

The LGMA Water Metrics take a system-based approach to assessing and managing risks associated with agricultural water:



Sources & Storage

&



Conveyance

&



Delivery

Before diving into the following sections:

Identify your water sources and distinct systems.

A distinct system can have a single source or multiple sources, but is determined by which lots or ranches the system serves.

Create a water system description for each distinct system.

You may use written descriptions, photographs, maps, drawings, and other means to describe each system. Your description should make it easy for someone to locate the visible (above-ground) elements of your system in the field.

Make sure to include:

- A unique name or identifier for each distinct system
- The location of permanent fixtures (e.g.: water district valves, gates, wells, canals, reservoirs, etc.)
- The ranches, lots, or fields served by each distinct system
- The direction(s) of water flow in each system

Determine how water from each distinct system will be used in production.

Categorize each distinct system as Type A or B.

Consider the sources, conveyance, and delivery for each distinct system and assess the hazards related to each, as you determine the overall system type. See Appendix A ("How do I know which type of ag water system I have?" and Table 1) for guidance.

TYPE

A

STEP 1

Baseline Microbial Water Quality Assessment

1

What do I need to do?

Test any closed water sources you intend to use for overhead applications (e.g.: irrigation, pesticide spray, ice control, etc.) near harvest and which you believe are of Type A quality for generic *E. coli*. If tests show that they meet the acceptance criteria, the sources become certified as Type A.

When and how often?

Complete the baseline microbial assessment at any point before the first 21-day-to-scheduled-harvest window of the season. We recommend that you complete this 30-35 days before scheduled harvest so you have time to receive test results and troubleshoot if needed.

FREQUENCY: once per source

SOURCE



The Baseline Microbial Assessment confirms that a water **source** you believe is Type A actually meets the microbial water quality requirements (acceptance criteria) for Type A water.

How to Certify a Type A Water Source:

Public + Private Municipal Sources



Certify municipal water sources as Type A using a Certificate of Analysis (COA) or annual water report that shows that generic *E. coli* levels fall within the Type A acceptance criteria.

Wells + Tertiary Treated Water Sources



Using Historical Data

Use the last five chronological water tests. The most recent test must have been conducted within six months of the beginning of the season.



Acceptance Criteria:



There must be no detectable generic *E. coli* in at least 4 of 5 samples. One sample can have up to 10 MPN of generic *E. coli*.

Using New Data

Collect three 100 milliliter samples from the water source and test for generic *E. coli*.
Wait at least one week and repeat with another three samples.

Acceptance Criteria



There must be no detectable generic *E. coli* in at least 5 of 6 samples. One sample can have up to 10 MPN of generic *E. coli*.

What if the source samples do not meet the Type A Acceptance Criteria?



Type B water can be used for any application up to the 21-day-to-scheduled-harvest window and for non-foliar irrigation at any time.

Do not use this water for overhead applications within 21 days of scheduled harvest.

Assess the water source (conduct an agricultural water system assessment) to determine the cause of the problem. (See Appendix A)

If the water meets the Type B acceptance criteria, you can still use it as a type B water source for overhead irrigation up to the 21-days-to-scheduled-harvest window.

If you cannot identify or correct the issue, this is considered a Type B source and must be treated before using for overhead applications within 21 days of scheduled harvest.

TYPE

A

STEP 2

Initial Microbial Water Quality Assessment

2

What do I need to do?

Collect three 100 milliliter samples from each closed water delivery system you believe is of Type A quality and that you intend to use for overhead irrigation near harvest. Test the samples for generic *E. coli*. If results show that they meet the acceptance criteria, the system becomes certified as Type A.

When and how often?

Complete the initial microbial water quality assessment at any point before the first 21-day-to-scheduled-harvest window of the season or if there is a material change to the system. Material changes include: changes to equipment, system, or piping design, and changes that may lead to the degradation of water quality.

We recommend that you complete the baseline and initial microbial system assessments 30-35 days before scheduled harvest so you have time to receive test results and troubleshoot if needed.

