Chapter 5

Preparedness Planning

INTRODUCTION

The previous chapters of this manual described hazards associated with various disasters, the effects of hazards on system components, and methods to prevent or reduce potential damage to system components before disasters occur. Still, even the safest systems *will* incur some damage from disasters.

The information gathered in the previous chapters provides the groundwork for completing an emergency-preparedness plan. Vulnerable system components that have not been improved need to be addressed in the plan. For example, if a vehicle storage shed is vulnerable to high winds, then the vehicles inside should be moved to safer locations. Actions such as these should become part of the plan.

This chapter describes how to develop an emergency-preparedness plan. Preparation for disaster is essential to protect system personnel, the public, the water supply, and system components. Before developing a plan, be sure to contact other agencies to determine what plans are already in effect.

Emergency-preparedness plans are also known as emergency-operations plans, or emergency-response plans. This manual uses the word *preparedness* to focus on that aspect of dealing with emergencies and disasters. Adequate preparation results in quicker recovery from disaster.

BASIC PRINCIPLES OF A PLAN

The three basic principles that follow guide in the preparation of an emergency-preparedness plan.

Existing Resources

The emergency-preparedness plan must consider only existing resources. In other words, the plan should not be based on the assumption that mitigation actions have been completed if they have not. For example, do not list a portable generator as standby power if the system does not have the generator in hand. Whenever system improvements are made, the plan should be revised

Concise and Logical

The emergency-operations plan should be as concise and logical as possible. The wording should be simple and the language used should be familiar to the personnel who will implement the plan. The information in the plan should be presented in a logical order, with the most important information, such as the communication chart, near the front of the plan.

Coordination With Other Agencies

An effective emergency plan requires the cooperation of many agencies and lifeline utilities. Water systems depend on the electric, transportation, and communications networks to function. A list of some of the appropriate agencies will be given later in this chapter.

Although a water system cannot operate in the long term without the support of the other agencies, systems should not depend on them for assistance during disasters. That is why systems should have standby power and radio communications. Systems should also be prepared to help other agencies as needed. For example, water utility field crews may be asked to help road crews clear blocked streets if access is the most immediate need in a disaster.

ELEMENTS OF A PLAN

An emergency-operations plan is a document that should be used before, during, and after a disaster. The plan is developed from the hazard summary, vulnerability analysis, and mitigation actions taken. The following describes the information that should be contained in the plan. The elements are presented in a recommended order; however, systems may use a different order and add or delete sections as necessary. The contents of a plan may be dictated by state, provincial, or local regulations or guidelines. See appendix A for an example of guidelines prepared by South Carolina for hurricane preparedness.

Mission, Goals, and Objectives

This section of the plan states the system's philosophy about emergency planning and response. It provides a focus for system personnel while they are planning for and responding to disasters. An example of a mission statement follows:

> The mission of the water system is to be a safe provider of life-sustaining potable water to the community under normal conditions as well as during emergencies.

Goals and objectives provide specific ways to accomplish the mission. Goals and objectives should be specific enough to authorize system staff to restore water to priority areas or customers first, so there can be no questions after the fact.

As an example, in the 1992 Contra Costa County, Calif., risk management and prevention program, the following three goals are identified:

- *prevent* chemical accidents from occurring by identifying potential causes and taking corrective action.
- *prepare* for chemical accidents that, nevertheless, may occur by developing emergency-response plans and training programs.
- *protect* the public in the event of such an accident by ensuring that the residents will be notified immediately of the accident and the appropriate protective action will be taken.

As another example, consider the following introduction from the City of Norfolk, Va., emergency operations manual:

> The purpose of this document is threefold. The following are considered as departmental objectives in order of occurrence:
>
> 1. Minimize damaging effects of natural disasters upon the water production, water distribution, and sewerage collection systems of the City of Norfolk.
> 2 Provide local and area assistance where and when required during and after natural disasters and phenomena.
> 3. Restore the water production, water distribution, and sewerage collection system to working order as quickly as possible in the event of natural disasters and phenomena.
>
> The plan will identify necessary functions for departmental personnel to quickly, efficiently, and safely restore essential utility services.

Plan Activation

Quick response to emergencies can lessen the effects of disaster hazards. Some disasters, such as hurricanes, come with warnings; others, such as earthquakes, come with little or no warning. Regardless, the sooner the system is notified, the sooner the emergency-response plan can be activated.

