# Developing and Pilot Testing a Laboratory Specific Continuity of Operations Tabletop Exercise



APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES

RAND HEALTH

**Authors:**
Stuart S. Olmstead, Shoshana R. Shelton, Christopher Nelson, Jeffrey Garnett

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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# EXECUTIVE SUMMARY

To ensure continuation of essential activities and minimize interruption of operations, public health laboratories must have in place an effective Continuity of Operations Plan (COOP). Public health laboratories are in various stages of development of their COOP and not all have tested their COOP either in an exercise or real incident. To help encourage testing, APHL asked RAND to develop a tool that public health laboratories could use to assess and improve their COOP.

## Overview of the Assessment Tool

The assessment tool is a tabletop exercise that provides participants with an opportunity to evaluate their current COOP in a response to a severe weather-related incident. The exercise is designed to be customizable, allowing users to adapt the scenario to threats to which the laboratory is most vulnerable.

Exercise participants may vary, but at a minimum should include the laboratory director, staff with leadership positions in the incident command system (ICS) structure, key leaders within the various divisions of the laboratory, a staff member with strong knowledge of information technology systems/structure, and a facilities manager.

## Development of the Assessment Tool

RAND reviewed documents, plans, and policies related to public health laboratory COOPs, and identified six components for the exercise to focus on: Incident Assessment, Activation of the COOP, Notification of Key Personnel, Identification of Essential Functions, Identification of Alternative Laboratory Facilities, and Reconstitution to Normal Operations. RAND generated a prototype of the exercise, and shared it with staff subject matter experts from APHL and its Emergency Management Subcommittee. Based on feedback received, RAND refined the exercise objectives, scenario, and discussion questions. The exercise was pilot tested in six sites, representing public health laboratories of various sizes, type (i.e., state, county), geographic location, and state governance structure (i.e., centralized, decentralized, mixed).

## Lessons Learned

The six pilot exercises were well received by laboratory staff and management. Below is a summary of the key lessons learned from the pilot test:

- All six pilot test sites demonstrated an understanding of the pre-event planning that takes place prior to an incident.
- While all of the pilot sites indicated they maintain a generator for back-up power, few have load tested it to determine its capacity under peak conditions.
- Some laboratories described more formalized roles and responsibilities for conducting the assessment including inspecting the exterior and interior of the building for damage and checking equipment and instruments, while others had not assigned responsibility for assessment or identified specific assessment activities.
- In some laboratories, if the power is out the electronic locks may not open, and staff will have to rely on physical keys to access the building.
- Triggers and protocols for activating the COOP varied across pilot sites. While some laboratories had pre-defined a progression of COOP activation levels, others indicated that sentinel events would trigger automatic COOP activation.
- All of the pilot site laboratories reported having staff call-down lists, though only some included the lists in the actual plan.
- Laboratories use multiple modes of communication for notifying personnel (e.g., email, work issued cell phone, home phone, toll-free number/call line, outgoing message on answering machine), but the amount of redundancy varies.
- Laboratories used different methods for identifying essential activities. Some laboratories delineate the level of priority for each laboratory test within their COOP. Other laboratories reported that the essential activities would depend on the circumstances.
- The laboratories that conducted newborn screening tests all identified it as an activity that should not be delayed significantly. Each of these laboratories has a formal agreement with another newborn screening laboratory to handle their tests during an emergency.
- All of the laboratories recognized that support functions such as facilities and information technology might be necessary to ensure completion of laboratory activities.
- Although most laboratories do not have formal Memorandums Of Understanding with other laboratories to perform essential testing, each laboratory was able to identify some other facilities that would likely be able to relieve the testing burden for the public health laboratory.

- Most laboratories reported cross training staff so that they are able to work across areas in the laboratory in emergencies, although the extent of this varied greatly between laboratories, and even within laboratories between divisions.

**Next Steps**

Based on the pilot tests, RAND recommends that APHL consider the following next steps for the COOP exercise:

- Test the exercise on a larger set of laboratories.
- Expand facilitation options.
- Clarify the need for participation by facilities staff.
- Emphasize the need for open discussion.
- Encourage laboratories to conduct an operational exercise.
- Hold discussion-based exercises for non-senior staff.

## ACKNOWLEDGMENTS

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We also acknowledge the insights and assistance of Edward Chan in developing the scenario, guidance of Jeanne Ringel, and expert editing and administrative support of Sarah Hauer. Finally, we thank Maureen Sullivan and Jeffrey Wasserman for their in-depth reviews of the report. We alone, however, bear responsibility for the content of the report and the exercise.

## LIST OF ACRONYMS

| Acronym | Definition |
|---|---|
| APHL | Association of Public Health Laboratories |
| CDC | Centers for Disease Control and Prevention |
| COOP | Continuity of Operations Plan |
| CST | Civil Support Team |
| EMAC | Emergency Management Assistance Compact |
| EOC | Emergency Operations Center |
| FCC | Federal Communications Commission |
| FEMA | Federal Emergency Management Agency |
| HSEEP | Homeland Security Exercise and Evaluation Program |
| ICS | Incident Command System |
| LIMS | Laboratory Information Management System |
| LRN | Laboratory Response Network |
| MOU | Memorandum of Understanding |
| PHEP | Public Health Emergency Preparedness |
| SME | Subject Matter Expert |
| SOP | Standard Operating Procedure |
| VPN | Virtual Private Network |
| WHO | World Health Organization |

# CHAPTER 1. INTRODUCTION

In the event of an emergency that disrupts normal operations, public health laboratories must be able to continue their core population-based activities, as well as respond quickly and effectively to the threat. Regardless of whether the threat is natural or man-made, many public health laboratory functions are essential to the response. For example, newborn screening is vital to ensuring the health of infants at all times. During flooding disasters, water testing becomes especially important to ensure water is free of contaminants and safe to drink. In a terrorism incident, testing is necessary for identifying and verifying bioterrorism or chemical terrorism agents and toxins. During a pandemic influenza incident, laboratories may have to function with fewer personnel.

To ensure continuation of essential activities and minimize interruption of operations, public health laboratories must have in place an effective Continuity of Operations Plan (COOP). According to the Association of Public Health Laboratories (APHL) Guidelines, "having an effective COOP in place ensures that the laboratory's core activities can be resumed within an acceptable period of time following such an incident. It allows the laboratory to shift efficiently from its normal structure and organization to a structure and organization that facilitates rapid recovery and continuation of services."[1] In addition, the most recent Public Health Emergency Preparedness (PHEP) cooperative agreement guidance from the Centers for Disease Control and Prevention (CDC-RFA-TP11-1101) lists "managing and sustaining a public health response" as a priority function, including ensuring the continued performance of pre-identified essential functions during an incident that renders the primary location where the functions are performed inoperable. These locations include laboratories. According to the CDC PHEP cooperative agreement, the COOP should address:

- "Definitions and identification of essential services needed to sustain agency mission and operations
- Plans to sustain essential services regardless of the nature of the incident (e.g., all-hazards planning)
- Scalable workforce reduction
- Limited access to facilities (e.g., social distancing and staffing or security concerns)

[1] Association of Public Health Laboratories, Guidelines for the Public Health Laboratory Continuity of Operations Plan (COOP) (accessed online 02/17/11 at www.aphl.org/aphlprograms/phpr/Documents/PHL_COOP_Guidelines.pdf).

- Broad-based implementation of social distancing policies if indicated
- Positions, skills, and personnel needed to continue essential services and functions (Human Capital Management)
- Identification of agency vital records (e.g., legal documents, payroll, and staff assignments) that support essential functions and/or that must be preserved in an incident
- Alternate worksites
- Devolution of uninterruptible services for scaled-down operations
- Reconstitution of uninterruptible services"[2]

Furthermore, CDC's *Public Health Preparedness Capabilities: National Standards for State and Local Planning* explicitly mentions continuity of operations plan as a resource element for Capability 12: Public Health Laboratory Testing. Per the guidance: "Written plans should include processes and protocols for continuity of operations (e.g., Continuity of Operations Plan or Annex) for chemical laboratory, radiological laboratory, biological laboratory and select agents consistent with federal guidelines, which are updated on an annual basis. Continuity of Operations should include not only the ability to conduct testing on unknown and unusual agents but also routine testing such as the assurance of newborn screening. Plans should address, but are not limited to the following elements:

- Laboratory maintenance of redundant utilities supplies for testing and support areas for short-term duration (i.e., 72 hours) in case of localized infrastructure failure
- Formal or informal agreements in place with other agencies to take over critical testing
- Staff illness
- Equipment failure"[3]

Public health laboratories are in various stages of development of their COOP and not all have tested their COOP either in an exercise or real incident. Some laboratories have their own laboratory-specific COOP, while others are part of a larger agency COOP. To help encourage testing, APHL asked RAND to develop a tool that public health laboratories could use to assess and improve their COOP. APHL asked that the tool be:

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[2] CDC 2011 PHEP Cooperative Agreement Guidance **(**accessed on 6/27/11 at http://www.cdc.gov/phpr/coopagreement.htm)

[3] Centers for Disease Control and Prevention, *Public Health Preparedness Capabilities: National Standards for State and Local Planning*, 2011 (accessed on 1/26/12 at http://www.cdc.gov/phpr/capabilities/index.htm)

- Workable in laboratories with varying degrees of prior experience with COOP planning and testing (e.g., for laboratories with a well developed COOP, the tool will help identify gaps, for laboratories without a COOP, the tool will aid in the development)
- Applicable across the nation regardless of laboratory size or geographic location,
- Usable without much external assistance, and
- Homeland Security Exercise and Evaluation Program (HSEEP) compliant.

Working in partnership with APHL, and utilizing other assessment and improvement tools developed by RAND, we developed and pilot tested a COOP tabletop exercise. This report describes how we developed the tabletop exercise (Chapter 2) and provides a brief description of the exercise tool (Chapter 3). We summarize lessons learned from the pilot testing in Chapter 4. The actual exercise materials are in Appendices: template briefing slides to lead the exercise (Appendix A); situation manual template (Appendix B); participant feedback form (Appendix C).