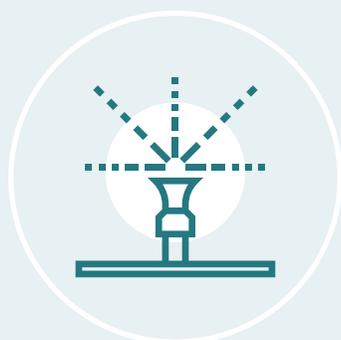
FREQUENCY: once per unique system per season

SYSTEM



The Initial Microbial Water Quality Assessment confirms that the distribution **system** does not reduce the microbial quality of water from a Type A source.

How to Certify a Type A Water System:



For any Type A water source, collect three 100 milliliter samples from different points in the distribution system during a single irrigation event and test for generic *E. coli*. At least one sample must be collected from the furthest point of the system (i.e.: last sprinkler head).

Acceptance Criteria



There must be no detectable generic *E. coli* in at least 2 of 3 samples. One sample can have up to 10 MPN of generic *E. coli*.

What if the water quality is degraded by the distribution system?

If the water quality is degraded and does not meet Type A acceptance criteria at the end of the distribution system, do not use this water for overhead applications within 21 days of scheduled harvest.

What if the water quality is degraded by the distribution system? (cont.)



Type B water can be used for any application up to the 21-day-to-scheduled-harvest window and for non-foliar irrigation at any time.

Assess the water system (conduct an agricultural water system assessment--see Appendix A) to determine the cause of the problem.

If the water meets the Type B acceptance criteria, you can still use it as a type B water source for overhead irrigation up to the 21-days-to-scheduled-harvest window.

If you cannot identify or correct the issue, this is considered a Type B system and must be treated before using for overhead applications within 21 days of scheduled harvest.

TYPE

A

STEP 3

Routine Verification of Microbial Water Quality

3

SYSTEM



Routine Verification of Microbial Water Quality confirms that the microbial quality of water distributed through a certified Type A **system** has not changed during the season.

What do I need to do?

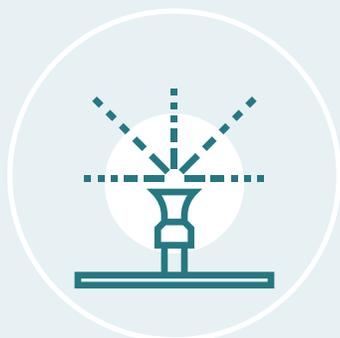
Test any water systems you have certified as Type A for generic *E. coli*. If tests show that they meet the acceptance criteria, the systems are then verified as Type A.

When and how often?

Complete routine verification at some point after completing the Initial Microbial Water Quality Assessment.

FREQUENCY: once per unique system per season

How to Verify a Type A Water System:



Collect three 100 milliliter samples from different points in your certified Type A water distribution system during a single irrigation event and test for generic *E. coli*. At least one sample must be taken from the end of the system (i.e.: last sprinkler head).

Acceptance Criteria



There must be no detectable generic *E. coli* in at least 2 of 3 samples. One sample can have up to 10 MPN of generic *E. coli*.

What if the water quality is degraded by the distribution system?

If the water quality is degraded and does not meet Type A acceptance criteria at the end of the distribution system, do not use this water for overhead applications within 21 days of scheduled harvest.

Assess the water system (conduct an agricultural water system assessment--see Appendix A) to determine the cause of the problem.

If the water meets the Type B acceptance criteria, you can still use it as a type B water source for overhead irrigation up to the 21-days-to- scheduled-harvest window or for non-foliar irrigation at any time.

If you cannot identify or correct the issue, this is considered a Type B system and the water must be treated before using in overhead applications within 21 days of scheduled harvest.

What if I performed my routine verification testing during the 21-day-to-scheduled-harvest window, but the water did not meet Type A criteria?

**Level 1 Assessment
Acceptance Criteria**



There must be no detectable generic *E. coli* in at least 4 of 5 samples. One sample can have up to 10 MPN of generic *E. coli*.

Perform a Level 1 Assessment (Table 2F in the Metrics):

During the next irrigation event, collect and test five 100 milliliter samples from any point in the delivery system. One of the samples must be from the furthest point of the delivery system (i.e.: last sprinkler head).

Test the samples and confirm that they meet the Level 1 Acceptance Criteria (at left).

If the water meets the Level 1 Assessment acceptance criteria, you may continue using the system as Type A.

What if the water does not meet the Level 1 Assessment acceptance criteria?

