

### What's In This Chapter?

1. The basic responsibilities of management, operations, and customers
2. The purpose and components of Preventive Maintenance (PM)
3. The components of an Emergency Response Plan (ERP)
4. The purpose of Action Plans
5. The purpose of a good public relations program
6. The reason for maintaining daily records at a water system

# Water Systems Organization

## Parts of a Water System

A water system is composed of more than the physical facilities. Other major parts of the system include the customers, the federal and state regulatory agencies, the governing body, the utility manager, and system operators. Each group has a unique and important role in providing safe water.

## Roles and Responsibilities

### Customers

The customer is the end-user of the product and responsible for paying for the service provided and using the water in a wise manner.

### Federal and State Agencies

Federal and state agencies are responsible for establishing regulations to assure that water provided by public water systems is safe to drink. In addition, these agencies provide information and technical assistance for water systems in meeting regulations.

### Governing Body

The governing body may be a city or borough council or a traditional village council. The council sets policy and rates and is responsible for overseeing the entire water utility.

The governing body, as a group and sometimes as individuals, is responsible and liable for the following:

- Quality of the service
- Fair treatment of customers, employees, and vendors, including contractors
- Safety of employees
- Financial solvency and physical well being of the water utility

### Utility Manager

The Utility Manager is responsible for the day-to-day operation, preventive maintenance, and emergency repairs. In small communities, the City Manager, Mayor, or City Administrator may fill the Utility Manager role.

### Operator

Operators maintain and operate the water system. They are directly accountable to the Utility Manager. Because this course is focused primarily on operation and maintenance of small water systems, additional information on the responsibilities of management and the operators are provided below.

## Management

### Who Is Management?

The identification of who or of what level of the organization should be considered management is a local decision and will not be addressed. However, regardless of who is defined as management, there are several management functions that must be performed in a properly operated water system. It makes no difference who performs these duties, as long as they are done.

## Management Tasks

Management is responsible for the following:

1. Establishing and maintaining ordinances pertaining to the management, operation, and financial policies and procedures of the utility.
2. Establishing and printing rules for customers.
3. Setting proper, equitable rates for the use of water.
4. Developing plans so that future needs can be met.
5. Establishing long-term (5 to 10-year) budgeting requirements.
6. Integrity of the financial situation, including budgeting, collecting utility bills, and paying encumbered bills.
7. Establishing and properly supporting a worker safety program.
8. Seeing that operators are properly trained.
9. Establishing proper recordkeeping systems for water quality data, billing, budgets, and operation data.
10. Communicating the needs and conditions of the system to state agencies, customers, and operators.
11. Developing and implementing a public relations/customer service program.

## Operation and Maintenance

The operator of the water system is a major link in the protection of the health of the community or village. This is one of the most important responsibilities in the community. Without a properly trained operator, a valuable water system can be damaged beyond repair in just a few days of cold weather. In addition, public health can be compromised and can lead to sickness or death of water customers.

### Operator Tasks

A good operator must perform the functions of mechanic, microbiologist, chemist, construction worker, janitor, public relations expert, data management expert, and a host of others. A good operator must:

- Be properly trained.
- Assist the manager in establishing an operating budget.
- Inspect equipment.
- Keep proper repair parts on hand.
- Collect adequate samples.
- Perform routine testing.
- Repair broken equipment.
- Prevent equipment breakdowns by performing preventive maintenance.
- Keep water temperature correct.
- Add proper chemicals in proper amounts.
- Prevent contamination of water sources.
- Prevent deterioration of the water system.
- Keep management aware of system problems.
- Communicate with the state, customers, and management.
- Keep quality records.
- Maintain an easy-to-retrieve record history.
- Be reliable.

### Review

For each of the following, provide one major responsibility in association with water systems:

- A. Customers
- B. Governing body
- C. State agency
- D. Manager
- E. Operator

### Programs and Plans

To properly and successfully operate and manage a water utility, there are several programs and plans that must be developed and implemented. The following is a brief introduction to a few of these key programs.

## Safety

### Programs

One of the major responsibilities of management is to develop, implement, and support a worker safety program. A more in-depth discussion of some of the key elements of a safety program is discussed in the safety lesson. A properly designed program includes a written policy and written programs and procedures for at least the following areas:

- Injury and illness prevention
- General safety and first aid
- Traffic control
- Confined space entry
- Lockout/tagout system
- Shoring protection and the associated competent person program
- Fall protection
- Hazardous material handling
- Hazardous material communication
- Hearing protection
- Fire prevention
- Safety committee
- Heavy equipment operation

## Training and Equipment

In nearly every case, each safety program component has a training requirement, as well as specific requirements for the selection and use of safety equipment. Current federal and state safety regulations call for the employer to supply all required safety equipment.

