF Screening Protocol[ix] should be used for this preliminary screen.**

The following is the minimal recommended testing that should be performed if appropriate instrumentation and supplies are available. **Note: Before preliminary testing is performed, laboratories must have protocols in place to triage potential positive samples.**

The following list is not comprehensive and any appropriate instrumentation should be used to test the sample.

EQUIPMENT/TEST	HAZARD CLASS/COMPOUNDS
Geiger Counter with a Geiger Mueller Probe (β/γ) and Pancake Probe (α) -Gamma radiation screening should be conducted on the exterior of the package. -Alpha/beta radiation screening should be conducted on the sample before it is split.	Radiation
Explosives Kit	Explosives and Oxidizers
E.L.I.T.E Tickets	Explosives
DropEx Plus Explosive Detection System	Explosives
M8, M9 Paper	Chemical Warfare Agents
Gas Meter	Volatile Organic Compounds/ Lower Explosive Limit
Oxidizer Test Kit/Strip	Oxidizers
Litmus Paper	pH, Corrosives, Water Reactivity
FTIR/Raman	Additional Chemical Classifications via Spectroscopy
Water Reactivity Test	Water reactive chemicals

If preliminary positive results are obtained from these screening assays, the state or local public health LRN member laboratory should follow existing protocols for subsequent testing or referral. If all screening assays performed are negative for both radiation and explosives, accession the sample into the LRN-B Reference laboratory for further testing. Take into consideration results for all tests to ensure proper PPE, air filters, fume hoods or other protection equipment is used.

9.1.1 **Prior to performing any laboratory analyses, the sample may be split to allow for biological, chemical and other testing.** To maintain chain-of-custody for a split sample, a laboratory should create a new chain-of-custody form and document on the new form the creation of an additional sample identification number on the original form. For example, if a powder comes into the laboratory (sample 1) and is immediately split for biological and chemical testing then the new samples would be 1.0 and 1.1. Each additional split must also be noted and given a unique identification. If the sample 1.1 is split again, the resulting samples would be identified as 1.1 and 1.2. This type of splitting identifies each sample individually and avoids the issue of disappearing identifiers such as splitting 1 into 1.1 and 1.2, where item 1 seems to disappear. As long as records are kept and a logical identification is used, chain-of-custody is maintained. Each time any portion of the sample changes hands or is transferred chain-of-custody must be completed and maintained.

For derivative or secondary evidence such as plates, slants and cultures, a similar system can be employed. The general rule of thumb still holds that as long as records are kept in a logical system and documented at each step, then chain-of-custody is maintained. Guidance from the FBI (see Appendix A for an example form) laboratory suggests that a separate chain-of-custody form should be started for derivative samples. An example of documentation is to note that 10 plates, such as 5 chocolate agar and 5 sheep blood agar, were created from sample 1 and were delivered by Person A and received by Person B at X time. Derivative or secondary evidence can often be properly decontaminated and destroyed after testing is complete (see Sample Preservation 8.0.2).

It is critical to maintain chain-of-custody on each sample. If chain-of-custody is not maintained, this may severely jeopardize law enforcement prosecution of suspected perpetrators. **Note: If chemical, biological, and radiological laboratory facilities are not co-located and biological testing is negative and the need exists for chemical testing or it is requested, the sample should be appropriately packaged and transported to a laboratory capable of such testing.**

Note: For credible threat samples submitted by the FBI, be sure to consult with the WMD Coordinator regarding the testing being requested. Per FBI policy, no chemical testing should be performed on credible threats by LRN laboratories.

- Minimum Sample Size Requirements for Biological Analysis:
  If there is bulk liquid or solid, save 1 milliliter of liquid or a swab of solid material. Acceptable sample types for biological testing include swab, wipe, liquid, powder, HEPA sock and filters. First responders should consult with their LRN-B Reference level laboratory to determine additional acceptable sample types.
- Minimum Sample Size Requirements for Chemical Analysis:
  Save 1-2 milliliters or 1-2 grams (pea-

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size) of remaining, unprocessed sample in a sealable glass container. First responders and state or local public health LRN-B Reference level laboratories should consult with the state or local public health (LRN-C) or state radiological laboratory to verify testing capability and sample size requirements.

