



Water Main Break Response Protocol for Chlorinated Systems

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Our water infrastructure continues to age faster than it is replaced, resulting in ever-aging water distribution systems. Water main breaks remain a major issue for water utilities despite improved asset management and financial planning. By some estimates, over 700 water mains break in the United States every day and need repair. Water utilities repair these types of breaks quickly and without interruption in water service or risk to water quality. Some breaks, like those that make the news, can affect water service to many people and businesses and present a significant risk to public health.

The water industry recognizes the need to classify water main breaks in terms of public health significance. We established four categories of water main breaks to standardize communication and response efforts in Washington State. These categories describe public health risk across the spectrum of water main failure impacts to utility operations. They are consistent with the Water Research Foundation study—Effective Microbial Control Strategies for Main Breaks and Depressurization (Kirmeyer et al. 2014).

The attached tables describe the recommended response, communication, and repair procedures for each type of water main break. We recommend water utilities incorporate these protocols into their standard operating procedures. The guidance for responding to each type of break is consistent with the requirements of WAC 246-290-451(1).

For more information

[Find our publications online.](#)

Contact our nearest regional office from 8 a.m. to 5 p.m. Monday through Friday. If you have an after-hours emergency, call (877) 481-4901.

[Eastern Region](#), Spokane Valley 509-329-2100 Adams, Asotin, Benton, Chelan, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Kittitas, Klickitat, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman, and Yakima counties.

[Northwest Region](#), Kent 253-395-6750 Island, King, Pierce, San Juan, Skagit, Snohomish, and Whatcom counties.

[Southwest Region](#), Tumwater 360-236-3030 Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Kitsap, Lewis, Mason, Pacific, Skamania, Thurston, and Wahkiakum counties.



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Main Break Categories

Type I Break	Type II Break	Type III Break	Type IV Break
Positive pressure maintained through completion of repair.	Controlled pipe repair with limited depressurization during pipe segment shutdown.	Uncontrolled loss of pressure at break site or depressurization elsewhere in the system.	Catastrophic main break or water loss event resulting in the complete loss of water service.
Pressure maintained in pipe during repair, and pressure maintained throughout the distribution system.	Pressure maintained at break site until pipe is exposed and trench dewatered. Shutdown limited to immediate valved off area. No loss of pressure elsewhere.	Pressure loss at break site while pipe is still buried or submerged and/or pressure loss elsewhere in the system.	Extensive water loss compared to system capacity, with no pressure/no water. Storage loss leaves limited flushing capacity.
Contamination is unlikely.	Limited possibility of contamination.	Significant possibility of contamination.	Contamination likely or certain.

Type I Main Break Response

Assess environmental impacts and respond accordingly.

Call Washington 811.

Excavate to below break. Maintain pit water level below break.

Disinfect repair parts and repair site by swab/spray with 1% chlorine solution.

Complete repair with pipe still pressurized.

Restore residual disinfectant level at break to background levels by flushing.

Boil Water Advisory (BWA) and bacteriological sampling not needed.

Type II Main Break Response

Assess environmental impacts and respond accordingly.

Call Washington 811.

Excavate to below break. Maintain pit water level below break.

Isolate/shut off customer services in affected area.

Provide customer notification using door hanger, personal contact, email, or reverse 911.

Follow established utility procedures to perform controlled shutdown of broken pipe segment.

Disinfect repair parts and repair site by swab/spray with 1% chlorine solution. If pipe replacement, disinfect from both ends by swabbing.

Complete repair.

Conduct low velocity flush to displace water in affected piping. Discharge to waste.

Flush to restore residual disinfectant level at the break to background levels.

Advise customers to flush plumbing when water service returns. Verify service is restored to all isolated customers.

If utility shuts off customer services in affected area and positive pressure is maintained throughout the system prior to depressurizing the break site, a boil water advisory is not needed.

Collect bacteriological/heterotrophic plate count samples to validate repair procedures. The utility may restore service before getting results.

Type III Main Break Response

Assess environmental impacts and respond accordingly.

Call Washington 811.

Provide generic water main break notification and customer response steps on utility's website or directly to customers by door hanger, personal contact, email, or reverse 911 as soon as possible.

Review cross connection control program status, particularly compliance with premise isolation of high health hazards and assess risk of back siphon/backflow accordingly.

Call DOH and local health jurisdiction. Decide appropriate public notification message and methods.

Issue a boil water advisory and update the utility's website to show impacted area(s).

Evaluate firefighting capacity and sanitation impacts and communicate with appropriate entities.

Isolate/shut off customer services at the break site (if practical).

Disinfect repair parts and repair site—swab/spray with 1% chlorine solution. If pipe replacement, disinfect from both ends by swabbing.

Complete repair.

Complete post-repair disinfection of the distribution system, applying Water Research Foundation Project 4307 (CT 100 mg-min/L), AWWA Standard C651 Section 4.11.3.3, or other applicable standard for guidance on disinfectant levels, if:

- Pressure is lost at the break before dewatering the trench and isolating the break.
- The break results in loss of pressure at points beyond break site, depending on degree of risk associated with extent, duration, and type of services affected.

Conduct a scour flush (at least three feet/second) to remove break-related sediment. This may not be practical for pipes greater than a 12-inch diameter. Flush at maximum practical flow rate until at least three pipe volumes are displaced and flush water runs clear.

Conduct a low velocity flush throughout area(s) subject to low pressures to displace water and restore background chlorine residual.

Restore residual disinfectant level at the break to background levels.

Check residual disinfectant level throughout the distribution system.

Advise customers to flush household plumbing when water service returns.

Collect bacteriological samples to verify effectiveness of response and provide basis for lifting the boil water advisory. The number of samples should reflect the impacted service population and service area.

Rescind BWA based on water quality monitoring results.

Type IV Main Break Response

A Type IV break is a Type III break, with significant impact on system-wide performance. Follow Type III response plus the following.

Assess utility capacity to deal with event and seek aid as soon as possible.

Notify local fire authority of current and expected status of storage volume and system pressure.

Depletion of stored water may affect flushing capacity following repairs, delaying full restoration of water service and lifting the BWA.

Utility may need to include conservation messages with BWA notification.

Continually assess storage, source, and distribution capacity as related to post-repair flushing needs.