

Guidelines and Policies for Public Water Systems

Appendix O- HANDBOOK FOR WATER SUPPLY EMERGENCIES

The Commonwealth of Massachusetts

Department of Environmental Protection

Drinking Water Program

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INTRODUCTION

The management of a water supply utility is a complex operation, which requires careful planning of procedures not only for daily activities, but also for maintaining quantity and quality of water during adverse conditions (emergencies). All public water supply functions are directed toward guaranteeing an uninterrupted supply of quality water to consumers. As such, an *Emergency Response Plan* is a vital component for an effective and safe water supply operation.

The purpose of this document is to serve as a guide to water suppliers during the preparation of their *Emergency Response Plan* required by 310 CMR 22.04(13), as well as to be followed during emergencies. Attachment I of this document provides guidelines for preparing an *Emergency Response Plan*.

Please note: Public Water Systems required to comply with the 2018 America's Water Infrastructure Act (AWIA) regarding emergency response planning must also follow the AWIA requirement: <https://www.epa.gov/waterresilience/awia-section-2013>. EPA community water systems ERP template and guidance can be found [here](#).

In this document we will differentiate emergency situations according to the following criteria:

Level I Routine Problems

These incidents are minor disruptions to the water system that affect 10% or less of the system and are anticipated to be repaired/resolved within 24 hours or less.

Examples: Water main breaks and mechanical problems at pumping stations.

Level II Alert/Minor Emergencies

These incidents are more significant disruptions to the water system that affect 50% or less of the system and are anticipated to be repaired/resolved within 72 hours or less.

Examples: Local total coliform bacteria detection, major main breaks, multiple main breaks, major mechanical problems at pumping stations/treatment facility, or failure of chemical feed systems.

Level III Major Emergencies¹

These incidents are very significant disruptions to the water system that affect more than 50% of the system and/or are anticipated to require more than 72 hours to be repaired/resolved. Major emergencies may require a Declaration of Water Supply Emergency and/or a Boil Water Order, Do Not Drink Order or Do Not Use Order

Examples: Break in major transmission main, loss or failure of treatment facility, loss of source (dam break, water supply shortage, contamination, etc.), loss of pressure in the system, widespread total coliformbacteria outbreak, fecal coliform or E. Coli detection, or acts of vandalism.

Level IV Natural Disasters

These incidents are generally caused by a widespread meteorological or geological event that disrupts the water system affecting more than 50% of the system and/or requiring more than one week for recovery of services. Such events may cause structural damage to a treatment facility or contaminate a source with untreated sewage, toxic chemical, or radioactive material. A Declaration of Water Supply Emergency and/or a Boil Water Order, Do Not Drink Order or Do Not Use Order are likely to be required.

Examples: Hurricanes, tornadoes, earthquakes, or floods.

Level V Nuclear Disasters/Terrorist Acts

These incidents involve large and uncontrolled releases of radioactive material or compounds into the environment/water supply source or deliberate acts that impair a water system (i.e. terrorism). In the case of nuclear disaster, surface water supplies within a 50-mile radius of a nuclear power plant experiencing such a release may be immediately contaminated. Groundwater supplies may remain safe for a period of time. A Declaration of Water Supply Emergency and/or a Do Not Drink Order or Do Not Use Order are likely to be required.

Examples: Nuclear power plant release to the environment or deliberate release of highly toxic materials to a water supply.

Note: Cyber incidents may trigger one or more emergency situations listed above. ¹ MassDEP considers all incidents that result in a Boil Water Order, Do Not Drink Order or Do Not Use Order to be Level III incidents.

DEFINITIONS

For the purposes of this document, the following definitions apply:

Emergency Response Plan A written plan establishing operating procedures for handling water supply emergencies. The plan shall include provisions for emergency water supply in the event of a sudden loss of existing sources, natural or man-made. It also shall specify who does what and when, using available resources, during emergency situations.

Emergency A situation or event, natural or man-made, which causes or threatens to cause damage to a water supply system such that there will be a disruption of normal water supply functions. The effects can be on a portion or all of the system and may require an immediate action in order to protect public health.

Response The actions taken during an emergency to minimize the impact of the emergency, protect the water supply, and return the water system to normal operating conditions.

**Boil Water Order
Do Not Drink Order,
Or Do Not Use Order** Order issued under MGL c. 111, sec. 160 by the Department following DWS Policy 87-06.

**Declaration of State
Of Water Supply
Emergency** Order issued under MGL c. 21G, sec. 15, 16, and 17 by the Department DWS Policy 87-05.

HOW TO USE THE HANDBOOK

The Massachusetts Department of Environmental Protection (MassDEP) has taken steps to ensure that public watersuppliers are prepared for emergencies. Every Public Water System (PWS) has been sent a copy of this document, which is entitled "Handbook for Water Supply Emergencies". In this document, PWSs are asked to prepare a written Drinking Water Emergency Response Plan (ERP) for their water system. The ERP must be available for inspection during sanitary surveys. A model ERP is also available on the MassDEP website titled Emergency Response Planning Guide for PWS: <https://www.mass.gov/doc/emergency-response-planning-guide-for-public-drinking-water-systems-0/download>.

During an emergency, the first step a PWS must take is to identify the emergency according to its severity using a Level I, II, III, IV, and V status with Level I being routine problems such as main breaks, and Level V being a nuclear disaster or major terrorist act. The description of these levels is contained in the INTRODUCTION portion of the handbook. **Be aware that the level of the emergency may change during the incident. If this occurs, the PWS must adjust its response accordingly.**

The level of the emergency determines the appropriate action to be taken. After determining the level, the PWS can turn to the appropriate section of the handbook to find the procedures to be followed. Each level has a separate section to assist the PWS in responding to the emergency. For example, if a Level III emergency is declared it could mean that there is a serious threat to a dam, reservoir, tank, or treatment facility; power loss in a major pumping system; unsafe water supply in any pressure zone; breakage in a large trunk line; or contamination by infiltration. The following are the steps that would be taken in such a case.

The initial response would be to begin a documentation log to describe the emergency. The next step would be to investigate and evaluate the emergency and decide if it is a bacterial contamination, chemical contamination, or a systems failure. Each would have their own set of methods to follow but they both would basically activate a response team, notify proper local and state authorities and outside personnel or agencies for advice and assistance. Boil orders may be issued or outside water may be trucked in or emergency sources may be utilized if needed. Decisions are made at that time but all are planned in advance and written up in each PWS's ERP.

Once the cause of the emergency has been determined and approvals obtained, work is initiated to correct the problem. Informing the public about the emergency is accomplished through the electronic local/regional media. All contact persons and their phone numbers are listed in the ERP. Contact persons would include fire, police, town officials, hospitals, media, contractors, state agencies and federal agencies. Coordinating the outside personnel and agencies working on the response should follow the flow charts found in the ERP. All forms and checklists are also found in the ERP. One set of these forms and checklists is to be sent to MassDEP and the other is to be kept on file at the PWS.

To insure this information is current, every year when the Annual Statistics are sent out to all PWSs, they are asked to update the information on the forms provided. Also, during their regularly scheduled Sanitary Surveys this information is reviewed and changes made to keep it current.

The information obtained through the Annual Statistics is entered in MassDEP's Water Quality Testing System (WQTS) database. Copies of this database are available to the Massachusetts Emergency Management Agency and updated copies are available from the Department of Environmental Protection, Drinking Water Program, One Winter Street - 5th floor, Boston, MA 02108, (617) 292-5770 and Program.director-dwp@mass.gov.

EMERGENCY RESPONSE PROCEDURES LEVEL I

Routine Problems

These incidents are minor disruptions to the water system that affect 10% or less of the system and are anticipated to be repaired/resolved within 24 hours or less.

Examples: water main breaks and mechanical problems at pumping stations.

Initial Response:

1. Begin documentation log (Emergency Response Checklist) at first report of the problem.
2. Investigate the problem and evaluate the situation to determine the level of emergency.

Response Procedures for Level I:

3. Activate the emergency response team and respond in accordance with the Emergency Response Plan.
4. Maintain records of all activities throughout the incident. Retain records for future reference.
5. Monitor resolution of the emergency and take appropriate action if the level of the emergency changes.

Notes:

1. **If a violation requiring a Tier 1 Public Notice in accordance with 310 CMR 22.16 occurs, the PWS must contact and consult with MassDEP staff within 24 hours of the public water system first learning of the violation.**
2. **If a coliform bacteria violation has occurred, the public water system must file a Coliform Violation Evaluation Survey (Attachment H) with the local MassDEP regional office. This survey will not be used for compliance purposes but will provide MassDEP with valuable information on the cause and corrective actions for coliform bacteria violations.**
3. **There are some emergencies or incidents that require 2 hours notification after obtaining knowledge of the potential or actual Emergency. These are described in 310 CMR 22.15(9)(b)1.**
 - a. **Emergencies or incidents requiring notification within two hours:**
 - i. **Loss of water or drop in pressure to less than 20 psi, affecting 50% or more of consumers for a system serving less than 10,000 persons;**
 - ii. **Loss of water or drop in pressure to less than 20 psi, affecting 5,000 or more consumers for a system serving 10,000 or more persons;**
 - iii. **Chemical or microbiological contamination of the water supply in exceedence of limits specified by the Department's Office of Research and Standards (ORS), as set forth in ORS' Immediate Action Levels for Water Treatment Plant Chemicals (available on-line at: <https://www.mass.gov/doc/immediate-action-levels-for-water-treatment-plant-chemicals-0/download>);**
 - iv. **Discovery of malicious intent or an act of vandalism, which may impact a system component;**
 - v. **Any consumer complaint in which the water may have caused physical injury;**
 - vi. **A pattern of unusual customer complaints about the water quality such as taste, odor, etc.; and**
 - vii. **Any other Emergency as determined by the Department in writing.**

EMERGENCY RESPONSE PROCEDURES LEVEL II

Alert/Minor Emergencies

These incidents are more significant disruptions to the water system that affect 50% or less of the system and are anticipated to be repaired/resolved within 72 hours or less.