If the water does not meet the Level 1 Assessment acceptance criteria, test the product for STECs (including *E. Coli* O157:H7) and *Salmonella* before harvesting. If product tests positive for any of these human pathogens, do not harvest it for the fresh market.



If product tests positive for human pathogens, do not harvest for the fresh market.

TYPE

B to A

STEP 1

Initial Irrigation Water Treatment Assessment

1

What do I need to do?

Before the 21-days-to-scheduled-harvest window, set up your water treatment system(s). Collect water samples from the manufacturer's recommended location and test to make sure they meet the manufacturer's parameters for a system that is working correctly. If not, adjust the system until they do, then create an SOP for setup.

When and how often?

Complete the initial irrigation water treatment assessment during an irrigation event before the first 21-day-to-scheduled-harvest window of the season and again if there is a material change to the system. Material changes include: changes to equipment, system, or piping design; changes to treatment systems that require updates to related SOPs; and changes that may lead to the degradation of water quality. We recommend that you complete the initial irrigation water treatment assessment for each system at least 30-35 days before scheduled harvest so you have time to troubleshoot if needed.

FREQUENCY: once per unique system per season

TREATMENT



The Initial Irrigation Water Treatment Assessment confirms that your water treatment system is set up correctly before it needs to be used.

How to Set Up Your Water Treatment System:



Before the 21-days-to-scheduled-harvest window, set up your water treatment system and allow it to stabilize (e.g.: pressure, flow rates). The system must be stabilized before you take samples to make sure that the treatment has made it through the system and that samples are representative of treated water.



Collect three 100 milliliter water samples from different points in the distribution system. One sample should come from the manufacturer or label's recommended location in the distribution system (usually either the first or last sprinkler head).



CONSIDER CHECKING:

- pH
- Flow rates
- Treatment dose
- Total suspended solids
- Turbidity

Acceptance Criteria

Test the samples for the parameters suggested by your treatment system's manufacturer or other applicable resource to make sure that the system is working as it should. The Metrics suggest a few parameters to start with. Check the product label or manufacturer's instructions to determine which additional values to test for.

What if the water sample levels are not where they should be?



It may take a few rounds of troubleshooting and assessment before you find the correct settings for your water treatment systems. Start your assessments early so everything is ready to go by the time you need to start using treated water.

If your water samples do not match the manufacturer or product label's reference ranges, you may need to adjust your system settings.

Refer to the manufacturer's instructions or contact the company for help.

Make the necessary adjustments and repeat the treatment system assessment until the water sample values are correct.

NEXT STEP: Create an SOP

Once you have found the correct settings for your water treatment systems, create an SOP for setting up and operating each system. Include enough detail for another person to easily operate the system, such as:

- Location and name of the system
- Supplies needed for setup
- Step-by-step instructions for setup and monitoring
- Required records
- Corrective actions

Your SOPs must also establish a frequency for monitoring the treatment system during each irrigation event to ensure that they are working correctly at all times.

You may choose to conduct documented monitoring events a given number of times (e.g.: once or twice per irrigation event), or at given time intervals (e.g.: every hour while irrigating). Whatever frequency you choose must be enough to ensure that the treated water is consistently safe and consistently meets the microbial quality required by the LGMA Metrics for its intended use.

A monitoring event may include completing a checklist for system parameters, testing sanitizer levels in treated water, or visual inspections. Each monitoring activity must be documented.

Your SOP should list activities that should be completed during a monitoring event, specific parameters to monitor, and desired values, ranges, or observations.



To save time creating SOPs, ask your treatment system manufacturer if they have one that you can modify to fit your operation.

TYPE

B to A

STEP 2

Initial Microbial Water Treatment Assessment

2

What do I need to do?

After setting up your treatment system (see B to A Step 1), collect three treated water samples from the distribution system and test for generic *E. coli* and Total Coliforms. If they meet the acceptance criteria, the system becomes certified as Type B to A.

When and how often?

Complete the initial microbial water treatment assessment during an irrigation event before the first 21-day-to-scheduled-harvest window of the season [and when there is a material change to the system](#). Material changes include: changes to equipment, system, or piping design; changes to treatment systems that require updates to related SOPs; and changes that may lead to the degradation of water quality.