## Training

Training costs money. Why then do successful organizations require and support personnel training? These organizations have found that training is necessary for the following reasons:

- Training provides personnel with the proper information to allow them to properly operate and maintain the system.
- Proper training can in many cases reduce operating cost.
- Training can be a motivator for all personnel.
- Some training is required to meet certification and safety requirements.
- Providing this training reduces the organization's liability exposure, improves operations, and reduces accidents.
- In critical environments such as the Arctic, properly trained personnel can prevent costly system failures.

## Certification and Training

Besides the training requirements associated with the safety program, each organization has the responsibility to see that the operators and office staff are properly trained and, where appropriate, certified. Although operator certification is required for most community water systems, it is also an excellent way to motivate employees and at the same time reduce liability exposure. In addition, most states require training to maintain operator certification. Continuing Education Units (CEUs) are the national standard for measuring training. One CEU is equal to 10 contact hours of training.

## Advanced Training

Research indicates that the best results are received from people who are trained at least one level above their work requirements. Therefore, it is the responsibility of management to see that each worker is involved in a regular training program. If the budget allows, at least two training and/or conference sessions per year are recommended. Both AWWA and WEF have suggested that the personnel training budget be equal to at least five percent of the amount paid for salary.

## Maintenance Management

### Components

A good way for the operator to plan and perform all of the required tasks is to develop a planned maintenance management system. This system includes a preventive maintenance (PM) system, data collection process, work order system, inventory control system, and monthly reports to management. This process is useful in justifying budget requests and managing personnel requirements.

### Key Element

The key element of a maintenance management system is the use of a routine schedule of sampling, testing, reporting, and equipment PM. The schedule could be a calendar, index cards, or computer-generated listing of equipment maintenance requirements.

**Review**

1. Identify three of the safety programs that must be developed by management.
2. Why should operators be trained?
3. What is the primary function of a preventive maintenance system?
4. The key element of a maintenance management system is the schedule. What are the four items that should be on this schedule?
5. Which “program” is the most useful in justifying the operations and maintenance budget?

## Emergency Response Plans (ERP)

### What is an Emergency Response Plan?

An ERP is a written, well-thought-out series of planned actions that help you respond to emergencies of all types. An ERP presents clear and logical steps to take in response to possible emergencies, designates persons responsible for specific actions, provides for training and planned practice exercises, and ensures effective coordination with first responders, law enforcement, and health officials.

If your water system does not have an ERP, you should prepare one. An ERP will help you organize your response to emergencies before they happen. An emergency can happen at any time, and any problem with the drinking water supply will become a top priority for you and the affected members of your community. An emergency could generate tremendous and immediate pressures on system operators, emergency response professionals, law enforcement, local health officials, and the public. A system that has an ERP and has practiced organized emergency response exercises will have a much better chance of minimizing the effects of emergencies. Therefore, having a well-planned system response to foreseeable emergencies makes good sense.

### Preparing an ERP

Preparing an ERP can take some effort. You should build an internal team of water system operators, board members, and community leaders to develop a complete ERP. The steps below can help you prepare a new ERP (or update your existing ERP). Remember that your state can be a good source of assistance should you have questions or need help in developing your ERP. In Alaska, contact the ADEC for more information. Finally, because every system is different, you may need to modify the ERP development process described below to make it work for you.

It is important to note that some states may have their own ERP requirements. Make sure you check with your state to see whether it has established specific requirements that you must address.

In developing an ERP, you should identify and form partnerships with the people and organizations whose help your system will need in an emergency:

- Local police and fire departments
- Public health officials
- Local emergency planning committees (LEPC)
- Local government/city managers
- State and federal agencies
- Nearby water utilities (for developing interconnections and mutual aid agreements)
- Health care providers
- Equipment suppliers
- News media

## Core Elements

A number of core elements should be included in any ERP, including yours. These elements will help ensure that your ERP and emergency response capabilities enable you to respond to any kind of emergency or threat. At the same time, the elements are flexible enough to ensure that your ERP meets the specific needs of your system.