Examples: Local total coliform bacteria detection, major main breaks, multiple main breaks, major mechanical problems at pumping stations/treatment facility, or failure of chemical feed systems.

Initial Response:

1. Begin documentation log (Emergency Response Checklist) at first report of the problem.
2. Investigate the problem and evaluate the situation to determine the level of emergency.

Response Procedures for Level II:

3. Activate the emergency response team and respond in accordance with the Emergency Response Plan.
4. Contact local responsible officials and authorities, including the MassDEP Regional Office, to inform them of conditions in the system and discuss any special actions that may be required. Such required actions may include, but are not limited to:
 - Collection of special water quality samples related to the nature of the emergency.
 - Collection of appropriate water quality samples at sites throughout the distribution system where problems have occurred. These samples must be taken both during and after the incident. If the problem is determined to be coliform bacteria related, follow the Coliform MCL Violation Determination flow chart contained in Attachment G.
 - Provide notification to parties affected by the incident.
 - Provide an alternate source of water to those affected by the incident, if needed.
 - Contact local news media to inform them of the incident, if needed.
 - Provide Public Notification of any violations of MassDEP regulations, as needed.
5. Contact local responsible officials and authorities, including MassDEP Regional Office, to inform them of the completion of repairs and results of all water quality testing.
6. Maintain records of all activities throughout the incident. Retain records for future reference.
7. Monitor resolution of the emergency and take appropriate action if the level of the emergency changes.

Notes:

1. If a violation requiring a Tier 1 Public Notice in accordance with 310 CMR 22.16 occurs, the PWS must contact and consult with MassDEP staff within 24 hours of the public water system first learning of the violation.
2. If a coliform bacteria violation has occurred, the public water system must file a Coliform Violation Evaluation Survey (Attachment H) with the local MassDEP regional office. This survey will not be used for compliance purposes but will provide MassDEP with valuable information on the cause and corrective actions for coliform bacteria violations.
3. There are some emergencies or incidents that require 2 hours notification after obtaining knowledge of the potential or actual Emergency. These are described in 310 CMR 22.15(9)(b)1.
 - a. Emergencies or incidents requiring notification within two hours:
 - i. Loss of water or drop in pressure to less than 20 psi, affecting 50% or more of consumers for a system serving less than 10,000 persons;
 - ii. Loss of water or drop in pressure to less than 20 psi, affecting 5,000 or more consumers for a system serving 10,000 or more persons;
 - iii. Chemical or microbiological contamination of the water supply in exceedance of limits specified by the Department's Office of Research and Standards (ORS), as set forth in ORS' Immediate Action Levels for Water Treatment Plant Chemicals (available on-line at: <https://www.mass.gov/doc/immediate-action-levels-for-water-treatment-plant-chemicals-0/download>);
 - iv. Discovery of malicious intent or an act of vandalism, which may impact a system component;
 - v. Any consumer complaint in which the water may have caused physical injury;
 - vi. A pattern of unusual customer complaints about the water quality such as taste, odor, etc.; and
 - vii. Any other Emergency as determined by the Department in writing.

EMERGENCY RESPONSE PROCEDURES LEVEL III

Major Emergencies

These incidents are very significant disruptions to the water system that affect more than 50% of the system and/or are anticipated to require more than 72 hours to be repaired/resolved. Major emergencies may require a Declaration of State of Water Supply Emergency and/or a Boil Water Order, Do Not Drink Order or Do Not Use Order. *MassDEP considers all incidents that result in a Boil Water Order, Do Not Drink Order or Do Not Use Order to be Level III incidents.*

Examples: Break in major transmission main, loss or failure of treatment facility, loss of source (dam break, water supply shortage, contamination, etc.), loss of pressure in system, widespread total coliform bacteria outbreak, fecal coliform or E. Coli detection, or acts of vandalism.

Initial Response:

1. Begin documentation log (Emergency Response Checklist) at first report of the problem.
2. Investigate problem and evaluate the situation to determine the level of emergency.

Response Procedures for Level III - Bacterial Contamination:

3. Initiate consultation with MassDEP and follow Public Notification requirements.
4. Activate emergency response team and respond in accordance with the Emergency Response Plan to collect samples and conduct preliminary analyses to determine potential contamination of the water supply. Use the data to follow the Coliform MCL Violation Determination flow chart contained in Attachment G.
5. Contact local responsible officials and authorities, including MassDEP Regional Office, to inform them of conditions in the system and discuss any special actions that may be required. Such required actions may include, but are not limited to:
 - Collection of special water quality samples related to the nature of the emergency.
 - Collection of bacteria samples at sites throughout the distribution system where problems have occurred. These samples may be taken both during and after the incident. If the problem is determined to be coliform bacteria related, follow the Coliform MCL Violation Determination flow chart contained in Attachment G.
 - Provide notification to parties affected by the incident.
 - With MassDEP approval, provide an alternate source of water if needed. Alternative water sources should be identified in the Emergency Response Plan and may include bottled water, interconnections with other water systems, tanked water, etc.
 - Contact local news media to inform them of incident, if needed.
 - If MassDEP issues a Declaration of State of Water Supply Emergency, Boil Water Order, Do Not Drink Order or Do Not Use Order, follow necessary procedures.
6. Once problem is identified, initiate actions to resolve the problem.
7. Contact local responsible officials and authorities, including MassDEP Regional Office, to inform them of completion of repairs and results of all water quality testing.
8. Maintain records of all activities throughout the incident. Retain records for future reference.
9. Monitor resolution of the emergency and take appropriate action if the level of the emergency changes.

**EMERGENCY RESPONSE PROCEDURES
LEVEL III (continued)**

Response Procedures for Level III - Equipment/System Failure:

9. Activate emergency response team to evaluate the extent of the problem and determine the type and quantity of support needed to initiate corrective action.
10. Contact local responsible officials, including MassDEP Regional Office, to inform them of conditions in the system and discuss any special actions that may be required. Such required actions may include, but are not limited to:
 - Conduct preliminary water quality analyses to determine potential contamination of the water supply as a result of the system failure.
 - Provide notification to parties affected by the incident.
 - With MassDEP approval, provide an alternate source of water if needed. Alternative water sources should be identified in the Emergency Response Plan and may include bottled water, interconnections with other water systems, tanked water, etc.
 - Contact local news media to inform them of incident, if needed.
 - If MassDEP issues a Declaration of State of Water Supply Emergency or Boil Water Order or Do not Drink Order, follow necessary procedures.
11. Once problem is identified, initiate actions to resolve the problem.
12. Contact local responsible officials and authorities, including MassDEP Regional Office, to inform them of completion of repairs and results of all water quality testing.
13. Maintain records of all activities throughout the incident. Retain records for future reference.
14. Monitor resolution of the emergency and take appropriate action if the level of the emergency changes.

Notes:

1. **If a violation requiring a Tier 1 Public Notice in accordance with 310 CMR 22.16 occurs, the PWS must contact and consult with MassDEP staff within 24 hours of the public water system first learning of the violation.**
2. **If a coliform bacteria violation has occurred, the public water system must file a Coliform Violation Evaluation Survey (Attachment H) with the local MassDEP regional office. This survey will not be used for compliance purposes but will provide MassDEP with valuable information on the cause and corrective actions for coliform bacteria violations.**
3. **There are some emergencies or incidents that require 2 hours notification after obtaining knowledge of the potential or actual Emergency. These are described in 310 CMR 22.15(9)(b)1.**
 - a. **Emergencies or incidents requiring notification within two hours:**
 - i. **Loss of water or drop in pressure to less than 20 psi, affecting 50% or more of consumers for a system serving less than 10,000 persons;**
 - ii. **Loss of water or drop in pressure to less than 20 psi, affecting 5,000 or more consumers for a system serving 10,000 or more persons;**
 - iii. **Chemical or microbiological contamination of the water supply in exceedence of limits specified by the Department's Office of Research and Standards (ORS), as set forth in ORS' Immediate Action Levels for Water Treatment Plant Chemicals (available on-line at: <https://www.mass.gov/doc/immediate-action-levels-for-water-treatment-plant-chemicals-0/download>);**
 - iv. **Discovery of malicious intent or an act of vandalism, which may impact a system component;**
 - v. **Any consumer complaint in which the water may have caused physical injury;**
 - vi. **A pattern of unusual customer complaints about the water quality such as taste, odor, etc.; and**
 - vii. **Any other Emergency as determined by the Department in writing.**

EMERGENCY RESPONSE PROCEDURES LEVEL IV

Natural Disasters

These incidents are generally caused by a widespread meteorological or geological event that disrupts the water system affecting more than 50% of the system and/or requiring more than one week for recovery of services. Such events may cause structural damage to a treatment facility or contaminate a source with untreated sewage, toxic chemical, or radioactive material. A Declaration of State of Water Supply Emergency and/or a Boil Water Order or Do Not Drink Order are likely to be required.

Examples: Hurricanes, tornadoes, earthquakes, or floods.

If the disruption of the system causes equipment failure and/or contamination caused by bacteriological activity, follow the emergency response procedures for Level III. If the contamination is caused by chemical compound(s), use the following procedure:

Initial Response:

1. Begin documentation log (Emergency Response Checklist) at first report of the problem.
2. Investigate problem and evaluate the situation to determine the extent of impact on the water system. Collect water samples for analyses to determine if it is contaminated and the type of contamination.