We recommend that you complete the initial irrigation water treatment assessment for each distinct system at least 30-35 days before scheduled harvest so you have time to troubleshoot if needed.

FREQUENCY: once per unique system per season

SYSTEM



The Initial Microbial Water Treatment Assessment confirms that your distribution system does not degrade the microbial quality of your treated water.

How to Certify a Type B to A Treatment System:



If you intend to use the log reduction method for Total Coliforms compliance, after setting up your water treatment system and confirming that it works correctly (B to A Step 1), collect one 100 milliliter sample of untreated water from your source and test for Total Coliforms.



With the treatment system running during a single irrigation event, collect three 100 milliliter treated water samples from different points in the distribution system. At least one sample must be collected from the furthest point in the system (i.e.: last sprinkler head). Test the samples for generic *E. Coli* and Total Coliforms.



Acceptance Criteria - *E. Coli*



There must be no detectable generic *E. coli* in at least 2 of 3 treated water samples. One sample can have up to 10 MPN of generic *E. coli*.

How to Certify a Type B to A Treatment System, cont.



To avoid a TNTC (too numerous to count) result, ask the lab to test the original samples and a 1:10 dilution.

Data Monitoring Criteria - Total Coliforms

All three treated water samples should have 99 MPN or less of Total Coliforms or an adequate log reduction from the pre-treatment sample (see Appendix A for the log reduction protocol). If the water does not meet the Total Coliform requirement, but meets the generic *E. coli* acceptance criteria, you may still use it as Type B to A water. However, you must perform Root Cause Analysis (see Appendix R) to find and fix the problem.

What if the water does not meet the Generic *E. coli* acceptance criteria?



It is very important to find and fix potential issues in your system and to understand their root cause. See Appendix R (Root Cause Analysis) and the Agricultural Water System Assessment form on the LGMA website for guidance.

Do not use this water for overhead applications within 21 days of scheduled harvest.

Conduct an agricultural water system assessment to determine the cause of the problem. See the Agricultural Water System Assessment form for guidance.

If the water meets the Type B acceptance criteria, you can still use it as a type B water source for overhead irrigation up to the 21-days-to-scheduled-harvest window or for non-foliar irrigation at any time.

If you cannot identify or correct the issue, this is considered a Type B system. Continue assessing the source and system and adjusting the treatment so that your treated water meets the Type A acceptance criteria for generic *E. coli*.

Water Treatment System Monitoring

What do I need to do?

Monitor any water treatment systems that are in use to make sure they meet the manufacturer's parameters for a system that is working correctly. Follow the SOPs you created during the Initial Irrigation Water Treatment Assessment (pg BA1-2).

When and how often?

Monitor the system whenever you irrigate with treated water, whether within or outside of the 21-days-to-scheduled-harvest window. Your SOPs should describe the frequency and monitoring requirements.

FREQUENCY: monitor each unique system at the frequency established by your SOP(s), but at least once per irrigation event.

TREATMENT



Treatment System Monitoring ensures that your system is working correctly every time it is used.

How to Monitor Your Water Treatment System:



Make sure your system is running and has stabilized (e.g.: pressure, flow rates).



Follow the SOPs you created during the Initial Irrigation Water Treatment Assessment (pg BA1-2) to make sure that your system is working as it should. These SOPs should outline specific activities to conduct and parameters to monitor, as well as values, ranges, or observations that indicate that the system is working properly.

Document the monitoring event(s) as laid out in the SOPs.

What if the system is not working correctly?

If your system parameters do not match the desired specifications outlined in your SOPs, complete the corrective actions outlined in the SOPs to bring the system back into compliance. Don't forget to document them!

What if the system is not working correctly? (cont.)

Type A Acceptance Criteria



There must be no detectable generic *E. coli* in at least 2 of 3 samples. One sample can have up to 10 MPN of generic *E. coli*.

After completing the corrective actions, collect three 100 milliliter samples from different points in the distribution system. At least one sample must be taken from the furthest point in the system (i.e.: last sprinkler head). Test them for generic *E. coli* and Total Coliforms.

If the water meets Type A acceptance criteria, no further action is needed and you may continue using the system as Type B to A.

If the samples do not meet the acceptance criteria, the water that was used was Type B.

What if Type B quality water contacted the edible portion of the crop within 21 days of scheduled harvest?