10.0 SAMPLE IS SENT TO THE LRN-B REFERENCE LABORATORY AND TESTED FOR BIOLOGICAL THREAT AGENTS

10.0.1 Perform the LRN-B Reference level protocol for Environmental Sample Processing for Bioterrorism Agents Panel, PCR Screening and Ricin Toxin TRF Testing and begin culturing for microorganisms.

11.0 PRELIMINARY POSITIVE LABORATORY RESULT

11.0.1 Report preliminary positive results using LRN-B Reference level notification and data messaging policies as well as your laboratory-specific communication policies.

11.0.2 Consult with your laboratory director and biological, chemical and/or radiological terrorism coordinators terrorism coordinators to determine if there is a need for chemical or radiological threat agent analysis. If testing is determined necessary, the sample should be prepared for chemical testing using appropriate personal protective equipment (PPE) and biological safety hoods/rooms.

11.1 PRELIMINARY NEGATIVE LABORATORY RESULT

11.1.1 Report preliminary negative results using LRN-B Reference level notification and data messaging policies as well as your laboratory specific communication policies. Consult with the LRN-C laboratory to determine capability for chemical threat agent analysis.

12.0 AGENT SPECIFIC CONFIRMATORY TESTING

12.0.1 LRN-B Reference level laboratories will perform agent specific confirmatory testing per existing protocols.

13.0 REPORT CONFIRMATORY TESTING RESULTS

13.0.1 Report positive and negative results using LRN-B Reference level notification and data messaging policies as well as your laboratory specific communication policies.

- Sample Disposal

  Biological: Upon completion of all tests and depending on the needs of the requestor, sample may be returned to submitter, referred to another laboratory or destroyed using an autoclave. All sample disposal procedures should comply with federal guidance[xi] and the select agent regulation.[xii] Note: The original sample should be kept for evidence unless specified by an appropriate source.

14.0 SAMPLE SENT FOR CHEMISTRY ANALYSIS

Additional federal guidance is needed to determine what chemical analyses should be performed. APHL developed this algorithm to assist laboratories with analyzing these suspicious non-clinical samples for chemical threat agents.

Sample submitters should consult with the LRN-C laboratory to determine testing capabilities. Sample is sent to the LRN-C laboratory for analysis for chemical threat agents. Sample initially is classified according to general chemical class. If additional analysis

is needed to either confirm the identity of the material or classification, it is completed after the initial classification. Additional analyses may require referral to other laboratories. All results are reported using the appropriate laboratory and network reporting mechanisms. **Note: EPA has a program with National Homeland Security Research Center called Standardized Analytical Methods (SAM) for Environmental Restoration Following Homeland Security Events.[xiii] These analytical methods may be used to determine the chemical involved in the event or to confirm field screening results.**

15.0 GENERAL CHEMICAL COMPOUND CLASSIFICATION

This first level of testing provides a general chemical classification, such as acidic inorganic compound, volatile organic compound, carbonate salt, cyanide or fluoride compound, etc. Depending on the instrumentation and material in question, a specific chemical or class may be identified. If the capability exists, chemical identification should be performed.

15.1 Microscope / IR/ Raman.

Fourier-Transform Infrared (FTIR) techniques, either FTIR-Microscopy or FTIR coupled with Raman will allow library screening, which may provide compound specific or mixture specific classification. This technique is not effective on most metal/metalloid compounds and dilute and/or complex mixtures. Few LRN-C laboratories have this capability and instrumentation.

15.2 Solubility Tests. More traditional

wet chemistry techniques will provide general classification of materials (liquid or solid). Coupled with FTIR results, potential structure elucidation is possible. Most LRN-C laboratories have this capability, but may not have a standard written protocol or reagents available.

15.3 Colorimetric Tests.

Wet chemistry colorimetric techniques, such as a hazard classification test, can be used to determine chemical class and/or provide hazard recommendation. Most LRN-C laboratories have this capability, but may not have a standard written protocol or reagents available.

