

# LGMA Water Metrics Update- Rationale Document for Major Updates

## Glossary

### 1) New / Revised Water-Related Definitions

- Public Water Provider
- Private Water Provider
- Private Well
- Major Well Repair / Significant Maintenance
- Validated Process

**Rationale:** These revisions improve clarity, consistency, and enforceability throughout the document. Because the updated water metrics rely more heavily on distinctions between source type, system ownership, and infrastructure condition, the glossary must clearly define these concepts so that growers, auditors, and regulators interpret and apply the requirements consistently. A new glossary term was also added for “Major Well Repair / Significant Maintenance” to clarify when corrective actions or reassessment are needed.

## 4. Personnel qualifications and training

### Revisions:

- For personnel conducting agricultural water assessments, training must be completed, and the training program must address the following minimum requirements:
  - When an agricultural water assessment should be completed.
  - How to conduct an agricultural water assessment and the required factors to assess.
  - Potential hazard and risk identification for all water source types (e.g. surface, groundwater, municipal, etc.).
  - Assessment of well integrity and the above ground components.
  - Monitoring practices, including microbiological testing, and residual monitoring.
  - Water treatment system set-up, corrective actions, and best practices.
  - Mitigations and corrective actions include follow- up testing, level 1 assessments, well chlorination, and when product testing is needed.

**Rationale:** Training requirements were added for the ag water assessment as they were previously not part of the document. The working group decided that it is very important for industry to be trained in how to conduct water assessments, to properly understand, and manage potential hazards and risks associated with water sources.

When approved, The CA LGMA will work developing training for agricultural water to suffice this requirement. In addition they are currently working on developing resources for industry.

## 6.1 General Agricultural Water Management

### 1) Revised Agricultural Water Framework

#### Revisions:

This has been revised to better organize agricultural water management into a more structured decision framework based on:

- water **source**
- the **intended use**
- how it is **applied to the crop**
- the **timing of use relative to harvest**

This framing is reflected throughout the water section and tables.

**Rationale:**

This revision improves usability and better aligns the water metrics with a risk-based systems approach. It helps users move from a fragmented “test this water type this way” approach to a more practical framework that asks:

- What water(s) do I have?
- How is it being used?
- When is it being used?

That structure is easier to apply operationally and supports more consistent implementation.

## TABLE 1B – Ag Water Microbial Testing Metrics Summary

### 1) New Summary Table

#### Summary of Change

A new summary table was added or substantially expanded to provide a consolidated overview of:

- source water assessment
- initial assessment
- routine verification
- sample number
- sample volume
- target organisms
- timing/frequency across all water categories

**Rationale:** This table improves readability, training, and implementation by putting the full testing framework in one place. It also helps reduce confusion across the various water types and tables by providing a single high-level reference for stakeholders.

## 6.2 Irrigation Water Sampling Plans and Remedial Actions

### 1) Revised Sampling Framework: Source + System + Point of Use

#### Summary of Change

This section was updated to better explain that water testing should evaluate:

1. the **source water**,
2. the **distribution system**, and
3. the **point of use**.

It also clarifies that sampling is conducted for different reasons:

- baseline/source qualification (What am I starting with?)
- initial system assessment (where applicable) (How is my system operating?)
- routine verification during use (Is my system operating as intended throughout use?)

**Rationale”** This revision addresses a major practical gap in water monitoring: water quality can change between the source and the point of use. By emphasizing the distribution system and endpoint sampling, the updated language better reflects known real-world contamination pathways and improves the proactive value of testing.

## 6.3 Management of Private Wells

The proposed updates to the well requirements are intended to strengthen how agricultural wells are evaluated, maintained, and monitored as part of agricultural water safety programs. A key improvement is that wells are no longer automatically assumed to be Type A water sources but instead must be qualified based on water quality results and system condition. This change better reflects the reality that ground water wells can vary in vulnerability and may be impacted by surface water connectivity, structural deficiencies, intrusion, inadequate protection, or other factors that have been shown to increase microbial risk. The revisions also introduce a more risk-based and practical framework by distinguishing lower-risk public water sources from private wells, reinforcing routine self-inspection and periodic professional inspection, clarifying remediation expectations, and strengthening water quality verification requirements.

### 1) Revision: Separate Type A private well or providers from Type A public water sources.

**Rationale:** Public water sources are inherently less risky as they have treatment, water quality testing, and provisions in place to ensure quality. Private wells/providers may contain total coliform bacteria or generic *E. coli* due to surface water connectivity, intrusion, compromised well structure/design, etc. and may not be routinely evaluated at the rigor to ensure water quality and protect public health.

### 2) Revision: Private well self-assessment

- As part of your annual Agricultural Water Assessment, self-assess above ground well components such as check valves, concrete integrity, well-headed condition, etc.

