



Baird



Fasten Your Seat Belts: Main Breaks and the Issuance of Precautionary Boil-water Notices

The water industry is like an airline—it has many attendants who, before each flight, announce various safety and emergency procedures for passengers. Most passengers no longer take notice because flying is considered commonplace and the associated risks are low. However, those charged with the responsibility for the safety of the customer by keeping a 94-ton piece of machinery and moving parts aloft in the air understand the seriousness of failure.

TAKEOFFS CAN BE DIFFICULT

Issues associated with aging water infrastructure continue to surface in many areas (USEPA, 2007). One such area is the issuance of precautionary boil-water notices resulting from the increased number of water main breaks in urban locations. This area of concern deals with the growing challenge of quickly isolating and controlling the break. Although there are many reasons for pipe failure that may be out of a utility's immediate control, the level of operability of the valves is controllable. In the United States, 40% of the water network's valves that are used to shut off and redirect water flow in the local systems are not functioning properly.

Review your safety information card. The safety information card for utilities is their emergency response manual, which contains standard operating procedures (SOPs) to address water quality incidents. Typically the manual will have sections on critical control points, responding to a main break, adverse water quality incidents, and even subsections on disasters and terrorism. A critical control point (CCP) is an essential point in the system at which control can be applied by the water utility to prevent or eliminate drinking water health hazards or reduce them to an acceptable level as defined by the Drinking Water Quality Management Standard (ANSI, 2011). The purposes of this emergency response SOP are to define the method for responding to a main break emergency as it applies to water quality and to maintain safe drinking water within the distribution system (City of Waterloo, 2009). Valves and, to a degree, hydrants are control points within the system that require adequate operability to effectively respond to both planned and unplanned water system repairs. The manuals and procedures as well as the water distribution system hydraulic models assume that 100% of the control points are known and operational.

Properly store your luggage and personal items. When a water main break is reported, typically by a customer by phone, only basic location information is available, such as cross streets or an address. The utility dispatches a crew to assess the emergency—including traffic needs and public safety concerns—and develops an action plan. It is at this point that the past level of investment or lack thereof in maintenance activities reveals itself and the real cost of the main break will be determined. Key self-assessment questions include:

- Are paper inspection logs and field maps used or a geographic information system (GIS) and a GIS-centric computerized maintenance management system?
- Are the valve locations accurate and accessible?
- Have the valves been properly maintained, and is their condition known?
- Is the water utility crew adequately staffed, trained, and equipped?
- Are unplanned events and costs higher than those for planned activities?
- Has the utility been replacing valves at higher costs than those for planned rehabilitation?
- Has the utility been properly tracking the number and type of service disruptions and combining the damage claims with the crew and equipment costs?

IN CASE OF EMERGENCY . . .

Put your mask on first, gently tug to start airflow, then help another. Utilities have been doing an incredible job of keeping rates low, but the increasing number of water main breaks and maintenance budget cuts, lack of technology investment, freezing and cutting of maintenance positions, training, and inventories are driving up the costs of water main repairs. Experienced utility workers are retiring and not being replaced—and all the while their system knowledge is being lost. Valve locations have not been updated or verified, and, in many cases, old valves have been paved over or are inoperable. If the valve has not been used for decades, it may fail when it is needed the most, requiring more valves to be located and shut off, further increasing the service disruption area. The additional time required to manage a larger area increases the flooding and property damage claims, which equate to the higher total cost of water main repairs (insurance claims can represent about 50% of the total cost of main repairs). The larger affected area can also include more businesses such as day care centers, medical facilities, restaurants, and multistory buildings, that will need to be shut down because of low water pressure or no water service at all.

If the event will likely cause a service disruption for an extended period—especially during peak water use times—the affected customers should be contacted with a written or verbal notice informing them



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they will be without water and that customer service representatives will respond to their inquiries. Many utilities have a policy that a reasonable effort should be made to contact customers, but this leaves a large amount of discretion on the part of the utility. For major work, utilities often assume the news media will make the announcement. During nonpeak water-use times, efforts to notify customers of a disruption may not even occur.

If the area without water service has fire hydrants, the fire department is contacted. If water services will be disrupted for a longer period or cover a small geographic area, water utility staff members may deliver bottled water directly to customers. Response and recovery decisions for service disruptions are made on the basis of the qualifications and experience of key staff members and the procedures set forth in the utility's emergency plan. Normally, the event can be resolved with minimal disruption if positive water pressure was maintained so that there was no opportunity for dirt or groundwater to enter into the water main. Water testing will follow a service event, and the work area should be cleaned by hand, swabbing all parts, material, and the existing pipe with a 1–5% chlorine solution.

Warning—turbulence ahead. In most cases, a simple repair is performed. However, when positive pressure cannot be maintained or contamination does occur, the utility must contact the local public health department (PHD) and provide an action plan.

Remain seated. State statutes create a PHD that is responsible for conducting an environmental health program consistent with the state's public health mission of preventing illness within its communities. An integral component of ensuring human health is risk assessments of exposure to contaminants in water. Many times a PHD or a department of environmental protection (DEP) has the final authority to issue a precautionary boil-water notice in a manner consistent with the degree of hazard encountered (Florida, 2006).

Keep the pathways clear. Communication and coordination among the department of health (DOH), DEP, water utility, and local government agencies are essential under emergency conditions that require the issuance of a precautionary boil-water notice to minimize danger to the public. Whichever department issues the notice is usually responsible for rescinding it. The public water system can issue and rescind its own precautionary boil-water notice using DOH guidelines if it determines it's necessary; however, concurrence by the DEP may be required. All precautionary boil-water notices are to be issued based on DOH or DEP guidelines. Telephoned or hand-delivered notices to all affected residences and businesses should occur as soon as possible, but in no case later than 24 hours after the water utility learns of the situation or failure.

Identify your closest exit. Breaks that involve a section of the water main being repaired or replaced require knowing the location of functioning valves and hydrants for flushing activities. Flushing is a critical part of any contamination remediation procedure.

In the event of an evacuation, make sure the airplane has stopped and assess conditions before exiting.

Microbiological contamination from fecal coliform bacteria such as *Escherichia coli*, parasites such as *Cryptosporidium*, and *Giardia*, and other viruses and pathogens is always a concern and requires continuous water quality testing.

A drop in pressure. Precautionary boil-water notices can also occur in cases in which pressure in any part of the water distribution system has been reduced to zero, or a negative pressure, unless the zero pressure is the result of an isolated water main break and the utility can demonstrate that the integrity of the water system has been maintained.

A drop in water pressure in a distribution system is a signal of the existence of conditions that could allow contamination to enter the public water system through backflow by backpressure or backsiphonage. Water pressure falling below the accepted service level of 20 psi does not, in the absence of other aggravating factors, necessarily constitute an imminent health hazard, unless determined by the state's DOH or DEP. Aggravating factors include:

- the presence of multistory buildings not adequately protected against backflow where the static head exceeds the residual main pressure,
- a historical record of inadequate disinfectant maintenance in the water distribution system,
- analytical records indicating recurring microbiological or turbidity problems, or
- the water system lacking an approved cross-connection control program.

The decision to issue the precautionary boil-water notice would be made on a case-by-case basis as determined by the professional judgment of the entity issuing the notice and on the review of all available data that may indicate the extent of the problem, such as type of facilities affected, duration of the low-pressure condition, and possibility of infiltration into the potable water system. If, however, the water pressure falls below 20 psi and affects critical facilities such as schools, child care establishments, assisted living facilities, nursing homes, dialysis centers, hospitals or other healthcare centers, or food establishments, a boil-water notice is required. Microbiological samples should be immediately collected at several locations within the area affected, and measures shall be taken (Florida DOH, 2006). Precautionary boil-water notices should also be issued in all cases in which surface water inundation of a water supply well has occurred.

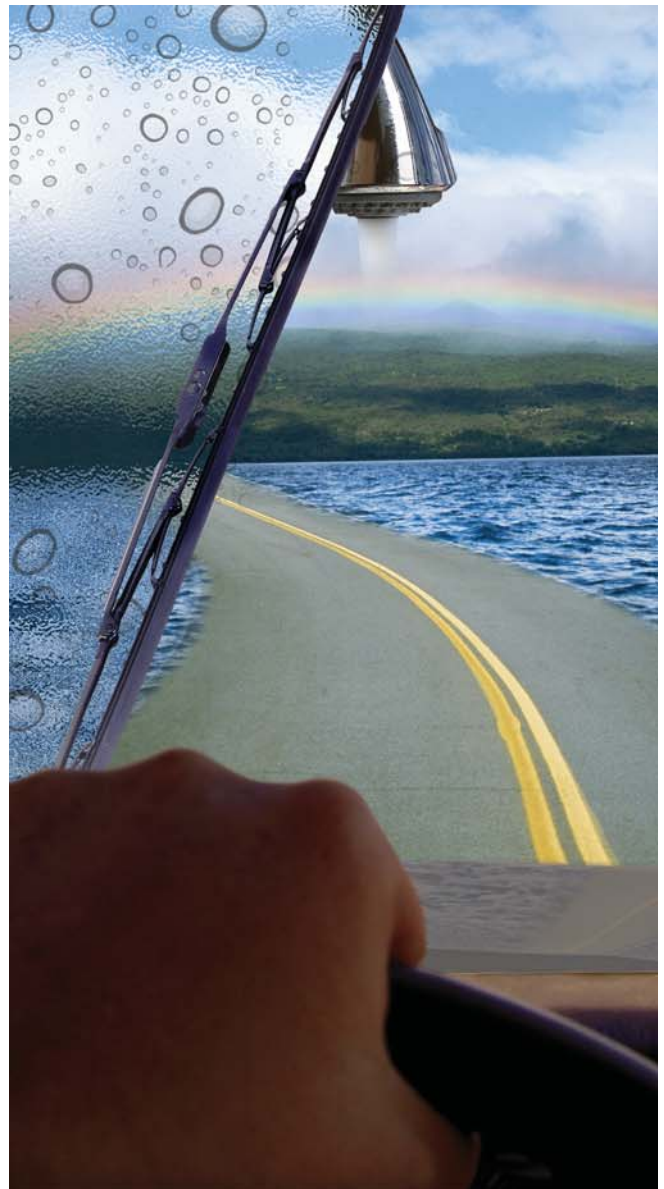
If it's safe, exit and assist others, then follow a safe path away from the airplane. Many states have posted best practices for utilities to follow. These best practices indicate that precautionary boil-water notices must be issued in cases of water main breaks or planned distribution system interruptions, which are deemed an imminent public health threat by the state DOH or DEP unless the public water system can demonstrate by "sound engineering judgment that the integrity of the water system has been maintained." This may occur based on the assurance from the public water system that a positive pressure has resulted in a continuous outflow of water before the repair and that applicable best management practices were followed (Florida DOH, 2006). For a complete listing of suggested best management practices for water main breaks and repairs, visit the Florida Department of Health's website at www.doh.state.fl.us/environment/water/manual/boilnew.htm.

ALWAYS HAVE A PLAN

Use your seat cushion as a flotation device in the event of a water landing. Many utilities are deciding to run their aged pipes to failure. This decision is usually the result of a utility not getting a rate increase approved and operating under the subsequent lack of funding. Whatever the cause, by default the decision is still the same—to run to failure—even though the emergency mobilization and repair costs will be two to three times higher than those for planned repairs and rehabilitation. Many times this may be the better strategy for smaller-sized pipes; however, there should always be a plan. The US Environmental Protection Agency has also indicated that a run-to-failure approach is always an option, but it should be part of a plan. A viable plan should include accurately locating and assessing the condition of the system valves and control points to reduce the overall costs of water main breaks.

Contents will shift during travel. Utilities are facing many challenges while trying to juggle multiple priorities—from regulatory changes to public opinions. Making long-term plans and adequately communicating those plans helps stabilize the payload.

Your flight attendants will be glad to answer any questions you may have. As utilities face revenue and budget restrictions, they may be forced to choose a run-to-failure scenario. However, although there are many reasons for pipe failure that may be out of a utility's immediate control, the level of operability of the valves is controllable. Utilities must accurately locate and assess the condition of their valves in order to reduce the overall costs for a run-to-failure approach. As water stewards, informing the public of health hazards is also an important duty. Water



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professionals can always seek help from associations like AWWA that are the embodiment of combined knowledge and experience. AWWA continues to be the “Authoritative Resource on Safe Water” (AWWA, 2011). As a member of the water industry, you should feel proud to be engaged in such a noble effort, even during challenging times.

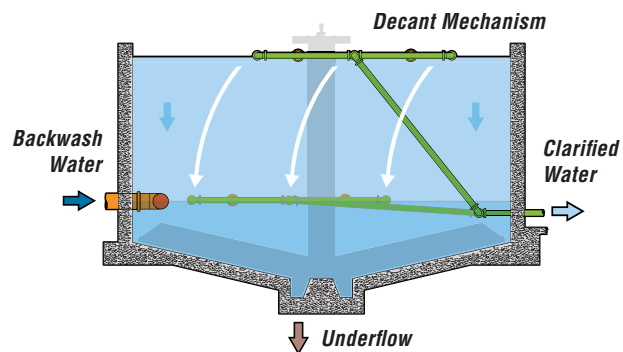
—Gregory M. Baird (greg.m.baird@agingwaterinfrastructure.org), managing director and chief financial officer (CFO) of AWI Consulting, has served as the CFO of Colorado’s third largest utility and finance officer of California’s seventeenth largest city. A graduate of Brigham Young University’s Marriott School of Management with a master’s degree in public administration, Baird has participated in the issuance of more than \$1 billion of municipal bonds and has consulted at the city, county, and state levels of government. He is an active member of AWWA and serves on the Rates and Charges Committee and on the National Affordability and Conservation subcommittees. Baird is on the Economic Development and Capital

Planning Committee with the Government Finance Officers Association for the United States and Canada and is a member of the California Society of Municipal Finance Officers. Baird’s formal rate training was with the National Association of Regulatory Utility Commissioners at Michigan State University’s Institute of Public Utilities.

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