15.4 XRF (solids only).

X-ray fluorescence (XRF) is widely used for elemental analysis, particularly in the investigation of metals, glass, ceramics and building materials. Detector types vary, and can include gas flow proportional counters, sealed gas detectors, scintillation counters and semi-conductor detectors. Most LRN-C laboratories do not have this capability or instrumentation.

15.5 Other Techniques (NMR, GC/MS, etc.) – dependent on availability.

These techniques will be dependent on the availability of instrumentation, expertise and material available for testing. Many LRN-C laboratories do not have this capability or may not have a written protocol or reagents available.

16.0 DETERMINE IF FURTHER CLASSIFICATION OF THE MATERIAL IS NEEDED.

16.1 No further classification is needed

Consult with your laboratory director and FBI WMD Coordinator (if applicable) to determine how to report results. Note: A centralized mechanism, LIMS or other electronic

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data reporting capability, is still needed to report non-clinical chemical test results. Report results using LRN Notification and Data Messaging Policies if clinical specimens are tested.

16.2 Additional Classification is needed

Identify likely analytical targets based upon preliminary and first responder results. Select the appropriate methods available to the laboratory. Consult with your laboratory director and FBI WMD Coordinator (if applicable) to determine how to report results. **Note: A centralized mechanism, LIMS or other electronic data reporting capability, is still needed to report non-clinical chemical test results. Report results using LRN Notification and Data Messaging Policies if clinical specimens are tested. Determine if analysis can be completed within the selected laboratory or requires referral to another laboratory.**

17.0 PERFORM CHEMICAL CLASS OR AGENT SPECIFIC CONFIRMATORY TESTING USING SAM OR OTHER METHODS.

This is broken down into 10 general high priority categories of materials. See also Appendix C.

17.1 Explosives – (corresponds to US DOT Class 1 – Explosives).

This includes materials, such as Diazonium salts, Nitro compounds, Perchlorates, Peroxides, RDX, etc. Recommended instrumentation for this category is FTIR Spectroscopy, Ion Mobility Spectroscopy (IMS) and calorimetry. At present, most LRN-C laboratories do not have instrumentation.

17.2 Non-Volatile Organic Compounds – (this does NOT correspond to US DOT Class 2 – Gases)

This category includes materials such as pharmaceutical and environmental contaminates or toxins. Recommended instrumentation for this category includes Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS), Ultraviolet-Visible Spectroscopy (UV/Vis) or Fluorescence spectroscopy. At present, some LRN-C laboratories have LC/MS/MS; most laboratories do not have Fluorescence or UV/VIS spectroscopy.

17.3 VOCs/SVOCs – (corresponds to US DOT Class 3 – Flammable Liquids and Combustible Liquids).

This category includes volatile and semi-volatile materials. Recommended instrumentation for this category includes Gas Chromatograph-Mass Spectrometry (GC/MS), Solid Phase Micro Extraction (SPME)-GC/MS, and purge and trap GC/MS. At present, LRN-C laboratories have GC/MS instrumentation; however, not all laboratories have purge and trap GC/MS capability.

17.4 Metals and Element Compounds – (corresponds to US DOT Class 4 – Flammable Solids).

This category includes metals (Arsenic, lead, cadmium, mercury, chromium, other heavy metals, etc.) and elemental compounds (non-metals, transition elements, etc.). Recommended instrumentation for this category includes Inductively Coupled Plasma Mass Spectrometry (ICP/MS), Liquid Chromatography Inductively Coupled Plasma Mass Spectrometry (LC-ICP/MS), as well as older techniques such as graphite furnace atomic absorption (GFAA) spectroscopy. At present, LRN-C laboratories have ICP/MS instrumentation, but not all laboratories have LC-ICP/MS or GFAA capability.

17.5 Inorganic Compounds – (generally corresponds to US DOT Class 5 – Oxidizers and US DOT Class 9 – Miscellaneous).

This category includes ionic compounds (such as cyanides, sulfides, phosphates, etc.). The recommended instrumentation for this category includes Ion Chromatography (IC), Ion Chromatography Mass Spectrometry (IC-MS), FTIR and other techniques, such as XRF, Raman or MP. At present, most LRN-C laboratories do not have this instrumentation.