### 1. System-Specific Information

In an emergency, you should be able to provide basic technical information to personnel who will provide emergency assistance. In most cases, the organizations providing assistance will be those with which you formed partnerships while developing your ERP. To ensure that you can provide the necessary system-specific information quickly and accurately, it is important that you include it as an easily accessible part of your ERP. The basic information that you should have in this section of your ERP includes the following:

- Owner name, operator name(s), and Public Water System Identification (PWSID) number, which identifies your system to your state and to EPA
- Key information about critical system components (for example, source water, treatment plant, water and chemical storage, and distribution system)
- Population served and number of service connections in the distribution system
- How to isolate parts of your system when the need arises

### 2. Roles and Responsibilities

You should specify roles and responsibilities for yourself and for your partners from outside of your system. First, you should designate an Emergency Response Leader (and a back-up), who will be the main point of contact and the primary decision-maker during an emergency. Other system personnel and your partners should also understand their roles, responsibilities, and place in the chain of command. While it is important not to get bogged down in terminology and titles, it is also important that you and your Emergency Response Leader make sure all parties are clear about their roles.

Everyone should be familiar with what is known as “command structure language.” The Federal Emergency Management Agency (FEMA) and other federal agencies use the National Incident Management System (NIMS) to coordinate emergency efforts. Your state and local government may have also adopted the NIMS. The NIMS Incident Command System (ICS) is the standard organizational structure for all major domestic incidents. It helps to coordinate the efforts of many emergency responders. The NIMS will enable responders at all levels to work together more effectively to manage domestic incidents no matter what the cause, size, or complexity. You can obtain more information on the NIMS and the NIMS ICS from FEMA at <http://www.fema.gov/nims>.

At a minimum, your ERP should include the following basic information for your Emergency Response Leader and one back-up point of contact:

- Name
- Home telephone number
- Work telephone number
- Pager number (if applicable)
- Cell phone number (if applicable)
- Address

Remember to communicate this information to your partners verbally and in writing.

You should also identify other key individuals and partners and describe their roles, responsibilities, and places in the chain of command. This too must be communicated to your partners verbally and in writing.

### 3. Communication Procedures – Who, What, and When

Timely communication with a variety of audiences is an essential component of your ERP. You should plan to notify three groups of people:

- **System personnel** – Your Emergency Response Leader or backup should be the first person notified in an emergency. Other appropriate personnel should then be contacted.
- **Emergency partners** – These are the partners you identified in ERP Step 1. They should be contacted as necessary, depending on the type of emergency.
- **Public and news media** – You should designate in advance a spokesperson who will handle public and media communications during an emergency. This spokesperson should not be the Emergency Response Leader. You should also develop a plan that your spokesperson can follow in communicating with the media and the public. This plan will help your spokesperson maintain a message that is clear, accurate, and easily understood by your audience.

Your ERP should include contact information for all individuals and organizations that fall into the groups discussed above. The list should include contact names, addresses, and all phone numbers for each contact. Update this list regularly to ensure that information is current, and organize it to ensure that the highest priority calls are made first. States and technical assistance providers may have sample contact list templates you can use.

#### 4. Personnel Safety

Protecting the health and safety of your personnel is an important part of your ERP. In your ERP, you should write out basic safety precautions, identify the location of first aid supplies, and identify locations where personnel should meet in the event of an emergency. You should also make sure that your personnel are regularly trained in all of your safety procedures. The personnel safety section of your ERP should, at a minimum, include the following:

- Directions for proper first aid and medical treatment
- Procedures for using and maintaining emergency response equipment
- Identification of evacuation routes and evacuation procedures
- Identification of assembly areas and procedures for locating all personnel

#### 5. Identification of Alternate Sources of Water

Your ERP should identify alternate sources of water that can address short-term (hours to days) and long-term (weeks to months) outages. There are a number of different options for short-term and long-term water supplies. Short-term options include bottled water from outside sources or retailers and bulk water from a variety of sources. Long-term options may include connecting your distribution system to a neighboring system. These alternate sources should be clearly identified in your ERP, and the agreements or arrangements for accessing the alternate sources should be clearly spelled out. Your source list and the agreements with these sources should be kept up to date.

You should also plan for the impact of various public health notifications, including “boil water,” “do not drink,” and “do not use” notices. The different steps you may need to take to deal with each of these notifications should be addressed clearly in your ERP.