**Rationale:** Routine self-assessments help to ensure that visible components and surrounding sanitary protections are regularly evaluated for conditions that could affect water quality. Food safety or responsible operational personnel should have sufficient knowledge to assess basic components well and identify obvious issues that may require corrective action or further evaluation. The inclusion of a standardized checklist in Appendix A supports consistency, completeness, and practical implementation of these assessments across operations.

### 3) Revision: 5-year professional private well inspection

- Every private well must be inspected by a certified professional once every five years to ensure integrity of the well components both above and below ground.
- Develop and maintain a 5-year rolling schedule for well inspections.
- Develop and maintain an inventory of each agricultural well, including a well identifier, ranch served, location, operational status, primary use, available construction and protection features, nearby potential microbial hazard sources, known historical microbial quality issues, and known major well repairs or significant maintenance.
- Reassess wells following major repairs or significant maintenance.
  - Major repairs added as a glossary term
  - Introduction of enforcement timeline (Y1: to perform inventory of well and prioritizations, Y2: start conducting the well assessment)

- Require the inventory, prioritization list, and documentation for well assessments
- Appendix A to include well inspection form and well inventory form.

**Rationale:** This revision establishes a structured, risk-based approach to managing private agricultural wells by introducing periodic professional inspections and formalizing well inventory and documentation requirements. A five-year inspection frequency ensures that critical components are evaluated for integrity and functionality over time, reducing the likelihood of undetected deterioration that could impact water quality. The requirement to maintain a comprehensive inventory improves traceability, supports prioritization based on potential risk (e.g., proximity to potential contamination sources or historical issues), and enables more informed decision-making.

The addition of reassessment following major repairs ensures that any changes to the well system are evaluated for potential impacts to water safety. Defining “major repairs” provides clarity and consistency in implementation. The phased enforcement timeline allows operations to first establish foundational records and prioritization (Year 1), followed by implementation of inspections (Year 2), supporting practical adoption across diverse operations.

#### 4) Added definitions for Well Certified Professional

<b>WELL CERTIFIED PROFESSIONAL</b>	<p>A qualified individual with appropriate credentials, training, and experience in agricultural well design, construction, inspection, maintenance, or hydrogeology who is capable of evaluating well integrity, identifying potential sources of contamination, and recommending corrective actions to protect water quality.</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>• A licensed well drilling or well service contractor experienced in agricultural systems</li> <li>• A professional engineer (PE) with experience in water systems, irrigation infrastructure, or groundwater protection</li> <li>• A hydrogeologist with expertise in groundwater flow, contamination pathways, and well vulnerability</li> <li>• A qualified water system specialist with demonstrated experience in well inspection, repair, and sanitary protection measures</li> </ul>
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#### 5) Revision: Shock chlorination treatment verification

- Well chlorination treatment
- System flushing and residual chlorine verification
- Post-chlorination microbiological testing
- Follow-up monitoring

**Rationale:**

This section adds additional requirements when wells are chlorinated to remediate bacterial levels in wells above the metric’s acceptance criteria or as a pre-season activity. This information

is included in the well remediation guidance in Appendix A, and the working group decided to include the basic steps in the metrics document.

#### 6) Revision: Sampling and testing requirements, Table 2C

- Water source assessment: 2-Tier testing requirements
  - Initial test: 1 - 100 mL sample for total coliform (P/A)
  - Follow-up testing: 1 - 1 liter sample for total coliform (<99 MPN/L) & generic *E. coli* (ND). This qualifies the well as type A.
- Routine verification of the distribution system
  - Each distinct irrigation system: 1 - 100 mL sample for generic *E. coli* once a month when the system is in use (in season).

**Rationale:** This revision strengthens the assessment of private well water quality by introducing a more structured, two-tiered approach to source testing and ongoing distribution system verification. The initial total coliform screening serves as a practical first indicator of whether the source may be vulnerable to contamination or system deficiencies. Follow-up testing with a larger sample volume and inclusion of both total coliform and generic *E. coli* provides a more robust evaluation of microbial water quality and supports classification of the source into the appropriate water system type.

Routine monthly verification of each distinct irrigation distribution system helps confirm that water quality is being maintained beyond the source and throughout the system where water is actually delivered and used. This is important because microbial risks may arise not only from the source itself but also the distribution system.

## 6.7 Irrigation Water Treatment Management

**Modified to reflect changes in section 2D:** This section reinforces that overhead applications within 21 days of harvest must meet the stricter microbial expectations for higher-risk direct contact water.

## 6.8 Management of Water Used in Overhead Chemical Applications Within 21 Days of Harvest

### 1) Clarification of Water Quality Expectations for High-Risk Use

**Revision:** This section reinforces that overhead applications within 21 days of harvest must meet the stricter microbial expectations for higher-risk direct contact water.

**Rationale:** Water used in applications that may contact the edible portion of the crop close to harvest presents a higher contamination risk and therefore requires stronger microbial controls and clearer expectations.

## Table 2B(1) Water from a public or private provider

- 1) **Revision:** Sampling and testing requirements, Table 2B(1)
  - Routine verification of the distribution system
    - 1 - 100 mL sample for generic *E. coli* monthly when the system is in use. Criteria updated to be ND for generic *E. coli*

**Rationale:** Public water sources are inherently less likely to contain bacteria as they have treatment, water quality testing, and provisions in place to ensure quality. However, once water enters on-farm storage or distribution systems, there remains the potential for microbial contamination due to system-specific factors such as cross-connections, backflow, infrastructure integrity issues, or localized conditions within irrigation lines. Monthly verification of each distinct distribution system using a 100 mL generic *E. coli* sample provides a practical and risk-based approach to confirm that water quality is maintained at the point of use.

## Table 2B (2) Reclaimed/Recycled Water

- 1) **Revision:** Sampling and testing requirements, Table 2B (2)
  - Water source assessment
    - Self-certification with historical water test data taken within the past 6 months: 5 consecutive tests with no detectable generic *E. coli*
    - Test for certification: 3-100 mL samples → wait at least 7 days → 3-100 mL samples = no detectable generic *E. coli*
  - Routine verification of the distribution system
    - 1 - 100 mL sample for generic *E. coli* monthly when the system is in use.

### **Rationale:**

Generally considered safe, but adequate data is lacking, mainly because the availability of reclaimed water is limited in leafy green growing areas. Water source testing regiment reflects the uncertainty of these water sources for direct crop contact

Even though regulated tertiary treated recycled water is produced under treatment and regulatory oversight, the on-farm distribution system can still introduce contamination. An initial microbial assessment with stricter quality parameters ensures water sources are qualified. Monthly verification helps ensure water quality is preserved after delivery and before use.

## Table 2D Treated Water

- 1) **Overall: Revision:** Monitoring of chemical residual and operational parameters at setup, Table 2D. This moved testing to be 3 microbial tests one time per season, to 1 monthly microbial test, with additional more frequent requirements for monitoring residual to confirm treatment efficacy.
  - Each distinct treatment system on all overhead irrigation systems
  - Sampling procedure: At a minimum, collect at least three chemical residual measurements, with at least one measurement collected from the farthest point/end of the delivery system (e.g., last line or sprinkler head).
  - Sampling frequency: Measurements should be taken after the system has stabilized, at the beginning of use, and should be representative as per the operation's SOP.

**Rationale:** This revision shifts the focus from infrequent, event-based testing to more consistent and operationally relevant monitoring of treated water systems. While previous requirements relied on a limited number of verification tests per season, this approach did not fully account for variability in treatment performance over time, across irrigation events, and throughout the season.

By introducing monthly monitoring and emphasizing chemical residual verification, this update ensures that treatment systems are functioning as intended during actual use and across the irrigation season. Measuring residuals at system startup, including at the farthest point of the delivery system, provides confirmation that the antimicrobial treatment is effectively reaching and being maintained throughout the entire system.

Requiring multiple residual measurements that are representative of the system, and aligned with the operation's SOP, strengthens process control and provides a more reliable indication of treatment efficacy than infrequent microbial testing alone. Overall, this change improves the ability to detect variability, verify system performance in real time, and ensure consistent water quality at the point of use.

**2) Revision:** Initial microbial quality assessment

- 3 - 100 mL samples collected from the beginning of the distribution system and one at the end of the system (e.g., the last sprinkler head) and tested for generic *E. coli*
- **Sampling must include:**
  - at least one sample from the beginning of the distribution system, and
  - at least one sample from the end of the system (e.g., the last sprinkler head)

**Rationale:** This section did not previously exist and was added to provide an **initial validation step for treated water systems** before they are used under the applicable water quality standard. The purpose of this initial microbial quality assessment is to verify that the treatment system is functioning as intended and that treated water is consistently achieving the desired microbial quality throughout the distribution system.

Collecting three 100 mL samples from across the system, including both the beginning and end of the delivery system, helps confirm that treatment performance is not limited to the injection point and that microbial water quality is being maintained through the full delivery pathway. This is especially important for identifying issues such as inadequate mixing, insufficient contact time, residual loss, or uneven treatment distribution.

Together, this initial microbial quality assessment and the associated monitoring of chemical residuals and operational parameters are intended to validate that the system is stabilized and capable of producing and maintaining the desired treatment conditions throughout the duration of an irrigation event.

**3) Revision:** Routine monitoring of chemical residuals/operational parameters and routine verification of the distribution system

- **Chemical residuals/operational parameters:** During each irrigation event when the treatment system is in use within the 21-days-to-harvest window, measure and record chemical residuals at the end of the distribution system to verify parameters established for the water treatment systems are stabilized/being met.
- At a minimum collect 3 residual tests that are representative of the irrigation event.

**Rationale:** Routine monitoring of chemical residuals and operational parameters for on chemical treatments during irrigation events provides a more representative verification of water treatment performance than periodic microbial testing. Measuring these parameters at the end of the distribution system during actual irrigation confirms that the treatment system is operating within its validated parameters and that disinfectant levels are maintained through the system at the time water is applied to the crop. Because residual measurements can be collected

multiple times during each irrigation event and provide immediate results, they allow operators to verify system performance under real operating conditions and make adjustments if needed.

- 4) Microbial quality of the distribution system
- a. 1 - 100 mL sample for generic *E. coli* monthly when the system is in use
  - b. If more than one test is taken within a month, those tests must also have no detectable generic *E. coli* in 100 mL water sample

**Rationale:** Monthly 100 mL microbial sampling provides a more representative verification of treated water quality across the growing season than the previous requirement of conducting multiple samples during a limited pre-harvest period. This approach improves the ability to detect variability in microbial water quality over time while maintaining a practical and implementable testing frequency.

When combined with routine residual monitoring, monthly microbial verification provides an additional confirmation that the treatment system is effectively maintaining water quality throughout the season.

- 5) **Revision:** Temporarily pausing water treatment during application of crop nutrition and crop protection materials

- If necessary, water treatment will not be required within 21 days-to-scheduled-harvest, ONLY during the time when crop nutrition/protection materials are being applied via overhead irrigation. Food safety risks should be evaluated and mitigations implemented as necessary. There are two options available for water use when utilizing this section.
  - **Option 1:** A window for application of crop nutrition and crop protection materials is allowed at the beginning of the irrigation event followed by irrigation with antimicrobial-treated water. Irrigated crops must be pre-harvest tested for pathogens (see Table 2F). Test the crop from all affected lots (i.e. lots that have been irrigated with this water within the 21 days to scheduled harvest window) for STEC (including *E. coli* O157:H7) and *Salmonella*. Product must be tested after the last irrigation event and prior to harvesting.
  - **Option 2:** A window for application of crop nutrition and crop protection materials is allowed at the beginning of the irrigation event when followed by irrigation with antimicrobial-treated water. Collect one 100 ml water sample at the time of use but prior to injection of chemicals. Sample must be taken at the water source and tested for generic *E. coli*. Once test results are obtained, utilize Table X (acceptance criteria are dependent on days-to-harvest) to determine the course of action. Water test results must be obtained prior to harvest or pre-harvest product testing is required.

Table X. Microbial Water Quality Criteria for Option 2		
Days to schedule harvest	Water test results (Generic <i>E. coli</i> MPN/ 100 mL) the sample must comply with the criteria below	Action

14	1-10	No action required
	>10	Pre-harvest product testing required as per Appendix C (Risk Based Protocol)
15-21	0-10	No action required
	11-235	Die-off must be met (Reference Appendix A)
	>235	Pre-harvest product testing required as per Appendix C (Risk-Based Protocol)
>21	Follow Type B metrics in Table 2E	

**Rationale:**

- Table X and the accompanying section were adopted from the Arizona Leafy Greens Marketing Agreement (AZ LGMA) to maintain consistency with an established, science-based framework already in use by the industry.
- The underlying rationale is that crop protection chemicals can interact with water treatment agents (e.g., sanitizers or disinfectants), and labels say it is not allowed to be used with a water treatment chemical and would be considered an "off label" use. Research has shown that certain agricultural chemicals may inhibit or reduce the effectiveness of water treatment processes, potentially diminishing microbial reductions achieved during treatment.
- As a result, when growers apply crop protection chemicals through the irrigation or water distribution system (e.g., chemigation), it becomes critically important to assess water quality prior to application. Evaluating water quality under these conditions ensures that treatment performance is not compromised and supports informed, risk-based decision-making to protect produce safety.

**Table 2F. Level 1 assessment**

**Revision: Level 1 Assessment – Remedial Actions, Table 2F**

- Revised the **generic *E. coli* remedial action acceptance criterion** from **80% non-detectable in five 100 mL samples** to **non-detectable generic *E. coli* in all five 100 mL samples**.

**Rationale:**

This revision strengthens the remedial action acceptance criterion by requiring that all five follow-up samples be non-detected for generic *E. coli*, rather than allowing one positive sample within the five-sample set. This provides greater confidence that water quality has returned to an acceptable condition before continued use of the system.