Warnings and alerts. The National Weather Service issues warnings about hurricanes and other severe weather. One person, or more if necessary, in the system should be officially responsible for obtaining the warnings and advisories, and then passing the information along. Otherwise, personnel may get faulty information based on rumor or inaccurate reports.

The US Geological Survey may issue warnings about potential earthquakes and volcanic eruptions. The US Army Corps of Engineers may issue warnings about flooding. State or provincial health departments will issue warnings of waterborne diseases. Other state or provincial agencies may issue warnings for hurricanes, floods, or potential earthquakes and eruptions. Be sure you have such agencies' phone numbers and are on their contact list if one is available.

An emergency plan should have actions triggered by the warnings. For example, a hurricane warning affecting the area where your system is located should trigger several planned actions. The following actions were taken by the Charleston, S.C., Commissioners of Public Works 48 hours before Hurricane Hugo struck in 1989 (Hill 1992):

- checked inventory of emergency repair equipment and supplies
- stocked service trucks with service and repair supplies
- checked communications equipment
- filled elevated tanks and isolated them from the distribution system
- test-ran emergency generators and topped them off with fuel
- shut down exposed pipe at river crossings where possible
- fueled all vehicles
- set pressure-reducing valves (PRVs) in manual mode in anticipation of loss of electric power
- made arrangements for field delivery of food to work crews
- notified media of emergency operations locations and phone numbers
- allowed emergency crews to take care of personal business
- lined up work crews and schedules

- sandbagged critical areas, building entrances, and pump stations
- removed vital records to the emergency operations command post

Having these actions listed beforehand is important; while hurrying to get the system prepared, some actions could easily be forgotten.

Sudden emergencies. Unfortunately, few disasters come with a warning. The success of a system in reducing the impact of a disaster depends on a quick response. System controls or personnel should be able to recognize an emergency situation. The information may come from a supervisory control and data acquisition (SCADA) system or other telemetry/computer system. The following is a list of parameters to monitor:

- pressure change
- flow change
- pH change
- tank elevation
- chlorine residual
- power failure
- other obvious damage
- unauthorized access

System personnel should also be trained to report any change in the above parameters

Often the system first receives word of a problem from external sources. The sources could be customers, personnel from other agencies, laboratories, emergency response crews, or the media. In fact, as part of the coordination of emergency planning with other agencies, each agency should be instructed on how to report a water system emergency. Refer to Figures 5-1 and 5-2 for sample forms to hand out to customers, or to municipal or other agency personnel likely to see or become involved in water system emergencies. The customer form can be sent out as a bill stuffer or another method can be used.

Personnel receiving calls from outside, particularly from the general public, need to be trained to collect all necessary information during the first call. Rarely can the caller be contacted again for more information. Refer to Figure 5-3 for a sample reporting form. Computer response software is also in development.

When the emergency has been reported to the system, the person who received the call must know to whom to give the information. A communication chart should be developed. See Figure 5-4 for a sample form.

Be sure to log in all emergency calls. Refer to Figure 5-5 for a sample emergency-messages log.

Communication Chart

The communication chart should list all system personnel responsible for directing response actions during emergencies. As shown in Figure 5-4, it should include job titles, phone numbers, and major water system responsibilities. Other groups to include in the communication chart include all system personnel, other lifeline utilities and agencies, priority customers, and mass media that can notify the general public. Include alternative communication methods, such as radios and cellular phones, if normal phone communication is disrupted. One way to relay the actual conditions at a site is with videotape. A staff person can be assigned a videotape

EMERGENCY TELEPHONE NUMBERS*

_____ WATER SYSTEM

The following events may constitute a WATER SYSTEM EMERGENCY:

1. Loss of service
2. Escaping water
3. Sudden changes in color, clearness, taste, or odor

If you observe any of these potential emergency conditions, please telephone the _____

_____ water system immediately.

Telephone Numbers

Business office _____

Operations control center _____

After hours service _____

If there is no answer at any of the above numbers, please contact the police department

at _____.

*For use by the general public.

Source: Washington State (1982).

Figure 5-1 Sample form for general public notification of water system emergency

EMERGENCY REPORTING INSTRUCTION*

In the event of an emergency that appears to involve water service, please fill out the form below and contact the _____ water system immediately Telephone numbers appear at the bottom of this form.

