

(THIS POLICY DOES NOT HAVE THE FORCE OF LAW)

**Policy for Evaluating and Responding to
Water Distribution Systems and
Subsystems that have Depressurized**

Division: DDAGW
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I. PURPOSE:

This document is intended to provide a policy to public water systems and Ohio EPA staff for evaluating and responding to possible contamination of water distribution systems and subsystems during depressurization events caused by a physical disruption (i.e. line breaks, valve repairs, new construction, etc.) or an operational disruption (i.e. pump failure, power outage, telemetry failure, extreme fire flows, etc.). The steps in this policy provide uniform procedures to affirm water supplies are safe for potable use after pressure is restored.

II. BACKGROUND:

Water supplies in distribution systems must be protected against contamination (bacterial or chemical). Critical standards for water systems include: maintaining continuous positive pressure; maintaining adequate chlorine residuals (where applicable); having an adequate backflow prevention and cross connection control program; and ensuring the absence of coliform bacteria. Any disruption of a water distribution system that results in a loss of continuous positive pressure of at least twenty pounds per square inch gauge at ground level at any point in the distribution system may allow contaminants to enter the system. This includes depressurization due to physical disruptions such as line breaks, valve repairs, new construction, etc. and depressurization due to operational disruptions such as pump failure, power outages, telemetry failure, extreme fire flows, etc.

III. APPLICABLE REGULATIONS:

1. Minimum system pressure - Ohio Administrative Code (OAC) rule 3745-83-01(E).
2. Disinfection of new or repaired water mains - OAC rule 3745-83-01(C)(6).
3. Public notification - OAC rule 3745-81-32 (B).
4. Minimum chlorine residual – OAC rule 3745-83-01 (C)(1).
At least 0.2 mg/L free chlorine or 1 mg/L combined chlorine
5. Minimum chlorine residual during times of actual or threatened waterborne disease outbreak or water supply emergency - OAC 3745-83-01(C)(4).
1 mg/l free chlorine or 6 mg/l combined chlorine

IV. OTHER APPLICABLE REFERENCES:

1. American Water Works Association Disinfection of Pipelines & Storage Facilities Field Guide (2006)
2. American Water Works Association Standard C651-05 Disinfecting Water Mains (2005)
3. American Water Works Association Standard C600 to C606 re: Pipe Installation (2005)
4. USEPA Distribution System White Paper re: New or Repaired Water Mains (2002).
5. Ohio EPA Policy on Disinfection of Finished Water Storage Facilities & Water Mains (2007).

V. POLICY:

1. **Definition.** For the purpose of this policy, a depressurization is defined as a loss of continuous positive pressure of at least twenty pounds per square inch gauge at ground level at any point in the distribution system caused by line breaks, extreme fire flows, or other extraordinary circumstances. This type of depressurization is **not** a violation of the pressure requirements contained in OAC rule 3745-83-01(E).

Any other pressure loss or low pressure situations (i.e., exceeding daily demand, design capacity or inadequate hydraulic design), shall be covered by OAC rule 3745-83-01(E) minimum pressure requirements and may result in a violation of the rule.

Community water systems and non-community water systems serving at least 1000 people which do not meet the requirements of AWWA Standard C651-05 prior to returning water mains to service following repairs, inspections, or other activities that might lead to contamination, unless a minimum pressure of twenty pounds per square inch gauge at ground level is maintained at all points in the distribution system are in violation of OAC rule 3745-83-01(C)(6).

2. **Main break which results in depressurization.**

Water systems are required to repair, disinfect and perform bacteriological sampling when a depressurization of the water supply distribution system occurs. In the event of depressurization due to water main breaks, the system is at risk of microbiological contamination.

- (a) If the water system is **repaired and disinfected in accordance with AWWA Standard C651-05** and the affected section is flushed until the chlorine residuals reach normal operating levels then an advisory is **not** necessary.

After repairs are completed, special purpose samples for total coliform and chlorine residual should be taken in accordance with AWWA Standard C651-05. Samples should be taken downstream of the break or repair, unless the direction of flow is unknown. If the direction is unknown, samples should be taken both up and

downstream. Sampling should continue until total coliforms are not detected in representative samples.

In accordance with OAC 3745-81-32, **if any of these special purpose samples are positive for E. coli or fecal coliform:** 1) the situation is to be considered an acute risk to human health and a water use advisory issued; and 2) the water use advisory is to remain in effect until total coliforms are not detected in consecutive samples collected at least 24 hours apart.

The appropriate Ohio EPA district office should be notified of any water use advisories.

OAC 3745-81-32(B)(2) states “Tier 1 notice is not required if the system issued a precautionary notice as approved by the director through the public water system’s contingency plan required by Chapter 3745-85 of the Administrative Code and a follow-up notice identifying the E. coli or fecal coliform results is issued to persons who received the preliminary notice.”

Additional flushing or disinfection of the water lines may be needed to ensure total coliform negative samples.

- (b) If the water system **cannot or does not make repairs and disinfect repaired mains in accordance with AWWA Standards** and/or the system cannot be adequately flushed a water use advisory should be issued. After the system is repaired and flushed, special purpose samples for total coliform and chlorine residual should be taken. The advisory should remain in effect until total coliforms are not detected in representative samples and the chlorine residual is within acceptable limits.

If any of the special purpose coliform test results are found to be **total coliform positive** (E. coli or fecal coliform negative), sampling and the advisory should continue until total coliforms are not detected in representative samples and the chlorine residual is within acceptable limits.

In accordance with OAC 3745-81-32, **if any of these special purpose samples are positive for E. coli or fecal coliform:** 1) the situation is to be considered an acute risk to human health and a water use advisory issued; and 2) the water use advisory is to remain in effect until total coliforms are not detected in consecutive samples collected at least 24 hours apart.

The appropriate Ohio EPA district office should be notified of any water use advisories.

- 3. **Depressurization due to an operational disruption** (i.e. pump failure, telemetering failure, etc). Under these types of circumstances it is not possible to disinfect the water system in accordance with AWWA Standard C651-05.

In the event that a water system becomes depressurized due to an operational disruption, it

should be considered microbiologically impacted and consumers **should be advised** to boil the water to be used for drinking purposes. The distribution system should be adequately flushed and the chlorine residual should be increased to at least 1 mg/l free chlorine or 6 mg/l combined chlorine throughout the distribution system (in accordance with OAC 3745-83-01(C)(4)).

Special purpose samples which are representative of the distribution system should be collected as soon as normal operating pressure is regained. The water use advisory should remain in effect until total coliforms are not detected in representative samples and the chlorine residual is within acceptable limits.

If any of the special purpose coliform test results are found to be **total coliform positive** (E. coli or fecal coliform negative), sampling and the advisory should continue until total coliforms are not detected in representative samples and the chlorine residual is within acceptable limits.

In accordance with OAC 3745-81-32, **if any of these special purpose samples are positive for E. coli or fecal coliform:** 1) the situation is to be considered an acute risk to human health and a water use advisory issued; and 2) the water use advisory is to remain in effect until total coliforms are not detected in consecutive samples collected at least 24 hours apart.

The appropriate Ohio EPA district office should be notified of any water use advisories.

4. **Coliform Sampling.**

Samples are to be taken to ensure that repair and disinfection procedures were effective in protecting the water supply against contamination. Samples should be representative of the entire area affected by the depressurization but should not be less than two samples per sampling event.

A minimum of two samples should be collected for the first 25 service connections and another sample for the next seventy-five service connections. In addition to this minimum, one additional sample should be collected for every additional 100 service connections affected. For example, if the system had 300 connections affected by the depressurization, they would need to collect a minimum of five samples (three for the first 100 connections, plus two for the remaining 200 connections). If the system had 1000 connections affected, they would need to collect a minimum of 12 samples (three for the first 100 connections plus nine for the remaining 900 connections). The following is a quick reference chart

Connections affected	Minimum number of samples
01-25	2
25-100	3
100-200	4
200-300	5
300-400	6
400-500	7
500-600	8

Connections affected	Minimum number of samples
600-700	9
700-800	10
800-900	11
900-1000	12

The appropriate Ohio EPA district office should be contacted for consultation if sampling is not taken according to this policy.

VI. **HISTORY:**

This policy was originally drafted as a memoranda titled "Policy for Bacteriological Sampling of Water Systems That Have Been Depressurized" issued February 11, 1991, updated December 19, 1995, to provide assistance for water systems that experienced loss of pressure due to physical disruptions in their distribution systems. The current version was issued on January 2, 2008.