Response Procedures for Level IV - Chemical Contamination:

3. If possible, remove the affected water supply source or close the distribution system until it can be fully evaluated for contamination.
4. Contact MassDEP Regional Office for further instructions.
5. Inform proper local and state authorities/agencies, activate response team immediately and respond in accordance with the Emergency Response Plan. The responsible authority or authorities will issue the necessary "Orders". See Attachment D - Procedures Involving Outside Agencies and Personnel.
6. Inform the public through the local/regional electronic media about the emergency, affected area, and alternative water supply. Keep the public informed about new developments through "special reports and public service news".
7. With MassDEP approval, activate alternative water supply such as bottled water, interconnections with other water systems, tanked water, etc.
8. Evaluate the situation to brief the authorities and inform the public. If necessary, take other precautionary measures to safeguard public health.
9. Collect new samples for analyses and put in place a monitoring system to ensure a safe water quality.
10. Maintain records of all activities throughout the incident. Retain records for future reference.
11. Monitor resolution of the emergency and take appropriate action if the level of the emergency changes.
12. Complete the checklist and attach the necessary forms/memoranda. Send to MassDEP Regional Office two (2) copies of the completed checklist and all attachments. It will not be necessary to send this specific emergency information to MassDEP if some other process will provide the necessary reporting (i.e. Emergency Declaration Procedure).

Notes:

1. If a violation requiring a Tier 1 Public Notice in accordance with 310 CMR 22.16 occurs, the PWS must contact and consult with MassDEP staff within 24 hours of the public water system first learning of the violation.
2. If a coliform bacteria violation has occurred, the public water system must file a Coliform Violation Evaluation Survey (Attachment H) with the local MassDEP regional office. This survey will not be used for compliance purposes but will provide MassDEP with valuable information on the cause and corrective actions for coliform bacteria violations.
3. There are some emergencies or incidents that require 2 hours notification after obtaining knowledge of the potential or actual Emergency. These are described in 310 CMR 22.15(9)(b)1.
 - a. Emergencies or incidents requiring notification within two hours:
 - i. Loss of water or drop in pressure to less than 20 psi, affecting 50% or more of consumers for a system serving less than 10,000 persons;
 - ii. Loss of water or drop in pressure to less than 20 psi, affecting 5,000 or more consumers for a system serving 10,000 or more persons;
 - iii. Chemical or microbiological contamination of the water supply in exceedence of limits specified by the Department's Office of Research and Standards (ORS), as set forth in ORS' Immediate Action Levels for Water Treatment Plant Chemicals (available on-line at: <https://www.mass.gov/doc/immediate-action-levels-for-water-treatment-plant-chemicals-0/download>; 0/download
 - iv. Discovery of malicious intent or an act of vandalism, which may impact a system component;
 - v. Any consumer complaint in which the water may have caused physical injury;
 - vi. A pattern of unusual customer complaints about the water quality such as taste, odor, etc.; and
 - vii. Any other Emergency as determined by the Department in writing.

For more on chapter 22.15 and these requirements, please follow the link below and refer to pg. 192.
<https://www.mass.gov/doc/310-cmr-22-drinking-water/download>

EMERGENCY RESPONSE PROCEDURES LEVEL V

Nuclear Disasters/ Major Terrorist Acts

These incidents involve large and uncontrolled releases of radioactive material or compounds into the environment/water supply source or deliberate acts that impair a water system (i.e. terrorism). In the case of a nuclear disaster, surface water supplies within a 50-mile radius of a nuclear power plant experiencing such a release may be immediately contaminated. Groundwater supplies may remain safe for a period of time. A Declaration of Water Supply Emergency and/or a Do Not Drink Order are likely to be required.

Examples: Nuclear power plant release to the environment or deliberate release of highly toxic materials to a water supply.

Initial Response:

1. Begin documentation log (Emergency Response Checklist) at first report of the problem.
2. Investigate problem and evaluate the situation to determine the extent of impact on the water system. Collect water samples for analyses to determine if it is contaminated and the type of contamination.

Response Procedures for Level V:

3. If possible, remove the affected water supply source or close the distribution system until it can be fully evaluated for contamination.
4. Be prepared to follow the directives issued by the Massachusetts Emergency Management Agency on the Emergency Broadcast network; and provide the necessary assistance to this agency. At a minimum, the directives will advise the public:
 - Not to use surface or ground water until the source is analyzed and approved to be safe for human or animal consumption.
 - Limit the ingestion of water stored in closed containers or bottled water until after it has been tested and approved for consumption.
5. MassDEP and/or the Department of Public Health will provide technical assistance and provide information on testing water sources to ensure that they are safe for consumption.
6. Maintain records of all activities throughout the incident. Retain records for future reference.
7. Monitor resolution of the emergency and take appropriate action if the level of the emergency changes.

Notes:

1. All threats against a water system must be reported to the State Police and Federal Bureau of Investigation immediately.
2. Terrorist acts found to be minor in nature may be reduced to a lower level and follow the appropriate emergency response procedures.
3. If a violation requiring a Tier 1 Public Notice in accordance with 310 CMR 22.16 occurs, the PWS must contact and consult with MassDEP staff within 24 hours of the public water system first learning of the violation.
4. If a coliform bacteria violation has occurred, the public water system must file a Coliform Violation Evaluation Survey (Attachment H) with the local MassDEP regional office. This survey will not be used for compliance purposes but will provide MassDEP with valuable information on the cause and corrective actions for coliform bacteria violations.
5. There are some emergencies or incidents that require 2 hours notification after obtaining knowledge of the potential or actual Emergency. These are described in 310 CMR 22.15(9)(b)1.
 - a. Emergencies or incidents requiring notification within two hours:
 - i. Loss of water or drop in pressure to less than 20 psi, affecting 50% or more of consumers for a system serving less than 10,000 persons;
 - ii. Loss of water or drop in pressure to less than 20 psi, affecting 5,000 or more consumers for a system serving 10,000 or more persons;
 - iii. Chemical or microbiological contamination of the water supply in exceedence of limits specified by the Department's Office of Research and Standards (ORS), as set forth in ORS' Immediate Action Levels for Water Treatment Plant Chemicals (available on-line at: <https://www.mass.gov/doc/immediate-action-levels-for-water-treatment-plant-chemicals-0/download>);
 - iv. Discovery of malicious intent or an act of vandalism, which may impact a system component;
 - v. Any consumer complaint in which the water may have caused physical injury;
 - vi. A pattern of unusual customer complaints about the water quality such as taste, odor, etc.; and
 - vii. Any other Emergency as determined by the Department in writing.

ATTACHMENT A
LOCAL AUTHORITIES AND DEPARTMENTS - EMERGENCY TELEPHONE NUMBERS
 (Attach additional sheets if needed)

City/Town: _____ PWS Name: _____ PWS ID #: _____

Local Authorities:

Fire Department

Name	Title	Telephone
Fax	Email	

Police Department

Name	Title	Telephone
Fax	Email	

Health Department

Name	Title	Telephone
Fax	Email	
Cell Phone	Pager	

Town Official(s)/
Elected Official(s)

Name	Title	Telephone
Fax	Email	
Cell Phone	Pager	

Name	Title	Telephone
Fax	Email	
Cell Phone	Pager	

Name	Title	Telephone
Fax	Email	
Cell Phone	Pager	

Water Supply Responsible Authorities: w - work telephone h - home telephone

Superintendent

Name	w	h	
Fax	Email		
Cell Phone	Pager		

***Include Area Code on All Telephone Numbers**

Assist. Superintendent _____ w_____h _____
Name

Fax Email

Cell Phone Pager

Primary Operator _____ w_____h _____
Name

Fax Email

Cell Phone Pager

Secondary Operator _____ w_____h _____
Name

Fax Email

Cell Phone Pager

Local News Media:
Newspapers

Name Telephone

Fax Email

Cell Phone Pager

Name Telephone

Fax Email

Cell Phone Pager

Radio Stations _____
Name Telephone

Fax Email

Name Telephone

Fax Email

Television Stations _____
Name Telephone

Fax Email

Name Telephone

Fax Email

***Include Area Code on All Telephone Numbers**

Other (i.e. Short-wave Radio Operators	_____		_____
	Name		Telephone
	_____	_____	
	Fax	Email	
	_____		_____
	Name		Telephone
	_____	_____	
	Fax	Email	

Other Emergency Contacts:

Special Users (i.e. Schools, Hospitals, Nursing Homes, Prisons, Others)

_____	_____	_____
Name	Address	Telephone
_____	_____	_____
Name	Address	Telephone

Waterworks Contractors

_____	_____	_____
Name	Address	Telephone
_____	_____	_____
Name	Address	Telephone

Hazardous/Toxic Waste Clean-up Contractors

_____	_____	_____
Name	Address	Telephone
_____	_____	_____
Name	Address	Telephone

Replacement Equipment (Rental/Purchase) and Repair Parts Suppliers

_____	_____	_____
Name	Address	Telephone
_____	_____	_____
Name	Address	Telephone

***Include Area Code on All Telephone Numbers**

Please complete all items on this form, return two (2) copies to the MassDEP Boston Drinking Water Program Office with your Annual Statistical Report and keep a copy in an accessible location with the rest of your emergency response information. Please keep this information updated.

