

Hurricane Preparedness & Response

Tips for Water & Wastewater Facilities

Hurricanes can significantly disrupt the operations of water and wastewater facilities. To minimize the potential for a public impact and to provide continuity of operations, many actions should be considered before and after a hurricane hits. Each facility should have a site-specific emergency response plan that has been practiced and validated. This article outlines the basic requirements for this plan, hurricane preparation and follow-up activities.

BEFORE THE HURRICANE ARRIVES

The saying, “If you do not plan, you plan to fail,” comes true each time a water or wastewater facility experiences an emergency with no plan or preparation. To prevent this scenario, an organization must identify the emergency operations and their schedule. The site should also identify cleanup crews and ensure that they are prepared prior to an emergency. This could consist of heavy equipment and extra personnel to help with storm cleanup. Work schedules may need to be adjusted so that key staff members are on site or can be reached to keep all services operational if the facility remains online, or to shut down and start up facilities if necessary.

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General

A plan must be in place to notify state and federal agencies (FEMA and others) of location and telephone numbers of the emergency personnel owner/operator for the water system operations. For public water systems, line up contacts to request an emergency water supply, if necessary. Plant managers must review the emergency response plan and ensure that it and contacts are current. Notify ahead of time and set up clear lines of communication with local police and fire departments in case of an injury or other emergencies. Plant managers should request that local law enforcement check on any staff who remain on site at the water system. If communication channels are disabled, this check must continue on a routine basis until communication channels are reestablished.

Plant managers must establish contacts to request an emergency water supply if necessary. This may include a delivery of purchased water from another potable water supply. Plant managers should arrange with the local power utility to be prepared to restore power to the water system as a priority customer. Prearrangements can be made to purchase materials and supplies and to borrow or lease heavy equipment needed to make repairs to the water system. This could include piping, valves, chemical feed-line tubing and hydrants. Arrangements should also be made to have materials and chemicals delivered to the site location as soon as it is safe and ready for operation.

Establish which media will be used for customers to access information and press advisories. Prepare customers for a possible boil water advisory status:

- 1) Prepare a multilingual boil water notice.
- 2) Prepare emergency disinfection of drinking water procedures for customers.
- 3) Have shelter-in-place guidelines ready in case of release of hazardous materials. This information is to be provided to the public who may need to remain indoors.

Stock and maintain first-aid supplies, batteries, flashlights and cell phones or other wireless communication devices. Check all normal and emergency communication equipment and charge or replace batteries. Stock an adequate supply (1 week) of nonperishable food and water for any essential persons who remain on site or who are considered first responders to the water system.

Alternative transportation strategies must also exist for rotating core employees if high water prevents travel.

Personnel should have a jump bag that contains a change of clothes, sleeping bag, flashlights, extra batteries, medications and other essentials. Train all essential personnel to shut down and to start up the system in case of emergency. Review distribution maps to ensure that they are up to date with isolation valves properly identified. Extra copies may be necessary for field staff.

Grounds & Common Areas

Annually inspect the water system source and treatment facility for security concerns. Test backup lights and generators. For all water systems, check backup pumps and controls. In addition to regular preventive maintenance, all system (surface, ground and purchased) checks should include backup chemical feeders, all pumps and motors. Verify that spare pumps, motors and other necessary spare parts are available. Operators should also check manual controls and oil levels. This includes fuel and service of motor vehicles, which should also be stocked with equipment and supplies and moved to high ground or temporarily located away from the threatened area.

A sufficient supply of sandbags should be available to sandbag entrances, areas around critical equipment and other critical areas. Emergency electrical generators must be located outside of flood-prone areas and an extra fuel supply should be maintained. The main criteria for determining generator requirements is to ensure that the number of generators is adequate for wastewater and water pumping operations.

If a hurricane is forecast, boarding all windows and doors to prevent wind damage is advisable. Plant managers should also shut down exposed pipes at waterway crossings to prevent loss or contamination of potable water if the pipes break. Isolating or valve-offing portions of the water system that appear to be more prone to damage can also reduce risk of a leak. This should be performed as a last measure since service may still be needed immediately prior to the storm event.

Administration, Lab Buildings & Relocation of Movable Assets

Consider the needs of administrative facilities. Securing important records, including plant operations manuals and water system mapping, in a well-protected location ensures their availability after a storm. Removing all sensitive laboratory equipment from the flood zone, when possible, reduces the potential for damage, as does removing portable electrical equipment and small motors. It is important to protect computers as well since they are susceptible to water damage. Also check bacteriological sampling materials to help operators prepare for increased or special monitoring after the storm. Disconnect electrical power to the water system building, workshops or offices if possible.