If the water contacted the edible portion of the crop within 21 days of scheduled harvest, test the product for STECs (including *E. Coli* O157:H7) and *Salmonella* before harvesting. If product tests positive for any of these human pathogens, do not harvest it for the fresh market.



If product tests positive for human pathogens, do not harvest for the fresh market.

TYPE

B to A

STEP 4

Routine Verification of Microbial Water Quality

4

What do I need to do?

Test your treatment system monthly when it is in use by collecting three samples of treated water from any point in the distribution system (with at least one sample collected from the end of the system) and testing for generic *E. Coli* and Total Coliforms.

When irrigating the first crop of the season that falls within the "21-days-to-scheduled-harvest" window, collect and test three samples. Wait at least three days and test another three samples.

When and how often?

Test the microbial quality of your treated water once a month throughout the season and twice during the first "21-days-to-scheduled-harvest" window of the season.

FREQUENCY: test each unique system monthly (when in use) and conduct a set of two tests once per unique system per season.

TREATMENT



Routine Verification of Microbial Water Quality confirms that your treatment system's parameters can handle seasonal variations in water quality.

How to Verify the Microbial Quality of Type B to A Treated Water:



Each month you use your water treatment system (or at the next irrigation event, if it has been more than 35 days since the previous one) collect three 100 milliliter samples of treated water from different points in the distribution system during a single irrigation event. At least one sample must be taken from the end of the delivery system. Test for for generic *E. coli* and Total Coliforms.

For the first crop of the system that falls within the "21-days-to-scheduled-harvest" window:



During the first irrigation event of the season that falls within the "21-days-to-scheduled-harvest" window, collect and test one set of three samples for generic *E. coli* and Total Coliforms. Wait at least three days, then collect and test three more samples.



Acceptance Criteria - *E. Coli*

For each sample set, there must be no detectable generic *E. coli* in at least 2 of 3 samples. One sample can have up to 10 MPN of generic *E. coli*.

How to Verify the Microbial Quality of Type B to A Treated Water, cont.



Data Monitoring Criteria - Total Coliforms

All three treated water samples should have 99 MPN or less of Total Coliforms or an adequate log reduction from the pre-treatment sample (see Appendix A for the log reduction protocol). If the water does not meet the Total Coliform requirement but meets the generic *E. coli* acceptance criteria, you may still use it as Type B to A water. However, you must perform Root Cause Analysis (see Appendix R) to find and fix the problem.

What if I performed routine verification testing during the "21-days-to-scheduled-harvest" window, but the water did not meet the generic *E. coli* acceptance criteria?

Level 1 Assessment Acceptance Criteria



There must be no detectable generic *E. coli* in at least 4 of 5 samples. One sample can have up to 10 MPN of generic *E. coli*.

Perform a Level 1 Assessment (Table 2F in the Metrics):

During the next irrigation event, collect and test five 100 milliliter samples from any point in the delivery system. One of the samples must be from the furthest point of the delivery system (i.e.: last sprinkler head).

Test the samples and confirm that they meet the Level 1 Acceptance Criteria (at left).

If the water meets the Level 1 Assessment acceptance criteria, you may continue using the system as Type A.

What if the water does not meet the Level 1 Assessment acceptance criteria?

If the water does not meet the Level 1 Assessment acceptance criteria, test the product for STECs (including *E. Coli* O157:H7) and *Salmonella* before harvesting. If product tests positive for any of these human pathogens, do not harvest it for the fresh market.



If product tests positive for human pathogens, do not harvest for the fresh market.

TYPE

B

STEP 1

Microbial Water Quality Assessment

1

What do I need to do?

Within 60 days* of the first use of the season, collect one 100 milliliter water sample from each Type B source as close to the point of use as practical. Test for generic *E. Coli* and confirm that the water meets the Type B acceptance criteria.

When and how often?

* If it has been less than 60 days since the system was last tested, the microbial water quality assessment can be conducted before or after the first use of the season. If it has been more than 60 days since the system was last tested, the microbial water quality assessment must be conducted before the first use of the season.

SYSTEM



The Microbial Water Quality Assessment confirms that your Type B water systems meet the acceptance criteria for water used in production before the "21-days-to-scheduled-harvest" window.