ATTACHMENT B
LIST OF STATE AND FEDERAL AGENCIES CONTACT
INFORMATION

State Agencies:

State Police.....(800) 525-5555** Email: _____

Department of Environmental Protection - Drinking Water Program Offices

 Boston.....(617) 292-5770* Email: _____

 Northeast Region (Wilmington)..... (978) 694-3200* Email: _____

 Southeast Region (Lakeville)..... (508) 946-2700* Email: _____

 Central Region (Worcester)(508) 792-7650* Email: _____

 Western Region (Springfield).... (413) 784-1100* Email: _____

Department of Public Health..... (617) 624-6000* Email: _____

 Outside of Working Hours..... (617) 522-3700**

Nuclear Incident Advisory Team(617) 727-9710** Email: _____

Massachusetts Emergency Management Agency..... (888) 304-1133** Email: _____

Federal Agencies:

EPA (Boston Office) (617) 918-1111* Email: _____

National Response Center... (800) 424-8802** Email: _____

Federal Emergency Management Agency(617) 223-9540** Email: _____

Occupational Safety & Health Administration..... (800) 321-6742* Email: _____

Centers for Disease Control and Prevention (Atlanta, Georgia... (800) 311-3435* Email: _____

Federal Aviation Administration (Accident Reporting).....(781) 238-7001**Email: _____

Federal Bureau of Investigation... (617) 742-5533** Email: _____

Department of Homeland Security (DHS)/

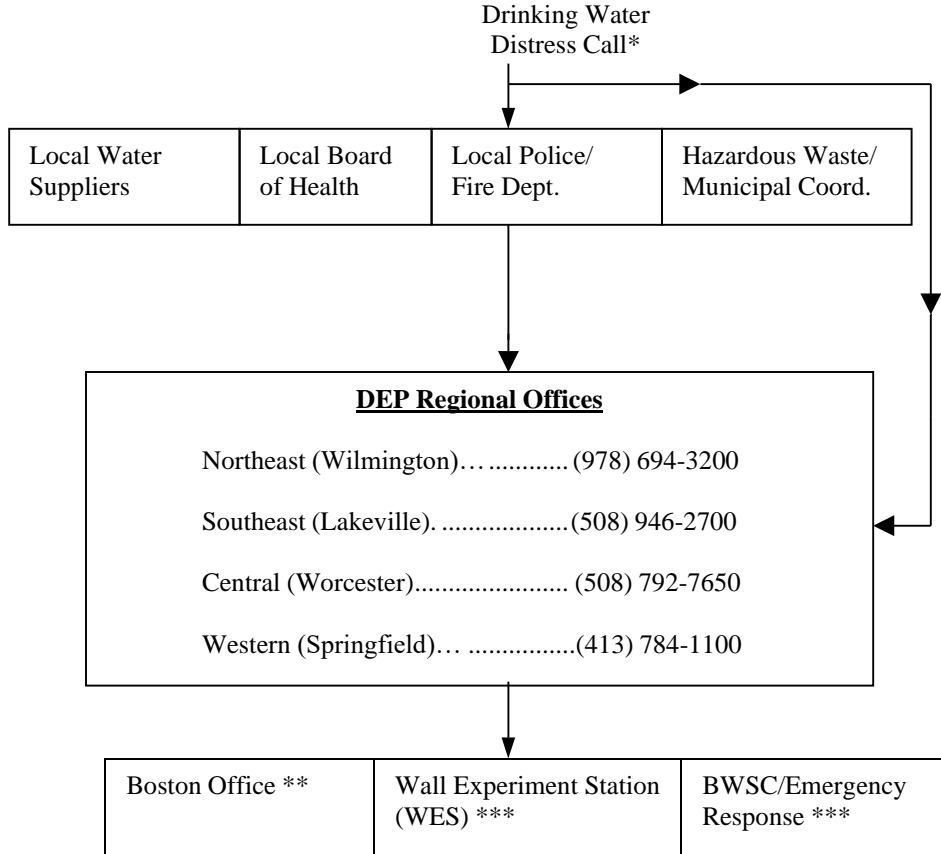
Cybersecurity and Infrastructure Security Agency (CISA)..... (888)-282-0870 Email _____

* Day Time
** 24 Hours

**ATTACHMENT C
PROCEDURES FOR CONTACTING MassDEP**

MassDEP may be contacted 24 hours/day, seven day per week by using the procedures in Section A of this Attachment during regular working hours or by using the procedures in Section B during all other hours.

A. During Working Hours - Monday to Friday (9:00 AM to 5:00 PM):



* All threats or suspected acts of terrorism against a water system must be reported to the Local Police or State Police immediately. Local and State Police will determine if the Federal Bureau of Investigation will be notified.

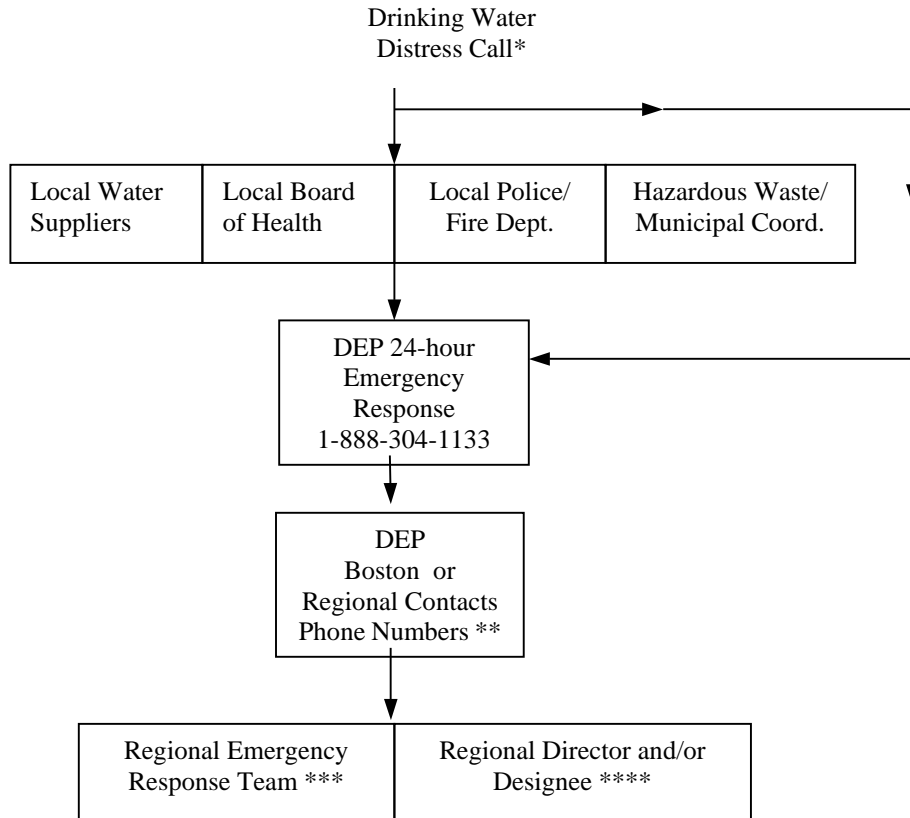
** Calls made directly to the Boston Office will be referred to the specific regional office.

*** WES will only be contacted by the Regional or Divisional Director or their designee, if deemed necessary, and will give advice on the necessary chemical analysis to be taken and will also decide which analyses can be done by WES.

**** The Bureau of Waste Site Cleanup (BWSC)/Emergency Response will be contacted whenever there is a spill, release of oil and/or hazardous material. The Drinking Water Program will work with the BWSC/Emergency Response until the end of situation. Each Bureau should exchange copies of all reports written as a result of the situation (i.e. spill reports and water supply emergency data reports).

ATTACHMENT C (continued)

B. During Non-Working Hours - Monday to Friday (5:00 PM to 9:00 AM), Weekends and Holidays:



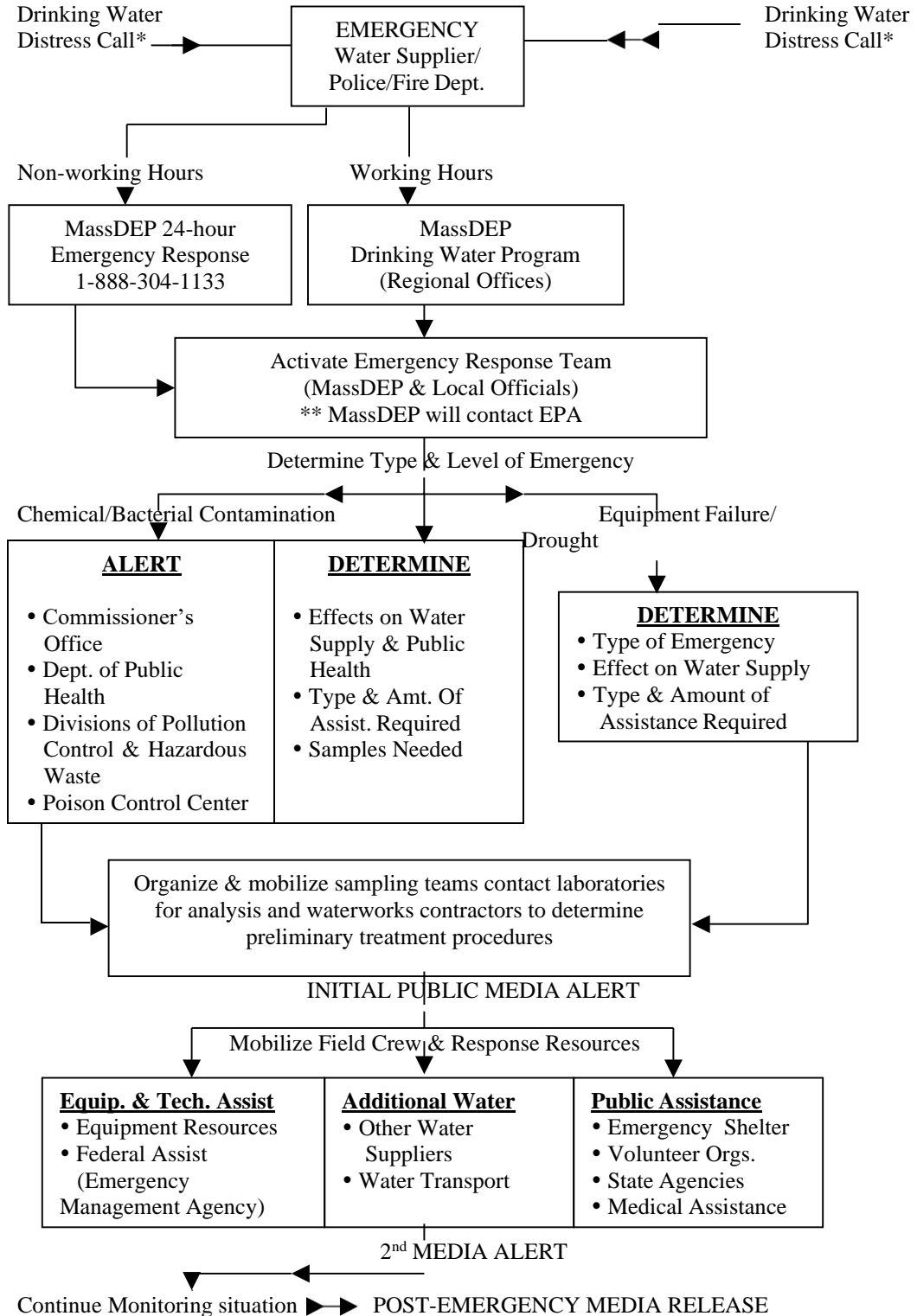
* All threats or suspected acts of terrorism against a water system must be reported to the Local Police and State Police immediately. Local and State Police will determine if the Federal Bureau of Investigation will be notified.

