

# Jack W. Moyer

**F** or many public works agencies, including wastewater utilities, Hurricane Katrina in 2005 served as a wake-up call regarding the need for emergency preparedness. Although drinking water systems and other infrastructure have received much of the subsequent focus, wastewater systems also have been shown to be vulnerable, resulting in significant service interruptions and environmental damage when they fail. Despite the many improvements in emergency preparedness made by wastewater utilities in recent years, additional opportunities for improvement remain. This article describes 10 relatively easy and inexpensive steps that wastewater utilities can take to improve their disaster preparedness.

#### **Assessing the Threats**

Since the terrorist attacks on Sept. 11, 2001, all drinking water agencies in the United States serving populations of 50,000 or more have completed mandatory vulnerability assessments and emergency response plans, as have most of the approximately 8000 water systems serving populations of 3300 or more. Most water agencies have begun or have completed implementing the recommendations developed as part of their vulnerability assessments. Among agencies that conduct wastewater treatment in addition to providing drinking water, many also have begun assessing their wastewater systems' vulnerabilities. Some wastewater utilities voluntarily have conducted separate vulnerability assessments on their wastewater systems. Although such efforts are not currently mandatory, three bills that would mandate such assessments for wastewater utilities were introduced during the 109th U.S. Congress that ended in December 2006.

Hurricane Katrina and other events have dramatized the potential effects that natural and man-made disasters can have on utility infrastructure, including wastewater systems. Potential direct effects on wastewater systems from such disasters include

- damage to treatment plants, pump stations, and exposed sewer mains from wind, flooding, downed trees, and the like;
- loss of electrical power to treatment plants and pump stations;
- damage to gravity sewer mains and force mains by washouts and uprooted trees;
- contamination of wastewater by intentional or accidental introduction of chemicals to the system, potentially disrupting biological treatment; and
- accumulated silt and debris washed into manholes and mains, potentially resulting in sanitary sewer overflows and erosion damage.

Although systems of different sizes and in different regions of the United States or the world may be subject to different types of disasters, the basic elements of preparedness and response remain the same, whether a vulnerability involves hurricanes, floods, earthquakes, tornados, acts of terrorism, or other threats.

Although many wastewater utilities have improved their preparedness since 2001, additional opportunities for improvement abound. This article focuses on 10 steps that utilities can take to ensure their ability to respond effectively and efficiently in the event of an emergency:

- Promote awareness and address employee concerns regarding security incidents and disasters.
- Develop comprehensive, up-to-date emergency response plans, and conduct associated training.
- Provide for emergency electrical power.
- Protect critical assets.
- Foster interagency relationships.
- Establish mutual-aid networks.
- Invest in reliable communications systems.
- Prepare a crisis communications plan for communicating with the media and the public.
- Create teams for conducting initial assessments of damage.
- Practice, practice, practice.

# Promoting Awareness, Addressing Concerns

The first step involves developing and promoting employee awareness of problems that can occur in a collection system and treatment plant during and after a disaster. As part of their training, employees should be prepared to respond in the event of the worst-case scenario. As Hurricane Katrina demonstrated, planning conducted to address such a scenario should account for the most extreme circumstances imaginable.

Many utilities have learned that employee concerns, such as preparing their homes,

protecting their families, and uncertainty regarding their special work responsibilities during disasters, can impede employee response to an incident significantly. During a disaster, employees are a wastewater agency's most valuable and sometimes most vulnerable asset. Preparing

Operators and maintenance staff should be involved in assembling the details of these plans.

employees for disasters requires the following steps:

- educating employees regarding the agency's plan;
- apprising employees of their expected roles;
- providing necessary training, tools, and safety equipment;
- providing employees with shelter that includes food, water, provisions for sleeping, and backup electrical power;
- providing similar facilities for families of employees;
- providing employees guidance to help them prepare their homes for an emergency by taking such steps as determining the vulnerability of their homes to storms, preparing home emergency kits, and establishing adequate shelter for their families;
- assisting employees in dealing with insurance and related issues associated with damage to their personal property; and
- offering follow-up counseling services.

Addressing these issues in advance of an emergency can go a long way toward ensuring success in responding to an incident and maintaining a healthy long-term relationship between employees and their employer.

# Developing Detailed Emergency Response Plans

Wastewater utilities should develop and periodically update emergency response plans that incorporate all the details needed for emergency response actions to be carried out effectively. For example, such details include the necessary internal and external contact information, as well as information on a wastewater system's infrastructure. This information must be maintained in an accessible location at all times.

Employees, representatives of other local agencies, and potential mutual-aid providers are only as valuable as a wastewater agency manager's ability to contact them during or following a disaster. Contact information can be the weak link in the disaster-response chain. Managers must maintain this information in a printed form that is current, accessible, and durable. Moreover, it is critical that this information be updated promptly when changes occur.