1. Person calling in emergency _____ Telephone number _____
   Time call was received _____
2. Location of emergency
   Street and house/building number _____
   Other (approximate location, distance from landmark, etc.) _____
   _____
3. Condition at scene (check appropriate box[es])
   ☐ Escaping water. ___ Seepage ___ Free-flowing ___ Gushing
   ☐ Flooding ___ Roads ___ Intersections ___ Property ___ Buildings
   ☐ Erosion ___ Banks ___ Foundations
   ☐ Electrical power: ___ Interruptions ___ Total loss of power
   ☐ Change in water quality ___ Taste ___ Odor ___ Color ___ Clearness
4. Actual/potential damage
   Briefly describe the situation _____
   _____
   _____
5. Access restrictions, if any _____
   _____
   _____
6. Assistance already available (who, what they are doing, etc.) _____
   _____
   _____
   _____

EMERGENCY TELEPHONE NUMBERS

Business office _____
Operations control center _____
After hours service _____

Signature of person who filled out form _____

*For use by municipal personnel likely to see or become involved in water system emergencies.

Source: Washington State (1982).

Figure 5-2 Sample form for other agency notification of water system emergency

EMERGENCY NOTIFICATION REPORT*

Part 1 — Facts Related to Emergency

1. Person or department calling in emergency _____

   Phone number/radio frequency _____ Date/time call received _____

2. Location of emergency

   Street and house/building number _____

   Other (approximate location, distance from landmark, etc.) _____

   _____

3. Condition at scene (check appropriate box[es])

   ☐ Escaping water: ___ Seepage ___ Free-flowing ___ Gushing

   ☐ Flooding: ___ Roads ___ Intersections ___ Property ___ Buildings

   ☐ Erosion: ___ Banks ___ Foundations

   ☐ Electrical power: ___ Interruptions ___ Total loss of power

   ☐ Change in water quality: ___ Taste ___ Odor ___ Color ___ Clearness

4. Actual/potential damage

   Briefly describe the situation _____

   _____

   _____

5. Access restrictions, if any _____

   _____

6. Assistance already available (who, what they are doing, etc.) _____

   _____

   _____

   _____

Part 2 — Assess Emergency

1. Personnel analyzing emergency _____

   _____

2. Reported results of investigation _____

   _____

3. Time assessed _____

Part 3 — Emergency Action Taken (Refer to emergency response plan.)

1. Immediate action taken (If emergency response plan is used, note page[s].) _____

   _____

Figure 5-3 Sample emergency notification report

2 Is immediate action ☐ Permanent ☐ Temporary

3. Was an emergency crew dispatched ☐ Yes ☐ No

Time arrived on scene ___ _____ _____

4. Note all other actions that will be necessary to bring facility back in line _____

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Part 4 — Persons/Department Notified of Emergency

Positions	Name	Work Telephone	Home Telephone	Time of Call
☐ General manager				
☐ Engineer				
☐ Operations supervisor				
☐ Office manager				
☐ Public relations or media contact				
☐ Fire department				
☐ Police department				
☐ Highway department				
☐ Local elected official (mayor, commissioner, etc.)				
☐ State or provincial drinking water department				
☐ Department of emergency services				
☐ Department of emergency services				
☐ State quality control				
☐ Local health department				
☐ Other (refer to system personnel and support call-up lists)				
☐ Priority customers				

Signature of person who filled out form _____

*To be completed and used by water system personnel

Source: Washington State (1982).

Figure 5-3 Sample emergency notification report (continued)

WATER SYSTEM PERSONNEL — EMERGENCY CALL-UP LIST*

For each of the following categories, in ranking order list the names of water system personnel responsible for making decisions in specific emergency situations. Include job titles, telephone numbers, and major water system responsibilities and expertise.

		Name	Title	Work Telephone	Home Telephone	Major Responsibility and Expertise
Quality and treatment:	1.					
	2.					
	3.					
	4.					
Source water	1.					
	2.					
	3.					
	4.					
Storage:	1.					
	2.					
	3.					
	4.					
Distribution*	1.					
	2.					
	3.					
	4.					
Pressure and pumping facilities:	1.					
	2.					
	3.					
	4.					

*To be completed and used by water system personnel.

Source: Washington State (1982).

Figure 5-4 Sample emergency communication report

EMERGENCY COMMUNICATIONS MESSAGES LOG*

Date	Time In	Out	To/From	Type of Message	Message

*To be maintained by water system personnel.

Source: Washington State (1982).

Figure 5-5 Sample emergency-messages log

camera to record the conditions and the response activities. The tape can be sent to the emergency-response center to show to those directing actions

Water utility personnel. Be sure to list home addresses, as well as phone numbers, of all utility personnel. If phone lines are down, personnel may have to be contacted in person Also, list any cross-training each person has completed. For example, a laboratory technician may have been trained to help a field crew during an emergency affecting the distribution system. Refer to Figure 5-4 for a sample form to list personnel.