Treatment Plant & Pumping Stations

Run diagnostic tests on supervisory control and data acquisition (SCADA) and control systems. All pump

stations should be in a well-drained area and be designed to remain in operation during flood events. If not, the pumps should be shut down and protected from electrical damage if they should become submerged. After any major storm, check raw water intakes to minimize debris or other materials that could enter. Ensure that operators and staff are familiar with the system's manual operations should SCADA become inoperable. Any wells that become submerged must be disinfected prior to returning to service.

Check with the state primacy agency for additional requirements before lifting any boil water notices. Check that all chemical bulk storage tanks are properly labeled to include chlorine cylinders and chemical mix tanks. This will help with identify these items should they be washed or windblown away. Ensure that all dry chemicals are stored off the floor in a dry room protected against flooding and water from floors, walls and ceilings.

Check the chemical inventory. A storm could cause a greater demand for disinfectant to address broken waterlines and increases in turbidity, so more disinfectant and coagulant chemicals may be required. Verify that the current supply of calcium hypochlorite (if used) is adequate for the potential increased use. Fill all storage tanks with water to prevent floating or falling from wind forces. This also helps maintain pressure throughout the distribution system. Remove or move chemicals to a safe area.

If chemicals are removed from an underground or aboveground tank, fill the tank with water, if possible, to prevent floating. Remove fuel from underground storage tanks to prevent contamination and fuel loss. If possible, move aboveground fuel storage tanks to a safe area. Fuel will be needed for emergency and plant vehicles until new supplies arrive. Prepare for a 1-week supply, if possible.

Remove electrical motors, where possible. If not, wrap them in plastic and seal as tightly as possible to protect the motors from silt, mud and dirt. Any submerged electrical motors should be cleaned and dried prior to startup to prevent damage. Remove shop tools and electrical hand tools from water system facilities. Monitor tank levels. Fill elevated and ground storage tanks to capacity. Storage tanks should be valved off from the distribution system immediately prior to the storm event to prevent loss of water during the storm.

AFTER THE HURRICANE HITS

EPA's Water Security Division has developed a checklist and guidelines to help drinking water and wastewater facilities recover following a hurricane. Recognizing that water utilities will want to restore operations (e.g., regaining adequate pressure and disinfection) as quickly as possible, water facilities should consider the following steps in recovering from severe weather conditions.

Each facility should have a site-specific emergency response plan that has been practiced and validated.

General

Line up and schedule emergency operations and cleanup crews. Maintain contact with state and federal agencies (FEMA and others) of location and telephone numbers of the emergency operating center or command post for the utility. For public water systems, line up contacts to request emergency water supply if necessary. Consult public health officials and the primacy agency for public notifications (e.g., boil water, do not drink). Notify customers and media where to access information and press advisories.

Arrange for food and water for the crews. Maintain clear lines of communication with local authorities, such as police and fire, in case of an injury or other emergency. Make arrangements with the local power utility to restore power as a primary customer. Make arrangements with local companies to purchase materials and supplies and to borrow/lease heavy equipment needed to make repairs to the plant. Confirm with local companies that materials and chemicals can be delivered to the plant as soon as it is safe and units are repaired and ready for operation. Plan for appropriate disposition of PPE and other equipment.

Grounds & Common Areas

If possible, resupply inventory of emergency repair equipment and supplies (e.g., sand and sandbags, hand shovels, power equipment, fuel, batteries, flashlights, portable radio, first-aid kits). Keep service vehicles stocked with equipment and supplies. Keep all vehicles and emergency generators fueled. Keep service vehicles on high ground (above expected flood crest). Maintain communications equipment and charge or replace batteries (e.g., two-way radios, cell phones, walkie-talkies, pagers). Sandbag critical areas. Coordinate debris removal. Shut down exposed pipes at river crossings to prevent discharge of raw sewage or to prevent loss or contamination of potable water if the pipes break.

Administration & Laboratory Buildings

Keep portable electrical equipment and small motors away from the flood zone. Keep all sensitive laboratory equipment away from the flood zone, where possible. Keep or store computers in a safe area. Keep or store all important records in a safe area. Keep vital records, such as built drawings, wiring diagrams, etc. to the emergency operations center or command post until normal operations resume. If electrical power has been disconnected, make arrangements with the local power company to restore as a primary customer.

Treatment Plant & Pumping Stations

Once flood waters recede, work with the power company to restore power. Keep chemicals in a safe area. Sample appropriate system elements (storage tanks, filters, sediment basins, solids handling) to determine whether residual contamination exists. Inspect electrical



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motors for damage caused by silt, mud and dirt getting into the windings. Replace electrical motors if damaged. Submerged motors should be washed with clean water and dried, and in most cases, restored to service. Inventory all shop tools and electrical hand tools in the emergency operations center or command post. For drinking water systems, if possible, continue to maintain elevated storage at full capacity as appropriate. Monitor chlorine residuals and system pressure as soon as you can safely gain access to the system and its control facilities.

This information is provided courtesy of EPA. Other emergency operation guidance documents are available on [EPA's website](#).

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