The important thing to remember is to identify short-term and long-term alternate water sources in your ERP and to establish agreements with these partners before an emergency occurs. Your ERP should list your alternate water sources, along with the relevant contact information. You should also file copies of your agreements with your ERP.

#### 6. Equipment and Chemical Supplies

You should identify in your ERP where to find the equipment, repair parts, and chemicals needed in the event of an emergency. This section of your ERP should include an updated list of the following:

- Current equipment
- Repair parts
- Chemical supplies
- Agreements with nearby systems to share portable generators and spare parts
- Contact information for any partners who can assist you with equipment and chemical supplies

#### 7. Property Protection

Protecting your facilities, equipment, and records is very important for getting your system running again after an emergency. Your ERP should clearly describe procedures to secure and protect important assets. In this section of your ERP, you should consider describing how you will lock down your facilities, how you will control access to the facilities, and the steps you will take to protect other crucial property and records.

## 8. Water Sampling

Sampling is critical to determining whether the water your system produces is safe for your customers to drink and use. In your ERP, you should address water sampling and monitoring issues that could arise during an emergency. Water sampling and analysis is critical during the detection of an incident and during recovery from an incident. When developing your ERP, you should consult with your state on water sampling and monitoring requirements, including responsibility for water quality monitoring during an emergency. Make sure you know what to do in an emergency before an emergency occurs.

Remember, the answers to these questions will most likely differ with each incident and will probably determine which parts of your ERP need to be implemented. You or your Emergency Response Leader should exercise judgment when determining how to respond to a specific threat.

## Action Plans – Responding to Different Types of Emergencies

An Action Plan provides your system with quick approaches for responding to specific types of emergencies. The Action Plans that you develop should complement the general activities outlined in the core elements of your ERP and should be tailored to specific events, such as floods and tornadoes. Action Plans should be short and concise “rip and run” documents that can be detached from your ERP and taken into the field by emergency responders. The activities listed in the Action Plans should complement actions already initiated under your ERP. You should develop Action Plans for intentional acts and for natural disasters and other significant events.

### Intentional Acts

Action Plans should cover the following incidents and threats of such incidents (for example, hoaxes):

- Contamination
- Intentional hazardous chemical release
- Structural damage/physical attack
- SCADA, computer, or cyber attack

### Natural Disasters and Other Significant Events

You may want to incorporate or modify existing plans to deal with a variety of natural disasters and other significant events. If you do not have existing plans, it makes sense to develop new plans to cover such events that may affect your system:

- Fire
- Flood
- Wind storms
- Severe weather (snow, ice, temperature, lightning, or drought)
- Earthquake and volcanic activity
- Electrical power outage
- Mechanical failure
- Water supply interruption
- Contaminated water
- Personnel problems (loss of operator, construction accidents, or medical emergencies)
- Accidental hazardous spill/release

Remember, your Action Plans should be clear, concise, and accessible. They should be well organized to make sure that the proper Action Plan can be found quickly by the staff members who need it.

Your Action Plans should include the following basic information:

- Special notification requirements
- Special response steps necessary for the specific type of emergency
- Recovery actions to bring your system back into operation
- Remediation actions needed to make sure your system is fully restored

## Follow-up Actions

Completing your written ERP is only the first step in making sure that your system is prepared to deal with an emergency. Your ERP should be a “living” document that you review and update regularly to ensure that all of your information is correct and up to date. Training in how to use your ERP is just as important as developing and updating it. Even the best ERP will be difficult to implement during an emergency if people do not know their responsibilities. You should regularly practice implementing your ERP. Orientation exercises, table-top workshops, functional exercises, and full-scale drills are all ways in which you can help to make sure that your well-planned ERP is executed properly and efficiently when a real emergency arises.

### Review

1. What are the major components of an emergency response plan?
2. Who should be involved in developing an ERP for your water system?
3. What type of events/emergencies should a water system plan for?
4. What should be in an Action Plan?
5. How often should an ERP be updated?

## Public Relations

### Definition

Public relations is a process of providing information, of listening to and responding to the needs of the customer. There are many ways of implementing a public relations program.

### Why a PR Program?

An effective public relations, customer relations program provides two advantages to the utility. First, it is the best method of determining customer expectations and level of satisfaction with the service being provided. Second, it is a viable method of developing customer support. This support is needed when the customer goes to pay their monthly bill and when the utility seeks revenue planning help for capital improvement projects.