In general, the following three groups of personnel are needed in an emergency (AWWARF and JWWA 1993).

- *command/liaison group* directs the response, making decisions on appropriate actions and communicating with other groups, agencies, and the public
- *field investigation group* works to identify the cause and extent of the emergency
- *treatment response group* performs the repairs and other emergency-response actions required

With smaller or localized emergencies, the groups' functions will overlap. For example, during an isolated main break, a field crew at the site may perform all three functions. In larger, widespread disasters, the responsibilities of the three groups are more distinct.

Other agencies. List those agencies or organizations, such as contractors, with whom you have standing agreements to provide mutual assistance. Refer to Figure 5-6 for a sample form and list. See also Figure 5-7 for a list of other departments and agencies to notify, and other utilities or lifelines whose priority service list your system should be on

Priority customers. Priority customers identified in the vulnerability analysis need to be notified if disaster hazards could affect the quality or quantity of water delivered to them. The water system representative contacting these customers should know who to contact. This is not the first person who answers the phone, but someone designated as an official contact or alternate. The system representative should find out if the customer's second source of potable water is available or functioning. Refer to Figure 5-8 for a sample priority-service form and Figure 5-9 for a sample priority-service list. Be sure to update the list at least annually.

General public. The general public is usually notified of disaster information through such mass media as radio, television, and newspapers. The water system's communication chart should include the phone numbers of the media outlets. Also, the media should be given the system's emergency phone number or an alternative method of contacting the system if the phone system is out of order. It is helpful to prepare sample public notifications, such as a boil-water order, beforehand. The notifications can be modified as necessary to fit the situation. See Figure 5-10 for a sample public-notification form. Also, the system should designate an official spokesperson or spokespersons. That way, the correct, or at least consistent, information will be given out.

Other methods for notifying the public include mobile public-address systems, sirens, leaflets, and computerized phone-dialing systems. For additional information on communicating with the public refer to *So the People May Know* (AWWA 1993).

Agreements With Other Agencies or Organizations

Include any written agreements as part of the preparedness plan. Also, include the interconnection agreements with other systems. Particularly important are the

SUPPORT CALL-UP LIST*

The following agencies/organizations have standing agreements with this water system whereby they will provide assistance on request in an emergency.

Organization	Address	Name	Telephone	Type of Assistance to Be Provided	Required Authorization

Approved _____ Date _____

*To be completed and used by water system personnel.

Source: Washington State (1982).

Figure 5-6 Sample support call-up form and list

SUPPORT CALL-UP LIST

Suppliers

- pipe, valve, and fitting vendor
- pipe bedding and concrete
- lumber yard
- chemicals and chemical feed pumps
- shoring
- pumps and electrical
- hardware store
- fuel
- tires
- signing
- heavy equipment
- rental center
- all contract vendors (emergency number can be a provision of the contract)

Contractors

- excavation
- general contractor
- electrical
- pump
- water hauler
- communications
- computer
- telemetering
- traffic control

Agencies

- wastewater/stormwater utility
- neighboring utilities
- emergency services
- safe drinking water program
- laboratories
- Red Cross
- ham radio club
- electrical/telephone utility
- fire department

Special Contractor/Equipment List

- concrete saw
- auxiliary power (pumps, garage, office computer, and communication)
- portable lights
- alternate transportation (boat, snowmobile, snowcat, helicopter, and freight company)
- portable rest rooms
- catering/restaurant
- showers
- warm/cool resting place
- chain saws
- sump pumps
- chlorine test kits

Source: Washington State (1982).

Figure 5-6 Sample support call-up form and list (continued)

OTHER DEPARTMENTS/AGENCIES TO NOTIFY

City Hall

- city manager/administrator
- elected officials
- fire department/district
- police department/sheriff
- wastewater/stormwater utility
- street/road/highway department
- engineer
- insurance/safety officer
- dispatcher

Other

- one-call system
- emergency services
- local/state health departments
- newspaper (news desk and traffic reports)
- radio (news desk and traffic reports)
- television (news desk and traffic reports)

Priority-Service Lists That Should Include Your Utility

- wholesale supplier
- electric utility
- telephone utility
- sewer utility
- emergency-response center
- chemical supplier
- fire department/district
- hazardous-material spill response

Source: Sander (1991).

