

**Guidance for Flood Event Monitoring by
Public Water Systems with Ground Water
Sources**

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I. PURPOSE:

This document is intended to provide guidance to public water systems with ground water sources and Ohio EPA staff for evaluating and responding to possible contamination of source water wells during flood events. Recommendations for evaluating baseline water quality of wells in floodplains are also provided. The steps in this guidance are recommendations only, however, alternate courses of action should be discussed with your district office representative.

Note: This guidance is not intended to address water systems that use ground water under the direct influence of surface water (GWUDI). However, GWUDI water systems susceptible to flooding should also be prepared to respond to flood conditions and some of the recommendations in this guidance may also be appropriate for those systems. We recommend that GWUDI water systems contact a district office representative for specific guidance.

II. BACKGROUND:

In accordance with rule 3745-81-76 of the Ohio Administrative Code (OAC) a well used for a drinking water source must be shown to be free of total coliform bacteria contamination before it can be designated as a ground water source. Drinking water from these sources may not be subject to treatment prior to distribution and continued integrity of the well is critical to maintaining a safe water supply. However, flooding in Ohio has shown that some wells placed in floodplains are susceptible to contamination by floodwaters, which may be due to a change in the integrity of the well. This guidance suggests steps to be taken before, during, and after flood events to help ground water systems manage potential contamination from floodwaters and is intended to be used in conjunction with a water system's contingency plan.

III. GUIDANCE

Before Flood Events

Public water systems with ground water sources located in floodplains should periodically (e.g. semi-annually) take samples from each well to test for pH and conductivity and make a visual determination of turbidity in order to establish a baseline for comparison. Visually inspecting each well is also recommended for indicators of well integrity, such as:

- secure well vents - are there signs of cracking or leaking?
- secure well caps - are they water tight?
- water level ports - are they plugged and water tight?
- general wellhead condition - signs of cracking of concrete pad or potential leaking of annular space?

severity of the situation and further requirements or guidance. If it is determined that the situation poses an acute risk to human health a Tier I public notice may be required¹. During non-business hours, the Ohio EPA Emergency Hotline (1-800-282-9378) should be used.

- inspect the wellhead as soon it can safely be accessed and daily thereafter for signs of damage;
- the water use advisory should not be lifted until the floodwaters have receded from the all of the wellheads in a wellfield and two consecutive raw water total coliform negative samples are received (details are provided under “At the Conclusion of Flood Events” below).

For public water systems that add chlorine, have at least 30 minutes contact time and have no previous history of well contamination from flood waters, the following actions are recommended:

- contact your Ohio EPA district office as soon as possible to consult about the severity of the situation;
- as a precaution, increase chlorine residual to at least 1 mg/l free chlorine or 6 mg/l combined chlorine throughout the distribution system²;
- conduct daily monitoring and inspections for the following indicators of well integrity as soon as you can safely gain access:
 - total coliform monitoring of raw and finished water
 - increased chlorine demand
 - change in water turbidity (visual determination based on comparison with pre-flood conditions)
 - change in pH or conductivity
 - signs of well damage or other reasons to question the integrity of the well;
- If any of these indicators raise a question of the well integrity, Ohio EPA recommends issuing a water use advisory instructing consumers to boil or refrain from using the water, as appropriate;
- If contamination is confirmed by total coliform positive sample result(s), contact your District Office representative. If it is determined that the situation poses an acute risk to human health a Tier I public notice may be required¹.
- If **all** indicators continue to support confidence in the well integrity, Ohio EPA recommends continued daily monitoring of conditions until flood waters recede.

At the Conclusion of Flood Events

1. If a water use advisory was issued but evidence of well contamination was not found, i.e.

¹ Typically, a Tier I public notice is only required when a violation occurs. In situations such as a flood the Director may find that conditions present an acute risk to human health making a Tier I notice necessary, even though there may be no violation. Indicators of an acute risk may include total coliform monitoring of raw water; increased chlorine demand; change in water turbidity; change in pH or conductivity; signs of well damage or other reasons to question the integrity of the well. Please see paragraph (B) of OAC rule 3745-81-32.

² This is required by paragraph (B)(6) of OAC rule 3745-83-01 for community and major noncommunity public water systems when there is a threatened outbreak of waterborne disease. It is also recommended for all systems whenever there is a threatened outbreak of waterborne disease.

IV. HISTORY

This document was originally drafted in 1997 to provide guidance on raw water monitoring of wellheads in floodplains during flood events. It was revised and reissued as a formal guidance on January 3, 2006.