17.6 Toxic Gases – (corresponds to US DOT Class 6 – Toxic Substances, specifically Division 6.1 Toxic or Poisons).

This category includes toxic asphyxiant, explosive, acute or chronic effects, or gases, such as Ammonia, Chlorine, Carbon monoxide, Cyanogen chloride, Diazomethane, Fluorine, Hydrogen cyanide, Hydrogen sulfide, Methane, Ozone, Phosphine, Phosgene, Radon, etc. Recommended instrumentation varies for this category, but in general is calorimetric, GC/MS, GC-FID or GC-NPD. LRN-C laboratories have GC/MS capabilities; however, most do not have the appropriate autosampler, such as a SUMA canister or Tedlar bag introduction system.

17.7 Radiochemicals – (corresponds to US DOT Class 7 – Radioactive Materials).

This category includes a variety of radiochemicals, such as Polonium-210, Radon, Uranium, etc. Recommended instrumentation includes Gamma Spectroscopy, Alpha Spectroscopy and Liquid Scintillation Counting techniques. At present, few LRN-C laboratories have basic capabilities and limited capacity. The state Conference for Radiation Control Program Directors (CRCPD) group may have the capability or instrumentation necessary for this testing.

17.8 Acid/Bases – (corresponds to US DOT Class 8 – Corrosives).

This category includes corrosive materials, such as acids (either single or mixed) and bases (either single or mixed) and can be either organic or inorganic corrosive materials. Recommended instrumentation includes FTIR and wet chemical techniques (such as pH, indicators, titrations, etc.). At present, most LRN-C laboratories do not have FTIR capabilities or instrumentation.

17.9 Pesticides – (does not correspond to US DOT Class 9 – Miscellaneous).

This category includes pesticides, herbicides, fungicides, insecticides, etc., such as Carbamates, Organo-phosphates, haloacetic acids, etc. Recommended instrumentation varies, but primarily includes GC, GC/MS and LC/MS/MS. At present, LRN-C laboratories have GC/MS capabilities, but not all laboratories have GC and LC/MS/MS capabilities.

17.10 Chemical Warfare Agents – (this is a separate category and does not directly correspond to any US DOT Hazard Class).

This category is broad and includes known and suspected Chemical Warfare Agents, such as Vesicants, Mustards, Blister Agents, Organophosphate Nerve Agents, cholinesterase inhibitors, choking agents, etc. Recommended instrumentation includes GC/MS and LC/MS/MS. At present, LRN-C laboratories have GC/MS capabilities, but not all laboratories have GC and LC/MS/MS capabilities.

GUIDELINES ON HOW TO USE THE ALGORITHMS

18.0 REPORT RESULTS.

All results (positive or negative) should be reported to the appropriate network and/or organizations utilizing your laboratory specific communication policies. At present, LRN-C does not have a reporting mechanism for non-clinical samples. All results should be reported up the proper chain of command and to the local WMD Coordinator and local law enforcement as deemed necessary. The Environmental Response Laboratory Network (ERLN) is still expanding laboratory participation and developing the Electronic Data Deliverable (EDD) for reporting. ERLN requires a Basic Ordering Agreement (BOA) to be in place prior to utilization of the laboratory and/or method.

Sample Disposal

Chemical: Upon completion of tests, follow Material Safety Data Sheet (MSDS) guidelines and consult safety officer for guidance to dispose of remaining sample.

Radiological: Consult the Integrated Consortium of Laboratory Networks (ICLN) Laboratory Logistics Limiting Issues Report for potential solutions to waste disposition.

Training Requirements

To ensure consistent implementation of this guidance, it is strongly recommended that the following training courses be conducted on an annual basis or more frequently as needed by the local jurisdiction:

1. First Responder Outreach and Cross-Training in Laboratory and Field Environments. It is important to develop and implement national training and competency assessment programs (e.g., proficiency testing, certification) for first responders involved in responding to all-hazard threats. **Cross-training should include ASTM Standards E2770-10 and ASTM E2458-10.**

2. Preliminary Laboratory Screening – chemists and other laboratorians may not be familiar with the stringent requirements for working in a BSL-3 or Class III BSC. As such, joint training for biologists and chemists is essential to ensure employee safety and adherence to laboratory protocols. **Laboratories are encouraged to cross-train on the All-Hazards Receipt Facility Protocol.** Currently, training is offered through the Wadsworth Center in Albany, New York, http://www.wadsworth.org/testing/biodefense/training.html.

3. Class III Biological Safety Cabinet Training – many laboratorians do not work in a Class III BSC on a routine basis. Annual training on the Class III BSC is vital to ensure proper use of this equipment.

4. Radiation detection equipment training – many laboratories may not be trained on the proper equipment and procedures for testing samples for radiation. Annual training and refresher courses should be conducted for this function.

APPENDIX A CHAIN-OF-CUSTODY GUIDANCE

I. GENERAL: GUIDANCE FOR PROPER USE OF CHAIN-OF-CUSTODY FORM

A. The custodian is responsible to maintain and collect additional chain-of-custody documentation generated at the laboratory.

B. The laboratory will maintain originals (copies if necessary) of all chain-of-custody documentation and provide originals to law enforcement officials upon transfer of evidence. Copies should be maintained by the laboratory for its records.

C. In the event that custodianship of the evidence is split, due to sampling of a specimen or the transfer of one or more items, the chain-of-custody forms must be initiated, maintained and transferred with that portion of evidence; the custodians receiving and releasing the sample or item will keep a copy of the Receipt of Property form.

D. The chain-of-custody documentation should be considered confidential/classified information; it should be maintained in a secure location.

II. RECEIPT OF PROPERTY FORM:

A. This form must be completed, signed, providing date and time, upon the receipt of evidence. Both the laboratory and the law enforcement official will retain a copy of the completed form.

B. This form must be completed, signed and dated upon the release of evidence to a law enforcement official. Both the labo ratory and the law enforcement official will retain a copy of the completed form.

C. Description information should include the following information for each and every item:

1. Unique identifier for each item
2. Number/quantity
3. Type/description

D. If multiple items are received, all items must be listed on the form or attached. Each item should be assigned a unique identifier (e.g., number). The original identifier should be maintained on the chain-of-custody records for any sample/portion of that item.

E. The name of the carrier/courier and the shipping/reference number should be recorded if item(s) are delivered by a carrier/courier.

F. Additional information may be attached as appropriate (e.g., original source/submitter, collected by, emergency contacts, situational information).

APPENDIX A
CHAIN-OF-CUSTODY GUIDANCE

III. CHAIN-OF-CUSTODY FORM:

This form must be signed and dated when transferring custody within the laboratory, from the initial receipt of the evidence, through the processing, storage, and release of the evidence to a law enforcement official.

RECEIPT FOR PROPERTY RECEIVED/RETURNED

Case ID:_____

Collection/Sampling Date: _____ Time: _____

Collected/Sample Taken By: _____

Organization: _____

Address: _____

_____

City, State:_____

Phone:_____

Description of Sample/Evidence: _____

_____

_____

_____

This Chain-of-Custody form remains with the sample/evidence at all times. By signing this form, all parties verify the sample/evidence is attended at all times.

Received from: _____

(sign/date/time)

Received by: _____ _

(sign/date/time)

APPENDIX A
CHAIN-OF-CUSTODY GUIDANCE

CHAIN-OF-CUSTODY FORM

Case ID #:_____

Date: _____ Time: _____

Transfer From (print/sign): _____

Transferred To (print/sign): _____

Security Method while held: _____

Date: _____ Time: _____

Transfer From (print/sign): _____

Transferred To (print/sign): _____

Security Method while held: _____

Date: _____ Time: _____

Transfer From (print/sign): _____

Transferred To (print/sign): _____

Security Method while held: _____

Date: _____ Time: _____

Transfer From (print/sign): _____

Transferred To (print/sign): _____

Security Method while held: _____

Date: _____ Time: _____

Transfer From (print/sign): _____

Transferred To (print/sign): _____

Security Method while held: _____

Additional Comments or Instructions: _____

APPENDIX B
DESCRIPTION OF THE LABORATORY RESPONSE NETWORK (LRN)