Figure 5-7 Other departments and agencies to notify

PRIORITY-SERVICE FORM*

Individuals/organizations located at the following service connections are critically dependent on an uninterrupted supply of water. In the event of an emergency effecting their primary source, the following actions must be taken:

1. Notify the customer immediately. Verify that the second source, if any, is functioning.
2. Take the indicated emergency action, if required.

Name	Address	Telephone	Reason for Requesting Priority Service	Alternative Source Available Yes	No	Emergency Action(s) to Be Taken

Approved _____ Date _____

*To be completed and used by water system personnel.

Source: Washington State.

Figure 5-8 Sample priority-service form

PRIORITY-SERVICE LIST

	Quality Problem	Quantity Problem	Reduce Use
Medical/Dental Facilities			
Hospital	X	X	
Clinics and offices	X		
Emergency clinics/outpatient	X	X	
Kidney dialysis patients	X	X	
Blood bank	X		
Public Facilities			
Schools and preschools	X	X	
Day-care centers	X	X	
Emergency shelters	X	X	
Stadiums, arenas, and convention centers	X	X	
Parks and cemeteries		X	
Wholesale suppliers		X	
Emergency-operations centers	X	X	
Fire and police stations/jails	X	X	
Large Users			
Large industrial users		X	
Wholesale customers	X	X	
High-rise buildings		X	
Contractors		X	
Steam plants		X	
Sawmills			X
Nonessential users			X
Food and Beverage Facilities			
Dairies	X	X	X
Soft drink bottlers	X	X	
Breweries and wineries	X	X	
Bakeries	X		
Restaurants	X	X	
Food processors	X	X	X
Critical Businesses			
Beauty shops		X	
Dry cleaners		X	
Fish markets	X		
Newspapers (printing facilities)		X	
Large computer facilities		X	
Hotels and motels	X	X	
Hatcheries	X	X	
Photo processors		X	
High-degree-of-hazard users (cross-connection potential)		X	

Source: Sander (1991)

Figure 5-9 Sample priority-service list

WATER SHUTOFF NOTIFICATION

The _____ water system will be turning the water off in your area in order to make necessary repairs to the system.

Area to be shutoff _____

_____

_____

_____

_____

Date(s) of shutoff _____

_____

_____

Time(s) of shutoff _____

_____

Reason for shutoff _____

_____

_____

Date of notice _____

If you have any questions about the above information, please call _____

Source: Washington State.

Figure 5-10 Sample form for public water shutoff notification

contracts with private suppliers and contractors. Usually, these contracts spell out what type of services are available, under what conditions, and for what price. The contracts normally have an expiration date, so they need to be updated regularly. Try to get them all on the same schedule, and designate a person to make sure they are updated before expiration. Some utilities require 24-hour access and emergency phone numbers from their suppliers as part of their annual bidding package and contract.

Disaster-Specific Plans

Emergency-preparedness plans can be effectively developed for specific disasters determined to be the most likely to occur. For example, a system could develop preparedness plans for an earthquake, a hazardous-materials spill, and a brush fire. Another system may develop emergency-preparedness plans for a hurricane, a flood, and a chlorine leak. The items included in a specific disaster plan are based on the hazard summary, the vulnerability analysis, and mitigation actions.

Hazard summary. Include in the disaster-specific plan the results of the hazard summary for the disaster. The summary can be presented in a few paragraphs or with a form. Refer to Figure 2-4 in chapter 2 for a sample. For each disaster, include the hazards specifically applicable to the system. For example, for an earthquake, provide an estimate of the magnitude of fault rupture, or horizontal and vertical accelerations at each site of concern. Other information could include the location of faults, areas with liquefiable soils, and slopes subject to sliding. The estimates provide the basis for determining the system's vulnerable components.

Vulnerability analysis. Provide specific estimates of the damage to system components as determined in the vulnerability analysis. Using the earthquake example listed would be probable damages due to such hazards as pipeline breaks or treatment plant damage. Include a map of the system with the preparedness plan. Be sure that critical components are identified.

Mitigation actions. List the mitigation and preparedness actions that need to be taken to lessen the impact of the hazards. A list of suggested mitigation actions, such as retrofitting a building to withstand seismic forces or relocating a section of pipe that crosses a fault, should be maintained in the plan. When a mitigation action has been completed, the plan should be updated. Continuing with the earthquake example, preparedness actions might include maintaining generators and isolation valves and testing radio communications.

The following example of a disaster-specific plan presents some of the details that should be included in all plans.