### Elements

The following is a brief listing of a few common public relations activities:

- Responding quickly to emergencies and complaints
- Providing information on service connection requirements, billing frequency, billing rates, payment requirements, and actions by the customer that can impact operating cost
- Holding an annual “coffee” information exchange or an open house at the water facilities
- Tracking and analysis of customer complaints
- Operating and maintaining the facilities in such a way as to prevent higher-than-normal operating costs
- Providing tours of the water facilities to school children and teachers

## Recordkeeping Systems

### Why Keep Records?

Records, or information, are maintained in a water facility for several reasons. Here is a listing of some of the more important ones:

- Helps to reduce operation and maintenance cost.
- Allows the analysis of operation and maintenance cost.
- Allows the evaluation of mechanical equipment in order to reduce maintenance cost.
- Provides information for budgeting.
- Allows engineers to evaluate the need for expansion.
- Reduces the community’s, the manager’s and the operator’s liability exposure.
- Improves process control decisions.
- Helps to maintain a high-quality product.
- Helps to identify problems before they become a crisis.
- Meets requirements of financing agencies for giving grants or loans.

### Which Records Need To Be Maintained?

Information is of no value if it cannot be retrieved. It is important that key records be maintained in a manner that allows for easy access and retrieval. This can be in a computer database or a simple index card system. The following are a few of the key information management systems needed in a water system.

### Nameplate

All of the data on the nameplate of each piece of equipment should be recorded. This makes the development of a critical spare parts list much easier, as well as making it easier to order parts.

### Inventory Control

A simple inventory control system that lists the critical spare parts, their numbers, when they were received, and when they were last used can be critical in resolving in emergencies.

### Plant Operations

The treatment process of a plant will change during the year due to changes in weather and demand. By maintaining a history and comparing the history to present conditions, the operator can often make changes in anticipation of changes in raw water quality. This, if done correctly, can help to maintain a constant high-quality finished water.

### Asset Value

By maintaining a listing of all assets in the system and tracking the cost of making major repairs, the organization can more accurately determine the data needed to establish proper billing rates. In addition, the organization can determine from this data the life expectancy of major components and set aside the appropriate amount of funds for their replacement.

### Review

1. What is the main advantage to having an effective public relations program?
2. Why is having good customer support so important?
3. List three reasons for maintaining a recordkeeping system.
4. List four sets of records that should be maintained at a water facility.
5. Why should nameplate data be collected and maintained as a separate set of records?

## Management Considerations Quiz

1. Which of the following is a major part of a water system?
  - A. Manager and operators
  - B. Customers
  - C. Governing body
  - D. All of the above
2. Who is responsible for setting rates and utility policy?
  - A. Manager
  - B. Operator
  - C. Governing body
  - D. Customer
3. Who is responsible for operating and maintaining the water system?
  - A. Manager
  - B. Operator
  - C. Governing body
  - D. Customer
4. Who is responsible for developing, implementing, and supporting a worker safety program?
  - A. Manager
  - B. Regulatory agencies
  - C. Governing body
  - D. Customer
5. Which of the following is not a benefit of personnel training?
  - A. Proper training can in many cases reduce operating cost.
  - B. Training can be a motivator for all personnel.
  - C. Training is required in order to meet certification and safety requirements.
  - D. Training wastes time and money.
6. Research indicates that the best results are received from people who are trained
  - A. To the minimum necessary to pass certification exams
  - B. To the minimum to qualify for the job
  - C. At least one level above their work requirements
  - D. To the maximum that the utility can afford
7. Which of the following is not part of a planned maintenance management system?
  - A. Data-collection process
  - B. Rate-setting process
  - C. Work order system
  - D. Inventory control system

8. An ERP should achieve the following:
  - A. Present clear and logical steps to take in response to possible emergencies
  - B. Designate persons responsible for specific actions
  - C. Ensure effective coordination with first responders, law enforcement, and health officials
  - D. Provide information for setting utility rates
  
9. Action Plans should include the following basic information:
  - A. Special notification requirements
  - B. Special response steps necessary for the specific type of emergency
  - C. Recovery actions to bring the system back into operation
  - D. Remediation actions needed to make sure the system is fully restored
  
10. An effective public relations program:
  - A. Helps in responding to the needs of the customer
  - B. Is not necessary for small utilities
  - C. Is the job of management only
  - D. Is a security risk
  
11. Recordkeeping systems for small utilities usually require:
  - A. Specialized training to manage
  - B. Only an index card system
  - C. Lots of time to keep up
  - D. Clerical staff