How to Assess the Microbial Quality of Water from a Type B System:



Use the FDA BAM, other EPA-approved, or AOAC-accredited method to analyze samples.

If your water system has been tested within the 60 days before the first use of the season:

Within 60 days of the first use of the season, collect one 100 milliliter water sample from the system as close to the point of use as practical. Test the sample for generic *E. coli*.

If your water system was tested more than 60 days before the first use of the season:

Before using the system during the season, collect one 100 milliliter water sample from the system as close to the point of use as is practical. Test the sample for generic *E. coli*.

Month Samples to include



ROLLING GEOMETRIC MEAN CALCULATION

Calculate the rolling geometric mean throughout the season using the 5 most recent test results:

$$\text{Geometric Mean} = \sqrt[n]{\text{result}_a \times \text{result}_b \times \text{result}_c \times \text{result}_d \times \text{result}_e}$$

where n is the number of results included in the calculation and n ≤ 5.

The first test of the season must meet the geometric mean acceptance criteria on its own. As you collect samples each month, include them in the geometric mean calculation until you reach five results.

For future months, replace the oldest result in the calculation with the newest one to maintain a five-sample rolling geometric mean.

How to Assess the Microbial Quality of Water from a Type B System, cont.

FOLIAR



Geometric Mean ≤ 126

Single Sample ≤ 235

(MPN per 100 milliliters)

Acceptance Criteria- Foliar Applications

The rolling geometric mean must be no greater than 126 MPN per 100 milliliter, with no single sample containing more than 235 MPN per 100 milliliter generic *E. coli*.

* Remember, Type B water can only be used for foliar applications before the 21-days-to-scheduled-harvest window.

NON-FOLIAR



Geometric Mean ≤ 126

Single Sample ≤ 576

(MPN per 100 milliliters)

Acceptance Criteria - Non-Foliar Applications

The rolling geometric mean must be no greater than 126 MPN per 100 milliliters, with no single sample containing more than 576 MPN per 100 milliliters generic *E. coli*.

What if the water does not meet the acceptance criteria?

Acceptance Criteria

FOLIAR



Single Sample ≤ 235

(MPN per 100 milliliters)

NON-FOLIAR



Single Sample ≤ 576

(MPN per 100 milliliters)

GEOMETRIC MEAN

Geo Mean (n=5) ≤ 126

(MPN per 100 milliliters)

Single samples of water intended for foliar use may contain no more than 235 MPN per 100 milliliters of generic *E. coli*.

Single samples of water intended for non-foliar use may contain no more than 576 MPN per 100 milliliters of generic *E. coli*.

The five-sample geometric mean must be no greater than 126 MPN per 100 milliliters of generic *E. coli*.

Stop using the water and assess the water source and system.

Implement corrective actions and then collect a new 100 milliliter sample from the same location as the initial sample.

Test the system each day for the next 5 days at the point closest to use. If any of these five samples do not meet the respective single-sample acceptance criteria (more than 235 or 576 MPN, respectively), or if the five-sample geometric mean does not meet the acceptance criteria, repeat the water system assessment and/or corrective actions.

Do not use the system until the water meets the acceptance criteria.

TYPE

B

STEP 2

Routine Verification of Microbial Water Quality

2

What do I need to do?

Test your Type B systems every month* when they are in use by collecting at least one 100 milliliter sample as close to the point of use as practical. Test the sample(s) for generic *E. coli* and confirm that they meet the Type B acceptance criteria.

When and how often?

Test the microbial quality of your water at least once a month when the system is in use. If your system is not used or tested for more than one month (35 days), it must be tested the next time it is used.

* Monthly water test samples must be collected at least 18 hours apart and no more than 35 days apart.

SYSTEM



Routine Verification of Microbial Water Quality confirms that your Type B water systems meet the acceptance criteria throughout the season.

How to Routinely Verify the Microbial Quality of Type B Water:



Each month you use your Type B water system (or at the next use, if it has been more than 35 days since the previous one), collect one 100 milliliter water sample from as close to the point of use as practical. Test the sample for generic *E. coli* and confirm that it meets the single-sample acceptance criteria. Incorporate this result into your rolling geometric mean calculation (see pg B1-1).