(LRN) FOR BIOLOGICAL (LRN-B) AND CHEMICAL (LRN-C) TERRORISM PREPAREDNESS

The Laboratory Response Network (LRN), the nation's premier laboratory system for identifying, testing and characterizing potential agents of biological and chemical terrorism, was founded in 1999 by the Centers for Disease Control and Prevention (CDC), the Association of Public Health Laboratories (APHL) and the Federal Bureau of Investigation (FBI). This integrated network of laboratories is a unique asset in responding to all-hazard threats, providing immediate and sustained laboratory testing and communication to respond quickly to acts of chemical or biological terrorism, emerging infectious diseases and other public health threats and emergencies.

LRN FOR BIOLOGICAL TERRORISM PREPAREDNESS (LRN-B)

The LRN-B is comprised of National, Reference and Sentinel laboratories forming a tiered network (see Fig. 1). At the foundation are thousands of sentinel clinical laboratories, which perform initial screening for potential pathogens. When sentinel clinical laboratories cannot rule out the presence of a biological terrorism agent, they refer specimens and isolates to an LRN-B Reference laboratory. The Reference laboratories, made up of over 170 state and local public health, military, international, veterinary, agriculture, food and water testing laboratories, are responsible for performing complex analyses and providing support to law enforcement for threat investigations. In the years since its inception, the LRN-B has played an instrumental role in improving public health infrastructure (e.g., staffing, laboratory equipment) by helping to boost laboratory capability and capacity, and by responding to real threats in a timely and efficient manner. At the apex of the pyramid are national laboratories, such as those at the CDC and the Department of Defense. These laboratories test and characterize samples that pose challenges beyond the capabilities of Reference laboratories, and provide support for other LRN members during a serious outbreak or terrorist event.

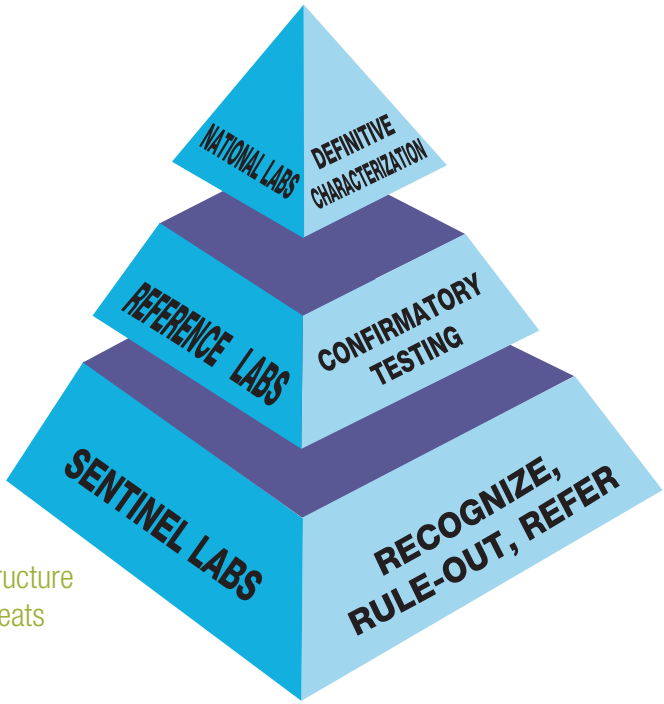

Figure 1: LRN Structure for Biological Threats Preparedness

APPENDIX B DESCRIPTION OF THE LABORATORY RESPONSE NETWORK (LRN)

THE LABORATORY RESPONSE NETWORK FOR CHEMICAL TERRORISM PREPAREDNESS (LRN-C)

The LRN-C was established in 1999, and comprised CDC and four public health laboratories (New York State Department of Health, Wadsworth Center; CA State Public Health Laboratory; VA Division of Consolidated Laboratory Services and Michigan Public Health Laboratory). In 2000, New Mexico Department of Health, Scientific Laboratory Division joined the network. These laboratories use methods that are based on mass spectrometry and are quantitative, detecting the actual chemical agent, or more common, a metabolite of the agent, in urine or blood.