# CHAPTER 2. DEVELOPING THE ASSESSMENT TOOL

To develop the tabletop exercise, we drew upon past RAND projects that developed assessment and improvement tools[4] and followed the exercise design process suggested by HSEEP.[5] We also reviewed FEMA's guidance on COOPs.[6]

The exercise development process included the following steps:

## Defining the Need

The first steps in designing an exercise include defining the needs that the exercise will address. Public health laboratories are in various stages of development of COOP. All 51 (100%) State Public Health Laboratories (SPHL) have some type of COOP and the number of SPHLs with a laboratory-specific COOP increased from 27 states (54%) in Fiscal Year 2008 (FY08) to 30 states (60%) in FY09. In FY09, 30 SPHLs (59%) tested their COOP to ensure it was operational. However, the combination of workforce shortages and the reduced funding climate has contributed to a decline in the number of laboratory exercises developed and implemented over the past couple of years.[7] Many public health laboratories require additional support or technical assistance in testing their COOP. Therefore, APHL asked RAND to develop a tool to guide public health laboratories in assessing and improving their COOP.

## Defining the Scope

Next, we reviewed documents, plans, and policies related to public health laboratory COOPs

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[4] Shoshana R. Shelton, Edward W. Chan, Christopher Nelson, David J. Dausey, Debra Lotstein, John A. Zambrano, Andrew M. Parker, and David M. Adamson, *A Workshop Template to Assess and Improve SNS Planning*, WR-639-DHHS, 2008; Christopher Nelson, Edward W. Chan, Carol E. Fan, Debra Lotstein, Leah B. Caldarone, Shoshana R. Shelton, Amy L. Maletic, Andrew M. Parker, Alexandria Felton, Amanda Pomeroy, and Elizabeth M. Sloss, *New Tools for Assessing State and Local Capabilities for Countermeasure Delivery*, TR-665-DHHS, 2009; Andrew M. Parker, Christopher Nelson, Shoshana R. Shelton, David Dausey, Matthew W. Lewis, Amanda Pomeroy, and Kristen J. Leuschner, *Measuring Crisis Decision Making for Public Health Emergencies*, Santa Monica, Calf.: RAND Corporation, TR-712-DHHS, 2009; Andrew M. Parker, Shoshana R. Shelton, Paul Dreyer, Christopher Nelson, Edward W. Chan, Amy L. Maletic, and Matthew W. Lewis, *Decision-Making Modules for the RSS-POD Supply Management Game: A Game-Based Assessment of Crisis Decision Making During Inventory Management and Distribution of Medical Countermeasures*, Santa Monica, Calf.: RAND Corporation, WR—692-DHHS, 2009.

[5] U.S. Department of Homeland Security, *The Homeland Security Exercise and Evaluation Program (HSEEP)*, updated. As of August 1, 2011: https://hseep.dhs.gov/pages/1001_HSEEP7.aspx

[6] Continuity of Operations Division (accessed on 6/29/11 at http://www.fema.gov/about/org/ncp/coop/index.shtm)

[7] Association of Public Health Laboratories, *Response by the Numbers: The Nation's Public Health Laboratories Protect the Country*, 2011 APHL All-Hazards Laboratory Preparedness Report, 2011. As of August 1, 2011: http://www.aphl.org/AboutAPHL/publications/Pages/default.aspx

in order to define the scope of the exercise. Our review included: the APHL COOP Planning Guidance and four state or county COOPs. Based on our review and the guidance laid out by APHL, we identified the following COOP components on which to focus the exercise:

- Incident Assessment
- Activation of the COOP
- Notification of Key Personnel
- Identification of Essential Functions
- Identification of Alternative Laboratory Facilities
- Reconstitution to Normal Operations

The scenario for each exercise included a combination of weather-related threats (e.g., hurricanes, tornados, snowstorms, and floods). We chose a weather-based scenario because weather-related threats are common and if severe enough, involve activation of the COOP at some level. However, a limitation of a weather-related scenario is that it does not specifically test LRN capabilities, such as identification and verification of bioterrorism or chemical terrorism agents and toxins.

**Developing and Refining a Prototype**

We generated a prototype of the exercise, which was reviewed by staff subject matter experts from APHL and its Emergency Management Subcommittee. Based on feedback received, we refined the exercise objectives, scenario, and discussion questions. The objectives provide the framework for the scenario and discussion questions. The scenario and discussion questions provide the storyline that drives exercise participants towards discussing, testing and improving their COOP.

**Pilot Testing**

APHL coordinated with RAND to recruit six sites to pilot test the exercise. Sites were selected to represent public health laboratories of various sizes, type (i.e., state, county), geographic location, and state governance structure (i.e., centralized, decentralized, mixed). Prior to each exercise, APHL and RAND held a call with the laboratory director from each site to discuss logistics involved with conducting the exercise and customize the scenario to best fit the needs of the particular laboratory.

Two RAND staff facilitated the exercise and hot wash at each site, and took notes on the discussions. APHL staff also attended and observed the exercises. Facilitators solicited feedback

on the tool itself, which was incorporated into the final version. Following the exercises, RAND provided each site with a summary of the COOP strengths and gaps they identified.

# CHAPTER 3. OVERVIEW OF THE ASSESSMENT TOOL

The assessment tool is a discussion-based exercise, specifically a tabletop exercise. The purpose of the exercise is to provide participants with an opportunity to evaluate their current COOP in a response to a severe weather-related incident. The exercise focuses on assessing and improving established policies and procedures to assure continuous performance of critical laboratory testing and support activities following the occurrence of a disruptive event. It is not intended to be an operational test requiring actual reaction to simulated events and mobilization of resources. The tabletop exercise is designed to be led by a facilitator, utilizing a set of briefing slides (Appendix A) that lay out a scenario that prompts participants to discuss COOP activation and implementation up to and including major physical damage to the laboratory facility.

Exercise participants may vary, but at a minimum should include the laboratory director, staff with leadership positions in the incident command system (ICS) structure, key leaders within the various divisions of the laboratory (e.g., microbiology, molecular biology, newborn screening, Laboratory Response Network (LRN) Biological Terrorism (BT) and Chemical Terrorism (CT) Coordinator, chemistry/environmental, biosafety, etc.), a staff member with strong knowledge of information technology systems/structure, and a facilities manager or staff member with equivalent knowledge of the facilities.

The initial slides of the exercise presentation describe the exercise structure, objectives, and guidelines for discussion. The guidelines reinforce that the tabletop exercise is intended to provide a low-stress environment for identifying, discussing, and developing action plans for addressing gaps in the COOP. The objectives of the exercise are:

- Test the laboratory's ability to conduct
    - Incident assessment,
    - Activation of the COOP,
    - Notification of key personnel,
    - Identification of essential laboratory activities,
    - Identification of alternative laboratories, and
    - Reconstitution to normal operations.
- Evaluate the adequacy of the laboratory COOP, identify gaps, and suggest improvements.

The exercise contains three situation reports. Following each situation report, a series of discussion questions cover the six COOP components identified in Chapter 2. Immediately following the exercise, a hot wash/debrief and an assessment of the exercise generates feedback

and discussion. In addition, there is a situation manual that covers much of the information in the slides that can be used as a handout and for note taking by the participants (Appendix B).

The scenario focuses on a weather-related incident, either a hurricane or blizzard coupled with secondary event(s) (e.g., tornado, ice storm, flooding). The exercise is designed to be customizable, allowing users to adapt the scenario to threats to which the laboratory is most vulnerable. The first situation report provides laboratories the opportunity to discuss pre-event planning. It previews the storm, approximately 48 hours prior to arrival. The discussion questions lead participants to review potential impacts on the laboratory and identify actions and decisions that need to be made. Each discussion section includes high-level questions soliciting participant response, and specific prompts for the facilitator to utilize for encouraging discussion. The second situation report covers the time period immediately after the storm hits and describes how the laboratory has been impacted by a loss of electricity, flooding, and unavailable personnel. The discussion questions following cover activation of the COOP, notification of key personnel, and identification of essential activities and alternative laboratory facilities. Finally, the third situation report challenges the laboratory with a secondary event that severely damages the physical structure of the building. Discussion questions lead participants to consider alternative laboratory facilities and reconstitution activities.

Finally, the exercise concludes with a hot wash and an assessment of the exercise design and conduct (see Appendix C for the Participant Feedback Form). The hot wash aims to identify the strengths and gaps of the current COOP, lessons learned from the exercise, and action steps to improve the COOP. Information gathered through the hot wash and Participant Feedback Forms may be useful for putting together a formal After Action Report (AAR) and Improvement Plan (IP). For further guidance on putting together an AAR and IP, and an AAR / IP template, see HSEEP. The second page of the Participant Feedback form serves as a feedback tool for the facilitators.

Conduct of the exercises in the pilot test varied in length, lasting from 2.5 to 4 hours, but generally took approximately 3 hours to complete.

# CHAPTER 4. LESSONS LEARNED AND NEXT STEPS

The six pilot tabletop exercises were well received by laboratory staff and management, and seemed to be a success based on the oral and written feedback offered to RAND. The six pilot sites had varying experience with COOP planning and testing, but all had a documented COOP. Some had a stand-alone COOP, while others' COOP was embedded in broader agency plans. All of the laboratories were familiar with their COOP and able to complete the exercise without major problems. Feedback obtained in the Participant Feedback Forms indicated that the pilot sites found the exercise to be well structured and organized, and useful for assessing COOP and identifying gaps.

## Key Findings

Below is a summary of the key findings across pilot sites for each COOP component.

### *Incident Assessment*

Overall, all six pilot test sites demonstrated an understanding of the pre-event planning that takes place prior to an incident including:

- Wrapping up unfinished testing
- Ensuring call-down lists are up-to-date and complete
- Calling surrounding suppliers to find out if they are planning to send specimens
- Calling couriers to see if they have specimens already in route
- Checking generators to ensure proper functioning
- Pre-arranging methods for fuel re-supply
- Shutting down equipment when possible
- Moving equipment away from windows (in the case of a weather-related incident)

While all of the pilot sites indicated they maintain a generator for back-up power, few have load tested it to determine its capacity under peak conditions. Some systems and equipment (e.g., HVAC systems) consume more power than others, and thus burn through fuel more quickly. In order to conserve fuel, especially in a potentially resource-limited situation, laboratories may need to prioritize which systems and equipment to use while running the generator. One laboratory has a natural gas powered generator that does not need to be refueled because it is connected to the public utility natural gas line.

Following an incident, the pilot sites indicated that they would conduct a damage assessment. Some laboratories described more formalized roles and responsibilities for conducting the assessment including inspecting the exterior and interior of the building for damage and checking equipment and instruments, while others had not assigned responsibility for assessment or identified specific assessment activities. In some cases, the laboratory management discussed the role of the city/county/state public works department in evaluating the facility after an incident.

One issue that was identified in some of the exercises during discussions about incident assessment was access to the building during a situation involving a major power outage. In some laboratories, if the power is out the electronic locks may not open, and staff will have to rely on physical keys to access the building. However, it was unclear in some laboratories which staff have keys. One laboratory mentioned having a strong relationship with a local police unit, which provides security to the laboratory.

***Activation of the COOP***

Triggers and protocols for activating the COOP varied across pilot sites. While some laboratories had pre-defined a progression of COOP activation levels, others indicated that sentinel events would trigger automatic COOP activation. A couple of the laboratories said that COOP activation depended on the incident and when it happened. For these laboratories, the decision about whether to activate the COOP seemed to be more subjective than laboratories with a more formalized triggers for activation. In many cases, laboratory managers explained that the COOP would not be "formally activated" but that the laboratory would naturally be operating under COOP because of the circumstances.

***Notification of Key Personnel***

All of the pilot site laboratories reported having staff call-down lists, though only some included the lists in the actual plan. In at least one laboratory, the plan delineates key personnel by title and then the names and specific contact information associated with those tables are included as an appendix. If and when personnel change, the laboratory only has to update the appendix rather than the whole plan. Each pilot site also indicated that they have had the opportunity to practice notifying personnel during exercises and/or real incidents (e.g., inclement weather). At two of the pilot sites, all employees carry a copy of the phone tree around with them.

Laboratories can use multiple modes of communication for notifying personnel (e.g., email, work issued cell phone, home phone, toll-free number/call line, outgoing message on

answering machine), but the amount of redundancy that laboratories incorporate into their operations varies. For example, some laboratories rely only on personal phones for contact, while other laboratories have access to at least three of the methods. One site indicated that they have access to a federal emergency communications asset that establishes priority access to phone lines. All of the sites recognized that telephone and email communications would be severely limited if a major loss of electricity occurred in the area.

It was also clear from the exercise that all of the pilot sites had thought through coordinating activities with couriers and customers in the event that the laboratory was unable to accept samples. One laboratory, in particular, listed contact information for all of their contractors and suppliers in their plan. In the future, participants at one laboratory suggested that it may be helpful for laboratories to include couriers and sample senders in their call-down drills.

***Identification of Essential Activities***

Laboratories used different methods for identifying essential activities. Some laboratories delineate the level of priority for each laboratory test within their COOP. Other laboratories reported that the essential activities would depend on the circumstances. For instance, in a flooding disaster, water testing might be a higher priority than in a different circumstance. The laboratories that conducted newborn screening tests all identified it as an activity that cannot be delayed significantly. Each of these laboratories has a formal agreement with another newborn screening laboratory to handle their tests during an emergency. Each laboratory that is part of the Laboratory Response Network (LRN) reported that they would rely on other LRN laboratories to handle those samples if necessary. They also reported that they would securely store or destroy select agents as necessary in an event.

Identification of essential activities is not limited to the actual laboratory tests that are performed. All of the laboratories recognized that support functions such as facilities and information technology might be necessary to ensure laboratory activities could be completed. Many of the laboratories reported robust Information Technology (IT) capabilities, with off-site storage of back- ups and some centralized server locations. However, in some cases, centralized IT equipment was seen as a potential liability if the IT staff did not understand the importance of data management and exchange to laboratory functioning and the needs during a COOP event. One larger laboratory had a dedicated IT system that could provide back-up servers at an alternate location with relative ease.

***Identification of Alternative Laboratories***

Although most laboratories do not have formal Memorandums Of Understanding (MOU) with other laboratories to perform essential testing, each laboratory was able to identify some other facilities that would likely be able to relieve the testing burden for the public health laboratory. These included other public health laboratories in the state, university or hospital laboratories, and private laboratories. The type of relationship with other public health laboratories in the state depended substantially on how the public health system in the state was organized. In one state, with a very centralized system, transfer between the public health laboratories would not be difficult, while in another, more decentralized state, the laboratory was less confident that other laboratories would fill in the gap. One laboratory had conducted an operational exercise to test its Emergency Management Assistance Compact (EMAC) for diverting newborn screening to neighboring states.

Some laboratory staff discussed relocating either equipment or personnel from the public health laboratory to an alternative setting. Many barriers to relocation exist, including the need to recalibrate or recertify instruments if moved. In addition, in some states, staff are licensed or certified to work in a specific location, and may require recertification or exemptions. One laboratory had already identified an alternate site; a state owned unoccupied building that could possibly be used in emergency.

Most of the laboratories would have customers send their specimens directly to the new laboratory, bypassing the public health laboratory. However, in some cases, the public health laboratory would triage samples and centrally re-route them. In these cases, the laboratory would need to manage the results of the testing. The laboratories reported that they could do this manually if computers were not available.

Most laboratories reported cross training staff so that they are able to work across areas in the laboratory in emergencies, although the extent of this varied greatly between laboratories, and even within laboratories between divisions. At least one laboratory reported that some of its space could easily be converted to perform different types of laboratory functions.

***Reconstitution***

This section of the exercise was more challenging to address in specific detail, due to the variability in the impact of different incidents. However, laboratory managers reported that planning for reconstitution would happen almost immediately after an incident, and several noted that reconstitution would involve additional stakeholders and decision-makers (e.g., governors' offices, public works departments). Several sites reported that prior relocation activities had

offered historical experience that could benefit future potential reconstitution activities. They generally reported using a phased in approach for reconstitution.

In addition to space, laboratory managers raised concerns about what the laboratory staff would do during rebuilding of the laboratory. Some reported that the staff might be used by the health department for other activities, but multiple managers were concerned that the local/state health department would not be able to compensate and, therefore, retain those staff. The laboratories indicated that retraining chemical and biological terrorism laboratory technicians is especially time consuming.

**Next Steps**

Based on the pilot tests, RAND recommends that APHL consider the following next steps for the COOP exercise:

*Test the exercise on a larger set of laboratories*. The pilot tests described above provide preliminary evidence of the exercise's feasibility and ability to generate useful insights about COOP across a range of public health laboratories. As noted earlier, pilot sites were selected to represent public health laboratories of various sizes, type (i.e., state, county), geographic location, and state governance structure (i.e., centralized, decentralized, mixed). However, because it was a convenience sample, findings may not be generalizable to all APHL member laboratories. Additional testing will help determine whether the exercise design is robust across the full spectrum of public health laboratories.

*Expand facilitation options*. One of the pilot implementations was facilitated remotely by Video Teleconference (VTC). APHL staff attended in person, helping make the exercise a success. It was not clear how well the situation would have worked without a facilitator in the room. However, it may be worth trying to perform an exercise completely remotely, in an effort to make this more accessible to all laboratories. In addition, APHL might try to test whether external facilitation is necessary at all by observing some laboratories try to self-facilitate the exercise. This could be performed by having one senior manager run the exercise, while either also participating, or not participating.

*Clarify the need for participation by facilities staff*. Facilities staff participated in most of the pilot tests. However, in one case there was not such involvement. Given the centrality of facilities issues in COOP we recommend that in the future extra efforts be made to encourage their participation.

*Emphasize the need for open discussion*. A common challenge in some exercises is to maintain an environment in which all participants feel free to discuss gaps and other challenges.

During the pilot tests, when participants felt constrained or inhibited to speak openly, the group discussions produced less information. A more open discussion environment leads to a more useful exercise. Thus, in the future, we recommend that those implementing the exercise emphasize the importance of open discussion to senior leadership before the exercise.

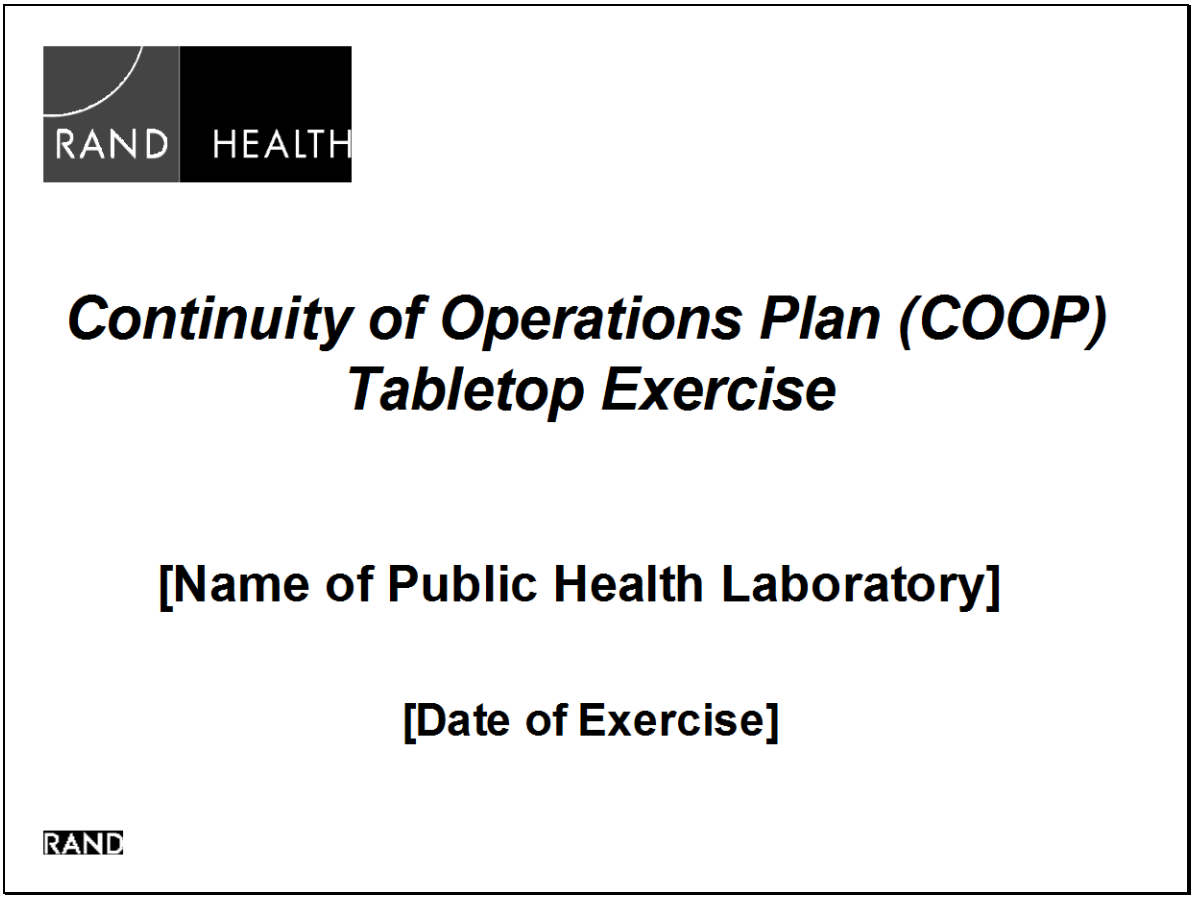
*Encourage laboratories to conduct an operational exercise*. Given the scope of the exercise, it tests the completeness of plans, but not operational capability. Thus, APHL might consider developing and testing an operational exercise that tests laboratories' ability to execute some of the key tasks associated with the functions described in this report. Following the approach taken by the Strategic National Stockpile, this might include developing a set of modular drill-based metrics that can be conducted either as stand-alone assessments or combined and embedded in larger functional or full-scale exercises.[8]

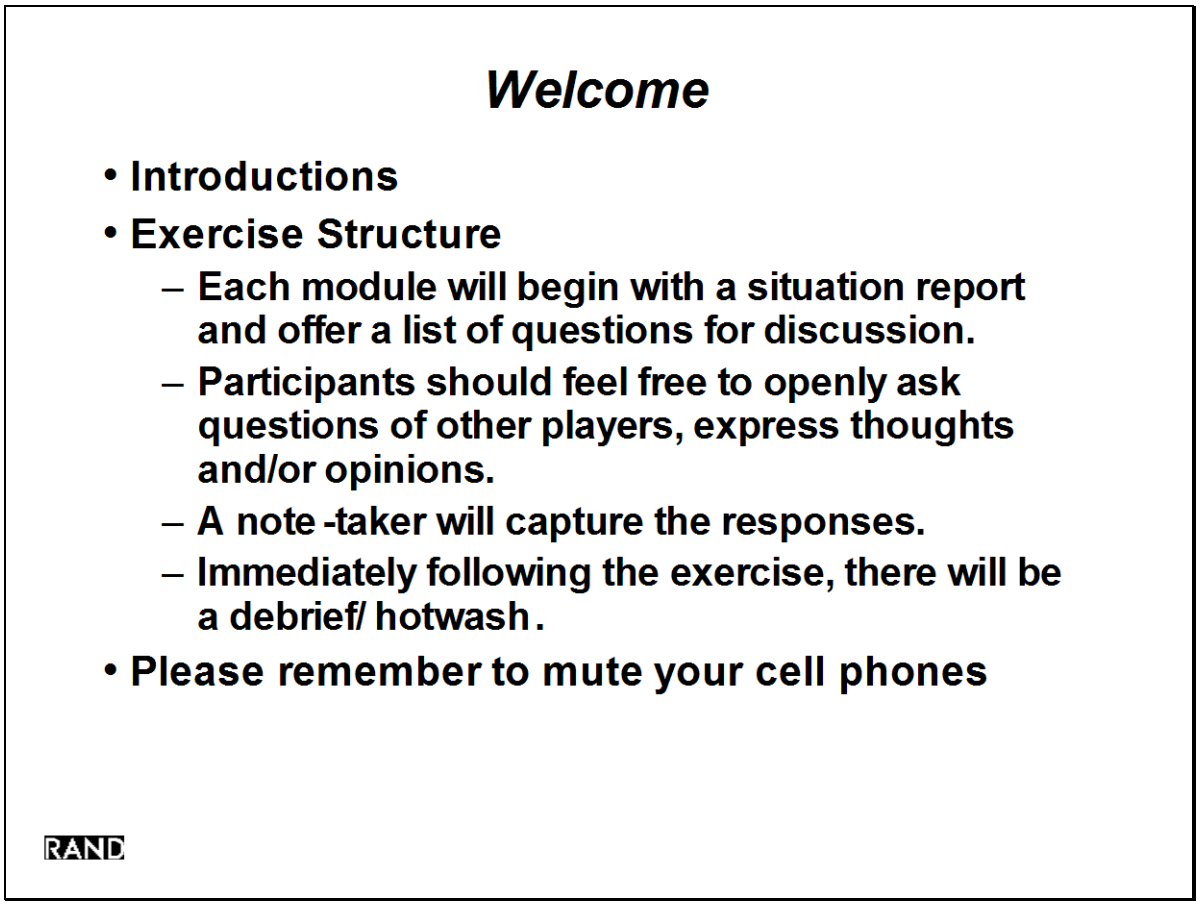
*Hold discussion-based exercises for non-senior staff*. Exercise participants all seemed to be familiar with their laboratory COOP. However, because the exercises tended to only involve senior level and management laboratory staff, it is possible that technical and junior level laboratory staff may not have the same awareness of the COOP. It may be helpful for laboratories to hold a more informal discussion-based exercise, such as a seminar, for non-management staff to acquaint them to the COOP. According to the Homeland Security Exercise and Evaluation Program (HSEEP), seminars are used to "orient participants to, or provide an overview of, authorities, strategies, plans, policies, procedures, protocols, response resources, and/or concepts and ideas".[9]

[8] Nelson, 2009.

[9] U.S. Department of Homeland Security, 2007.

## APPENDIX A. TEMPLATE BRIEFING SLIDES






The exercise should take 3-4 hours, but it could be a little more or less depending on the amount of discussion.

## *Exercise Guidelines*

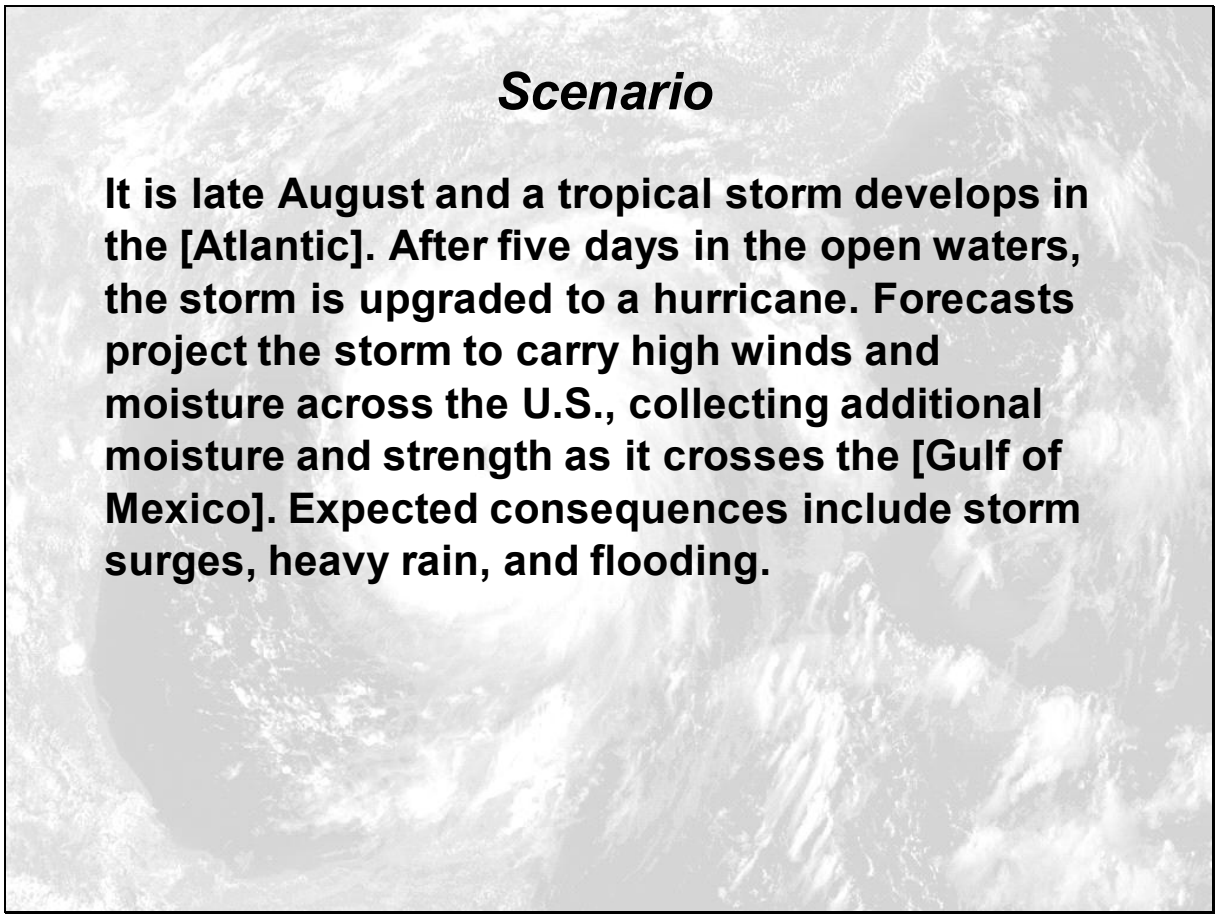
- **This is an open, low-stress, no-fault environment for discussion and problem solving.**
- **Varying viewpoints are expected and encouraged.**
- **Assume the scenario is plausible.**
- **Respond based on your knowledge of current plans and capabilities (i.e., you may use only existing assets).**
- **Decisions are not precedent setting and may not reflect your organization's final position on a given issue. This is an opportunity to discuss and present multiple options and possible solutions.**

Don't assume the COOP is the only information you have access to – you can go to other sources as well.

## *Objectives*

- **Test the laboratory's ability to conduct**
  - **Incident assessment,**
  - **Activation of the COOP,**
  - **Notification of key personnel,**
  - **Identification of essential lab activities,**
  - **Identification of alternative labs, and**
  - **Reconstitution to normal operations.**

- **Evaluate the adequacy of the laboratory COOP**

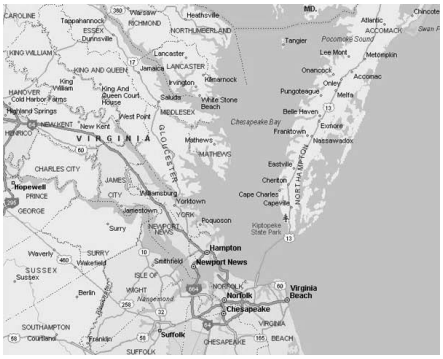



Alternative blizzard scenario:

It is late January and the National Weather Service has issued winter storm watches, warning, and advisories to more than 30 states, including [state]. Forecasts project heavy snowfall to blanket the [northern mid-Atlantic region] and [Northeast]. Expected consequences include snow accumulations up to two feet, high winds, and freezing rain.

## *Situation Report #1: Before the Storm*

- **After four days, the hurricane has steadied at a Category 4 level.**
- **Models indicate a track that includes a possible landfall along the [Gulf coast] within 48 hours.**




Alternative blizzard scenario:

- The average temperature in [city] in January has been 10º F (-12º C). [City] has had continuous snow cover since December 2. So far this winter, 135.2 inches of snow has fallen. The current snow depth is 30 inches.
- On January 25, an Arctic front sweeps southward through the [northern Great Plains] to the [Midwest].
  - Between 6:00 and 7:00 am on January 26, a wall of snow accompanies the cold front's passage through [city, state], along with a major temperature drop.
  - Between 7:00 and 8:00 am, [city, state], reports similar situations.
  - [City] and [city], as well as [city, state], have also been hit strongly by the cold front.

## *Discussion*

- **How will the storm likely impact lab operations?**
- **What actions do you take?**
- **What decisions do you need to make?**
- **Do you activate the COOP? If so, at what level?**

Prompts:

- What is the initial incident assessment and what items do you consider in assessing the incident?
- Do you activate the COOP? If so, at what level?
- Are there any downsides to activating the COOP too early?

Additional probes:

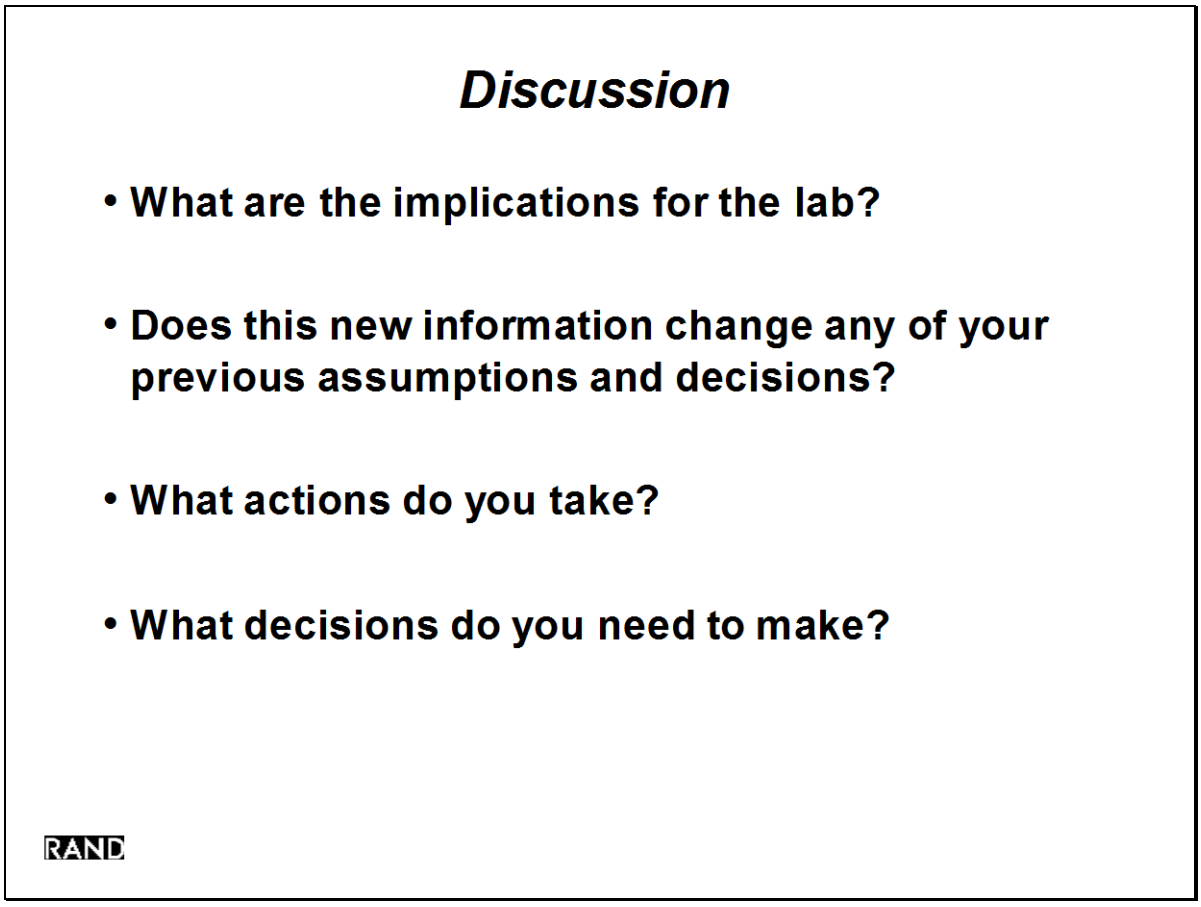
- Who decides on whether to activate the COOP plan?
- Who has the authority to activate the COOP?
- Does ICS have to be activated before the COOP can be activated?
- How are you communicating with staff?
- Are you interfacing with any other agencies or stakeholders?

## *Situation Report #2: The Storm Hits*

- **48 hours later, the hurricane reaches its peak and makes landfall on [location] as a category 4 hurricane.**
- **The hurricane brings storm surges, force winds, and heavy rains to [state].**
- **The lab sustains a loss of electricity and heavy flooding.**
- **Reports suggest that approximately one half of lab personnel can not report to work for at least 24 hours due to power outages at home, flooding, school closures, and hazardous road conditions**

Alternative blizzard scenario:

- 24 hours later, the blizzard hits [city]. Within hours, the temperature drops from 26 to 0º F (-3 to -18º C).
- Drifts of over 25 ft develop as strong winds blow the new snow and snow that had previously accumulated on land and frozen [Lake Erie].
- The combination of snow fall and blowing snow causes extremely low visibility, making travel nearly impossible.
- Buildings throughout the area, including the [name of lab], are experiencing power outages.
- Reports suggest that approximately one half of [name of lab] personnel cannot report to work for at least 48 hours due to power outages at home, school closures, and impassable roads.




Prompts:

- Are there other constituencies to keep informed?
- How does this new information change the initial incident assessment that was conducted?

## *Activation of COOP*

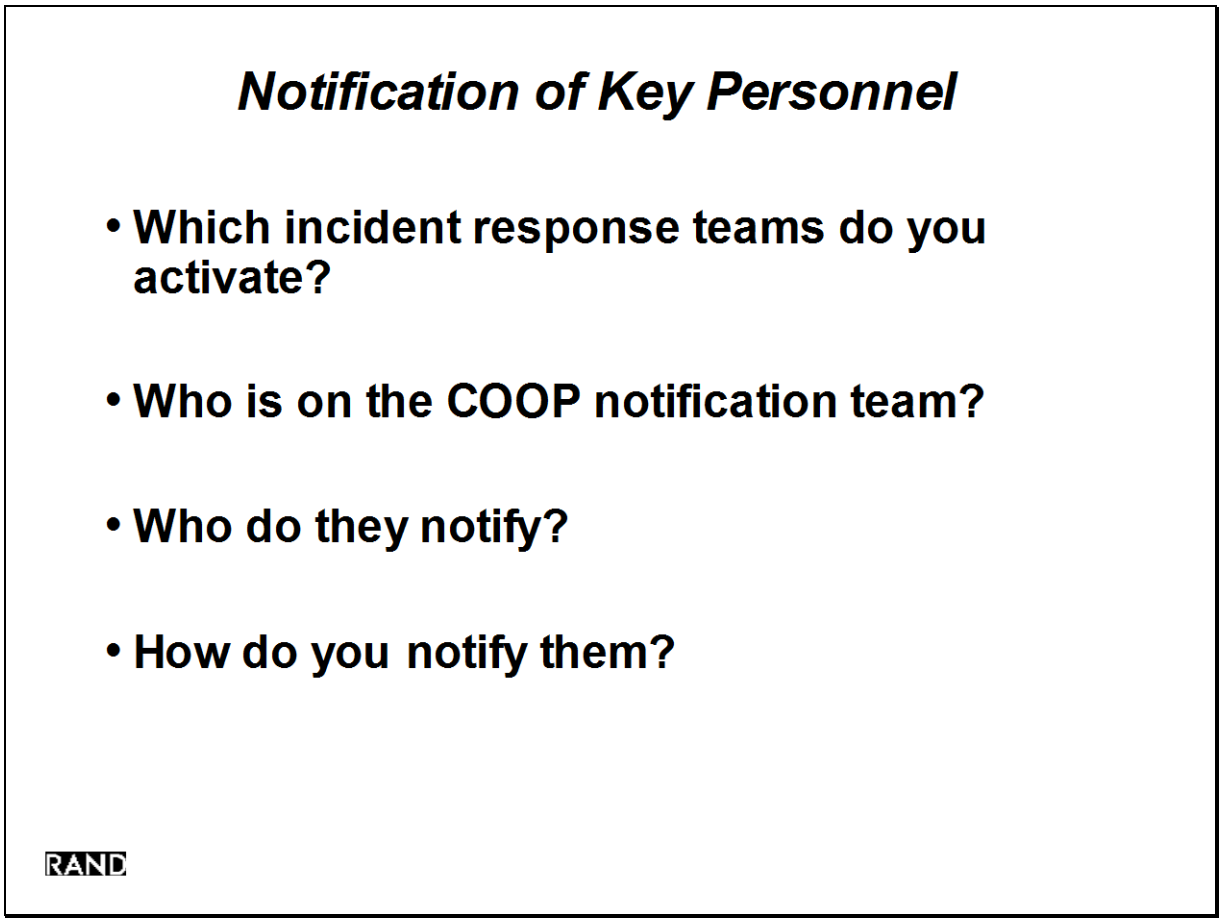
- **What statewide operations have been impaired?**
- **What are the immediate recovery needs and priorities?**
- **Do you activate the COOP? If so, at what level?**

General Prompts:

- What assumptions are you making?
- What things are most likely to go wrong?
- How susceptible is the lab's IT service to a disruption? How might lab operations be impacted?
- What could be done to prevent or mitigate that?

Specific Prompts:

- Does your lab have a back-up generator?
- How long can it run on the back-up generator?
- What equipment is on the back-up generator?

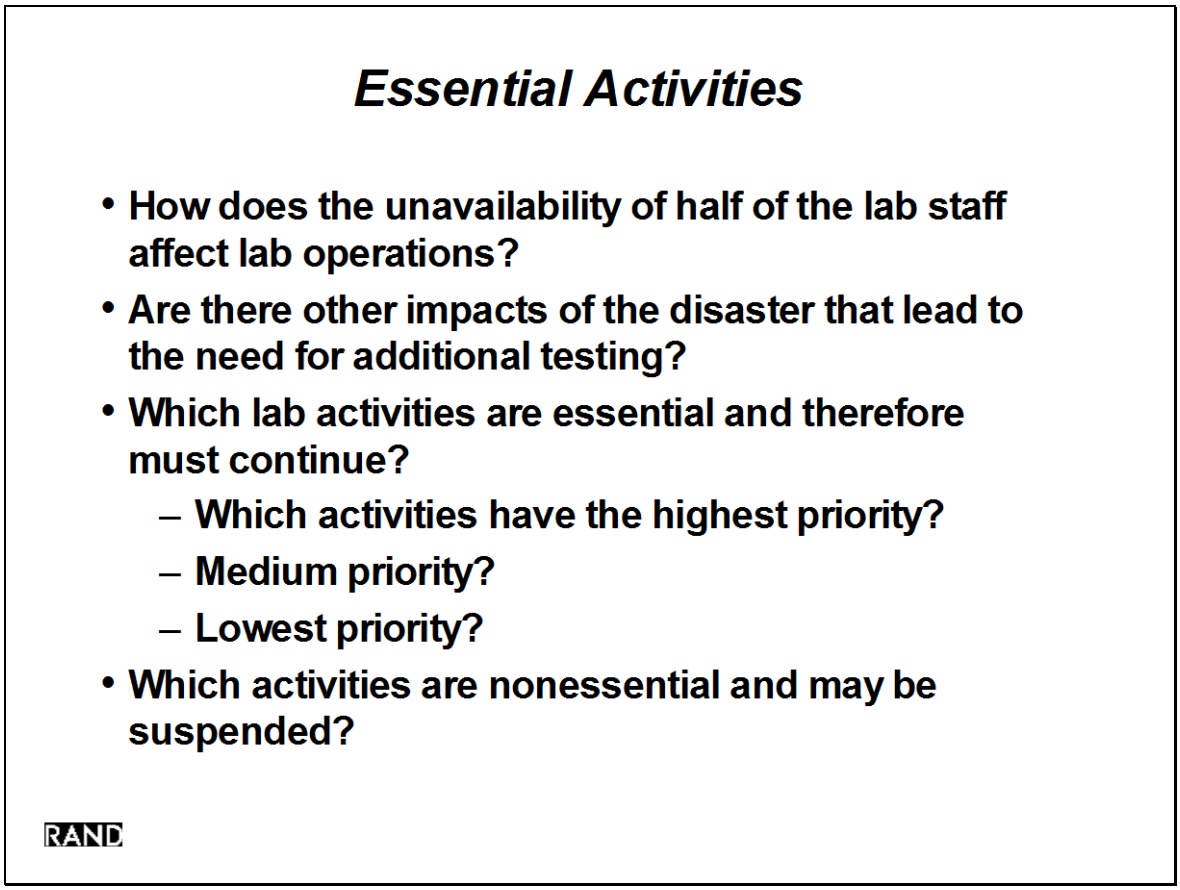



General Prompts:

- What assumptions are you making?
- What things are most likely to go wrong? What could be done to prevent or mitigate that?

Specific Prompts:

- How do you notify lab personnel? Automated call system? Website? 1-800 number? Blast email?
- Is contact information readily available and up-to-date?
- Are there any other constituencies you need to engage?

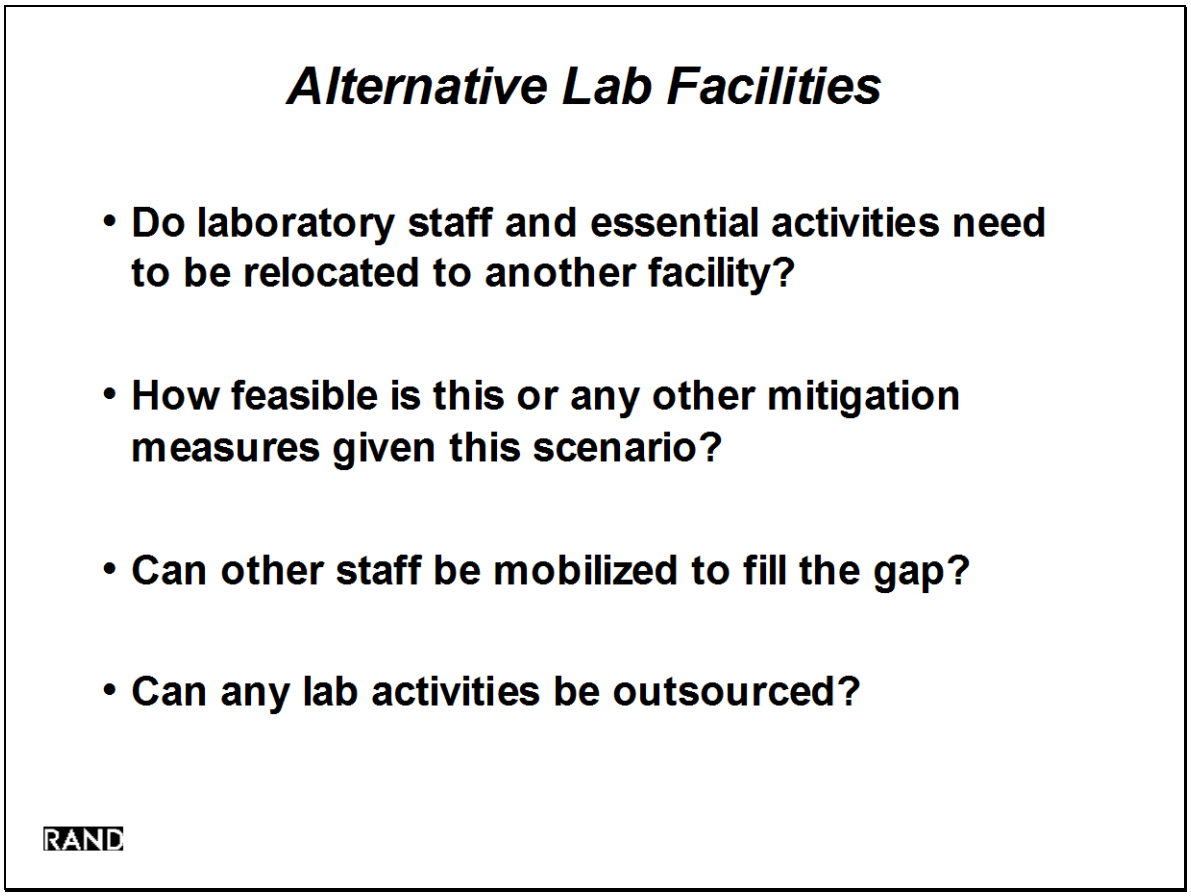



General Prompts:

- What assumptions are you making?
- What things are most likely to go wrong?
- What could be done to prevent or mitigate that?

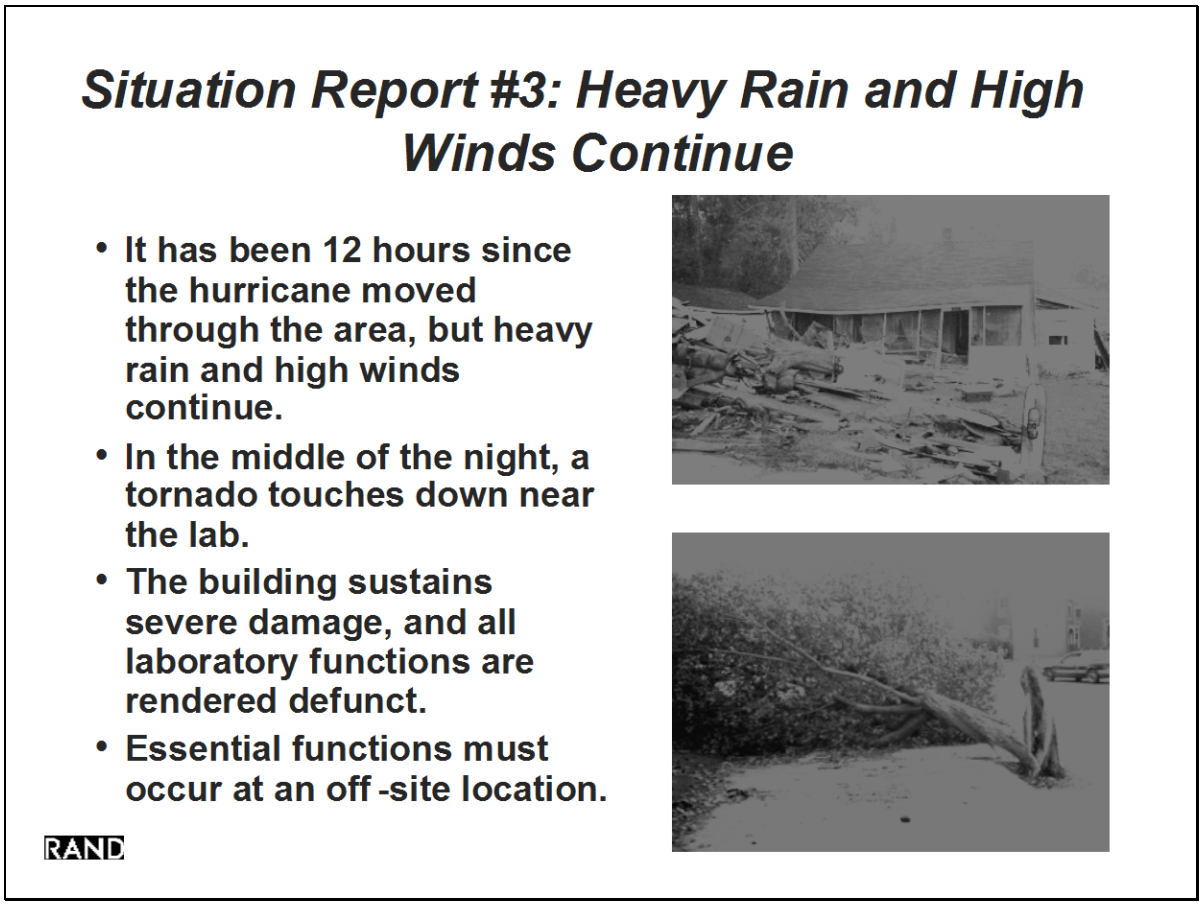
Specific Prompts:

- Are the essential and non-essential activities written in the COOP?
- Do you have MOUs with the other facilities?
- Which tests can be done by public labs? Which can only be done by private labs?
- How would your answers to these questions change if the hurricane had hit a satellite lab?
- How would select agents be secured – via storage, secure transfer, or destroy? Is this outlined in COOP?




Prompts:

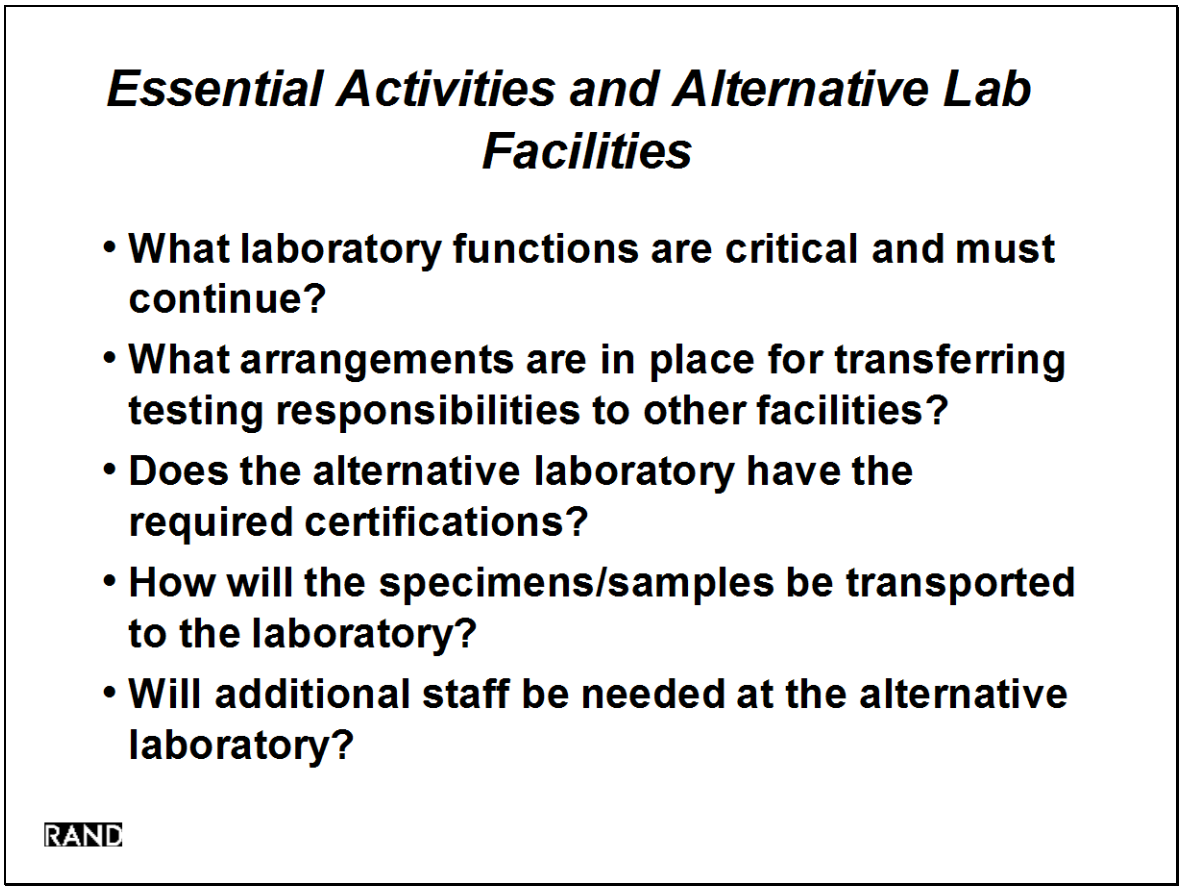
- What is the process for re-locating staff to alternate facilities?
- Do staff have cross-training for performing multiple different testing activities?
- Are there any licensing or certification issues involved for alternate staff to perform testing?




Alternative blizzard scenario:

Heavy Snow and High Winds Continue

- It has been 12 hours since the blizzard began, and heavy snow and high winds continue.
- In the middle of the night, an ice storm hits the [name of lab].
- The roof sustains severe damage, electrical power is completely lost and all laboratory functions are rendered defunct.
- Essential functions must occur at an off-site location.




Specific Prompts:

- What test volumes need to be accommodated?
- Will the alternative laboratory receive specimens/samples directly?
- Will the alternative laboratory retain or return the tested specimens?
- Who would be responsible for reporting test results for specimens diverted to other labs?
- Will main laboratory personnel go to the alternative lab? Are there policies that affect this?
- How would your answers to these questions change if the tornado had hit the satellite lab?

## *Reconstitution*

- **When does reconstitution planning begin?**
- **Who will oversee reconstitution/transition to the restored facility?**
- **Which lab function/activities are the first priorities for reconstitution?**
- **Who ensures that continuity/ recovery operations are adequately resourced and monitored?**

General Prompts:

- What is the expected timeline for reconstitution, assuming several months of repairs?
- How long are partner laboratories prepared to support essential testing activities at the needed capacity?
- What personnel policies are there for retaining staff during long-term work disruptions?
- What other constituencies will have an impact on reconstitution planning (funding, etc.)?
- How would new procurement be handled?

## *Hot Wash*

- **Based on this exercise, what are the greatest strengths of your COOP?**
- **Where are the gaps in your COOP?**
  - **Knowledge gaps**
  - **Gaps due to infrastructure**
- **What initial steps can you take to improve these gaps?**
  - **Actions**
  - **Persons responsible**

## *Exercise Assessment*

- **What was most useful about the exercise?**
- **What would you change about the exercise?**
- **Is the scenario missing any important components?**
- **Was the number and mix of participants appropriate for the exercise?**

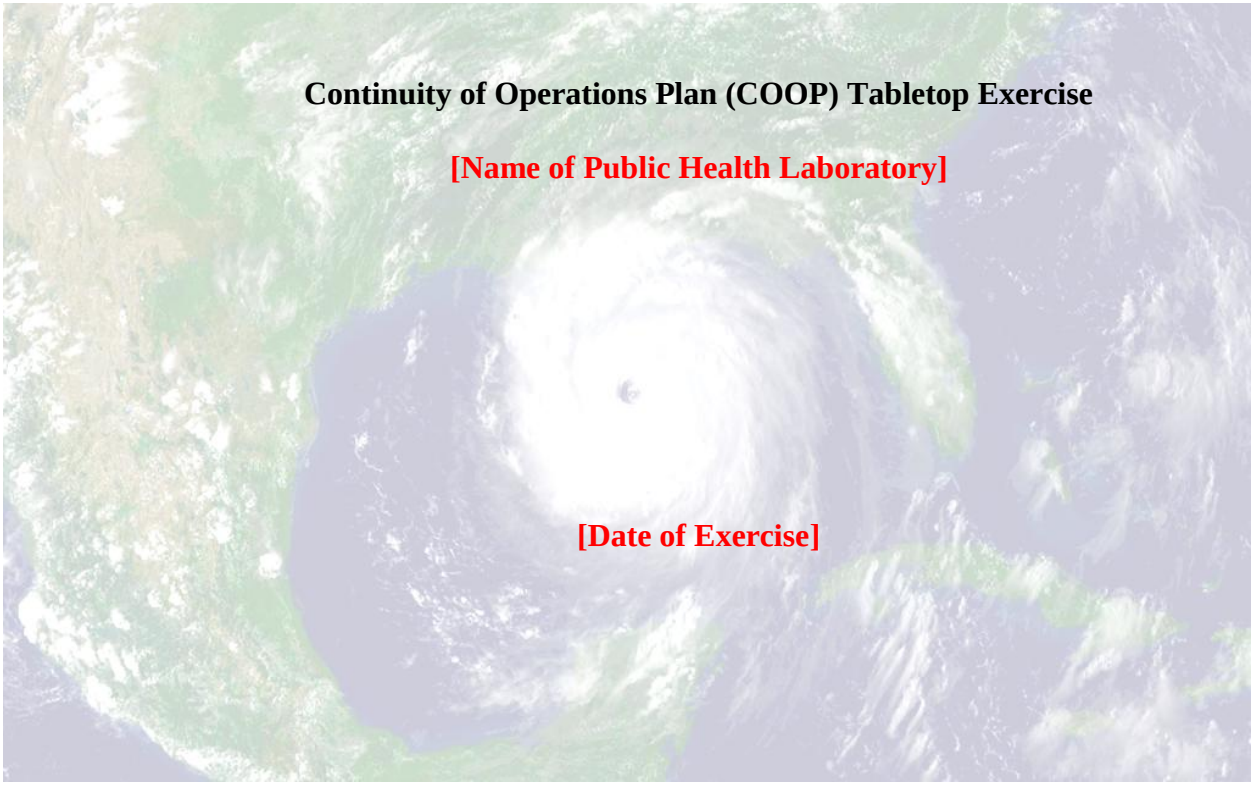
Some version of these questions and the hotwash questions will also be included on the participant feedback forms

# Thank You

# APPENDIX B. SITUATION MANUAL TEMPLATE

This Appendix contains a template that laboratories can use to create the situation manual. The exercise is intended to be customizable to suit the characteristics and needs of a wide range of laboratories. Customizable text is displayed in red.

**Situation Manual**



**Continuity of Operations Plan (COOP) Tabletop Exercise**

**[Name of Public Health Laboratory]**

**[Date of Exercise]**

# INTRODUCTION

## Background

In the event of an emergency that disrupts normal operations, public health laboratories must be able to continue their core population-based activities, as well as respond quickly and effectively to the threat. To ensure continuation of essential activities and minimize interruption of operations, public health laboratories must have in place an effective Continuity of Operations Plan (COOP). According to APHL Guidelines, "having an effective COOP in place ensures that the laboratory's core activities can be resumed within an acceptable period of time following such an incident. It allows the laboratory to shift efficiently from its normal structure and organization to a structure and organization that facilitates rapid recovery and continuation of services."

## Purpose

The purpose of this exercise is to provide participants with an opportunity to evaluate current continuity of operations plans in a response to a hurricane. The exercise will focus on assessing and improving established policies and procedures to assure continuous performance of critical laboratory testing and support activities following the occurrence of a disruptive event

## Scope

This exercise emphasizes the role of the [name of public health laboratory] in ensuring that laboratory core activities can be resumed within an acceptable amount of time following an incident that disrupts normal operations.

## Exercise Design Objectives

Exercise design objectives focus on improving understanding of a response concept, identifying opportunities or problems, and achieving a change in attitude. This exercise will focus on the following design objectives selected by the Exercise Planning Team:

- Test the laboratory's ability to conduct
- Incident assessment,
- Activation of the COOP,

- Notification of key personnel,
- Identification of essential laboratory activities,
- Identification of alternative laboratories, and
- Reconstitution to normal operations.

Evaluate the adequacy of the laboratory COOP, identify gaps, and suggest improvements.

**Participants**

- **Players**. Players respond to the situation presented, based on expert knowledge of response procedures, current plans and procedures, and insights derived from training.
- **Observers**. Observers support the group in developing responses to the situation during the discussion; they are not participants in the moderated discussion period, however.
- **Facilitators**. Facilitators provide situation updates and moderate discussions. They also provide additional information or resolve questions as required. Association of Public Health Laboratory (APHL) staff also may assist with facilitation as subject matter experts (SMEs) during the TTX.

**Exercise Structure**

This discussion-based exercise will be a [multi-site] tabletop exercise. The facilitator will present players with the following three situation reports:

- Situation Report 1: Before the Storm
- Situation Report 2: The Storm Hits
- Situation Report 3: Heavy Rain and High Winds Continue

The situation reports summarize key events that occur within that time period. After the each situation report, the facilitator leads participants in a discussion of appropriate response issues.

**Exercise Guidelines**

- This is an open, low-stress, no-fault environment for discussion and problem solving.

- Varying viewpoints are expected and encouraged.
- Assume the scenario is plausible.
- Respond based on your knowledge of current plans and capabilities (i.e., you may use only existing assets).
- Decisions are not precedent setting and may not reflect your organization's final position on a given issue. This is an opportunity to discuss and present multiple options and possible solutions.

## SITUATION REPORT #1: BEFORE THE STORM

It is late August and a tropical storm develops in the [Atlantic]. After five days in the open waters, the storm is upgraded to a hurricane. Forecasts project the storm to carry high winds and moisture across the U.S., collecting additional moisture and strength as it crosses near the [Gulf of Mexico]. Expected consequences include storm surges, heavy rain, and flooding throughout the [specific geographic regions].

After four days, the hurricane has steadied at a dangerous Category 4 level. Models indicate a track that includes a possible landfall along the Gulf coast within 48 hours.

### DISCUSSION

Based on the information provided, participate in a discussion concerning the issues raised in Situation Report #1. Identify any additional requirements, critical issues, decisions, or questions that should be addressed at this time.

1. How will the storm likely impact laboratory operations?

2. What actions do you take?

3. What decisions do you need to make?

4. Do you activate the COOP? If so, at what level?

## SITUATION REPORT #2: THE STORM HITS

48 hours later, the hurricane reaches its peak as predicted and makes landfall as a category 4 hurricane on [location]. The hurricane brings storm surges, force winds, and heavy rains to [state]. The [name of public health laboratory] sustains a loss of electricity and heavy flooding. Reports suggest that approximately one half of laboratory personnel cannot report to work for at least 24 hours due to power outages at home, flooding, school closures, and hazardous road conditions.

### DISCUSSION

Based on the information provided, participate in a discussion concerning the issues raised in Situation Report #2. Identify any additional requirements, critical issues, decisions, or questions that should be addressed at this time.

1. What are the implications for the laboratory?

2. Does this new information change any of your previous assumptions and decisions?

3. What actions do you take?

4. What decisions do you need to make?

### *Activation of COOP*

1. What statewide operations have been impaired?

2. What are the immediate recovery needs and priorities?

3. Do you activate the COOP? If so, at what level?

### *Notification of Key Personnel*

1. Which incident response teams do you activate?

2. Who is on the COOP notification team?

3. Who do they notify?

4. How do you notify them?

***Essential Activities and Alternative Laboratory Facilities***

1. How does the unavailability of half of the laboratory staff affect laboratory operations?

2. Are there other impacts of the disaster that lead to the need for additional testing?

3. Which laboratory activities are essential and therefore must continue?

4. Which activities have the highest priority?

5. Medium priority?

6. Lowest priority?

7. Which activities are nonessential and may be suspended?

8. Do laboratory staff and essential activities need to be relocated to another facility?

9. How feasible is this or any other mitigation measures given this scenario?

10. Can other staff be mobilized to fill the gap?

11. Can any laboratory activities be outsourced?

## SITUATION REPORT #3: HEAVY RAIN AND HIGH WINDS CONTINUE

It has been 12 hours since the hurricane moved through the area, but heavy rain and high winds continue.

In the middle of the night, a tornado touches down near the [name of public health laboratory]. The building sustains severe damage, and all laboratory functions are rendered defunct. Essential functions must occur at an off-site location.

### DISCUSSION

Based on the information provided, participate in a discussion concerning the issues raised in Situation Report #3. Identify any additional requirements, critical issues, decisions, or questions that should be addressed at this time.

1. What are the implications for the laboratory?

2. Does this new information change any of your previous assumptions and decisions?

3. What actions do you take?

4. What decisions do you need to make?

#### *Essential Activities and Alternative Laboratory Facilities*

1. What laboratory functions are critical and must continue?

2. What arrangements are in place for transferring testing responsibilities to other facilities?

3. Does the alternative laboratory have the required certifications?

4. How will the specimens/samples be transported to the laboratory?

5. Will additional staff be needed at the alternative laboratory?

***Reconstitution***

1. When does reconstitution planning begin?

2. Who will oversee reconstitution/transition to the restored facility?

3. Which laboratory function/activities are the first priorities for reconstitution?

4. Who ensures that continuity/recovery operations are adequately resourced and monitored?

# APPENDIX C. PARTICIPANT FEEDBACK FORM

**Exercise:** _____ **Exercise Date:** _____

**Participant Name:** _____ **Title:** _____

**Part I – Recommendations and Action Steps**

**1. Based on discussions today, list the top three issues/areas for improvement in your COOP.**

_____

_____

_____

_____

**2. Identify the action steps that should be taken to address the issues identified above. For each action step, indicate if it is a high, medium, or low priority.**

_____

_____

_____

_____

**3. Identify who should be assigned responsibility for each action step.**

_____

_____

_____

_____

**4. List the policies, plans, and procedures that should be reviewed, revised, or developed. Indicate the priority level for each.**

_____

_____

_____

_____

## Part II – Exercise Design and Conduct

### 1. What is your assessment of the exercise design and conduct?

*Please rate, on a scale of 1 to 5, your overall assessment of the exercise relative to the statements provided below, with **1** indicating **strong disagreement** with the statement and **5** indicating **strong agreement.***

| | Assessment Factor | Rating of Satisfaction with Exercise | | | | |
|---|---|---|---|---|---|---|
| | | *Strongly Disagree* | *Disagree* | *Neutral* | *Agree* | *Strongly Agree* |
| a. | The exercise was well structured and organized. | 1 | 2 | 3 | 4 | 5 |
| b. | The exercise scenario was plausible and realistic. | 1 | 2 | 3 | 4 | 5 |
| c. | The exercise was useful in assessing the COOP and identifying gaps. | 1 | 2 | 3 | 4 | 5 |
| d. | The facilitator(s) was knowledgeable about the material, kept the exercise on target, and was sensitive to group dynamics. | 1 | 2 | 3 | 4 | 5 |
| e. | Participation in the exercise was appropriate for someone in my position. | 1 | 2 | 3 | 4 | 5 |
| f. | The participants included the right people in terms of level and mix of disciplines. | 1 | 2 | 3 | 4 | 5 |

### 2. What changes would you make to improve this exercise?

*Please provide any recommendations on how this exercise or future exercises could be improved or enhanced.*

_____

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_____

8515 Georgia Avenue, Suite 700
Silver Spring, MD 20910

240.485.2745 phone
240.485.2700 fax
www.aphl.org

APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES