



## DRINKING WATER AND ENVIRONMENTAL HEALTH DIVISION POLICY AND PROCEDURE

### DWEHD-399-022 - Guidelines for Issuing Boil Water Advisories to Address Potential Microbial Contamination of Community Water Supplies

Effective Date: October 12, 2007  
Last Reviewed Date: April 17, 2020  
Last Revision Date: August 20, 2020  
Distribution: All DWEHD Staff

#### ISSUE

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Community water supplies (CWS) are expected to provide customers with a continuous supply of water that meets both federal and state drinking water standards. However, there may be circumstances when the public must be notified that the water may not be safe. In these circumstances, a boil water advisory (BWA) may be issued to prevent illness from known or suspected microbiological contamination. This policy and procedure is to provide guidance to Michigan Department of Environment, Great Lakes, and Energy (EGLE), Drinking Water and Environmental Health Division (DWEHD), staff on advising CWS personnel when to issue and rescind a BWA, the appropriate content, and the manner and method of delivery.

#### STAKEHOLDER INVOLVEMENT

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EGLE staff met with municipal utilities directors to seek input on issues that were subsequently addressed in this policy and procedure.

#### DEFINITIONS

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**Boil Water Advisory (BWA):** A written or verbal advisory issued by the CWS or EGLE notifying the users of the water supply that the water is or may be contaminated and advising them to boil the water prior to using it for drinking or cooking.

**Community Water Supply (CWS):** A public water supply (PWS) that provides year-round service to not fewer than 15 living units, or that regularly provides year-round service to not fewer than 25 residents. Examples include municipalities, such as cities, villages, and townships; apartment complexes; manufactured housing communities; condominiums; and nursing homes.

**Complete Loss of Pressure:** Sustained negative pressures or pressure below five pounds per square inch (psi) in any portion of a distribution system. It does not include instantaneous low or negative pressure occurring from pressure surges caused by pump cycling, valve operation, or other water hammer events.

**Maximum Contaminant Level (MCL):** The maximum permissible level of a contaminant in water that is delivered to any user of a PWS.

**Repeat Sample:** A sample that is collected and analyzed in response to a previous coliform-positive sample.

**Routine Sample:** A water sample that is collected and analyzed to meet the monitoring requirements for total coliform, as outlined in the written sampling plan.

**Tier 1 Public Notice:** A public notice required to be provided as soon as practical but not later than 24 hours after the supplier learns of a violation or situation that has significant potential to have serious adverse effects on human health as a result of short-term exposure. A Tier 1 Public Notice also requires the supplier to initiate consultation with EGLE as soon as practical but not later than 24 hours after the supplier learns of the violation or situation. Examples of these violations or situations include:

1. A violation of the *E. coli* MCL;
2. A violation of the treatment technique requirement resulting from a single exceedance of the maximum allowable turbidity limit;
3. An occurrence of a waterborne disease outbreak;
4. A failure or significant interruption in key water treatment processes;
5. A disruption of the water supply or distribution system; and
6. Other violations or situations as determined by EGLE on a case-by-case basis. A violation or situation that requires a Tier 1 Public Notice also requires the supplier to consult with EGLE to determine additional public notice requirements, including the timing, form, manner, frequency, and content of the notice designed to reach all persons served, and any repeat notices or directions. At a minimum, one or more of the following forms of delivery must be used:
  - a. Appropriate broadcast media;
  - b. Posting of the notice in conspicuous locations throughout the area served by the supply;
  - c. Hand delivery of the notice to persons served by the supply; or
  - d. Another delivery method approved by EGLE.

Within ten days of completing the Tier 1 Public Notice, the supplier shall submit to EGLE a certification that it fully complied with the public notification requirements, including a copy of the type of notice distributed to persons served by the supply and to the media.

**Tier 2 Public Notice:** A public notice required to be provided as soon as practical but not later than 30 days after the supplier learns of a violation or situation that has the potential to have serious adverse effects on human health. Examples of these violations or situations include:

1. All violations of the MCL, maximum residual disinfectant level, and treatment technique requirements except where EGLE determines a Tier 1 notice is required;
2. Violations of monitoring and testing procedure requirements, taking into account potential health impacts and persistence of the violation; and

3. Failure to comply with a variance or exemption.

For a Tier 2 Public Notice, EGLE may, on a case-by-case basis, grant extensions in writing for up to three months from the date the supplier learns of the violation or situation, for reasons such as coordinating with billing cycles or if the violation or situation was quickly resolved and no longer poses any risk to the persons served. A Tier 2 Public Notice shall be repeated every three months as long as the violation or situation exists. A Tier 2 Public Notice and any repeat notices shall be in a form and issued in a manner that is reasonably calculated to reach persons served in the required time period. At a minimum, the notice shall be provided:

1. By mail or direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the supplier; and
2. By other methods reasonably calculated to reach other persons not receiving a bill, such as apartment dwellers, university students, nursing home patients, and prison inmates.

Other methods may include:

- a. Publication in a local newspaper;
- b. Delivery of multiple copies to apartment complexes and manufactured housing communities;
- c. Posting in public places or on the Internet; or
- d. Delivery to community organizations.

Treatment Technique (TT): Minimum treatment requirement or a necessary methodology or technology that is employed by a supplier of water for the control of the chemical, physical, biological, or radiological characteristics of a PWS.

Treatment Technique Trigger (TTT): Treatment technique triggers require assessments to identify sanitary defects that may allow a pathway for contamination. Assessments are divided into level 1 and level 2 according to the requirements below:

1. A level 1 assessment is required for the following TTTs:
  - a. For supplies collecting 40 samples per month or more, >5 percent of routine and repeat samples in a month are total coliform (TC)-positive.
  - b. For supplies collecting fewer than 40 samples per month, two or more routine and repeat samples in a month are TC-positive.
  - c. The supply fails to take every repeat sample after a TC routine sample.
2. A level 2 assessment is required for the following TTTs:
  - a. An *E. coli* MCL violation in R 325.10704j (1).
  - b. A second level 1 trigger within a rolling 12-month period.

## **POLICY**

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A BWA may be issued for a variety of reasons when microbial contamination is known or suspected. Revised Total Coliform Rule (RTCR) MCL violations, surface water TT violations, low or loss of pressure events, and waterborne disease outbreaks are circumstances when a BWA may be issued. Each of these situations is discussed in detail below. However, these situations are not the only times a BWA can or should be issued. Each incident must be

handled on a case-by-case basis, using professional judgment to evaluate the circumstances in each situation.

Finally, there may be situations when water supplies experience contamination that is not microbial but is chemical due to a chemical spill or backflow due to a cross connection. In these cases, a notice to customers could include “Do Not Drink” or “Do Not Use” language since boiling the water may not remove the contamination.

### **Types of Incidents:**

#### 1. Violation of a Drinking Water Standard

##### a. RTCR MCL Violations and TTTs

An acute RTCR *E. coli* MCL violation occurs when monitoring indicates the presence of coliform organisms in both a routine and a follow-up repeat sample in the same monitoring period, and either analysis (routine or repeat) is also positive for *E. coli*. Because this MCL violation confirms the presence of a more direct connection to contamination, these violations warrant issuance of a BWA, unless there are unique circumstances.

A TTT resulting from confirmed TC without *E. coli* occurs when monitoring indicates the presence of coliform bacteria in two or more samples in the same monitoring period for a supplier collecting less than 40 samples per month, or in more than 5 percent of the samples for a supplier collecting 40 or more samples per month, and the criteria for an acute violation did not occur, i.e., *E. coli* were NOT detected in either a routine or repeat sample. For example, a supply that collects five samples per week for a total of 20 samples per month may have one sample report positive for TC during the first week, but all repeat samples report negative for coliform. If another sample in a subsequent week also reports TC-positive, but again, all repeat samples are coliform-negative, then an RTCR TTT has occurred because two or more samples reported positive for coliform, but no *E. coli* was detected in either a routine or a repeat sample.

When a non-*E. coli* TC-positive TTT occurs, staff should evaluate possible sources of contamination. If a source is identified that is considered likely to contribute disease causing organisms or result in water of questionable quality still being distributed, a BWA should be instituted. Examples of contaminant sources that would elevate the public health risk include, but are not limited to:

- flooding of the wells;
- failure of the treatment system;
- recent construction activity in the distribution system;
- vermin (birds, rodents, etc.) activity in storage tanks; or
- supply-wide or extensive pressure loss in the distribution system.

Even if the source of contamination is not easily identified, a BWA may be appropriate if the event is widespread or ongoing. A BWA shall be instituted if monitoring indicates *E. coli* contamination unless unusual circumstances warrant consideration, such as the absence of any coliform in repeat samples, or when staff are assured that the contamination has been eliminated before confirmation results are available.

However, not every situation must result in a BWA. There may be exceptions when TC is confirmed but a BWA is not needed. For example, situations where samples collected on different days from widely dispersed locations report coliform present even though repeat samples do not show positive results. In this case, the sampling results may trigger an assessment, but a BWA may not be necessary.

If a BWA is deemed necessary by the DWEHD, it should be issued as soon as possible but no later than 24 hours after the supply learns of the event. If an *E. coli* MCL occurs, the MCL results in required public notification (PN) per the PN Rule. The water supply may issue the PN and BWA simultaneously in one document (highly recommended) and must meet all the requirements of a Tier 1 PN and include BWA language.

After measures have been taken to eliminate the source(s) of contamination, such as initiating or increasing chlorine feed rates and system flushing, additional sampling must be conducted and defects corrected. For groundwater supplies, raw water bacteriological sampling is required under the Groundwater Rule to determine if the raw water is the possible source of contamination. For MCL violations, the BWA can be rescinded after the analyses of two sets of samples collected 24 hours apart report the absence of coliform bacteria. The number of samples in each set should be a minimum of three samples but can be increased based on supply size or the extent of the affected area. Supplies are encouraged to use routine sample sites if available and to use extra care if routine sites are not available.

b. Surface Water Treatment Rule (SWTR) TT Violations

SWTR TT violations include:

- exceedance of turbidity standards at filter confluence point;
- failure to meet disinfection contact time requirements (C\*T); or
- failure to meet disinfection residual standards.

Upon determination of an SWTR TT violation, DWEHD staff must determine if the violation poses a threat to public health. For example, if the turbidity levels at the filter confluence point were found to have exceeded 0.3 nephelometric turbidity unit

(NTU) in 95 percent of the samples in a two-month period, an SWTR TT violation has occurred. Based upon a review of plant performance and consultation with program managers, staff may determine that no significant health risk was posed and no BWA is necessary. However, the water supply must still issue a Tier 2 PN within 30 days of the violation. On the other hand, a BWA is likely to be necessary for a treatment plant that gets overwhelmed by excessive runoff and reports a turbidity level in excess of 1.0 NTU at the filter confluence point for a four-hour period.

If the TT violation is ongoing or prolonged, or the DWEHD determines a significant public health risk is posed, DWEHD staff may elevate the PN to Tier 1 status, which must be issued within 24 hours and include BWA language. After appropriate measures have been taken to reduce or eliminate any health risk, additional monitoring must be conducted. Appropriate measures may include increasing coagulant dose, increasing chlorine residuals through the treatment plant, backwashing filters more often, and flushing key system components. In this case, a BWA can be rescinded after analyses of two sets of samples collected 24 hours apart report the absence of coliform bacteria. The number of samples in each set should be a minimum of three samples but can be increased based on supply size or type and severity of the TT violation.

Surface water plants utilizing conventional or direct filtration must add a primary coagulant under R 325.11008. Failure to add a primary coagulant is a violation of the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), and may also contribute to a TT violation under R 325.10611 (Filtration and Disinfection), which requires 3-log inactivation of giardia and 4-log inactivation of viruses. In these cases, DWEHD staff will have to determine if the violation poses a threat to public health and whether other actions are necessary, such as requiring a BWA. Factors to consider if a BWA is necessary would include chlorine residual concentrations throughout the treatment plant, raw water quality, C\*T compliance, plus individual filter effluent and combined filter effluent turbidity levels.

## 2. Waterborne Disease Outbreaks

Waterborne disease outbreaks can be declared by the Centers for Disease Control and Prevention, the Michigan Department of Health and Human Services, a local health department (LHD), or other public health institutions. If an outbreak is declared, the DWEHD will work with the declaring agency to ensure affected community PWSs take appropriate measures to mitigate public exposure. These measures will include appropriate public notification, including instructions to boil water if appropriate. The DWEHD will allow the water supply to rescind the notification when the agency declaring the outbreak indicates it is safe to do so as the result of additional monitoring.

### 3. Interruptions in Service

#### a. Negative or Complete Loss of Pressure

A complete loss of pressure or negative pressure in the distribution system must result in a BWA being issued to all water customers in the impacted area. After pressure is restored and the supply recovers (tanks are filling and enough sources are operating to ensure pressures do not drop again), the affected area should be thoroughly flushed and coliform samples must be taken throughout the area to determine if the distribution system remains free of coliform contamination. The number of samples will vary depending on the size of the supply and the extent of the area impacted. For very small supplies that experience a power failure that results in a complete loss of pressure throughout the distribution system, a minimum of three samples should be collected. If applicable, chlorine residual measurements should be taken to ensure that an adequate disinfectant residual is present. If possible, chlorine dosages and residuals should be increased by 1 to 2 parts per million during this period as a corrective and preventive measure. If the first round of sampling does not detect coliform bacteria, the advisory may be rescinded. However, if the first round of sampling detects coliform bacteria, additional flushing should be conducted in the area where the positive coliform samples were collected, and a second round of coliform samples collected from the area. The BWA should remain in effect until safe coliform sample results are obtained.

#### b. Low Pressure Events

Low pressure events might not result in a BWA. Low pressure is considered a drop in pressure below 20 psi but greater than 5 psi. A drop in water pressure in a distribution system could allow contamination to enter the water supply through backflow by backpressure or backsiphonage. The decision to issue a BWA should be made on a case-by-case basis and be based upon professional judgment of all available data that may indicate the extent of the problem, such as:

- Geographical extent of the pressure loss;
- Nature of the service area (residential vs. commercial/industrial);
- Duration of the low-pressure condition;
- Disinfection practices of the water supply;
- Relative elevation differences in the service area;
- Status of the local cross connection control program;
- Age and condition of the underground piping;
- Amount of underground piping located in areas of a high groundwater table; or
- Ability and willingness of the operators to rapidly apply chlorine to the system or distribute an increased chlorine residual throughout the affected area.

After normal pressure is restored, the impacted area should be thoroughly flushed, and coliform samples taken throughout the area to determine if the distribution system is free of any bacteriological contamination. The collection of coliform samples after low pressure events is not absolutely required but may be recommended based on the factors above.

c. Water Main Breaks or Repairs

A BWA may be issued during water main breaks and after the break has been repaired. Whether or not to issue a BWA will depend on the location and severity of the break and, more importantly, a decision based on sound engineering judgment that the integrity of the water supply has been maintained. If at all possible, repairs should be performed under reduced or low pressure by closing the closest valves on each side of the break just enough to reduce the flow so the repairs can be made under pressure while the water flowing from the break is diverted away from the excavation to maintain clean sanitary conditions. If the water main can be repaired under pressure, and no nonpotable water, soil, or other potential contaminants entered the main during the break and repair process, then a BWA is not necessary. If the water main that was removed from service is flushed, disinfected, and sampled in accordance with American Water Works Association (AWWA) Standard C651 before being placed back into service, a BWA does not need to be issued.

If a water main break results in a complete loss of pressure before, during, or after the repair is made, a BWA must be issued to all customers in the affected area. The BWA should remain in effect until the area is flushed, chlorine residuals are reestablished (if applicable), and sample results do not detect coliform bacteria.

**Content and Delivery of a BWA:**

If the DWEHD determines a BWA is necessary, the water supply must issue the advisory as soon as practical, but not later than 24 hours after being advised to do so. The supply must make a good faith attempt to notify all customers in the affected area. Appropriate methods of distribution are situation specific, but may include radio or television broadcasts, hand delivery, and/or posting in conspicuous locations throughout the area. Delivery requirements as detailed in the PN Rule should be used to determine appropriate delivery methods.

Although there are content requirements for public notification under the PN Rule, there are no requirements specific to boil water language. To ensure all appropriate information is transmitted to the customers, a BWA should include the same content elements as required for public notification under the PN Rule. If a BWA is issued as the result of an MCL violation and the water supply issues the BWA in conjunction with the required PN (highly recommended), the content MUST meet all PN Rule content, delivery, and reporting requirements.

The DWEHD boil water language is consistent with the United States Environmental Protection Agency policy that requires water be brought to a boil and allowed to boil for one (1) minute before use. The language also suggests the use of bottled water as an alternative to boiling and describes the circumstances under which boiled or bottled water should be used.

Staff should notify the appropriate LHD and the Michigan Department of Agriculture and Rural Development, Food and Dairy Division, whenever a BWA is issued or rescinded. These agencies may receive calls from concerned customers or be involved in oversight of facilities impacted by the BWA and, therefore, need to be aware of the situation.

Several BWA templates have been created and are available to DWEHD staff. To ensure consistency and inclusion of all necessary content, these templates should be used as the basis for PNs and/or a BWA. Available templates include, but are not limited to:

- Advisory for an RTCR MCL
- Advisory for a low/no pressure event
- Notification for cancellation of a BWA

**PROCEDURE**

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Step	Who	Does What
1	PWS	Notify EGLE of results in a timely manner as required by law and follow through with appropriate actions.
2	Program Staff	Respond to all RTCR and TT violations plus complete loss of pressure events in a timely manner and determine whether a BWA needs to be issued. <ul style="list-style-type: none"> <li>• If needed, assist supply in drafting BWA and determining most appropriate method of delivery with approval from the District or Unit Supervisor.</li> </ul> If needed, assist the supply in determining actions to remove the possible contamination, including steps needed to rescind the BWA.
3	District Staff	Provide on-site technical assistance for <i>E. coli</i> MCL violations and other boil water situations as appropriate. Depending on the event, this may include a mandatory Level 2 Assessment.
4	District or Unit Supervisors	Assist program staff in the matters pertaining to issuing a BWA.

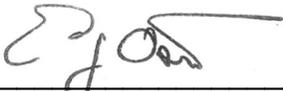
**LINKS TO ADDITIONAL INFORMATION**

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Safe Drinking Water Act, 1976 PA 399, as amended, being Michigan Compiled Laws 325.1001 *et seq.*, and the administrative rules promulgated thereunder, being R 325.10101 *et seq.* of the Michigan Administrative Code.

**APPROVING AUTHORITY**

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Michigan Department of Environment, Great Lakes, and Energy

**HISTORY**

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Policy No.	Action	Date	Title
WB-014	Original	10/12/2007	Guidelines for Issuing Boil Water Advisories
ODWMA-399-022	Revised (Reformatted)	01/24/2013	Guidelines for Issuing Boil Water Advisories to Address Potential Microbial Contamination of Community Water Supplies
DWEHD-399-022	Revised	08/20/2020	Guidelines for Issuing Boil Water Advisories to Address Potential Microbial Contamination of Community Water Supplies

**CONTACT/UPDATE RESPONSIBILITY**

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Any questions pertaining to the implementation of this policy and procedure should be routed through the associated CWS District Office. Updates to this policy and procedure will be the responsibility of EGLE, Drinking Water and Environmental Health Division, Technical Support Unit.

*An EGLE policy and procedure cannot establish regulatory requirements for parties outside of EGLE. This document provides direction to EGLE staff regarding the implementation of rules and laws administered by EGLE. It is merely explanatory, does not affect the rights of or procedures and practices available to the public, and does not have the force and effect of law. EGLE staff shall follow the directions contained in this document.*