



Wastewater Response Protocol Toolbox: Planning For and Responding To Wastewater Contamination Threats and Incidents

December 2011

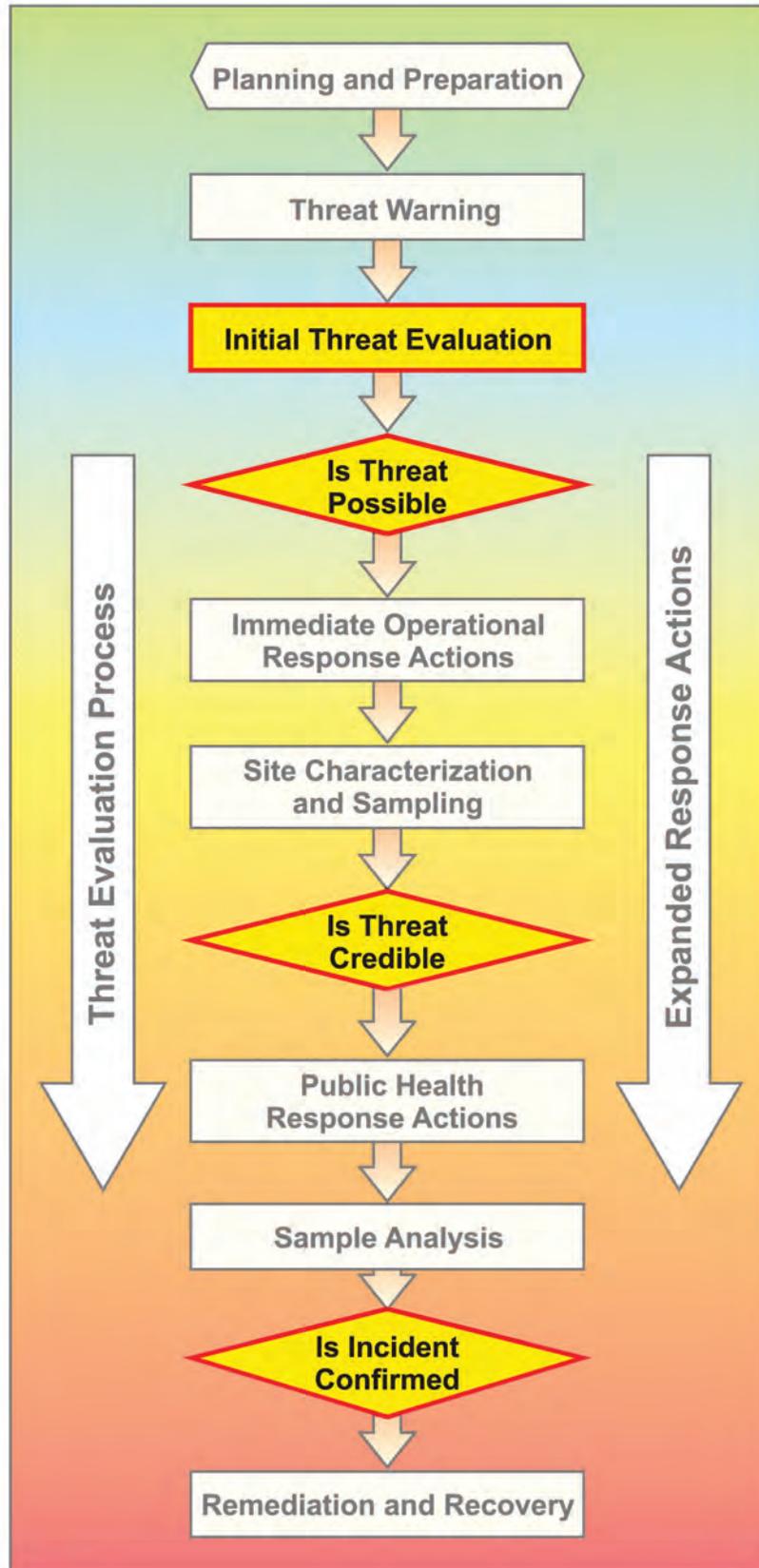
Module 2: Contamination Threat Management Guide



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1 Introduction

As discussed in Module 1, accidental and intentional contamination events involving wastewater systems have occurred in the past. In some cases, such as Guadalajara, Mexico in 1992, the results have been devastating in terms of the impact on human lives and property. Therefore, in the event of either an accidental or intentional contamination threat, there is a need to be able to evaluate the credibility of the threat and identify appropriate response actions. Also, because a large number of people and a significant amount of infrastructure and private property can be exposed to a contaminant passing through a collection and treatment system within just a few hours, there is a need to evaluate and respond in a short amount of time.

While it is desirable to have complete information prior to making response decisions, the reality is that this will almost certainly not be the case when responding to contamination threats. Typically, there will not be time to conclusively determine whether the wastewater has been contaminated or definitively identify the contaminant prior to making decisions to protect health and property. However, it is also necessary to avoid false alarms that would result in undue stress on the public. Therefore, a delicate balance must be achieved between actions taken to protect public safety and property, and limiting overreaction to a perceived threat.



Module 2, the Contamination Threat Management Guide, provides a framework for making decisions based on available, yet incomplete, information in response to a contamination threat. It represents the hub of the WWRPTB. The objectives of this module include:

- Present a framework for evaluating a wastewater contamination threat and making appropriate decisions
- Describe the type of information that may be used for conducting a threat evaluation
- Describe the actions that might be implemented in response to a contamination threat (giving appropriate consideration to the potential consequences of an incident and the impacts that may result from the response actions)

Based on these objectives, Module 2 is divided into the following sections:

1. Introduction
2. Overview of the Contamination Threat Management Process
3. ‘Possible’ Stage of the Threat Management Process
4. ‘Credible’ Stage of the Threat Management Process
5. ‘Confirmed’ Stage of the Threat Management Process
6. Contamination Threat Management Matrices
7. Summary
8. Appendices

Many of the concepts described in Module 2 are similar to those for the Water Security initiative, which addresses drinking water

security. In particular, the *Interim Guidance on Developing Consequence Management Plans for Drinking Water Utilities* (CMP) (EPA 817-R-08-001, October 2008) provided for the Water Security initiative addresses the various stages of the threat management process for drinking water (possible, credible, and confirmed). See http://www.epa.gov/safewater/watersecurity/pubs/guide_interim_cmp_wsi.pdf for additional information about the CMP.

2 Overview of the Contamination Threat Management Process

2.1 Roles and Responsibilities

As discussed in Module 1, the Incident Command System (ICS) is the national model for managing emergencies, including contamination threats, involving public drinking water and wastewater systems.

Organizations that may Assume Incident Command Responsibility During an Intentional Contamination Situation

Wastewater Utility. May be responsible for incident command during the initial stages of an event since it will often be the first party to become aware of the threat warning. The utility will retain this responsibility, by default, unless/until another organization (with proper authority) assumes command. The Utility Incident Commander would probably serve as overall Incident Commander while the utility maintains primary responsibility for managing the crisis.