Disaster preparedness requires detailed planning for all potential disaster events, involves all employees, and provides the level of detail

During a disaster, employees are a wastewater agency's most valuable and sometimes most vulnerable asset. necessary in a real event, including the availability of collection system maps and other information regarding a utility's infrastructure. Operators and maintenance staff should be involved in assembling the details of these plans to ensure that a plan works as expected when put to use. Furthermore, all personnel should be trained in the details of their agency's

emergency response plan. Such plans are not static documents, and, therefore, wastewater managers must continue to monitor their system's vulnerabilities and refine and adjust their response plans, as needed.

As Hurricane Katrina demonstrated, all local agencies must be prepared to provide for their own needs for at least 3 days following a disaster, because it may take that long for other agencies to be able to provide aid. This possibility must be taken into account when developing a response plan.

# Providing for Emergency Electrical Power

Hurricane Katrina and many other recent incidents have accentuated the dependency of wastewater systems, particularly treatment plants and pump stations, on electrical power. To maintain treatment plant and pump station operations, wastewater system managers should arrange to purchase, rent, or borrow permanent or mobile emergency electrical generators. Hurricane Katrina's aftermath demonstrated that trailermounted generators are much more valuable for sewer pump stations than skid-mounted units, because trailer-mounted units are easier to move from one pump station to another.

Generators also require appropriate switchgear so that they will start automatically when the normal electrical supply fails. Otherwise, generators should have connections to enable them to be started manually. Moreover, provisions must be made for maintaining and fueling generators. Unlike the other steps recommended in this article, acquiring electrical generators and associated switchgear is expensive. Nonetheless, wastewater utilities should address this need by planning to borrow or otherwise acquire generators in the event of a disaster. The need for emergency electrical generators is a lesson that has been demonstrated repeatedly in disasters.

### **Protecting Critical Assets**

Wastewater system managers must protect their critical assets, both fixed and movable. Highpressure jet and vacuum trucks, for instance, are substantial investments for wastewater systems, and they can play a particularly valuable role during disaster recovery. Therefore, system managers should do whatever is possible to locate these and other critical pieces of equipment where they will be safe and readily available after an incident.

Stationary assets also should be protected as much as possible. This includes permanent improvements, such as raising electrical equipment above the potential flood elevation, and temporary improvements, such as sandbagging critical system components, including electrical components at treatment plants and pump stations.

System managers also should have on hand other resources likely to be needed after a disaster, including spare electrical components and piping, portable pumps, repair parts, heavy equipment, and sandbags. It is critical to protect these assets from damage or loss in a disaster.

#### **Fostering Interagency Relationships**

If they have not already done so, wastewater agency managers should become acquainted with representatives of other local agencies. Through such relationships, managers can develop or obtain training materials to better detail the roles of internal personnel at all levels and the coordination needed with other agencies to ensure the best possible disaster response. In particular, these other agencies include

- other local water and wastewater systems;
- local government management;
- local emergency responders and emergency management agencies;
- local public health agencies and health care providers;
- local law enforcement;
- critical customers;
- other local utilities, particularly electrical utilities: and
- ٠ state water and wastewater primacy agencies.

Along with the need to develop relationships with other local agencies, wastewater managers should become familiar with the U.S. Federal Emergency Management Agency's (FEMA) National Incident Management System, which includes, among other components, standards for communications and command structure during a disaster. Entities seeking funds from the FEMA or its parent organization, the U.S. Department of Homeland Security, must comply with the National Incident Management System.

#### **Establishing Mutual-Aid Networks**

Water and wastewater agencies must continue to establish and develop mutual-aid networks, both within and among states. Agencies in several states have been working to form such associations under the Water-Wastewater Agencies Response Network (WARN) and other models. Utilities participating in WARN enter into agreements and make advance arrangements to assist each other during emergencies.

After North Carolina suffered as a result of Hurricane Fran in 1996 and Hurricane Floyd in 1999, mutual aid among local agencies has been enhanced significantly by the following measures:

- Many local governmental agencies developed and executed the Statewide Mutual Aid Agreement, which lays the legal groundwork necessary for providing mutual aid. These legal provisions are critical to help ensure that utilities providing aid subsequently will be reimbursed by the FEMA.
- The State of North Carolina established the position of mutual-aid coordinator in its Division of Emergency Management.
- A Web site was created to enable local governmental agencies to post their needs regarding mutual aid at www.ncmutualaid. org.
- A resource-typing model, known as Mutual Aid Disaster Intervention Response Teams, was developed by the Disaster Preparedness Committee of the North Carolina American

Water Works Association and Water Environment Association (Raleigh). The model, which details the components of various types of mutual-aid teams, was one of the first efforts in the United States to conduct resource typing, a practice that is becoming increasingly prevalent.