Acceptance Criteria:

Foliar Applications



FOLIAR

Geometric Mean ≤ 126
Single Sample ≤ 235

(MPN per 100 milliliters)

The geometric mean must be no greater than 126 MPN per 100 milliliter, with no single sample containing more than 235 MPN per 100 milliliter generic *E. coli*.

* Remember, Type B water can only be used for foliar applications before the 21-days-to-scheduled-harvest window.

Non-Foliar Applications



NON-FOLIAR

Geometric Mean ≤ 126
Single Sample ≤ 576

(MPN per 100 milliliters)

The geometric mean must be no greater than 126 MPN per 100 milliliters, with no single sample containing more than 576 MPN per 100 milliliters generic *E. coli*.

What if the water does not meet the acceptance criteria?

Acceptance Criteria

FOLIAR
 **Single Sample ≤ 235**
 (MPN per 100 milliliters)

NON-FOLIAR
 **Single Sample ≤ 576**
 (MPN per 100 milliliters)

GEOMETRIC MEAN
Geo Mean (n=5) ≤ 126
 (MPN per 100 milliliters)

Single samples of water intended for foliar use may contain no more than 235 MPN per 100 milliliters of generic *E. coli*.

Single samples of water intended for non-foliar use may contain no more than 576 MPN per 100 milliliters of generic *E. coli*.

The five-sample geometric mean must be no greater than 126 MPN per 100 milliliters of generic *E. coli*.

Stop using the water and assess the water source and system.

Implement corrective actions and then collect a new 100 milliliter sample from the same location as the initial sample.

Test the system each day for the next 5 days at the point closest to use. If any of these five samples do not meet the respective single-sample acceptance criteria (more than 235 or 576 MPN, respectively), or if the five-sample geometric mean does not meet the acceptance criteria, repeat the water system assessment and/or corrective actions.

Do not use the system until the water meets the acceptance criteria.

STEP 1

OVERHEAD CHEMICAL APPLICATIONS

Baseline Water Treatment Assessment

1

What do I need to do?

For each unique Type B water system that will be used to mix chemical treatments (e.g.: fertilizer, pesticides, etc.) for overhead delivery near harvest, create a water treatment process. Test the process before the 21-days-to-scheduled-harvest window and verify that the treated water meets the acceptance criteria for generic *E. Coli*. If needed, adjust the process and test samples until they meet the acceptance criteria. Create an SOP with monitoring parameters.

When and how often?

Complete this process once for each unique water system that will be used to mix or deliver overhead chemical applications before the first 21-days-to-scheduled-harvest window in which it will be used. If you plan to use different sizes of holding tanks or a different sanitizer to treat water from the same system, include each variation in your SOP. Repeat the baseline assessment any time you make a material change to the system.

FREQUENCY: once per unique system before 21 days to scheduled harvest and when there is a material change to the system.

TREATMENT



The Baseline Assessment establishes a reliable process for treating water from Type B systems that will be used in overhead chemical applications near harvest.

How to Complete a Baseline Assessment for Overhead Chemical Application Water



Make sure to choose a sanitizer that is compatible with the treatment you will apply.

Determine how much water will be needed for chemical application and how much sanitizer to add to that amount of water so that the treated water meets the acceptance criteria. Use your knowledge of the untreated water's microbial quality, along with your sanitizer manufacturer's instructions and reference charts, to make this determination.



Fill at least 3 tanks with (or complete this process for at least 3 batches of) equal volumes of water from the system. Treat the water using the quantities you determined above.

Collect at least one 100 milliliter sample of the treated water from each tank and test for generic *E. Coli*. Total coliform testing is not required.



Acceptance Criteria

There must be no detectable generic *E. Coli* in all 3 samples.

Baseline Assessment for Overhead Chemical Application Water, cont.



PARAMETER EXAMPLES:

- Log quantity of sanitizer added
- Log free chlorine value
- Log pH or ORP

If the samples do not meet acceptance criteria, adjust the process until three new 100 milliliter samples of treated water (one from each tank) meet the acceptance criteria.

Create an SOP for this process, including parameters to monitor (and their desired values) and corrective actions in case of failure.

See lines 502-515 of the LGMA Metrics (food safety practices) for additional detail on what elements to include.