Local Fire Department/HazMat Team. May assume incident command if hazardous materials are involved.

Wastewater Permitting Agency. May assume incident command, especially when a smaller utility lacks the resources to manage the threat.

Public Health Agency (state or local). May assume incident command if the situation is a public health crisis.

Local Law Enforcement. May assume incident command when criminal activity (excluding federal crimes) is suspected.

FBI. Will assume incident command (of the criminal investigation) when there is a terrorism incident or a credible threat of terrorism. In this case, EPA's Criminal Investigation Division (CID) will have a role in working with the FBI. If it is determined that a contamination threat or incident is not an act of terrorism, EPA's CID will typically be the lead federal agency for law enforcement in the response.



Under this management system, incident command has overall responsibility for managing the crisis. The organization that assumes responsibility for incident command will vary with the nature and severity of the situation. During the course of managing a contamination threat, the individual designated as Incident Commander may change as different organizations assume responsibility for managing the situation. In the event of a more complex emergency, a Unified Command may be set up in which the incident command consists of representatives of the key stakeholders with jurisdictional or functional authority.

The organization that assumes responsibility for incident command will vary with the nature and severity of the situation.

If an organization other than the wastewater utility assumes incident command, the utility will play a supporting role during the threat management process. Regardless of which organization is in charge of managing the overall situation, the utility will always have a responsibility for the wastewater system.

2.2 Response and Consequence

Response decisions regarding a wastewater system contamination threat may have consequences that significantly affect the community. While the health and safety of utility workers and the public will always be the primary concern during a contamination incident, it should be realized that the response actions taken to deal with the threat may have serious ramifications. For example, if the decision is made to completely shut down a municipal wastewater system due to concerns

over a contaminant, this would seriously impact the public health of a community that can no longer safely treat sanitary waste. Additionally, any decision to bypass the wastewater treatment plant must be consistent with applicable laws and regulations including 40 CFR 122.41(m). This could seriously impact the environment and downstream water users when raw sewage containing the contaminant is released untreated into a receiving stream.

Criteria for Response Decisions

Response decisions concerning contamination threats and incidents should be based on the following three criteria:

1. Is the contamination threat ‘Possible,’ ‘Credible,’ or ‘Confirmed?’
2. What are the potential consequences of the contamination on human health and safety, the environment, the economy, and the wastewater infrastructure?
3. What is the potential impact of the response action on public health, the economy, and the environment?

A Response Planning Matrix is a tool that can help officials weigh these three criteria when making response decisions. The matrix is a simple tabular summary that lists the three levels of a threat evaluation, the potential consequences of a threat (including the number of people affected and health effects), and potential response actions along with their impacts on the public and the environment. A blank Response Planning Matrix is included in Appendix 1 at the end of the toolbox.

2.3 Contamination Threat Management Decision and Response Tree

The overall threat management decision process is summarized in Figure 2-1. The remaining sections in this module describe the various steps in this decision and response tree.

3 Stage I: 'Possible' Stage of Threat Management Process

A wastewater contamination threat is characterized as 'Possible' if the circumstances of the threat warning (threat warnings are discussed in section 3.1) indicate that there was an opportunity for contamination. This is the lowest threshold determination in the threat evaluation process and is the point at which a decision is made regarding whether or not to initiate an investigation. If the threat is determined to be impossible, there is no need to continue the threat evaluation or consider any response actions. However, it is likely that most contamination threats will meet this relatively low threshold and thus warrant investigation.

The target time period for determining whether or not a contamination threat is 'Possible' is within **one hour** from the time the threat warning is received by the utility. Given the potentially severe consequences of failing to respond to an actual contamination incident in a timely and appropriate manner, it is important to determine whether or not a threat is 'Possible' in this relatively short time frame. The one hour target, however, should be treated as a flexible goal since the circumstances of a particular threat may dictate a shorter or longer period.

As with all stages of the threat management process, the Incident Commander usually is responsible for determining whether or not the contamination threat is 'Possible.' In

most cases, this determination will be made by the utility Incident Commander, although others may become involved in the initial evaluation as appropriate. For example, if the threat warning is reported by a law enforcement agency, they would likely play a role in determining whether or not a threat is 'Possible.' Also, the wastewater permitting agency may need to be informed about all threat warnings and may participate in this initial stage of the threat evaluation. However, given the short target time frame for the initial evaluation, the utility Incident Commander might make this determination, initiate an investigation, and initiate some preliminary operational responses.

Relevant and timely information is key to determining whether or not a threat is 'Possible' in the target time period. In most cases, the information considered at this stage will be derived directly from the threat warning (e.g., nature of warning, location, time of discovery, suspected time of incident, and other details). Under some circumstances, additional information beyond the threat warning may be considered. However, there may not be sufficient time to do so in most cases, and the determination regarding whether or not the threat is 'Possible' will be based primarily on details of the threat warning.

A Threat Evaluation Worksheet is provided in Appendix 2 to help organize the information used throughout the threat evaluation, beginning with a summary of information about the threat warning itself.

3.1 Information from the Threat Warning

A threat warning is an unusual event, observation, or discovery that indicates the potential for intentional or accidental contamination and suggests the need for actions to address the concern. Threat warnings