** MassDEP's Emergency Response team will contact the Drinking Water Program.

*** The Regional Incident Response person may be able to handle the emergency without calling the Regional Director or his/her designee. Incident Response personnel are required to notify, by telephone, the regional Drinking Water Section Chief at the start, or within 24 hours, of the event (emergency) being reported and forward a copy of the Incident Report to the Drinking Water Program at the MassDEP Boston Office.

**** The Regional Director or his/her designee will define the scope of the problem, determine who should handle the emergency response, and determine who should be contacted (i.e. local Board of Health, etc.). The Regional Director or his/her designee will also have available a list, with addresses and telephone numbers, of experienced volunteer water supply engineers. This list will also be available to the Office of Incident Response. This list should be prioritized in order of experience. Services will be reimbursed, for any time spent outside of their normal working hours, according to the current union contract.

**ATTACHMENT D
PROCEDURES INVOLVING OUTSIDE AGENCIES & PERSONNEL**



* All threats against a water system must be reported to the State Police immediately.
 ** EPA will be responsible for contacting the Federal Agencies if the emergency is related to tampering with the water system.

ATTACHMENT E (continued for Level III or greater)

Which of the following actions were involved in the emergency? (Check appropriate actions)

Motor vehicle accident:
Vehicle type: _____ Make: _____
Color: _____ Reg. _____ State: _____
Owner (Name/Address): _____

Accidental discharge:

Illegal dumping/discharge:

Chemical(s) involved:
Trade Name/ Common Name: _____
(Circle) Solid / Liquid / Vapor Other: _____
Placard / Label ID / DOT #: _____

Disease outbreak, type of disease: _____

Bacterial Problem, describe: _____

Nearest Public Drinking Water Source (surface/ground):

Name/address (location)
Approximate distance from emergency location _____

Which of the following actions did you complete? (Check appropriate actions)

Notify person(s) in charge of all emergencies:
Name: _____ Home Telephone _____
Work Telephone _____
Initial Emergency Response: _____

Close reservoir: _____ Wells Nos. _____
Name of Reservoir

Shutdown pump(s): _____
No. or Name

Shut off some of the distribution lines
Specify (location, valve): _____

Cross Connection Survey
Results: _____

Other (describe): _____

ATTACHMENT E (continued for Level III or greater)

Local Authorities/Departments Contacted:

<input type="checkbox"/> Water Supply Superintendent/Assistant	<input type="checkbox"/> Certified Operator
<input type="checkbox"/> Mayor/Officials	<input type="checkbox"/> Fire Department
<input type="checkbox"/> Police Department	<input type="checkbox"/> Health Department
<input type="checkbox"/> Other: _____	

Local/Regional News Media Contacted:

<input type="checkbox"/> Local Newspaper	<input type="checkbox"/> Local Radio Station
<input type="checkbox"/> Local TV Station	<input type="checkbox"/> Local Short-wave
<input type="checkbox"/> Other: _____	<input type="checkbox"/> Radio Operator(s)

State Authorities/Agencies Contacted:

State Police / State Agencies (Emergency Line)
 MassDEP (Emergency Line): Boston NERO SERO CERO WERO
 MassDEP: Water Pollution Control Hazardous Waste
 Department of Public Health
 Massachusetts Emergency Management Agency (MEMA)
 Other: _____

Federal Authorities/Agencies Contacted:

EPA - Boston Office (Emergency Line)
 National Response Center
 Coast Guard
 Federal Emergency Management Agency (FEMA)
 Federal Highway Administration
 National Guard
 Communicable Disease Center - Atlanta, GA
 Other: _____

Notify office staff about the problem/emergency to answer questions from the users;

Brief the person(s) in charge of the emergency response and superiors about new developments;

Prepare and attach a list of equipment and materials (specification/quantity) used in emergency response;

Emergency report (checklist) completed; (Prepare and file the emergencies report for every single emergency situation.)

Emergency report filed and one (1) copy submitted to MassDEP Regional Office - DWP.

Other: _____

**ATTACHMENT F
GUIDELINES FOR PREPARING A NEWS RELEASE**

YOURTOWN WATER DEPARTMENT
123 Main Street
Yourtown, YX 99999

Date of Issuance: Month, Day, Year

CONTACT: Contact's Name
Work Telephone
Home Telephone

FOR IMMEDIATE RELEASE

YOUR CITY OR TOWN, STATE - When preparing a news release, the questions: WHO? WHAT? WHEN? WHERE? And HOW? (when appropriate) should be answered in the lead paragraph. The lead paragraph should be kept as brief as possible, with no more than one or two sentences at most.

- The body of a news release should start about one-third of the way down the page. The news release should be typed or printed on one side of 8 1/2" x 11" sheets of paper.
- Use wide margins at the top and bottom of the page and double-space your release so the copy can be edited, as appropriate.
- The source of information should be prominently displayed at the top of the release. In addition, the release should list the name, address and telephone number of the contact person in the upper left corner of the first page.
- A release date should appear in the upper right-hand section of the first page. Most releases should be "FOR IMMEDIATE RELEASE". Stipulate a date for release only when the news warrants holding it for a specific date or time.
- The text should be tightly edited. Keep your sentences and paragraphs short; use proper punctuation and grammar.
- End each sheet at the end of a paragraph. Use "more" at the bottom of the sheet if the release continues onto another sheet.
- Put a slugline in the upper left-hand corner of the second sheet and any additional sheets. Indicate the appropriate page number in the slugline.

Indicate the end of the release by placing one of the following symbols at the bottom of the last page of the news release:

###

30

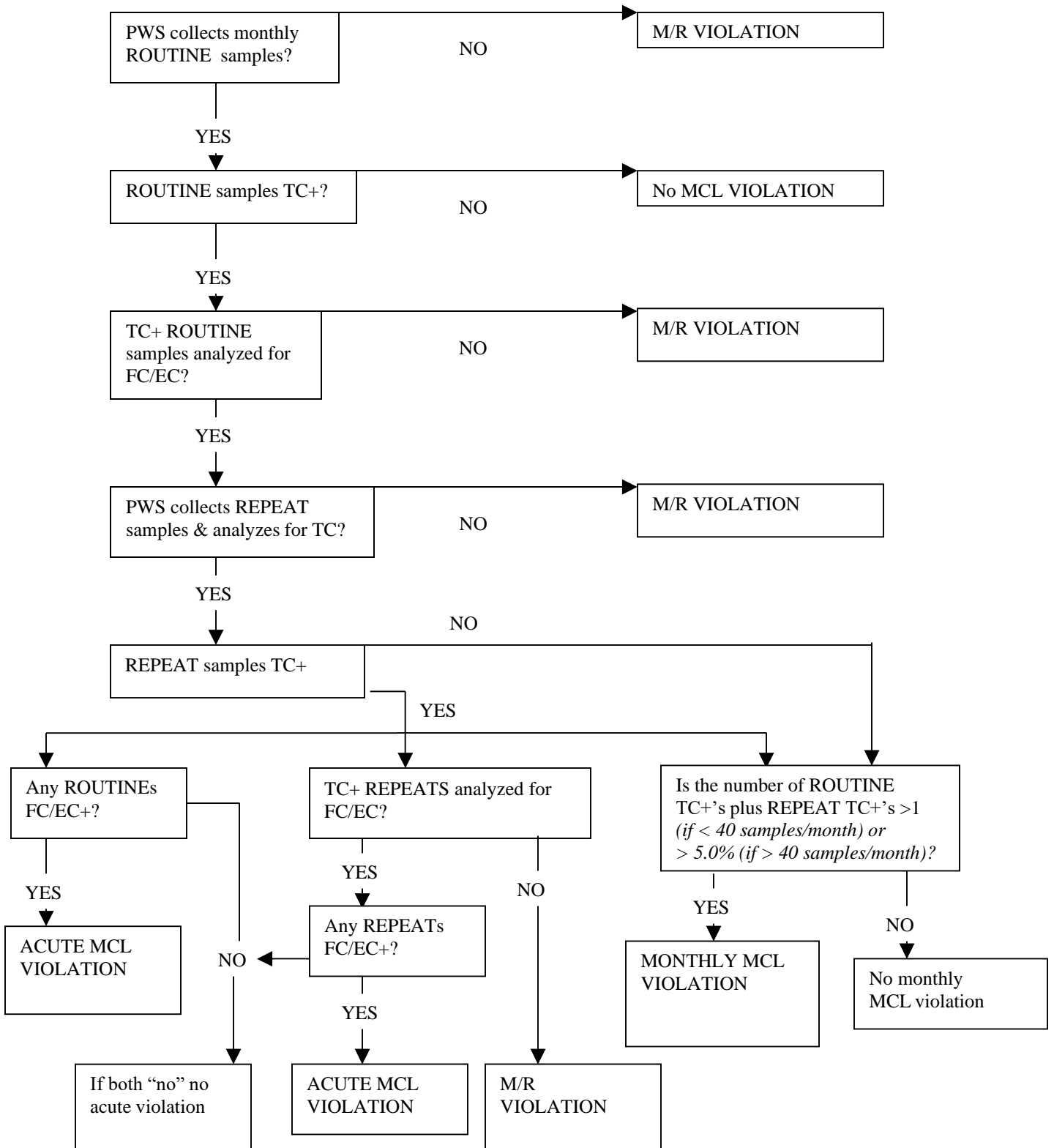
END

Proofread every word; double-check the copy with your source; let someone else proofread the finished copy for typos and grammar before distribution.