Hazardous-Material Spills

Many governmental agencies, ranging from federal to local, have developed emergency-response plans to deal with hazardous-material spills. Water systems should know what plans are currently active and how their system fits into a plan. A case study of a hazardous-material spill appears on page 69.

To help clarify the essential ingredients of a hazardous-material spill plan, the description and function of each will be described in the following paragraphs (Ryckman and Ryckman 1980). These ingredients have been discussed previously in more general terms for all emergencies. The list provides a good summary to use for all plans.

Fast response. As with most emergencies, the most critical time is the first few minutes after a spill has occurred. All material spills have the potential to

Case Study: Phenol, Alcohol, and Solvents Spill

This case study involves a private spill-response group known as REACT.

Residents' complaints of foul odors coming from a nearby stream prompted state officials to investigate the source of the problem. A government investigation traced the problem to a nearby specialty chemical company, where a spill of an estimated 10,000 gal (38 kL) of 810 alcohol and monononylphenol had occurred on the company grounds. These chemicals had leached into the groundwater aquifer beneath the company's property, which discharged into the stream. The company was directed by the regulatory authorities to take immediate steps to rectify the situation. The company elected to try to solve the problem by using straw to soak up the materials from the creek. This effort proved to be futile, and several company employees received minor skin burns from contact with the monononylphenol. Management then decided to seek outside assistance.

REACT was contacted and advised of the situation. Company management authorized REACT to contain and remove the material from the creek and to conduct an investigation to determine the source of the problem. Personnel and equipment were immediately dispatched to the scene, arriving within one hour. A series of booms, both containment and sorbent, were set up along a 5-mi (8-km) stretch downstream of the aquifer outcropping to prevent the spill from entering a major river used as a water source for a large city. Samples collected from the creek were analyzed, revealing the presence of kerosene in addition to the reported alcohol and monononylphenol. Two response teams proceeded to construct activated carbon sandbag dams that served as the primary containment and adsorption systems. Next, an activated carbon "blackout" of the entire 5-mi (8-km) stretch of creek was completed within one day. This arrested the odor problem and stopped residents' complaints.

Monitoring at the outcropping revealed that the aquifer still contained significant concentrations of pollutants. A decision was made to construct a cofferdam at the groundwater outcropping to collect and pump the pollutants back to the chemical company's property for subsequent treatment. This operation ceased after monitoring indicated no further pollution discharges from the aquifer system for five consecutive days. This was 25 days after the initial call for assistance.

Response efforts were conducted 24 hours a day for a 25-day period. During this time, in-plant audits and recommendations were made to update the facility's spill-prevention control and countermeasures plan. The recommendations included moving all underground process lines aboveground, providing concrete paving and secondary containment structures for bulk storage and transfer facilities, and redesigning the stormwater facilities.

Excerpted from Ryckman and Ryckman 1980.

contaminate the water supply. The previous section in this chapter on sudden emergency response provides methods of fast response.

Experience. Scientists, engineers, and others with appropriate experience and knowledge of hazardous materials are essential to a successful response. If in-house personnel do not have the experience or training, contact experts to be on call. Another type of experience needed involves operations, that is, handling the labor-intensive cleanup operations. Operations personnel correspond to the field investigation group and the treatment response group described earlier in this chapter.

Leadership. During an emergency, one person or a coordinated group of persons should be in charge. This corresponds to the command/liaison group. If another agency is responsible for spill response, then a water system should designate one person to be in contact with the lead agency. Establish in advance ideal locations for an emergency operations center. Be sure the center has power, water, communications ability, and access.

Communications. Communications are vital to an effective emergency response. Previous sections in this and other chapters discuss the importance of communications and present methods to ensure that they are maintained.

Availability. Information, equipment, and personnel must be available 24 hours a day, seven days a week.

Coordination. Successful coordination of people, information, and equipment involves planning beforehand. A previous section of this manual discussed working with other agencies. Response elements that need coordination include cleanup operations, public health and safety measures, liaison with regulatory agencies, information flow to the local water system, and information to and from the emergency site.

Equipment and supplies. Water systems should maintain such equipment as booms, and supplies such as sandbags and sorbent. Additional sources of equipment and supplies should be located and arrangements made for delivery as needed.

Transportation. Efficient transportation is a necessity. The specific mode will depend on the location of the spill and the type of equipment needed to handle the spill.

Data resources. Access to a database listing technical information about substances is important. The database should include appropriate containment, removal, recovery, treatment, and disposal practices.

Laboratories. Arrangements should be made with both mobile and permanent laboratories that can analyze spills to determine the substances involved.

Required reporting of hazardous substances. The Emergency Planning and Community Right-to-Know Act of 1986 (also known as SARA Title III) requires that a water system report the storage and use of extremely hazardous substances, such as chlorine, to various agencies, including the

- National Response Center
- state emergency-response commission
- local emergency-planning committee
- local fire department

If a water system stores more than a threshold planning quantity (minimum limit) of extremely hazardous substances, it must report those chemicals to the National Response Center. A system must report to the National Response Center, the state emergency-response commission, and the local emergency planning committee any release of hazardous substances that go over a property line. A system must send a copy of the material safety data sheet (MSDS) (usually included with the chemical) for each hazardous chemical stored or send a list of chemicals grouped by hazard category to the state emergency-response center, the local emergency planning committee, and the local fire department. Also, the system must file a tier 1 form (available from the state emergency-response center) by March 1 of each year with the same three agencies. The form asks for information on the amounts of chemicals that were stored during the previous year and the hazards they pose (listed on the MSDS).

Because the chemicals used in water treatment vary, a system should contact the state emergency-response commission or the local emergency planning committee to determine which chemicals need to be reported.

For more information on this law, call USEPA's Emergency Planning and Community Right-to-Know Hotline at (800) 535-0202. It can provide the number for your state commission. The phone number of the National Response Center is (800) 424-8802. Enter this number in your system's emergency-preparedness plan.

VULNERABILITY ANALYSIS

Facility _____

Failure description _____

1. **Failure Detection**

   Is failure detectable by

   a) telemetry system? Yes ____ No ____

   b) routine inspection? Yes ____ No ____

   c) service complaint? Yes ____ No ____

2. **System Impact**

   a) Is facility a source? Yes ____ No ____

   b) Does facility have an alternate operating mode? Yes ____ No ____

   c) If so, is alternate facility a full replacement? Yes ____ No ____

   d) Does failure cause

      1. loss of service? Yes ____ No ____

      2. loss of fire protection? Yes ____ No ____

      3. low service pressure? Yes ____ No ____

      4. other effects to system? Yes ____ No ____

      Describe _____

      _____

      5. damage to property? Yes ____ No ____

      Describe _____

      _____

   e) Does failure cause loss of storage capacity? Yes ____ No ____

   f) Does failure degrade water quality? Yes ____ No ____

   g) Are other system facilities affected? Yes ____ No ____

      List _____

      _____

Source: Washington State.

Figure 5-11 Sample form for facility vulnerability analysis

3. Facility Vulnerability

a) Is routine inspection and maintenance required? Yes ___ No ___

Frequency of inspection _____

Frequency of maintenance _____

b) Does facility require electric power? Yes ___ No ___

Failure history _____

c) Is auxiliary power available? Yes ___ No ___

d) Is facility protected against vehicle vandalism? Yes ___ No ___

Describe _____

e) Is facility protected against vehicle accident? Yes ___ No ___

f) Does this facility require special protection from

1. flood Yes ___ No ___
2. high wind Yes ___ No ___
3. cold weather Yes ___ No ___
4. hot weather Yes ___ No ___
5. fire Yes ___ No ___
6. other Yes ___ No ___

g) Under which disaster conditions listed on the hazard summary could this facility potentially fail? _____

h) Does normal operation depend on chemicals? Yes ___ No ___

If yes, list _____

Source: Washington State.

Figure 5-11 Sample form for facility vulnerability analysis (continued)

If yes, list means of transportation _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

i) Is facility susceptible to other impacts?

1. debris in water Yes ____ No ____
2. low pressure Yes ____ No ____
3. high pressure Yes ____ No ____
4. other _____ _____ _____ _____ _____

j) Is facility dependent on other system facilities? Yes ____ No ____

List _____ _____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____ _____

4. Facility — Supervisory Control Dependency

a) Is facility dependent on telemetry for

1. control Yes ____ No ____
2. status reporting Yes ____ No ____
3. data logging Yes ____ No ____
4. other _____ _____ _____ _____ _____

b) When control fails, does component

1. stop? Yes ____ No ____
2. remain in last command position? Yes ____ No ____
3. revert to local control? Yes ____ No ____

5. Personnel

a) Can normal repair be undertaken by

1. all personnel? Yes ____ No ____
2. a special few? Yes ____ No ____
3. one? Yes ____ No ____
4. outside contractor? Yes ____ No ____

Source: Washington State.