• The Disaster Mutual Aid Pocket Guide for North Carolina Water and Wastewater System Managers also was developed.

Recent disasters also have demonstrated that local agencies must work to coordinate with and embrace aid from partners with whom they

have worked with infrequently in the past. This includes nongovernmental organizations, such as the American National Red Cross (Washington, D.C.), and faith-based organizations. Although relationships with these organizations likely will be more significant for other sectors of local government than

**Contact information** can be the weak link in the disaster-response chain.

wastewater agencies, system managers should be familiar with their increased involvement.

## Investing in Reliable Communication Systems

Utility managers should maintain their investment in traditional two-way radio communications systems that are not dependent on the resources of others or subject to excessive communications traffic. Many utilities have become increasingly reliant on cellular technologies in recent years. However, these technologies have been shown to be vulnerable in disasters. Traditional radio systems may require provisions for emergency electrical power to keep them operational in a disaster. Utility agencies should consider investing in satellite phones and participating in emergency phone systems, such as the Government Emergency Telecommunications Service, which provides priority telephone service to registered governmental agencies.

It should be noted that this recommendation does not necessarily involve converting to interoperable communications systems, a change that requires substantial investment. Although radio systems that enable personnel from one agency to communicate with personnel in other agencies have been widely promoted since the 2001 terrorists attacks, it is much more critical that personnel within an agency, such as a wastewater utility, be able to communicate by radio with others in the agency, rather than with persons in other agencies.



# Preparing To Communicate in a Crisis

Wastewater agency managers must prepare crisis communication plans for critical communications with the public and the media. Managers should develop draft news releases for various scenarios involving their systems. Statements that may be needed should be anticipated and internally practiced.

The process of developing a crisis communication plan should include the following core components:

- Develop the message.
- Prepare for dealing with the media.
- Educate employees and other key stakeholders.
- Put a face on the organization.

During the past year, the U.S. Environmental Protection Agency has been developing guidance on this task under the name "Message Mapping." Although water agencies may have a more critical need for such a plan than wastewater agencies, critical messages pertaining to wastewater also should be prepared.

# Creating Damage Assessment Teams

Past disasters have demonstrated the need for staff of a wastewater utility to make an initial assessment of the damage to their system

Wastewater system managers must protect their critical assets, both fixed and movable. before attempting to begin repairs. Although mutualaid providers and others can assist in this task, an initial assessment should be made before efforts are made to mobilize aid resources.

In this initial phase of response, it is also important to determine the level of housing and logistical

support that will be available to aid providers and to communicate that information to potential responders. In preparing such a checklist, several key needs and conditions must be addressed, including

- housing and sanitation,
- food and water,
- work safety conditions for employees,
- communications systems,
- first aid and emergency medical services,
- current inoculations required for responders,
- expected temperature range and weather conditions,
- vehicular and equipment needs,
- psychological conditions anticipated,

- financial services, and
- availability of laundry services.

An example of such a list is the Mutual Aid Responders' Accommodations Checklist developed by the Disaster Preparedness Committee of the North Carolina American Water Works Association and Water Environment Association.

#### **Practice, Practice, Practice**

Finally, staff at wastewater agencies should practice their disaster response plans. One of the best ways to practice is through relatively easy and inexpensive tabletop exercises, also known as "sandbox" or "desktop" exercises. A tabletop exercise involves a simulated response to a hypothetical disaster, either natural or manmade. These exercises are easier and faster to plan and execute than full-scale exercises, which can involve such complex activities as transporting resources to a remote location or using actors as victims.

As a result, tabletop exercises mean faster planning, scheduling, and organization, and they can be conducted at a lower cost and with less vulnerability to the weather. Tabletop exercises require only personnel, presentation materials, and associated support materials and involve working through a hypothetical disaster and related response activities in one or more meeting rooms. Most tabletop exercises are conducted in 6 hours or less.

Wastewater agency managers should conduct tabletop exercises with increasingly broad interagency involvement, both vertically and horizontally. Tabletop exercises lend themselves particularly well to many utility system incidents, because such incidents often do not involve a well-defined incident scene and involve relatively abstract components, such as water and wastewater contaminants.

No one can foresee or plan for every possible outcome related to a disaster. However, managers and staff of wastewater agencies who implement the 10 steps outlined in this article will be much better prepared to keep their systems operating following disasters. Fortunately, many of the steps are relatively straightforward and inexpensive. If followed, the actions can go a long way in helping wastewater utilities avoid unnecessary disruption and confusion during a most critical time.

Jack W. Moyer is the emergency management director at URS Corp. — North Carolina (Morrisville).