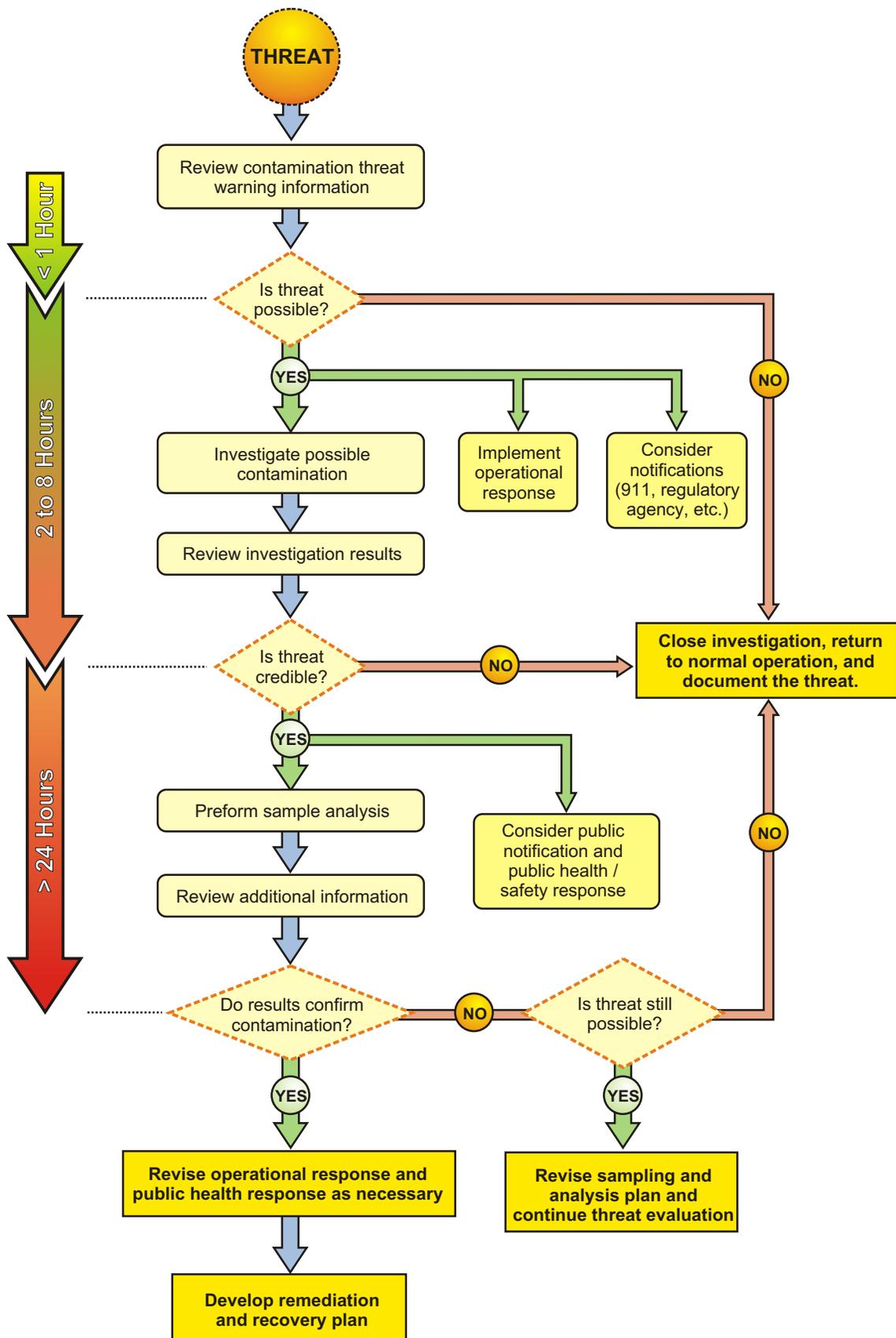


Figure 2-1. Contamination Threat Management Decision Tree for Wastewater

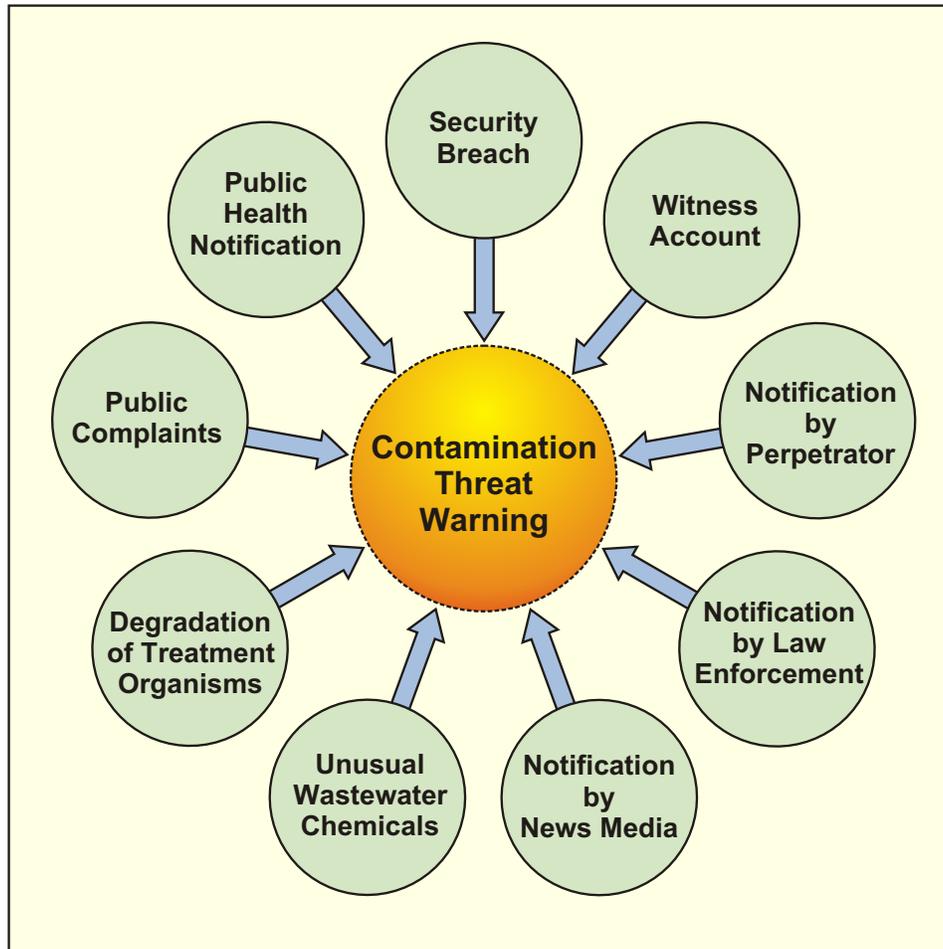


Figure 2-2. Types of Threat Warnings

may come from several sources both within and outside of the wastewater utility. Figure 2-2 summarizes the most likely threat warnings that a wastewater utility may expect to receive.

Security Breach

A security breach is an unauthorized intrusion into a secured facility or the collection system that may be discovered through direct observation (for example, through an alarm, cut fence, or open manhole). A Security Incident Report Form is included in Appendix 3 to assist in documenting the available information about a breach and support the threat evaluation.

Witness Account

A witness account is a threat warning from an individual who directly witnesses suspicious activity. A Witness Account Report Form is included in Appendix 4 to help document a witness account.

Direct Notification by Perpetrator

A threat may be made directly to the utility by a perpetrator, either verbally or in writing. Report forms for telephone and written threats are provided in Appendices 5 and 6, respectively.

Notification by Law Enforcement

A utility may receive notification about a contamination threat from a law enforcement agency.

Notification by News Media

A contamination threat might be made to the media, or the media may learn of an accidental contamination before the utility is alerted.

Unusual Wastewater Chemical Characteristics

Unusual wastewater chemical results could come from on-line monitoring or routine grab sampling indicating a possible contamination event.

Degradation of Treatment Organisms

Should a contaminant enter the treatment plant from the collection system, the first indication of its presence could be a degradation in the abundance or activity of microbes in the secondary treatment process.

Public Complaints

Public or utility employee complaints about unusual odors associated with the sewer system (e.g., petroleum products or industrial chemicals) may suggest the presence of a contaminant. Wastewater system personnel reporting unusual health symptoms may also indicate a threat.

Notification by Public Health Agencies

Notification from health agencies or health care providers that people are being negatively affected by fumes emanating from domestic sewer systems, catch basins, or the wastewater treatment plant may suggest a contamination

event. A Public Health Information Report Form included in Appendix 7 is intended to organize information from public health entities to support this evaluation.

3.2 Additional Information

Information extracted from details of the threat warning is critical to determining whether or not a contamination threat is ‘Possible.’ Different types of warnings will have different levels of initial believability. For example, widespread complaints of solvent-like odors wafting up from sanitary sewer manholes would have a higher degree of initial believability than a report of unusual wastewater chemistry based on changes in a few general parameters (e.g., pH or alkalinity). Some warnings may be judged so reliable that the threat is deemed ‘Credible’ solely on the basis of information about the threat warning, while others may be almost instantly dismissed as impossible.

Regardless of the nature and source of the threat warning, it is critical that protocols be in place to report the warning to the utility Incident Commander as quickly as possible. Utilities should develop communications procedures to ensure that threat warnings can be rapidly and accurately reported on a 24/7 basis.

While the threat warning will likely provide the most immediate and relevant information, several other resources might be considered to help make the determination as to whether a threat is ‘Possible.’ These may include: internal information from utility staff that are knowledgeable of the operation of the wastewater system, information from the utility’s VA that is relevant to the current situation, and real time water chemistry data that might be used as an indicator of wastewater contamination.

3.3 Response Actions Considered at the 'Possible' Stage

Once a contamination threat has been deemed 'Possible,' relatively low level response actions are appropriate since this is a very early stage in the threat management process. Two response actions that might be considered at this stage include site characterization and operational response.

Site Characterization

This is the process of collecting information from the site of a suspected wastewater contamination incident. This is a key activity in the ongoing threat evaluation and is intended to help determine whether or not the 'Possible' threat is 'Credible.' Site characterization includes the following activities:

- Site investigation
- Field safety screening
- Rapid field testing of wastewater
- Sample collection

Detailed procedures for conducting site characterization are described in Module 3: Site Characterization and Sampling Guide.

Immediate Operational Responses

These are actions intended to limit the potential exposure of the public to the contaminant and reduce the risk to private property, the wastewater infrastructure, and the environment while site characterization activities are conducted. An example operational response would be diverting the flow of untreated wastewater to temporary storage, rather than exposing the treatment process, until the nature of the possible contamination event can be better characterized. Emergency pretreatment of the influent wastewater may also be



considered consistent with any applicable laws and regulations. This may include the addition of powdered activated carbon, a strong oxidant such as chlorine or potassium permanganate, or the addition of caustic to neutralize or precipitate a toxic chemical.

If a flammable substance is in the collection system, the utility, working with the fire department, may attempt to remove the substance using vacuum trucks and/or oil spill remediation equipment. If the flammable substance is in the plant influent, the utility may decide to turn off pumps to the treatment basins and assist the fire department in dispensing aqueous film forming foam.

The decision to implement these response actions may need to be made very quickly for the actions to have their desired effect. For example, in order for diversion and storage of untreated wastewater to be effective, it may need to be implemented as quickly as feasible after a threat is deemed 'Possible.' To facilitate this, the utility Incident Commander should be aware of the regulatory and legal considerations that may apply to decisions, and be empowered to implement such response actions at the 'Possible' stage. However, the immediate response actions should then be shared with utility management.

If an operational response is not feasible, the threat evaluation process should be accelerated to determine whether or not the threat is ‘Credible.’

4 Stage II: ‘Credible’ Stage of Threat Management Process

A wastewater contamination threat should be considered to be ‘Credible’ if additional information collected during the investigation (initiated after the ‘Possible’ decision was made) corroborates the threat warning, and the cumulative information indicates that contamination is likely. For example, if the threat warning comes in the form of a security breach and additional convincing signs of contamination (e.g., abnormal wastewater chemical values) are observed during site characterization, the threat could be considered ‘Credible.’ While many warnings may result in ‘Possible’ contamination threats, only a small percentage of those ‘Possible’ threats are expected to be elevated to the ‘Credible’ level.

It is important to move quickly from the ‘Possible’ stage to the next stage of the threat management process to determine whether or not the threat is ‘Credible’ and warrants an elevated response. The target time period for determining whether or not a contamination threat is ‘Credible’ is within **2 to 8 hours** from the time that the threat was deemed ‘Possible.’ The decision to elevate a threat from ‘Possible’ to ‘Credible’ is significant since elevated response actions may be necessary to protect public health and safety. The elevated response measures may fall outside of the authority of the utility Incident Commander, and the organizations that would be involved in these response decisions would need to be engaged in the threat evaluation process at this stage. This might include wastewater utility management, the regulatory agency, and the

public health agency. If there is a possibility that the contamination event was deliberate, law enforcement may also need to be involved. The individual typically responsible for determining that a contamination threat is ‘Credible’ is the Incident Commander, who may not be the utility Incident Commander at this point in the threat management process.



4.1 Information Considered at the ‘Credible’ Stage

Many of the information resources used to determine that a threat is ‘Possible’ may also prove relevant at the ‘Credible’ stage. It is important to view the investigation as a continuum. Information collected through the ‘Possible’ and ‘Credible’ stages of an investigation should be evaluated in its entirety.

Additional information that might be considered to support the threat evaluation and determine whether or not a contamination threat is ‘Credible’ include site characterization results, previous threats and incidents, and information from external sources.

Site Characterization Results

This includes observations from the site investigation such as physical evidence (e.g., discarded equipment and containers) and environmental indicators (e.g., dead animals, dead vegetation, and unusual odors). This also includes results from field safety screening and rapid field testing of the wastewater. If it is suspected that a contaminant may have already entered the treatment plant, it may be useful to examine archived samples from a continuous automatic sampling program if the utility operates one.

Previous Threats and Incidents

Summary information derived from analysis of previous incidents similar to the current threat warning may be considered. This can include incidents that have occurred at this utility as well as incidents that have occurred previously in other parts of the country.



Information from External Sources

Information can also be obtained from external sources to assist incident command in determining whether a threat is ‘Credible.’ Some potential external information sources include:

- Wastewater Permitting Agency

- EPA
- Water ISAC - (Water Information Sharing and Analysis Center) <http://www.waterisac.org>
- NRC (National Response Center): Has experts trained to provide assistance in the case of a terrorist threat or incident. Also serves as a central point of contact for federal resources (1-800-424-8802).
- Law Enforcement Agencies (from all levels of government)
- FBI: The focus of the FBI’s investigation will be the terrorism aspects of the threat. However, if the FBI determines that the event is ‘Credible’ from a terrorism perspective, the threat will likely also be considered ‘Credible’ from a utility and public health/safety perspective.
- Neighboring Utilities and WARNs
- Public Health Agencies
- 911 Call Centers
- Homeland Security Warnings and Alerts

If a specific contaminant is suspected during a threat, information about that contaminant should be consulted to help establish the ‘Credibility’ and potential consequences of the threat (e.g., toxicity and water solubility). A resource for contaminant specific information is EPA’s Water Contaminant Information Tool (WCIT) at <http://www.epa.gov/wcit>.

4.2 Response Actions Considered at the ‘Credible’ Stage

Once the decision has been made that the threat of contamination is ‘Credible,’ the response actions that are taken are designed to minimize risk to public health/safety, private property, the economy, infrastructure, and the environment. The response is also aimed at gathering additional information to ultimately decide whether the contamination threat can be ‘Confirmed.’

The response actions taken at the ‘Credible’ stage may have a greater impact on the public than those taken at the ‘Possible’ stage. Four response actions that may be considered at the ‘Credible’ stage, in conjunction with applicable laws or regulations, include the following:

Sample Analysis

Once a threat has been deemed ‘Credible,’ one of the first steps taken in an effort to confirm a contamination incident should be the analysis of samples that were collected during site characterization. The recommended analytical procedures for confirming the presence of tentatively identified contaminants, or analyzing wastewater samples for unknown contaminants, are presented in Module 4: Analytical Guide.

Continuation of Site Characterization Activities

Once a threat is deemed ‘Credible,’ additional site characterization and sampling activities may be implemented in an attempt to confirm a contamination incident. In cases where a ‘Credible’ contamination threat is not confirmed, the additional site characterization and sampling activities will help verify that the wastewater has not been contaminated and support the decision to return to normal operations.

Law Enforcement Notification

If at this stage of the threat management process it appears that an intentional act may have been associated with the apparent contamination event, law enforcement should be contacted if they have not been contacted previously.



Public Notification and Public Health/Safety Response

As with the immediate operational response actions taken following the decision that a threat is ‘Possible,’ the goal of the public health response actions taken after a threat has been deemed ‘Credible’ is to minimize risk to the population. However, the public health response and safety actions at this stage are elevated with respect to the impact on the public. It is at this point that officials may need to notify the public of the emergency under existing laws or regulations or they may decide to notify the public anyway in the absence of a legal requirement to do so. For example, if significant levels of flammable or explosive chemicals have entered the wastewater collection system, either accidentally or due to an intentional act, the nearby population may be instructed to evacuate the area. If the contaminant has entered the treatment plant, plant personnel may be instructed to evacuate. If the contaminant has passed through the treatment plant, or the contaminated wastewater has been released to the receiving stream, downstream users, such as drinking water treatment plants, should also be contacted.

The Incident Commander (or Unified Command) will typically make decisions regarding actions taken in response to



a ‘Credible’ wastewater contamination threat. Due to the elevated level of actions considered at this stage, responsibility for incident command may shift from the utility Incident Commander to another individual or organization. Additionally, at this point local government may choose to activate their Emergency Operations Center (EOC) to help facilitate a coordinated response among the participating agencies. Activation of the EOC may be full or partial depending upon the circumstances.

The EOC is the physical location or headquarters in which the coordination of information and resources to support incident management takes place. It is the support arm of the response effort. It is typically maintained by a community or jurisdiction (city, county, state) as part of their emergency preparedness program. The EOC is usually located in a central, permanently established facility situated some distance from the incident. It is from this location that elected officials, top agency representatives, and EOC staff coordinate information and resources to support on-scene management of the incident which occurs at the Incident Command Post.

The Incident Command Post (ICP) is usually where the Incident Commander or the Unified Command, and their staff, are physically

located. The ICP is normally located as close as possible to the site of the emergency. It is from this location that incident command may exercise tactical command and control over the emergency response effort.

5 Stage III: ‘Confirmed’ Stage of Threat Management Process

Confirmation represents the transition from a contamination threat to a contamination incident and requires definitive proof that the wastewater has been contaminated. The most reliable means of confirming a contamination incident is through analytical confirmation of the presence of a contaminant. However, under some circumstances, it may be necessary to confirm a contamination incident in the absence of definitive analytical data. This is particularly true in cases where there are challenges in collecting a representative sample due to uncertainty about the point of contaminant introduction, or due to a significant amount of time having elapsed between the introduction of the contaminant and receipt of the threat warning. In cases where analytical confirmation is not possible, it will be necessary to rely upon a preponderance of evidence to confirm an incident. It may take several days to collect sufficient evidence (analytical or non-analytical) to confirm a contamination incident.

If the threat evaluation yields no conclusive evidence of contamination, then there should be a determination as to whether the threat still appears to be credible. If it is still ‘Credible,’ then additional investigation and analysis are warranted. On the other hand, if incident command decides that the threat is no longer ‘Credible,’ then the incident could be brought to a close. However, the investigation at this point will have to be sufficiently thorough to demonstrate that the wastewater is safe and the system can be returned to normal operation.

5.1 Information Considered at the ‘Confirmed’ Stage

The types of information that might help confirm a contamination incident include the following:

Analytical Results

Positive identification of a contaminant through sample analysis can confirm a contamination incident and provide the basis for making decisions about public health/safety responses and remediation activities.

Additional Site Characterization Results

At the ‘Confirmed’ stage of the threat management process, there will likely be results from site characterization activities performed at multiple locations. These results should be reviewed collectively to explore any potential trends in the data.

Information from External Sources

At this stage, external resources can be specifically targeted in light of the information already collected. Information from these resources may help to build the ‘preponderance of evidence’ to confirm an event in the absence of laboratory identification of a contaminant.

5.2 Response Actions Considered at the ‘Confirmed’ Stage

Once a contamination incident has been confirmed, it should be moved into full response mode. At this point, depending on the level of risk posed by the contamination event, city, county, and/or state EOCs may be activated in order to support an effective and coordinated response (Figure 2-3). Other organizations that may be actively engaged in the response include: the

wastewater permitting agency, public health officials, emergency response agencies, law enforcement, and the WARN network. All of the participating organizations will likely be coordinated under existing incident command structures designed to manage emergencies at the local or state level. One agency will likely be designated as a lead agency and be responsible for incident command. In some cases a Unified Command may be established. If federal agencies are involved in the response, their roles are defined by the National Response Framework (<http://www.fema.gov/emergency/nrf/>). In any case, the utility will still have a role in the implementation of full response actions.



Figure 2-3. Emergency Operations Center

Effective implementation of response actions at this stage is enhanced by positive identification of the contaminant and knowledge of contaminant properties. In particular, the appropriate public health protection strategies, and selection of treatment technologies, will depend on the nature of the specific contaminant. It is vital to perform a thorough investigation in order to have confidence in any decisions about response actions. This is especially true if response actions are implemented on the basis of a preponderance of evidence rather than analytical confirmation.

Once the incident has been confirmed, and available information about the incident has been analyzed, the public health response measures already implemented should be reassessed and revised if necessary. This might include revisions to containment strategies or public notifications. Once the immediate public health crisis is under control, efforts will likely focus on remediation and recovery.

6 Contamination Threat Management Matrices

Listed below is a series of Contamination Threat Management Matrices. There is a matrix (tabular summary) provided for each of the nine threat warnings discussed in Section 3.1. Each matrix lists the following items at each stage of the threat evaluation:

- Information that should be considered in assessing the threat
- Factors that should be considered in evaluating this information
- Potential notifications
- Possible response actions

While these matrices are generic, they can be tailored to the needs of a specific utility and to very specific incidents (e.g., security breach at a particular wastewater facility). The actions in these matrices or additional actions may be required by any laws or regulations that apply to the situation. The customized Contamination Threat Management Matrices could then be used as an aid in development of a utility's Emergency Response Plan and site specific Response Guidelines.



6.1 Security Breach

Table 2-1: Recommendation for Threat Evaluation Stage - Security Breach

	Possible	Credible	Confirmatory
Information	<ul style="list-style-type: none"> • Location of security breach • Time of security breach • Information from alarms • Observations when security breach was discovered • Additional details from the threat warning 	<ul style="list-style-type: none"> • Results of site characterization at location of security breach • Previous incidents • Real time wastewater chemical data from location of breach • Input from local law enforcement 	<ul style="list-style-type: none"> • Results of sample analysis • Contaminant information • Results of site characterization at other investigation sites • Input from permitting agency and public health agency
Evaluation	<ul style="list-style-type: none"> • Was there an opportunity for contamination? • Has normal operational activity been ruled out? • Have other "harmless" causes been ruled out? 	<ul style="list-style-type: none"> • Do site characterization results reveal signs of contamination? • Is this security breach similar to previous security incidents? • Does other information (e.g., wastewater chemical characteristics) corroborate threat? • Does law enforcement consider this a credible threat? 	<ul style="list-style-type: none"> • Were unusual contaminants detected during analysis? Do they pose a risk to the public? • Do site characterization results reveal signs of contamination? • Is contamination indicated by a "preponderance of evidence?"
Notifications	<ul style="list-style-type: none"> • Notifications within utility • Local law enforcement agencies 	<ul style="list-style-type: none"> • Wastewater primacy agency • State/local public health agency • FBI (if contamination appears to be deliberate) 	<ul style="list-style-type: none"> • Emergency response agencies • National Response Center • Other state and federal assistance providers • WARN network • Downstream users if receiving stream was contaminated
Response	<ul style="list-style-type: none"> • Isolate affected area • Initiate site characterization • Estimate spread of suspected contaminant • Consult external information sources 	<ul style="list-style-type: none"> • Implement appropriate public health/safety protection measures • Consider steps to protect wastewater system (e.g., diversion of contaminated wastewater) consistent with applicable laws and regulations 	<ul style="list-style-type: none"> • Characterize affected area • Revise public health/safety protection measures as necessary • Plan remediation activities

6.2 Witness Account

Table 2-2: Recommendation for Threat Evaluation Stage - Witness Account

	Possible	Credible	Confirmatory
Information	<ul style="list-style-type: none"> • Location of the suspicious activity • Witness account of the suspicious activity • Additional details from the threat warning 	<ul style="list-style-type: none"> • Additional information from the witness • Results of site characterization at location of suspicious activity • Previous incidents • Real time wastewater chemical data from the location of suspicious activity • Input from local law enforcement 	<ul style="list-style-type: none"> • Results of sample analysis • Contaminant information • Results of site characterization at other investigation sites • Input from permitting agency and public health agency
Evaluation	<ul style="list-style-type: none"> • Was there an opportunity for contamination? • Is the witness reliable? • Has normal operational activity been ruled out? • Have other "harmless" causes been ruled out? 	<ul style="list-style-type: none"> • Do site characterization results reveal signs of contamination? • Is the suspicious activity similar to previous security incidents? • Does other information (e.g., wastewater chemical characteristics) corroborate threat? • Does law enforcement consider this a credible threat? 	<ul style="list-style-type: none"> • Were unusual contaminants detected during analysis? Do they pose a risk to the public? • Do site characterization results reveal signs of contamination? • Is contamination indicated by a "preponderance of evidence?"
Notifications	<ul style="list-style-type: none"> • Notifications within utility • Local law enforcement 	<ul style="list-style-type: none"> • Wastewater permitting agency • State/local public health agency • FBI (if contamination appears to be deliberate) 	<ul style="list-style-type: none"> • Emergency response agencies • National Response Center • Other state and federal assistance providers • WARN network • Downstream users if receiving stream was contaminated
Response	<ul style="list-style-type: none"> • Isolate affected area • Initiate site characterization • Estimate spread of suspected contaminant • Consult external information sources • Interview witness for additional information 	<ul style="list-style-type: none"> • Implement appropriate public health/safety protection measures • Consider steps to protect wastewater system (e.g., diversion of contaminated wastewater) consistent with applicable laws and regulations • Analyze samples • Perform site characterization at additional sites 	<ul style="list-style-type: none"> • Characterize affected area • Review public health protection measures as necessary • Plan remediation activities

6.3 Direct Notification by Perpetrator

Table 2-3: Recommendation for Threat Evaluation Stage - Direct Notification by Perpetrator

	Possible	Credible	Confirmatory
Information	<ul style="list-style-type: none"> • Transcript of phone (or written) threat • The who, what, where, when, and why of the threat • Additional details from the threat warning • Vulnerability assessment 	<ul style="list-style-type: none"> • Law enforcement assessment • Primacy agency assessment • Previous threats at this utility or other utilities • Results of site characterization at selected investigation sites • Real time wastewater chemical data • Reports from ISAC, EPA, etc. 	<ul style="list-style-type: none"> • FBI assessment • Results of sample analysis • Contaminant information • Results of site characterization at other investigation sites • Input from permitting agency and public health agency
Evaluation	<ul style="list-style-type: none"> • Is the threat feasible? • Has the wastewater already been contaminated? • Is the location known or suspected? • Is the identity of the perpetrator known or suspected? • Have there been personnel problems at the utility? 	<ul style="list-style-type: none"> • Do site characterization results reveal signs of contamination? • Does other information (e.g., wastewater chemical characteristics) corroborate threat? • Does law enforcement consider this a credible threat? • Does the permitting agency consider this a credible threat? 	<ul style="list-style-type: none"> • Were unusual contaminants detected during analysis? Do they pose a risk to the public? • Do site characterization results reveal signs of contamination? • Is contamination indicated by a “preponderance of evidence?”
Notifications	<ul style="list-style-type: none"> • Notifications within utility • Local law enforcement • Wastewater permitting agency 	<ul style="list-style-type: none"> • FBI (if contamination appears to be deliberate) • State/local public health agency • EPA Criminal Investigation Division 	<ul style="list-style-type: none"> • Emergency response agencies • National Response Center • Other state and federal assistance providers • WARN network • Downstream users if receiving stream was contaminated
Response	<ul style="list-style-type: none"> • Isolate affected area if identified in the threat • Identify sites and initiate site characterization • Consult external information sources • Gather information from law enforcement assessment 	<ul style="list-style-type: none"> • Implement appropriate public health protection measures • Consider steps to protect wastewater system (e.g., diversion of contaminated wastewater) consistent with applicable laws and regulations • Analyze samples • Perform site characterization at additional sites • Estimate spread of suspected contaminant 	<ul style="list-style-type: none"> • Characterize affected area • Revise public health protection measures as necessary • Plan remediation activities

6.4 Notification by Law Enforcement

Table 2-4: Recommendation for Threat Evaluation Stage - Notification by Law Enforcement

	Possible	Credible	Confirmatory
Information	<ul style="list-style-type: none"> • Law enforcement report • The who, what, where, when, and why of the threat • Additional details from the threat warning • Vulnerability assessment 	<ul style="list-style-type: none"> • Law enforcement assessment • Previous security incidents • Results of site characterization at selected investigation sites • Real time wastewater chemical data • Reports from ISAC, EPA, etc. 	<ul style="list-style-type: none"> • FBI assessment • Results of sample analysis • Contaminant information • Results of site characterization at other investigation sites • Input from permitting agency and public health agency
Evaluation	<ul style="list-style-type: none"> • How did the threat warning come to law enforcement? • Is the threat feasible? • Has the wastewater already been contaminated? • Is a specific location targeted? 	<ul style="list-style-type: none"> • Do site characterization results reveal signs of contamination? • Does other information (e.g., wastewater chemical characteristics) corroborate threat? • Does law enforcement consider this a credible threat? • Does the permitting agency consider this a credible threat? 	<ul style="list-style-type: none"> • Were unusual contaminants detected during analysis? Do they pose a risk to the public? • Do site characterization results reveal signs of contamination? • Is contamination indicated by a "preponderance of evidence?"
Notifications	<ul style="list-style-type: none"> • Notifications within utility • Wastewater permitting agency 	<ul style="list-style-type: none"> • FBI (if contamination appears to be deliberate) • State/local public health agency 	<ul style="list-style-type: none"> • Emergency response agencies • National Response Center • Other state and federal assistance providers • WARN network • Downstream users if receiving stream was contaminated
Response	<ul style="list-style-type: none"> • Isolate affected area if known • Identify sites and initiate site characterization • Work with law enforcement to assess threat credibility • Consult external information sources 	<ul style="list-style-type: none"> • Implement appropriate public health protection measures • Consider steps to protect wastewater system (e.g., diversion of contaminated wastewater) consistent with applicable laws and regulations • Analyze samples • Perform site characterization at additional sites • Estimate spread of suspected contaminant 	<ul style="list-style-type: none"> • Characterize affected area • Revise public health protection measures as necessary • Plan remediation activities

6.5 Notification by News Media

Table 2-5: Recommendation for Threat Evaluation Stage - Notification by News Media

	Possible	Credible	Confirmatory
Information	<ul style="list-style-type: none"> • Details of media report • The who, what, where, when and why of the threat • Additional details from the threat warning • Vulnerability assessment 	<ul style="list-style-type: none"> • Additional details from media • Law enforcement assessment • Previous security incidents • Results of site characterization at selected investigation sites • Real time wastewater chemical data • Reports from ISAC, EPA, etc. 	<ul style="list-style-type: none"> • FBI assessment • Results of sample analysis • Contaminant information • Results of site characterization at other investigation sites • Input from permitting agency and public health agency
Evaluation	<ul style="list-style-type: none"> • How did the threat warning come to the media? • Is the threat feasible? • Has the wastewater already been contaminated? • Is a specific location targeted? 	<ul style="list-style-type: none"> • Do site characterization results reveal signs of contamination? • Does other information (e.g., wastewater chemical characteristics) corroborate threat? • Does law enforcement consider this a credible threat? • Does the permitting agency consider this a credible threat? 	<ul style="list-style-type: none"> • Were unusual contaminants detected during analysis? Do they pose a risk to the public? • Do site characterization results reveal signs of contamination? • Is contamination indicated by a “preponderance of evidence?”
Notifications	<ul style="list-style-type: none"> • Notifications within utility • Local law enforcement • Wastewater permitting agency 	<ul style="list-style-type: none"> • FBI (if contamination appears to be deliberate) • State/local public health agency 	<ul style="list-style-type: none"> • Emergency response agencies • National Response Center • Other state and federal assistance providers • WARN network • Downstream users if receiving stream was contaminated
Response	<ul style="list-style-type: none"> • Isolate affected area if known • Identify sites and initiate site characterization • Contact news media for additional details • Consult external information sources 	<ul style="list-style-type: none"> • Implement appropriate public health protection measures • Consider steps to protect wastewater system (e.g., diversion of contaminated wastewater) consistent with applicable laws and regulations • Analyze samples • Perform site characterization at additional sites • Estimate spread of suspected contaminant 	<ul style="list-style-type: none"> • Characterize affected area • Revise public health protection measures as necessary • Plan remediation activities

6.6 Unusual Water Quality

Table 2-6: Recommendation for Threat Evaluation Stage - Unusual Water Quality

	Possible	Credible	Confirmatory
Information	<ul style="list-style-type: none"> Unusual wastewater chemical data Baseline wastewater chemical data Real time wastewater chemical data Operational information corresponding to the time of the unusual water quality 	<ul style="list-style-type: none"> Results of site characterization at selected investigation sites Previous threat warnings triggered by changes in wastewater chemistry Contaminant information Public complaints 	<ul style="list-style-type: none"> Results of sample analysis Contamination information Results of site characterization at other investigation sites Input from permitting agency and public health agency
Evaluation	<ul style="list-style-type: none"> Are the unusual wastewater chemical values significantly different from an established baseline? Could operational changes be the cause? Are there similar results at other monitoring locations? 	<ul style="list-style-type: none"> Do site characterization results reveal signs of contamination? Are these unusual data substantially different from previous episodes involving changes in wastewater chemistry? Are the unusual wastewater chemical data indicative of a specific contaminant? Are the unusual wastewater chemical results clustered in a specific area? Are there any unusual public complaints in the area? (e.g., odors) 	<ul style="list-style-type: none"> Were unusual contaminants detected during analysis? Do they pose a risk to the public? Do site characterization results reveal signs of contamination? Is contamination indicated by a "preponderance of evidence?"
Notifications	<ul style="list-style-type: none"> Notifications within utility 	<ul style="list-style-type: none"> Wastewater permitting agency State/local public health agency Local law enforcement FBI (if contamination appears to be deliberate) 	<ul style="list-style-type: none"> Emergency response agencies National Response Center Other state and federal assistance providers WARN network Downstream users if receiving stream was contaminated
Response	<ul style="list-style-type: none"> Identify sites and initiate site characterization Begin analysis of available wastewater chemical data Investigate any unusual public complaints Consult external information sources 	<ul style="list-style-type: none"> Implement appropriate public health protection measures Consider steps to protect wastewater system (e.g., diversion of contaminated wastewater) consistent with applicable laws and regulations Analyze samples Perform site characterization at additional sites Estimate spread of suspected contaminant 	<ul style="list-style-type: none"> Characterize affected area Revise public health protection measures as necessary Plan remediation activities

6.7 Degradation of Treatment Organisms

Table 2-7: Recommendation for Threat Evaluation Stage - Degradation of Treatment Organisms

	Possible	Credible	Confirmatory
Information	<ul style="list-style-type: none"> Extent of degradation Time of degradation Additional signs of contamination 	<ul style="list-style-type: none"> Results of site characterization at location of suspected contamination Previous incidents Real time wastewater chemical data Input from local law enforcement 	<ul style="list-style-type: none"> Results of sample analysis Contaminant information Results of site characterization at other investigation sites Input from permitting agency and public health agency
Evaluation	<ul style="list-style-type: none"> Was there an opportunity for contamination? Has normal operational activity been ruled out? Have other “harmless” causes been ruled out? 	<ul style="list-style-type: none"> Do site characterization results reveal signs of contamination? Is this degradation of treatment organisms similar to previous contamination incidents? Does other information (e.g., wastewater chemistry) corroborate threat? 	<ul style="list-style-type: none"> Were unusual contaminants detected during analysis? Do they pose a risk to the public? Do site characterization results reveal signs of contamination? Is contamination indicated by a “preponderance of evidence?”
Notifications	<ul style="list-style-type: none"> Notifications within utility 	<ul style="list-style-type: none"> Wastewater permitting agency State/local public health agency Local law enforcement and FBI (if contamination appears to be deliberate) 	<ul style="list-style-type: none"> Emergency response agencies National Response Center Other state and federal assistance providers WARN network Downstream users if receiving stream was contaminated
Response	<ul style="list-style-type: none"> Isolate affected area Initiate site characterization Estimate spread of suspected contaminant Consult external information source 	<ul style="list-style-type: none"> Implement appropriate public health/safety protection measures Consider steps to protect wastewater system (e.g. diversion of contaminated wastewater) consistent with applicable laws and regulations 	<ul style="list-style-type: none"> Characterize affected area Revise public health protection measures as necessary

6.8 Public Complaints

Table 2-8: Recommendation for Threat Evaluation Stage - Public Complaints

	Possible	Credible	Confirmatory
Information	<ul style="list-style-type: none"> • Compilation of public complaints, including geographic distribution (e.g., unusual odors emanating from sewers) • Recent wastewater chemical data that may be associated with complaints • Operational information corresponding to the time of the unusual complaints 	<ul style="list-style-type: none"> • Results of site characterization at selected investigation sites • Summary of historic public complaints • Contaminant information 	<ul style="list-style-type: none"> • Results of sample analysis • Contaminant information • Results of site characterization at other investigation sites • Input from permitting agency and public health agency
Evaluation	<ul style="list-style-type: none"> • Are the complaints unusual? • Could operational changes be the cause? • Are the complaints clustered in a specific area? • Are complaints from habitual complainers? 	<ul style="list-style-type: none"> • Do site characterization results reveal signs of contamination? • Are other people in the area making similar complaints? • Are the unusual complaints significantly different from typical complaints? • Are the complaints indicative of a specific contaminant? • Is there anything unusual about the water quality in the area? 	<ul style="list-style-type: none"> • Were unusual contaminants detected during analysis? Do they pose a risk to the public? • Do site characterization results reveal signs of contamination? • Is contamination indicated by a "preponderance of evidence?"
Notifications	<ul style="list-style-type: none"> • Notifications within utility 	<ul style="list-style-type: none"> • Wastewater permitting agency • State/local public health agency • Local law enforcement • FBI (if contamination appears to be deliberate) 	<ul style="list-style-type: none"> • Emergency response agencies • National Response Center • Other state and federal assistance providers • WARN network • Downstream users if receiving stream was contaminated
Response	<ul style="list-style-type: none"> • Identify sites and initiate site characterizations • Begin analysis of available wastewater chemical data • Interview people in area with high numbers of complaints • Consult external information sources 	<ul style="list-style-type: none"> • Estimate affected area and isolate if possible • Implement appropriate public health/safety protection measures • Consider steps to protect wastewater system (e.g., diversion of contaminated wastewater) consistent with applicable laws and regulations • Analyze samples • Perform site characterization at additional sites • Estimate spread of suspected contaminant 	<ul style="list-style-type: none"> • Characterize affected area • Review public health protection measures as necessary • Plan remediation activities

6.9 Public Health Notification

Table 2-9: Recommendation for Threat Evaluation Stage - Public Health Notification

	Possible	Credible	Confirmatory
Information	<ul style="list-style-type: none"> • Details of notification from public health sector • Symptoms of health effects and causative agent, if known • Contaminant information 	<ul style="list-style-type: none"> • Geographic distribution of health effects • Recent wastewater chemical and operational data • Reports of public complaints • Contaminant information 	<ul style="list-style-type: none"> • Results of site characterization at selected investigation sites • Results of sample analysis • Contaminant information • Law enforcement and/or FBI assessment
Evaluation	<ul style="list-style-type: none"> • Why is wastewater under investigation as a possible source? • Are the reported symptoms consistent with exposure to the contaminant via wastewater? • If causative agent is known, is it stable in water? 	<ul style="list-style-type: none"> • Is the geographic pattern of exposure consistent with exposure to contaminated wastewater? • Is there a recent occurrence of unusual water quality data or public complaints? • Does additional information about the potential contaminant indicate wastewater as a potential source? 	<ul style="list-style-type: none"> • Has the public health agency concluded that wastewater is the cause of the health effects? • Did sample analysis detect the causative agent? • Was another contaminant detected during sample analysis that could be the cause of the health effects?
Notifications	<ul style="list-style-type: none"> • Notifications within utility • State/local public health agency • Wastewater permitting agency 	<ul style="list-style-type: none"> • FBI (if contamination appears to be deliberate) • Local and State law enforcement agencies 	<ul style="list-style-type: none"> • Emergency response agencies • National Response Center • Other state and federal assistance providers • WARN network • Downstream users if receiving stream was contaminated
Response	<ul style="list-style-type: none"> • Consult with public health agency and permitting agency • Consult external information sources 	<ul style="list-style-type: none"> • Estimate affected area and isolate if possible • Implement appropriate public health/safety protection measures • Identify additional sites and initiate site characterization • Analyze samples 	<ul style="list-style-type: none"> • Characterize affected area • Revise public health/safety protection measures as necessary • Plan remediation activities

7 Summary

Because of the potentially serious impacts of a wastewater contamination event on public safety/ health, private property, and wastewater infrastructure, contamination threats should be evaluated and managed in a timely and systematic manner. Improper management of a threat can lead to overreaction to a false alarm or underreaction to a dangerous situation. Module 2 of the WWRPTB presents recommendations to systematically process a suspicion of intentional or accidental contamination of a wastewater system. Utilities can use these suggestions for evaluating threats and responding accordingly when they prepare or upgrade their Emergency Response Plans and Response Guidelines.

8 Appendices

The following are examples of forms that may be used to facilitate the public health response:

- Response Planning Matrix
- Threat Evaluation Worksheet
- Security Incident Report Form
- Witness Account Report Form
- Phone Threat Report Form
- Written Threat Report Form
- Public Health Information Report Form

These forms can be found in the Appendices located at the end of the Toolbox.