Figure 5-11 Sample form for facility vulnerability analysis (continued)

OPERATING AND DAMAGE REPORT

This report must be filled out in detail and turned in. It must be signed by the responsible foreman and supervisor on completion of repair/emergency.

Part 1 — General Information

1. Date of this report _____

   Date and time water system became aware of break or problem _____

2. Location of break or problem _____

3. Person or persons who notified water system of break or problem _____

   _____

   Position(s) _____

4. Location and custody of book, card, memo, etc., containing information relative to this report

   _____

Part 2 — Pre-Action Information — Assessing the Emergency

1. Time/date crew arrived at scene _____

2. Names of crew persons at scene _____

3. Nature of problem and/or cause of break. If unknown, state probable cause and detail facts supporting conclusions _____

   _____

   _____

4. What damage was done? _____

5. What damage was done to adjacent property? _____

   _____

Part 3 — Emergency Action Taken

1. What emergency action(s) was taken to control situation at the scene? _____

   _____

   _____

   _____

Source: Washington State.

Figure 5-12 Sample damage report form

2. Names of crew persons making emergency repairs

3. Time/date emergency repairs were made and service was restored

4. Materials used for repair

5. Is further action needed? If so, explain

Part 4 — Supplemental Information

1. If quality problem, what disinfection procedures were followed?

   Is further action needed? Yes ____ No ____ Action

2. Were water quality samples taken?

   Yes ____ No ____

Parameter	Date	Results

3. Were any photos taken? Yes ____ No ____ By whom?

4. Size and location of valves operated or work necessary to effect shutdown (diagram)

Source: Washington State.

Figure 5-12 Sample damage report form (continued)

5. Size, kind, type, pressure rating and/or class pipe appurtenance _____

_____

6. Date of installation _____ Life expectancy _____

7. Date of last inspection of pipe or appurtenances _____

8. Is main subject to excessive pressure or pressure changes? _____

9. History of prior trouble within _____ feet and dating back to _____

10. Present condition _____

11. Condition and type of joints _____

12. Type of soil in ditch and characteristic of ground cover around existing water main _____

_____

13. Depth of pipe (top of pipe to street surface) _____

14. Size of hole in street _____

15. Type and thickness of street surface _____

_____

IMPORTANT: WHERE IT APPEARS THAT DAMAGE CLAIMS MAY ARISE, FILL OUT AND ATTACH SUPPLEMENTARY SHEETS WITH ALL INFORMATION POSSIBLE AND DRAW A DIAGRAM ON SEPARATE SHEET SHOWING AS MUCH DETAIL AS POSSIBLE, LOCATION, AND ADDRESS OF DAMAGED PROPERTY.

Crew Leader _____ Supervisor _____

Source: Washington State.

Figure 5-12 Sample damage report form (continued)

Component-Specific Plans

Preparing a water system for the most probable disasters will mitigate much of the potential damage to the system components. For critical components, such as a treatment plant, a plan specific to that component should be developed The component-specific plan will address the hazard effects, and mitigation and preparedness actions that may not be covered in the disaster-specific plan.

Component-specific plans are similar in content to disaster-specific plans. Component-specific plans should include the hazard summary, vulnerability analysis, and mitigation and preparedness actions that relate to a specific component. Figure 5-11 illustrates a sample form that can be used for a facility vulnerability analysis.

Disaster Recovery Accounting

A system should identify and document all costs related to each specific emergency. It may be possible to recover all or a portion of these costs through federal, state, or provincial disaster-relief funding. One familiar way to clearly identify costs related to a disaster is to use a preplanned, emergency work-order numbering system. All costs related to any specific operation are charged to the work-order number for that project. Many work orders may be used during one natural disaster because there may be many different projects in progress to restore the entire system. All emergency work orders, however, should be specifically coded to identify them as being related to the emergency.

It also helps to use an operating and damage report form to keep track of the work. The records can be invaluable for assessing the damage of a disaster and evaluating the response The records also indicate if followup actions are needed. A sample form is shown in Figure 5-12. Photos and videotape are excellent ways to document actions.

Distribution List

A list should be kept of those who have a copy of the emergency plan. When the plan is updated, the new material will be sent to the persons with a copy of the plan.

UPDATING A PLAN

Just as a water system does not remain static, neither should the system's emergency-preparedness plan. The plan should be updated quarterly or when major changes are made, such as a new facility coming on-line. Make sure that updating the plan is part of a staff person's responsibilities.

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