###

(Credit to Drinking Water Week Workbook published by New England Water Works Association)

**ATTACHMENT G
VIOLATION DETERMINATION FOR THE TOTAL COLIFORM RULE**



ATTACHMENT I
GUIDELINES FOR PREPARING AN EMERGENCY RESPONSE PLAN

An Emergency Response Plan (ERP) will contain strategies, resources, plans, and procedures to detect, prepare and respond quickly and effectively to water supply emergencies. A good ERP is an essential component of a well-managed water system and is aimed to increase the resiliency of the overall system, including physical security and cyber security. The ERP will help the water system provide a continuous supply of safe drinking water to its customers and ensure a safe working environment for its employees. The process of developing an ERP can contribute greatly to meeting these goals.

The level of effort that should be put into the development of an ERP depends on the size and complexity of the system as well as the hazards identified and the vulnerability of critical elements of the water system. Hazard identification and vulnerability assessment is simply a matter of identifying vital components of the water system and considering incidents that could impact them.

Components that might be vulnerable and could result in diminished availability or quality of water, and therefore should be considered in an Emergency Response Plan, include:

- Watersheds
- Aquifers
- Sources (including emergency supplies and interconnections)
- Dams
- Transmission Systems (especially if there is no redundancy)
- Distribution Systems
- Treatment Systems
- Water Storage Tanks
- Chemical Storage Tanks
- Personnel
- Power systems
- Pumping Systems
- Transportation Systems
- Communication Systems
- Computer and Control Systems

In the development of an Emergency Response Plan, the water system should consider the impacts that the following incidents could have on the above components:

- Bacterial Contamination
- Chemical Contamination
- Equipment Failures
- Water main breaks
- Fires/Explosions
- Fuel Spills
- Chemical Spills/Leaks
- Transportation Spills
- Vandalism/Terrorism
- Power Outages
- Floods
- Droughts
- Hurricanes
- Ice storms
- Tornadoes
- Earthquakes

ATTACHMENT I (continued)

After the potential hazards that the water system might experience and the vulnerability of the water system's components have been identified, the planning team can develop the ERP. The ERP must detail what actions should be taken to respond to both potential and actual emergencies in a manner that will ensure continuity of essential services, minimize the duration of the emergency, and protect the safety of its employees. The ERP must be specific in addressing who will respond to the emergency, what actions are required, where key items can be located, when actions should be taken, and how the public will be notified. Such details may include:

- Identification of an emergency response team.
- Method of contacting water system personnel during an emergency.
- Delineation of responsibilities and organizational structure.
- Designation of personnel to release information to the public.
- Development of background material for news release (see Attachment F).
- Protocol for determining what conditions would prompt a water system to discontinue use of a water source.
- Procedures for restricting water use.
- Procedures for providing alternate sources of water to the customer.
- Prioritization of customers need for water service.
- Procedure for implementing bulk water use including a list of [licensed bulk water suppliers](#). The bulk water use needs to comply with [Policy 92-07](#) and the "[Procedures for Emergency Tank Truck Bulk Water Hauling](#)"
- Directory of key personnel and agencies including Department of Environmental Protection, Emergency Response Agencies, local Fire Department, local Police Department, local Board of Health, Newspapers, Radio Stations, Television Stations.
- Identification of customers with special needs such as schools, hospitals, dialysis centers, nursing homes, large institutions and commercial uses.
- Identification of contractors that can provide materials, equipment, or services and timeframes for implementation.
- Identification of necessary security measures.

The process of developing an ERP may identify additional actions that can be taken by the water system in order to be better prepared for an emergency. The following are examples of actions that the water systems might take in order to be better prepared for an emergency:

- Modify the design and operations of facilities.
- Determine the time needed to obtain necessary materials during an emergency incident.
- Acquire redundant components that can be built into the system, available on site, or available from identified contractors.
- Establish mutual aid agreements that identify the amount of water available and are reviewed periodically.
 - E.g. Join the [Massachusetts Water/Wastewater Agency Response Network \(MAWARN\)](#) to receive rapid mutual aid and assistance from other public systems in Massachusetts to restore services damaged by natural or man-made incidents.
- Inventory activities in Zone I/II, Zone A/B, Interim Wellhead Protection Areas (IWPA) and the watershed of Class B drinking water river intakes.
- Review data from Source Water Protection Program (SWAP).
- Establish liaison with organizations and people responsible for activities that may have serious impacts on the water system.
- Establish liaison with local spill response and other emergency response planning agencies.
- PWS incorporate emergency bulk water deliveries into their ERP and should identify the entity(ies) that they plan to use and whether they've worked out how those deliveries would be implemented.
- Exercise isolation valves, emergency connections, and other stand-by equipment.
- Provide emergency response training, including training on cyber incident response.
- Periodically review and update the ERP.
- Compile Material Data Safety Sheet (MSDS) information of all chemicals used.
- Develop and update detailed water system map that identifies type, size and location of mains and

- valves.
- Determine costs associated with recommended improvements and seek funding.
- Identify a phased approach to reduce water consumption during drought related water shortages and identify triggering criteria for the various phases of reduced consumption.

Once the initial ERP has been completed, it must be tested and assessed. Staff must be trained on how to use the document. The ERP must be readily available. Drills should be conducted periodically to assess their effectiveness. The ERP should be reviewed and updated annually.

Resources to Assist in Preparation of Emergency Response Plan:

- A model ERP is available on the MassDEP website at <https://www.mass.gov/doc/emergency-response-planning-guide-for-public-drinking-water-systems-0/download>, titled Emergency Response Planning Guide for PWS.
- [EPA Community Water Systems AWA \(2018\) ERP template and Instructions.](#)
- [Guidance for Responding to Drinking Water Contamination Incidents \(epa.gov\)](#)
- [EPA Distribution System Contamination Response Procedure \(DSCR\) guide](#)
- [RCAP Emergency Response Planning Guide for Public Drinking Water Systems](#)
- [Emergency Planning for Water Utility Management; AWWA Manual M19](#), American Water Works Association, Denver, CO.
- [Drought Management Planning](#), AWWA.
- [A Guide to Lawn and Landscape Water Conservation](#), Commonwealth of Massachusetts; Executive Office of Environmental Affairs.
- [EPA Cyber Incident Checklist for Water Utilities.](#)
- [MAWARN](#)

ATTACHMENT J COUNTERTERRORISM PLANNING

Check List of Security Measures for Water Utilities

When assuring the safety of any facility, consider the credo "detect, delay, and respond" (Sandia, 2000). Basically, some saboteurs will be deterred if they think what they might do would be detected; others will be deterred if they are delayed for a significant amount of time before reaching their end goal because they fear detection. If an intruder does obtain his goal of sabotage, be it contamination of the water or physical destruction of system facilities, then utility staff must respond quickly and appropriately to keep the consequences of the saboteur's action to a minimum.

Immediate action you can take to secure your facilities includes:

- At your office, well houses, treatment plants and vaults, make it a rule that doors are locked and alarms set.
- Tell your employees to ask questions of strangers in your facilities.
- Limit access to facilities. Indicate restricted areas by posting "Employees Only" signs.
- Increase lighting in parking lots, treatment bays, and other areas with limited staffing
- DO NOT leave keys in equipment at any time.
- Invite local law enforcement to become familiar with facilities and establish a protocol for reporting and responding to threats.
- Discuss detection, response, and notification issues with public health officials and establish a protocol.
- Establish a chain of command and emergency call list in case of emergencies.
- Provide copies of operational procedures to law enforcement and emergency management personnel.
- Limit access to water supply reservoirs. Fence and lock vulnerable areas such as wellheads and meter pits.
- If computer networks, or automated control or monitoring systems are utilized by the system, implement cybersecurity measures such as, the implementation of strong password policies, restricting IT system access privileges, monitoring suspicious activities, employee drill, and training on cybersecurity.

Critical Infrastructure Protection

The Who, What, Why, and How of Counterterrorism Issues

By Gay Porter DeNileon

The fax came across the desk of many US water utility executives on January 24, 2001.

"URGENT! Last night, the FBI received a signed threat from a very credible, well-funded, North Africa-based terrorist group indicating that they intend to disrupt water operations in 28 US cities. Because the threat comes from a credible, well known source, with an organizational structure capable of carrying out such a threat, the FBI has asked utilities, particularly large drinking water systems, to take precautions and to be on the lookout for anyone or anything out of the ordinary."
(AMWA, 2001)

Even though the signature on the letter was later determined to be a hoax and the possibility of the threat being carried out successfully was considered to be "highly unlikely" by the Federal Bureau of Investigation (FBI, 2001), the alarm resonated in utility boardrooms and security offices across the US. The message was clear: As long as enemies of the United States exist, terrorism could strike an American water supply within our lifetimes, unless steps are taken to prevent such action.

The potential for threat is not new. "It has long been recognized that among public utilities, water supply facilities offer a particularly vulnerable point of attack to the foreign agent, due to the strategic position they occupy in keeping the wheels of industry turning and in preserving the health and morale of the American populace," wrote John Edgar Hoover, the first director of the FBI, shortly before the Japanese invasion of Pearl Harbor (Hoover, 1941).

While the prospective saboteur and some of his methods may have changed, the awareness and concern about an intentional attack on the nation's critical infrastructure has only heightened since the demise of the Cold War. Not only has the number of terrorist-type groups grown but they are increasingly extreme. "Modern terrorist groups tend to be decentralized, and many self-declared terrorists work alone," writes Michael T. Osterholm in his book about the threat of bioterrorism, *Living Terrors* (Osterholm et al, 2000). Also, the information highway has joined the traditional critical infrastructure underpinnings of the nation: transportation, banking and finance, energy, telecommunications, emergency response systems, and water supply. In May 1998, then President Clinton issued Presidential Decision Directive 63 (PDD 63), and a supporting, unclassified White Paper that defined the administration's policy on protecting the nation's critical infrastructure. The White Paper states, in part, "As a result of advances in information technology and the necessity of improved efficiency. [The nation's critical infrastructures] have become increasingly

ATTACHMENT J (continued)

automated and interlinked. These same advances have created new vulnerabilities to equipment failures, human error ... and physical and cyber attacks." (National Security Council, 1998)

What are the threats?

"Three attributes are crucial to water supply users. There must be adequate quantities of water on demand; it must be delivered at sufficient pressure; and it must be safe for use. Actions that affect any of these three factors can be debilitating for the infrastructure," states the water sector summary report crafted by the presidential commission tasked with presenting a case for increased security measures of the nation's infrastructure (President's Commission, 1997). A variety of methods could be used to undermine these three essential functions of a water supply system.

Physical destruction. Many observers believe that physical destruction of water system components or the disruption of a water supply is a much more likely scenario than a contamination event. The loss of flow and pressure would not only cause problems for water customers, but drastically hinder firefighting efforts as well. Hoover identified eight potentially vulnerable points in a water utility in addition to "bacterial infection or other pollution of water," including damage to vital equipment by explosives, damage to interdependent infrastructure such as power stations, arson, and injury to personnel (Hoover, 1941). Explosives and guns are much easier to obtain than destructive quantities of contaminants, so the potential for conventional damage to be inflicted on a water supply is much higher than a contamination event. Damage of a physical nature includes disruption or destruction of

- * an operating or distribution system component
- * the power source or other interdependent infrastructure, such as telecommunications
- * water treatment chemical containers, particularly chlorine
- * supervisory control and data acquisition (SCADA) systems.
- * raw water reservoirs, aqueducts, and pumping stations.

Another concern is the potential for creating a system-wide water hammer effect by opening and closing major control valves too rapidly, resulting in a large number of simultaneous main breaks (President's Commission, 1997). This, and a loss of pressure that could affect firefighting capabilities, would not only jeopardize the water supply, but also tax the resources of utility staff and other public works personnel. As with any natural disaster that destroys utility facilities or threatens the delivery of safe water, the stress and overtime imposed on staff handling the situation is a factor that must be considered in the larger picture of preparedness and response.

ATTACHMENT J (continued)

Chlorine and other hazardous chemicals used in the treatment process also can be susceptible to attack, particularly during transport to the utility or at an unsecured plant site. Not only would the release of chlorine gas into a residential neighborhood be dangerous, but the interruption of the supply of chemicals to the treatment plant could undermine the disinfection process.

Bioterrorism/Chemical Contamination. As the subject of many conferences and workshops, as well as of fiction and nonfiction books and movies, bioterrorism is a buzzword that catches immediate attention. Technically, the term refers to massive contamination by a microbiological agent, but there is also concern about contamination by a toxic chemical, both of which, under certain circumstances, can be considered weapons of mass destruction (WMD). Major Donald C. Hickman, in a paper urging better protection of US Air Force water systems against deliberate contamination, cites the release of sewage into a Bohemian reservoir by Nazi agents, the dumping of animal carcasses and hazardous materials into the majority of Kosovo's wells, and the use of cherry laurel water, which contains cyanide, by Nero against his enemies in ancient Rome, to build his case (Hickman, 1999).

Generally, biological agents considered to be a WMD -- an agent capable of producing mass casualties and of being produced in mass quantities -- pose the most danger in aerosol form. Contamination would likely occur through the air in an interior space, such as the sarin attack in a Tokyo subway in 1995. In determining which chemical and biological agents that are most likely to be used in a terrorist attack, the FBI's main criteria are "high dermal or inhalation toxicity, common malicious use reported, and prior use by terrorists" (FBI, Feb. 1, 2001). Nelson P. Moyer, of the University Hygienic Laboratory, said, "The ideal waterborne agent of bioterrorism has a low infectious dose, produces severe gastrointestinal disease in a population with little or no immunity, and results in a higher percentage of systemic complications leading to death." (WQTC, Moyer, 2000)

While in the past, the Centers for Disease Control and Prevention (CDC) in Atlanta has focused on airborne routes, CDC is now focusing more research on the waterborne viability and resistance to disinfection of such agents of smallpox, anthrax, botulinum toxin, tularemia, and hemorrhagic fever viruses, which are Category A biological agents of high concern (CDC, 1999). Such research is not new, and other characteristics that are relevant to an agent's potential as a biological weapon include the agent's stability in the drinking water system, virulence, culturability in the quantity required, and resistance to detection and identification processes (Berger et al, 1955). CDC is also stockpiling antidotes and vaccines, has established a disease surveillance network in hospitals and other health care facilities to detect and identify unusual unexplained illnesses, and is working with public and private laboratories to facilitate the detection and identification of biological agents in the event of a terrorist attack (Hughes, 1999).

ATTACHMENT J (continued)

In water systems, the commonly held belief that "dilution is the solution," along with the multiple barrier approach used to detect and eliminate or deter naturally occurring pathogens, would likely prevent the successful introduction of a toxic chemical or microbiological agent at the source or in the treatment plant (WQTC, DeLeon, 2000). Also, "the opportunities for finding unobserved sites for sabotage are few, as compared with the distribution system," (Berger et al, 1955) which is particularly vulnerable because of its unguarded accessibility and the widespread area it reaches.

Backflow. Consider the unintentional release of aqueous fire-fighting foam into the Charlotte Mecklenburg Utilities distribution system through a fire hydrant when a fire truck pump was turned on before a valve was closed. The pump feeding the foam produced more pressure than the water pressure in the system, and without a backflow prevention device stopping it, more than 60 gallons of foam got into the neighborhood's pipes and taps (Krouse, 2001). Almost every home and building on a public water system has unprotected access to the distribution system; one wacko who understands hydraulics and access to a drum of toxic chemicals could inflict serious damage to a water supply in a neighborhood or pressure zone without detection pretty quickly in most communities. Contaminants could also be introduced into a system in distribution reservoirs and through fire hydrants.

Cyber attack. The threat and reality of cyber attacks can affect the entire infrastructure network. Prof. James T. Lambert of the University of Virginia, in a presentation to the participants of a US Environmental Protection Agency (USEPA) sponsored workshop, cited research showing that many water utility SCADA systems are susceptible to hacking, which could result in disclosure or theft of sensitive information, corruption of information, or, at the worst extreme, denial of service (USEPA/DOE Workshop: Lambert). Because many supervisory control and data acquisition (SCADA) systems are not connected to the Internet, the threat of a cyber attack is most likely to come from a disgruntled employee with access to the system.

Who poses a threat?

While a "terrorist" threat is typically expected to be carried out by an organized group or nation with a cause or statement to make, the disenfranchised loner, e.g., Unabomber Ted Kaczynski or Oklahoma City bomber Timothy McVeigh, is a more likely menace. The intentional acts can usually be categorized into five classes of perpetrators:

1. Vandals, who commit crimes of opportunity, such as a spontaneous action without a provoking cause. Examples include teenagers who skinny dip in a water tank then dump into the reservoir the excess paint they've used to scrawl their class year on the outside of the tank.

ATTACHMENT J (continued)

2. The lone wolf, a disenfranchised, often mentally ill individual who may target his victims for their ethnicity, beliefs, or other supposed infractions.
3. Insiders, particularly employees, former employees, or contractors, who are seeking revenge or venting anger over some real or imagined slight. Because of their inside knowledge of an operation, these perpetrators could feasibly inflict the most serious harm.
4. Activist groups or cults, not aligned with a country, but intent on making a statement, such as the Earth Liberation Front that claimed responsibility for burning down the \$12 million Vail, Colo., ski lodge, or the Oregon cult that poisoned a salad bar and water system with salmonella.
5. State-sponsored terrorist groups, such as those linked to known enemies of the US.

A state-sponsored group was the alleged signatory of the threatening letter to water utilities on January 24; the concern of the parties that notified utilities about the threat was that the group actually had the financial and technical resources to carry out a major disruption of water supplies in 28 cities. Not many members of the other four classes of perpetrators have that sort of financial or manpower resources, but that does not mean they are not resourceful. In 1998, a group of teenagers carefully plotted a way to get into the water treatment plant in Neenah, Wis., where they intended to throw dry soap in the filters and liquid soap on the floors, place trip wires where plant personnel would be impeded, and videotape the entire action. These teens also had a cache of 77 pounds of M-80 firecrackers, lighter fluid, bolt cutters, and baseball bats that they said were to be used to defend themselves if necessary (Wettering, 1999).

What is being done?

PDD 63 established the National Infrastructure Protection Center (NIPC) and appointed the USEPA as lead federal agency on critical infrastructure protection issues for the water supply sector (National Security Council, 1998). USEPA subsequently appointed Diane VanDe Hei, executive director of the Association of Metropolitan Water Agencies (AMWA) as the water sector liaison to the federal government on critical infrastructure. USEPA is funding, in cooperation with the AWWA Research Foundation, a research project to develop a vulnerability assessment methodology. AMWA established a national Critical Infrastructure Protection Advisory Group (CIPAG), which began meeting in January 2001. Comprised of industry representatives, with technical support from water associations and federal agencies such as USEPA, FBI, and the Department of Energy, the CIPAG is providing guidance to a variety of activities, including

- * an Information Sharing and Assistance Center (ISAC) for the water supply sector, which would allow secure transmission of threat information and other sensitive data;
- * guidance documents that will outline what steps to take to protect a facility against attack, respond to attack, and mitigate the consequences of an attack;

ATTACHMENT J (continued)

- * cooperative meetings of all critical infrastructure sectors, through the US Chamber of Commerce and the Critical Infrastructure Assurance Office, a federal coordinating office;
- * a national infrastructure assurance plan for the water sector; and
- * training activities.

CIPAG Chair Brian Ramaley of Newport News (Va.) Public Utilities will provide an update and overview of the group's activities at a Sunday workshop during the 2001 AWWA Annual Conference and Exposition (ACE) in June. The workshop, "Critical Infrastructure Terrorism and Security," will provide participants with the first view of the USEPA/AWWARF-funded vulnerability assessment tool being developed by Sandia National Laboratory, as well as some practical advice from FBI agents, researchers, and utility professionals who already have a program in place to address terrorist issues.

A number of public and private institutions are conducting research on issues related to critical infrastructure protection and have established training programs that will take participants through the basics of identification, response, and remediation, although most programs are not water sector specific. AWWA is planning to develop a 2 -3 day "Seminar in a Box" program in 2002 that would explore in-depth the issues presented at the 2001 ACE workshop. This seminar would provide trainers and materials on a request basis to utilities, AWWA sections, and other qualified groups or agencies.

What are other concerns?

One of the biggest issues that many water utility executives raise is the confidentiality of information, e.g., concerns that the public may have easy access to details of a vulnerability assessment under local and state Freedom of Information Act (FOIA) laws. The federal FOIA allows agencies to withhold information that "could reasonably be expected to endanger the life or physical safety of any individual," and "geological and geophysical information and data, including maps, concerning wells" (FOIA). Also at the federal level, most sensitive data would not be available, because utilities are not required to provide such information to USEPA or any other agency at this time. A water industry ISAC and the FBI/NIPC Infraguard program (see sidebar) may be the answer to some of these concerns. By limiting access to, and possibly encrypting information, only those with the proper access codes or passwords will be allowed read or browse specific data. The USEPA and AMWA are also working with the CIAO to assist municipal utilities in dealing with local and state FOIA laws. Utilities are advised, nevertheless, to have their attorneys review any plans to collect sensitive information, such as the results of vulnerability assessments, to ensure that the utility has a basis for withholding information under state and local laws.

ATTACHMENT J (continued)

What can utilities do?

Utilities must take it upon themselves to assess their vulnerabilities and prioritize them for necessary security improvements. The AWWARF vulnerability assessment tool will provide templates to assist utilities in this process, and the tool may be distributed through the ISAC. The steps that can be taken once the vulnerabilities are identified are numerous (see sidebar), and need to include outreach to local and regional law enforcement and emergency management officials, as well as federal and state agencies that would be involved in a terrorist situation (see sidebar on who does what in federal and state agencies). These officials should be invited to tour the water utility facilities so they are aware of its features and vulnerable points and can respond appropriately if an attack occurs. That personal contact will also raise the water utility's visibility on the radar screen of agencies, such as the local FBI field offices, that monitor terrorist activities, so they will think to notify the water utility in the event of a threat and to include utility staff in preparedness and emergency response training.

Most utilities have emergency preparedness plans that address redundancy of operations, public notification, chain of command, media response, emergency water supply, and other issues that need attention in a crisis. These plans should provide the backbone of a response strategy for a terrorist attack as well, but should be reviewed and updated to include a checklist or barometer (predetermined with input from local and federal law enforcement officials) to determine how serious the threat is and whether or not to

- * monitor the situation and do nothing differently operationally,
- * increase security,
- * issue boil-water or do-not-drink alerts,
- * change operations (e.g., slow filter rate, increase/decrease chemicals),
- * cease operations, or
- * take other steps.

Some utilities have checklists for their customer service staff, so if a threat comes in, the person manning the phone can help identify who and where the threat came from. The checklist includes questions about tone of voice, gender, whether or not the voice was disguised or muffled, and background noise. Again, law enforcement agencies can help in crafting or supplying such a checklist, and should be notified immediately if a threat is phoned in to a utility.

Aftermath

ATTACHMENT J (continued)

News item from a California daily:

"It had a look that is common to weekend vandalism: the cut screen, the mess in the building, the spilled material. But the building was the control room for Grass Valley's water treatment plant, and the mysterious bright red substance was spilled into the Sierra foothill town's water supply over the weekend. ...

The plant will remain out of commission probably until early next week and the 2,300 residences and businesses will continue to receive 1.2 mgd from the Nevada Irrigation District." (Cox, 1999)

The FBI alert that went out to utilities on Jan. 24, 2001, was initially sent to about 300 of the largest metropolitan suppliers. Smaller utilities, however, tend to be less protected and thus more vulnerable to attack, whether it be by teenage vandals or by state-sponsored terrorists. Every utility that has had to repaint a graffiti-riddled water tower or replace stolen signs around a reservoir has witnessed how vulnerable it is to outside intrusion. Consider those incidents and multiply them by a factor of evil intent to cause harm, and then consider just how safe your facility is from a deliberate act of aggression. For, as J. Edgar Hoover said (Hoover, 1941), "We must not be lulled into a false sense of security. The thrusts of the subversive agent must be met and thwarted at every turn. The methods of operation of the saboteur and the espionage agent are limited only by their ingenuity."

REFERENCES

Association of Metropolitan Water Agencies (AMWA) Jan. 24, 2001. memorandum to utilities serving 100,000 customers or more.

Berger, B. and Stevenson, A. 1955. Feasibility of Biological Warfare Against Public Water Supplies. *Jour. AWWA*, 47:2:101

Centers for Disease Control and Prevention (CDC). 1999. Worksheet. Critical Biological Agents for Public Health Preparedness.

Cox, J. Oct. 13, 1999. "Vandals Pollute Grass Valley Water Supply: Two Teens Held." *The Sacramento Bee*.

Federal Bureau of Investigation (FBI). Jan. 24, 2001. Memorandum to AMWA.

FBI. Feb. 1, 2001. "FBI contacts for suspicious pesticide/organophosphate nerve gas incidents." Memorandum to Poison Control Centers.

Freedom of Information Act. 5 U.S.C. § 552, As Amended By Public Law No. 104-231, 110 Stat. 2422.

<<http://www.fas.org/sgp/foia/foia.html>>

ATTACHMENT J (continued)

Hickman, D.C., 1999. A Chemical and Biological Warfare Threat: USAF Water Systems at Risk. *The Counterproliferation Papers Future Warfare Series No. 3*. USAF Counterproliferation Center, Air War College, Air University, Maxwell Air Force Base, Alabama.

Hoover, J.E. Water Supply Facilities and National Defense. 1941. *Jour. AWWA*, 33:11:1861

Hughes, J.H. Apr. 10, 1999. Statement before the Subcommittee on Technology, Terrorism, and Government Information Subcommittee on Youth Violence Committee on the Judiciary US Senate.

Krouse, M. 2001. Backflow Incident Sparks Improvements. *Opflow*. Vol. 27, No. 2.

USEPA/DOE Workshop on Protecting our Water Supply Infrastructure: Lambert, J.T., Risk Management of SCADA Systems. 2000. Argonne, Ill.

Osterholm, M.T. & Schwartz, J. 2000. *Living Terrors: What America Needs to Know to Survive the Coming Bioterrorist Catastrophe*. Delacorte Press.

National Security Council (NSC). May 22, 1998. White Paper Policy on Critical Infrastructure Protection: Presidential Decision Directive 63.

President's Commission on Critical Infrastructure Protection. Oct. 13, 1997. *Critical Foundations: Protecting America's Infrastructures*.

Sandia National Laboratories Water Surety Workshop. Danneels, J.J., *Methodology for Improving the Security of the Water Infrastructure*. 2000. Albuquerque, N.M.

University of North Carolina. June 1999. Public Health Grand Rounds Satellite Broadcast Bioterrorism: Implications for Public Health. < http://www.sph.unc.edu/academics/webcasts.html?webcast=1999-06-11_implications>

Water Quality Technology Conference: De Leon, R. and Stewart, M. Evaluation of Vulnerability to Microbial Threats. Proc. 2000 AWWA WQTC, Salt Lake City.

Water Quality Technology Conference: Moyer, N.P., Infectious Risks from Public Drinking Water or The Bioterrorist's CCL. Proc. 2000 AWWA WQTC, Salt Lake City.

Wettering, L. 1999. Teens or Terrorists: Plant Security Tested by Devious Plot. *Opflow*. Vol 25, No. 3.