STEP 2

OVERHEAD CHEMICAL APPLICATIONS

Routine Treatment System Testing

2

What do I need to do?

Each month when you have an overhead chemical application event within 21 days of scheduled harvest (or at the next application, if an event does not occur within one month of the last test), collect at least one 100 milliliter sample of treated water from a representative agricultural water system and test it for generic *E. Coli*.

When and how often?

Conduct routine testing of a representative system once each month you have an overhead chemical application event on a crop within 21 days of scheduled harvest.

FREQUENCY: test a representative system once a month when applications will occur.

TREATMENT



Routine testing verifies that your treatment process effectively treats water throughout the season.

How to Verify the Microbial Quality of Overhead Chemical Application Water



Every month when you have an overhead chemical application event on a crop within 21 days of scheduled harvest, choose a representative water system to test. If an overhead application does not occur within one month of the last test, conduct this testing at the next application.

Treat one batch of water from that system according to the SOP established in Step 1 (page CH1-1).

Collect at least one 100 milliliter sample of the treated water and test it for generic *E. Coli*.



Acceptance Criteria

There must be no detectable generic *E. Coli* in the sample.

What if the sample does not meet the acceptance criteria?

If a sample does not meet acceptance criteria, do not use the water from the respective tank for any overhead application within 21 days of scheduled harvest.

What if the sample does not meet the acceptance criteria? cont.

Acceptance Criteria



There must be no detectable generic *E. coli* in the treated water sample.

Implement the corrective actions stated in your SOP and test a new 100 milliliter sample of treated water. If it meets the acceptance criteria, it may be used.

Conduct root cause analysis to identify why the original process did not result in water that met the acceptance criteria. Correct the issue and update your SOP if needed.

What if water that did not meet the acceptance criteria was used in an overhead chemical application on the crop within 21 days of scheduled harvest?

If the water contacted the edible portion of the crop within 21 days of scheduled harvest, let the grower/shipper know immediately.

The product must be tested for STECs (including *E. Coli* O157:H7) and *Salmonella* before harvesting. If product tests positive for any of these human pathogens, do not harvest it for the fresh market.



If product tests positive for human pathogens, do not harvest for the fresh market.

STEP 3

OVERHEAD CHEMICAL APPLICATIONS

Treatment Process Monitoring

3

What do I need to do?

Each time you treat a batch of Type B water that will be used to mix chemical treatments (e.g.: fertilizer, pesticides, etc.) for overhead application to a crop within 21 days of scheduled harvest, complete the monitoring activities established in your SOP (from page CH1-1). Make sure the desired monitoring values are met before using it.

When and how often?

Complete and record the monitoring activities each time you treat a batch of water from a system.

FREQUENCY: complete monitoring activities for each batch of water you treat.

TREATMENT



Treatment Process Monitoring verifies that your treatment process SOP yields consistent results throughout the season.

How to Monitor the Treatment Process for Overhead Chemical Application Water:



Each time you treat a batch of Type B water that will be used to mix chemical treatments (e.g.: fertilizer, pesticides, etc.) for overhead application to a crop within 21 days of scheduled harvest, complete the monitoring activities established in your SOP (from Step 1 on page CH1-1).

Record the required values and verify that they match the desired values or ranges outlined in your SOP.

What if the treatment parameters are not met?

Acceptance Criteria



There must be no detectable generic *E. coli* in the treated water sample.

If monitoring shows that the parameters do not match the desired values outlined in your SOP, do not use the water.

Perform the corrective actions stated in your SOP to ensure that the water treatment is effective.

After performing corrective actions, collect one 100 milliliter water sample and test it for generic *E. Coli*. Include test results with the corrective action documentation.

What if the water does not meet the acceptance criteria after corrective actions?

Conduct root cause analysis to identify why the process did not result in water that met the acceptance criteria. Correct the issue and update your SOP.

What if water that did not meet the acceptance criteria was used in an overhead chemical application on the crop within 21 days of scheduled harvest?

If the water contacted the edible portion of the crop within 21 days of scheduled harvest, let the grower/shipper know immediately.

The product must be tested for STECs (including *E. Coli* O157:H7) and *Salmonella* before harvesting. If product tests positive for any of these human pathogens, do not harvest it for the fresh market.



If product tests positive for human pathogens, do not harvest for the fresh market.