Today there are 55 LRN-C members (CDC and 54 public health laboratories). All labs are qualified to package and ship clinical samples. Thirty-five laboratories have the capability to test for exposure to nine different threat agents. Ten laboratories have expanded capability to test for exposure to an additional four threat agents, and have expanded capacity to provide 24/7 analytical analyses in the case of a large scale event. (See Fig. 2).

LEVEL 3 LABORATORIES

Although every network member participates in Level 3 activities, only nine laboratories are designated as Level 3 laboratories. These seven laboratories work with hospitals and other first responders within their jurisdiction to maintain competency in clinical specimen collection, storage and shipment.

LEVEL 2 LABORATORIES

Thirty-five laboratories are designated as Level 2 laboratories within the LRN. These laboratories can detect exposure to a limited number of toxic chemicals—such as cyanide or toxic metals—in human specimens, such as blood or urine.

LEVEL 1 LABORATORIES

Ten laboratories in the nation are Level 1 laboratories. These laboratories can detect an expanded number of chemical agents in human specimens, including all Level 2 laboratory analyses plus analysis for mustard agents, nerve agents and other toxicants that could be used in chemical warfare. These laboratories are intended to provide the CDC with much needed surge capacity during a large scale event.

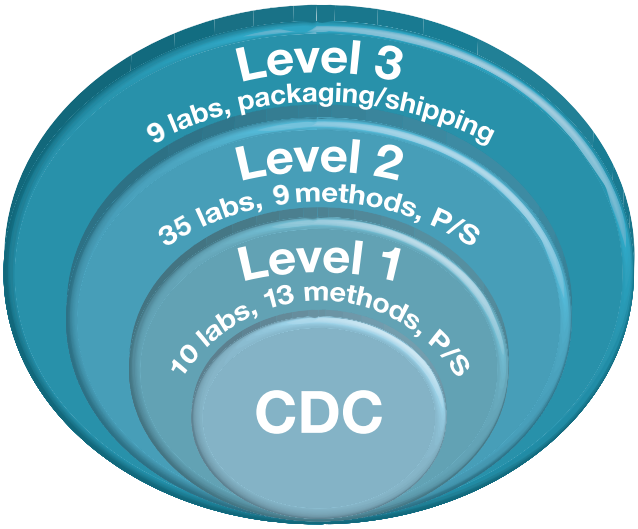

Figure 2: LRN Structure for Chemical Terrorism Preparedness

APPENDIX C
HIGH PRIORITY CHEMICALS FOR CHEMICAL THREAT ASSESMENT

CHEMICALS AS A GROUP:

- Acids (single or mixed)
- Bases
- Metals
- Inorganic ions/anions
- Semivolatile Organic Compounds (SOCs)
- Volatile Organic Compounds (VOCs)
- Explosives
- Radiochemicals (Alpha, beta and gamma radiation)
- Gases

CHEMICALS BY ELEMENTS/ COMPOUNDS/TYPES:

Chemical warfare agents

- Tabun
- Sarin
- Soman
- Vescicant agents
- Sulfur mustard
- Nitrogen mustard
- Lewisite

Radiochemical agents

- Polonium-210
- Cesium
- Strontium
- Uranium
- Other radiochemicals

CHEMICALS BY ELEMENTS/ COMPOUNDS/TYPES:

Metals

- Arsenic
- Lead
- Thallium
- Cadmium
- Mercury
- Chromium
- Other metals

Inorganic Anions

- Cyanide
- Sulfide
- Chloropicrin
- Pyridine

Insecticides

- Organo-phosphates
- Carbamates

Gases

- Ammonia
- Chlorine
- Carbon monoxide
- Cyanogen chloride
- Diazomethane
- Fluorine
- Hydrogen cyanide
- Hydrogen sulfide
- Methane
- Ozone
- Phosphine
- Phosgene
- Radon

Explosives

- Diazonium salts
- Nitro compounds
- Perchlorates
- Peroxides
- RDX

WEB RESOURCES:

High Toxicity Chemicals: http://msds.chem.ox.ac.uk/hightoxicity.html

CDC ToxFAQs : http://www.atsdr.cdc.gov/toxfaqs/index.asp#bookmark01

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APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES