

## **Application of Surveillance and Epidemiological Investigation Performance Measures into Practice**

### **A CDC Public Health Emergency Preparedness Cooperative Agreement Case Study**

#### **Purpose**

This case study provides PHEP awardees with examples that will allow them to apply performance measures (PM) guidance to their jurisdictions. The case study is intended to provide examples of how the performance measures can be implemented; awardees are encouraged to review the aspects that may apply to them while ensuring that the measures apply to the particulars of their own jurisdictions.

#### **PHEP 13.1**

##### **Disease Reporting**

Proportion of reports of selected reportable diseases received by a public health agency within the awardee required timeframe

*The pre-selected sample of counties provided to the awardee by CDC applies to this measure.*

#### **PHEP 13.2**

##### **Disease Control**

Proportion of reports of selected reportable diseases for which initial public health control measure(s) were initiated within the appropriate timeframe

*The pre-selected sample of counties provided to the awardee by CDC applies to this measure.*

#### **PHEP 13.3**

##### **Outbreak Investigation Reports**

Percentage of infectious disease outbreak investigations that generate reports

*The pre-selected sample of counties provided to the awardee by CDC applies to this measure.*

#### **PHEP 13.4**

##### **Outbreak Reports with Minimal Elements**

Percentage of infectious disease outbreak investigation reports that contain all minimal elements

*The pre-selected sample of counties provided to the awardee by CDC applies to this measure.*

#### **PHEP 13.5**

##### **Exposure Reports**

Percentage of epidemiological investigations of acute environmental exposures that generate reports

#### **PHEP 13.6**

##### **Exposure Reports with Minimal Elements**

Percentage of epidemiological investigation reports of acute environmental exposures that contain all minimum elements

## Surveillance and Epidemiological Investigation Example

For several years, State Awardee X has used PHEP funds to maintain surveillance and epidemiology capability across the state. Based on a recent review and Capabilities Planning Guide (CPG) data, Awardee X has decided to build additional capability in these areas. In terms of reportable disease surveillance, the awardee is anecdotally aware that case reporting of notifiable diseases by private providers is uneven across the state. In some regions within the state, it appears that private healthcare providers are notifying the health department of reportable diseases fairly regularly and in a timely manner; in other regions these reports seem to be submitted irregularly and often late. In order to gather evidence about the timeliness of disease reporting and improve surveillance of reportable diseases across the state, State Awardee X has developed two interrelated goals that correspond with Function 1, Task 1, 2 and 4 *and* Function 2, Task 1 and 2 of PHEP Capability 13. The awardee will be able to use the corresponding PHEP performance measures related to surveillance to measure performance of these functions. Because these measures are required by CDC annually, the awardee chooses to invest considerable effort in planning to ensure the right systems and procedures are in place to collect data for these measures. State Awardee X anticipates that coordinating with a variety of partners, reconfiguring the state surveillance system to capture necessary data elements, and developing internal continuous quality improvement processes will be needed to meet its programmatic goal and fulfill CDC reporting requirements.

### PHEP Surveillance Performance Measures

To start the process, State Awardee X facilitates a planning meeting comprised of representatives from local health departments (LHDs) across the state to develop a common understanding of the CDC PHEP performance measures. During this meeting, State awardee X reminds LHD representatives that the two *surveillance* performance measures assess timeliness of **disease reporting** from providers, hospitals, and labs to public health agencies as well as public health agencies' timeliness of **initiating control measures** for six diseases (Botulism, Tularemia, Meningococcal Disease, Measles, Shiga-toxin positive *E. coli*, and Hepatitis A). An epidemiologist from a county that borders a neighboring state knows that, in addition to collecting data for these six diseases (the only ones required for CDC), the neighboring state is also planning to collect performance data for Pertussis and Shigella for its own internal purposes (i.e., these won't have to be reported to CDC). The group discusses the potential added value of collecting data on these additional diseases and comes to consensus that while logistically challenging, it would be worthwhile.

### *SURV – Disease Reporting (PHEP 13.1)*

In State X, reportable diseases, including the required timeframes in which providers and labs are supposed to report these diseases, are regulated by the state. The “stop time” for the Disease Reporting measure (PHEP 13.1) is always the date of first report to a public health agency (e.g., local, county, regional, or state). State Awardee X wants to hear from LHDs about what an appropriate “start time” could be for the diseases – as the selected start times will need to be used by all participating health departments throughout the budget year. State Awardee X then uses the following table, which includes the specific case event date options, to guide the discussion.

Disease	State-mandated Reporting Time Requirement	Start Time Reporting Options: Date of Diagnosis – lab confirmed, Date of Diagnosis – presumptive/clinical, Date of laboratory report, Date of laboratory result, and Date of specimen collection	Stop Time	Reported to CDC
Botulism	Immediately		Date of first report to a public health agency	X
Tularemia	Immediately			X
Meningococcal Disease	24 hours			X
Measles	24 hours			X
<i>E. coli</i>	24 hours			X
Hepatitis A	24 hours			X
Pertussis	48 hours			
Shigella	48 hours			

The group observed that some of the case event date types may not apply in practice for particular diseases. For example, “Date of diagnosis – presumptive/clinical” for Hepatitis A or *E. coli* (STEC) is probably too early because (a) those diseases are only diagnosable with a lab confirmation and (b) public health action is generally not taken until a confirmation is obtained. Similarly, “Date of diagnosis – lab confirmed” could be too late for measles, since (a) lab confirmations may take a few days and (b) physicians occasionally do diagnose cases through clinical determinations (e.g., rash + fever + cough) and an established epidemiological link to a previously confirmed case. To clarify which case event date types are best suited for each disease, State Awardee X employs the following examples to help LHDs become familiar with how to calculate timeliness of disease reporting for this measure. The examples also help clarify, for the state and for LHDs, which cases should be included in performance measures data collection (i.e., those that occur in counties in the pre-selected sample provided by CDC) and those that should not be reported to CDC (those that do not occur in the pre-selected sample of counties).

Example 1: A provider at a community clinic in a county that is part of the pre-selected sample sees a six-year old patient, recently returned from travel to South Asia, with a high fever, conjunctivitis, skin rash, and Koplik spots. A presumptive diagnosis of measles is made on Wednesday, June 6, 2012 at 10:30 a.m. The provider reports the presumptive measles diagnosis to the state health department on Wednesday, June 11, 2012 at 11:15 a.m. Assume that “Date of diagnosis – presumptive/clinical” is the case event date type selected for measles and that the awardee-required timeframe (as determined by that state’s reportable disease regulations) is “immediately.” Was this report of measles received by a public health agency in the awardee-required timeframe? Can it be included in the numerator of the performance measure?

Answer: Yes to both. The provider contacted the local health department 45 minutes after her presumptive diagnosis, which qualifies as immediate because it was received within 12 **standard** (not business) hours. Therefore, State Awardee X can include this report in the numerator.

*Please note: if this case had occurred in a county that was **not** part of the pre-determined county sample provided by CDC (or an agreed upon substitution), the awardee would **not** report this case as part of the performance measure; it would count neither in the numerator or denominator).*

**Example 2:** A private provider in a sampled county documents a lab-confirmed Hepatitis A case on Friday, June 8, 2012 (time not available). The provider reports the lab-confirmed diagnosis to his regional health department on Monday, June 11 at 4:00 p.m. Assume that “Date of diagnosis – lab confirmed” is the case event date type selected for Hepatitis A and that the awardee-required timeframe (as prescribed by law in that jurisdiction) is “24 hours.” Was this report of Hepatitis A received by a public health agency in the awardee-required timeframe? Can it be included in the numerator of the performance measure?

Answer: No to both. The awardee-required timeframe is 24 hours and the provider reported the case 3 **calendar** days after documenting his lab-confirmed diagnosis. Therefore, State Awardee X cannot include this report in the numerator, but **must** include it in the denominator. For this particular report to have counted towards the numerator, the regional health department would have needed to receive the report no later than Saturday, June 9, 2012 (i.e., the next calendar day).

The awardee and LHDs collectively agree that “Date of Diagnosis- Presumptive/Clinical” is an appropriate case event date type for measles while Date of Laboratory Confirmation is appropriate for Hepatitis A. The awardee continues a similar exercise for the remaining four diseases required for this performance measure in order to determine which case event date types will apply to them. Once a case event date type is determined for each of the six diseases, State Awardee X communicates to its own surveillance staff as well as participating LHDs that everyone must use the same case event date type for a given disease (in this example, all LHDs must use date of lab confirmation for Hep A) but that a given case event date type may be used for more than one disease (e.g., date of lab confirmation may also be used for other diseases, like *E. coli*, meningococcal disease, etc.)

#### *SURV – Disease Control (PHEP 13.2)*

State Awardee X then transitions to a discussion about determining the timeliness of initiating control measures. Unlike the PHEP 13.1 Disease Reporting measure, in which it was a state regulation or law that determined timeliness of disease *reporting*, State Awardee X reminds LHDs that **CDC** has determined the timeframes within which a health department needs to *initiate a control measure* for the six selected diseases. These timeframes, as well as examples of appropriate control measures for each of the six selected diseases, are all identified in Appendix D of the PHEP BP1 Performance Measures Guidance. State Awardee X points out that the initiation timeframes are all within a certain number of hours or days from initial case identification, depending on the disease. State Awardee X clarifies that while some health departments may choose to initiate a control measure for suspected cases, waiting until a case is confirmed to initiate a control measure still meets the intent of the performance measure.

State awardee X also calls the group’s attention to the definition of “initiation,” and uses the following table for illustration:

Initiating a control measure IS...	Initiating a control measure IS NOT...
<ul style="list-style-type: none"> <li>• Implementation of a control measure</li> <li>• Recommending a control measure</li> <li>• Inability to initiate a control measure, despite an effort to do so (or: attempt made, but unsuccessful)</li> </ul>	<ul style="list-style-type: none"> <li>• The first phone call to a provider to get more information about the case (except when that call also includes the control measure itself, such as provider or patient education, etc.)</li> </ul>

State Awardee X then provides some examples for LHDs to determine whether a control measure was initiated within an appropriate timeframe.

Example 1: An epidemiologist at the central office receives notification of three lab-confirmed cases of *E. coli* on Wednesday, June 13, 2012 at 3:30 p.m. The investigation reveals that all three individuals attended an office picnic earlier in the week, where a variety of meats, vegetables, and produce were served. The epidemiologist suspects that some of the food at the picnic was contaminated and that other employees may have ingested *E. coli*-tainted food. After gaining the contact information of other picnic attendees, the epidemiologist calls these individuals and advises them to seek medical attention if they experience severe stomach cramps, bloody diarrhea, and/or nausea and vomiting. Calls are completed on Friday, June 15 at 4:45 p.m. Was a control measure initiated within an appropriate timeframe for these three cases of *E. coli*? Should these reports count in the numerator of the PHEP 13.2 Disease Control measure?

Answer: Yes to both. Contact tracing and educating contacts are both appropriate control measures for a report of *E. coli*, and the epidemiologist initiated these control measures within three **calendar** days of notification. Therefore, State Awardee X can include these three reports in the numerator. Note: Making a phone call to the *first* potentially exposed individual within three calendar days (i.e., not necessarily making *all* calls) would also meet the intent of the measure.

Example 2: A regional epidemiologist receives notification of a suspected case of botulism at a local hospital on Tuesday, June 19 at 11:30 a.m. The epidemiologist calls the provider at 12:00 p.m. the same day to get more information about the patient. The provider doesn't receive lab confirmation until Thursday, June 21 and submits the report to the epidemiologist the same day at 2:30 p.m. The epidemiologist begins an investigation to identify the source of infection on Monday, June 25 at 10:00 a.m. Was a control measure initiated within an appropriate timeframe for this case of botulism? Should this report count in the numerator of the Disease Control measure?

Answer: No to both. The CDC-required timeframe for initiating a control measure is within 24 hours of initial case identification. The epidemiologist initiated source identification four calendar days after receiving lab confirmation from the provider. In order for this case to count in the numerator, the epidemiologist would have needed to initiate source identification by 2:30 p.m. on Friday, June 22.

### *Data Collection, Aggregation, and Quality Improvement*

To facilitate data collection, State Awardee X agrees to add these variables into the state surveillance system. However, due to contract timing issues, the variables won't be added to the surveillance system until the next budget period. In the interim, State Awardee X will request quarterly updates via e-mail from LHDs collecting data for this measure. The awardee provides an Excel template to these LHDs, which collects the requisite local level information the state needs to report aggregate data to CDC at the end of the year.

State Awardee X communicates that it will review these reports and, when the state surveillance is eventually modified, it will pull surveillance reports quarterly and touch base with LHDs to discuss the data and identify any challenges they are experiencing. Additionally, because timeliness of reporting depends on providers and labs, State Awardee X agrees to contact its Hospital Preparedness Program and ask that an informal message be sent to its partners (e.g., hospital and infection control associations, hospital-based infectious disease epidemiologists, the state licensing board, etc.) asking that hospital-based providers and laboratorians report according to CDC's guidance for the six selected diseases.

### *County Sample*

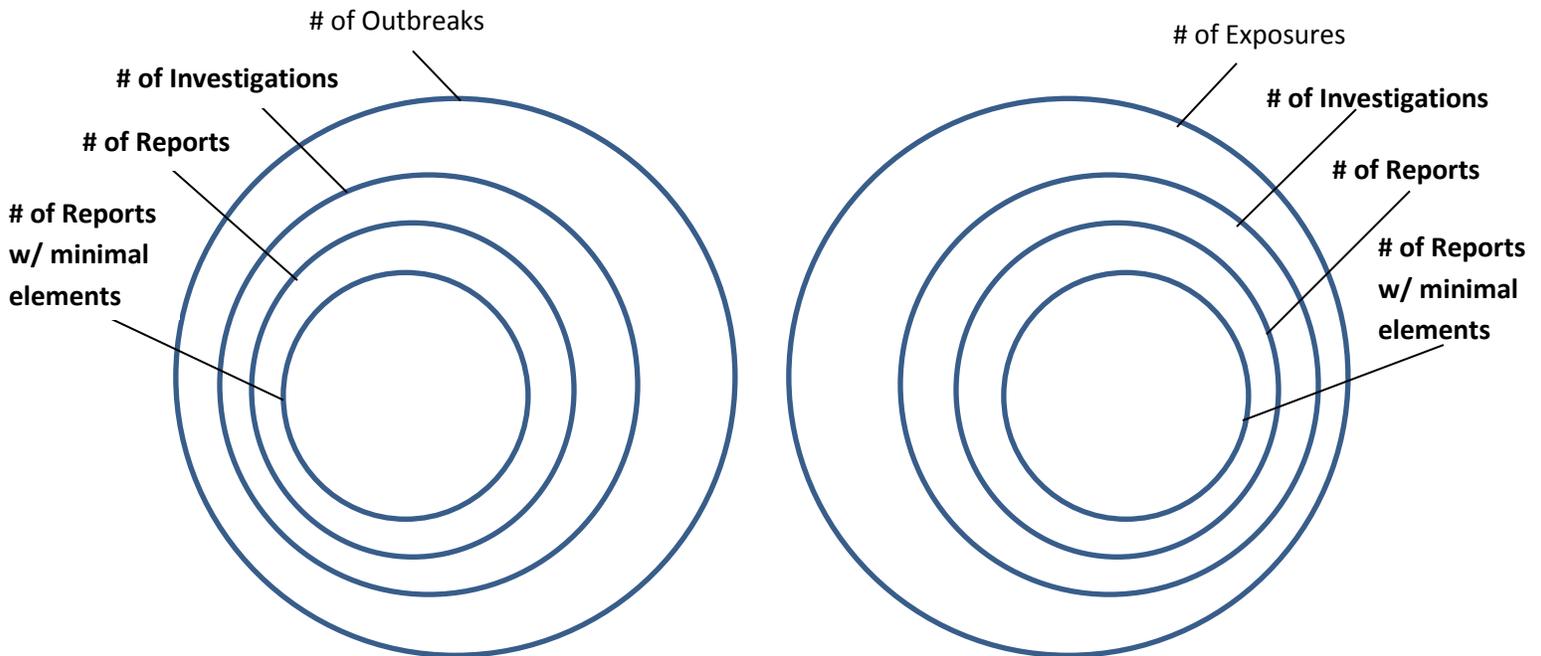
Even though State Awardee X is a centralized state, it will still need to coordinate with and collect county-level data in sampled counties. A list of these sampled counties has been provided to the state by CDC. The PHEP director recalls that there is an option to substitute one county for another by requesting to do so through her PHEP project officer. As long as the county she wishes to substitute is in the same quartile as the original county, and that the total state population represented in the sample remains at or above 25% of the entire population. State Awardee X realizes that one of the sampled counties is serviced by a regional health department, which routinely collects surveillance data on the entire region, including the sampled county. State Awardee X therefore submits a request to DSLR and receives approval to substitute the region for the county.

Because State Awardee X's surveillance system captures data from all counties in the state, the PHEP director decides to apply the performance measures to all counties. She remembers that she will only need to report data from the sampled counties to CDC; but she recalls listening to several presentations by DSLR staff encouraging her to assess performance across her entire state – even if the results for the remaining (non-sampled) counties will only be used internally her and her epidemiology staff, and not shared with CDC. This also helps to answer a question posed in other states (centralized and decentralized): if a case of disease (one of the six covered by the surveillance performance measures) occurs in a non-sampled county, should it be included in the performance measure since it is technically “received by the awardee health department.” The answer is no!

### PHEP Epidemiological Investigation Performance Measures

State Awardee X engages LHD representatives about the PHEP Epidemiological Investigation performance measures. There are four measures – two each for infectious disease outbreaks and for acute environmental exposures. The measures are identical in structure – the percentage of investigations that generate investigation reports and the percentage of investigation reports that include all minimal elements. State Awardee X uses the following figure to show the similarities between the outbreak and acute environmental exposure measures and display the primary components of the measures (i.e., the bolded text).

Figure 1.



*Infectious Disease Outbreak Measures (EI – Outbreak Investigation Reports (PHEP 13.3) and EI – Outbreak Reports with Minimal Elements (PHEP 13.4))*

The performance measures guidance states that **only the infectious disease outbreak measures (not the acute environmental exposure measures) apply to LHDs**. Therefore, State Awardee X works with LHDs to come up with a standard definition of infectious disease “outbreak.” The definition CDC provides in the performance measures guidance differs from the definition the state uses. CDC is not asking states to change their definitions. However, State Awardee X has decided that it would like all local health departments in the state to use the same definition, and facilitates a conversation to determine a statewide definition. Similarly, State Awardee X solicits feedback on the threshold beyond which an investigation is warranted – recognizing that **CDC does not expect awardee and local health departments to investigate all outbreaks**. In order to avoid confusion during data collection, the awardee also delineates for its own epi staff as well as for LHDs what should “count” as an investigation, and what should be categorized as “routine” follow-up.

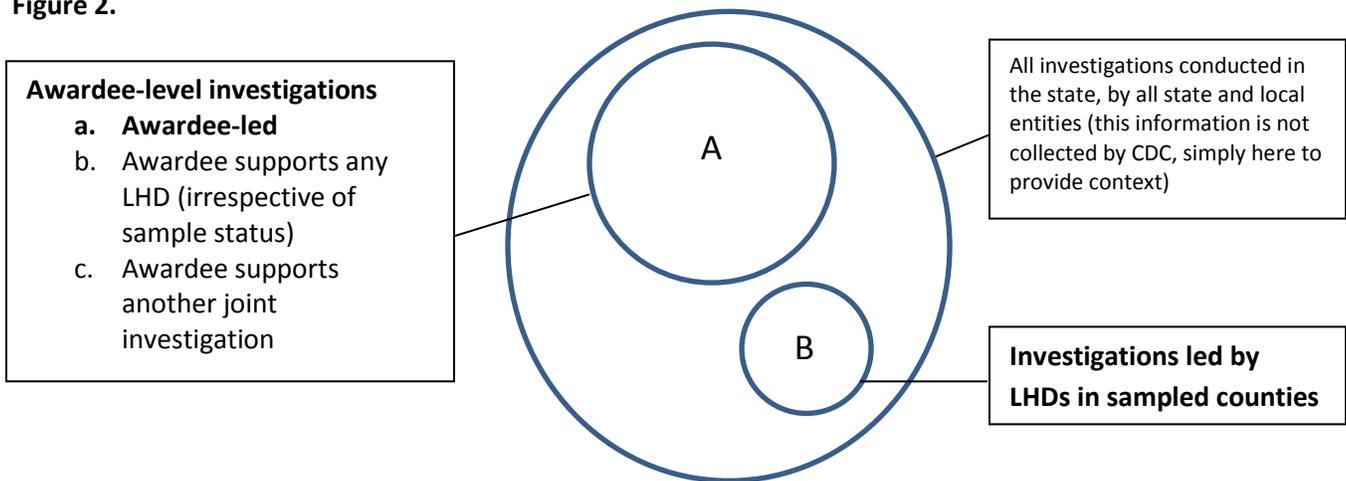
State Awardee X then points out the various categories of investigations for which CDC has asked awardees to collect and submit data. These include “awardee-level investigations” and “LHD-led investigations.” See the following table for more information.

**Awardee-level investigations** are meant to capture investigations in which the State/central office plays a **significant** role (i.e., generally something beyond routine consultation or confirmatory or rule-out lab testing), such that it would contribute to writing the investigation report and/or have a vested interest in receiving a copy of the report. There are three categories of awardee-level investigations, which for the purposes of reporting to CDC, are considered mutually exclusive. **Only the first category (awardee-led investigations) is used to calculate the awardee performance metric**. Awardees will not be held accountable for investigations led by other agencies.

Investigation Category	Description
<b>Awardee-led investigations</b> (denominator for awardee metric)	Outbreak investigations led by the state/central office for the duration of the investigation as well as investigations in which the State/central office took over the lead role from a LHD early in the investigation
<b>Awardee supports LHD investigation</b> (supporting data element, not the actual performance measure)	Outbreak investigations in which the State/central office was <b>significantly involved</b> in an investigation led by an LHD – <i>irrespective of whether the LHD covers a sampled county</i> . “Significant involvement” is not meant to include an occasional phone consultation or laboratory confirmatory or rule out testing.
<b>Awardee supports another type of joint investigation</b> (supporting data element, not the actual performance measure)	Outbreak investigations in which the State/central office was <b>significantly involved</b> in an investigation led by CDC or a neighboring state
<b>Local health department (LHD)-led investigations</b> (supporting data element, not the actual performance measure)	Outbreak investigations conducted solely by LHDs in pre-selected counties determined by CDC (or substituted with CDC permission). Generally, this means that local LHD staff members initiate the investigation, conduct site visit(s), analyze pertinent data, and produce an investigation report. Local-level investigations conducted in non-sampled counties should not be reported to CDC as part of this performance measure.

State Awardee X then explains that **LHD-led investigations** refer to those local investigations owned/conducted by LHD staff in sampled counties. This applies whether centralized or decentralized (since almost all centralized states still have LHDs, as categorized by NACCHO). While it is probable that the staff in a sampled county will communicate with the awardee health department/central office about the investigation (e.g., phone consultations), for the purposes of reporting to CDC, awardees should consider these investigations to be led by the LHD. Figure 2 graphically illustrates the universe of investigations conducted in a jurisdiction at the awardee and local levels. The largest circle represents all investigations; the smaller circles within it represent (A) awardee led- or supported-investigations and (B) investigations led by local health departments in sampled counties. Investigations within circles A and B are to be reported to CDC in the appropriate data elements.

**Figure 2.**



State Awardee X asks participants to work through the following examples in order to become familiar with the epidemiology investigation-related performance measures.

Example 1: State Awardee Y is reviewing outbreak investigation reports in preparation for submitting PHEP performance measure data. State Awardee Y is a centralized state and as such maintains area command over the majority of local investigations. This makes it difficult to decide the category of investigations under which to report these data. One of the investigation reports indicates that State Awardee Y sent an epidemiologist from the central office to assist with an investigation in a non-sampled county and that the epidemiologist devoted several days to data analysis and report generation. Another investigation report indicates that an epidemiologist from the central office participated in two conference calls with health department staff in a sampled county to discuss investigation findings and recommendations. How should the awardee report these investigations to CDC?

Answer: State Awardee Y should report the first investigation in the “awardee supports LHD investigation” category because sending staff from the central office and contributing substantially to data analysis and report generation qualify as “significant” involvement – irrespective of whether that help was provided to a sampled or non-sampled county. State Awardee Y should report the second investigation in the “investigations led by LHDs in sampled counties” category because the investigation was conducted by LHD staff in a sampled county; even though the local staff consulted with central office staff, such periodic, routine phone consultations do not qualify as “significant” involvement. Had the investigation occurred in a non-sampled county, this activity would not be reported at all in the performance measure since: (a) it is not in a sampled county, therefore no need to report local data; and (b) awardee activity wasn’t deemed “significant” so it would not be reported as “Awardee-supports LHD investigation.”

Example 2: State Awardee A and State Awardee B are reviewing outbreak investigation reports in preparation for submitting PHEP performance measure data. For State Awardee A, a lot of investigation “reports” are really just 2-3 page memos, and occasionally e-mails, that may or may not adhere to a standardized format. On the other hand, State Awardee B produces traditional reports (usually MS Word documents with a cover page, usually divided into sections, typically 10-15 pages – occasionally much longer) to document investigations in its jurisdiction. After seeing some of the more traditional reports produced in State B, State Awardee A is concerned that the templates used in its state won’t qualify to be included in the PHEP outbreak investigation reports performance measures. Does State Awardee A need to change the way it captures information about outbreak investigations in order to meet the intent of the PHEP performance measures?

Answer: No. Per the performance measures guidance, investigation reports can include a number of products, including memoranda, e-mails, written correspondence, forms, and templates.

Example 3: State Awardee C needs to determine if its outbreak investigation reports contain all seven minimal elements required by CDC. One report contains all of the required information (i.e., the minimal elements and sub-bullets included in the performance measures guidance) – but it is not structured with seven discrete sections that correspond to the minimal elements. Another report contains six of the seven minimal elements, but is otherwise an excellent report. Can Awardee C include these reports in the numerator of PHEP 13.4?

Answer: Yes for the first report, no for the second one. The format of investigation reports does not need to match exactly the format indicated in the performance measures guidance as long as all required content is included (somewhere) in the report. Moreover, for a report to count towards the numerator, it must contain all *seven elements*.

*Acute Environmental Exposure Measures (EI – Exposure Investigation Reports (PHEP 13.5) and EI – Exposure Reports with Minimal Elements (PHEP 13.6))*

The PHEP director in State X wants to know whether PHEP measures 13.5 and 13.6, regarding acute environmental exposure, refer to activities such as chemical or toxic exposure (or toxic release) investigations, environmental health inspections or other types of regulatory activity. He realizes that these performance measures are explicitly focused around *epidemiological investigations* of acute environmental exposures, not regulatory activity. To the extent that any of the above are not part of an epidemiological investigation, they are not within scope for these measures. Of course, the converse is also true: if, for example, a non-OSHA-related exposure investigation or toxic release investigation entails significant epidemiological investigation-related activity, then such an activity would be within scope for these measures.

State Awardee X does not conduct epidemiological investigations of acute environmental exposures. This function is a responsibility of the Environmental Health Agency, which is not part of the State Health Department. However, because CDC requests that the awardee work with its environmental health colleagues to collect data for these performance measures – even if they fall outside of the direct purview of PHEP program, or even the health department, in a given state – State Awardee X decides to call a meeting with the Environmental Health Agency to strategize. During the meeting with the Environmental Health Agency there are questions as to which types of acute environmental exposures “count” for these measures and State Awardee X provides the table of inclusion/exclusion criteria (Appendix E in the BP1 performance measures guidance) developed by CDC. Additionally, the state PHEP program and the Environmental Health Agency decide to establish a data sharing agreement, so that investigation reports may be shared with the PHEP program quarterly. This data is can then be reported to CDC at the end of the year.