Handbook for Complying with the Storage Tank Rule

Colorado Department of Public Health and Environment
Water Quality Control Division
Colorado Safe Drinking Water Program

This handbook has been developed to assist public water systems that use finished water storage tanks in complying with the applicable requirements in section 11.28 of the Colorado Primary Drinking Water Regulations, 5 CCR 1002-11 ("Regulation 11").

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1 INTRODUCTION

This handbook was prepared based upon the current requirements in the state statute and regulations. On March 10, 2015, the Water Quality Control Commission adopted revisions to the *Colorado Primary Drinking Water Regulations*, 5 CCR 1002-11 ("Regulation 11"). This included the addition of the Storage Tank Rule in section 11.28 of Regulation 11. The purpose of this handbook is to provide a reference for suppliers of water that use finished water storage tanks that is a "one stop shop for the Storage Tank Rule" and identifies:

- An overview of the Storage Tank Rule
- Department policies
- Regulatory requirements
- Other applicable Regulation 11 requirements
- Guidance
- Other helpful resources
- Frequently asked questions

2 OVERVIEW OF THE STORAGE TANK RULE

The Storage Tank Rule, section 11.28 of Regulation 11, became effective April 1, 2016, and includes:

- A requirement that suppliers of water that use finished water storage tanks must develop, maintain and implement a written plan for finished water storage tank inspections.
- A definition of a finished water storage tank.
- A definition of a comprehensive inspection.
- A definition of a periodic inspection.
- A requirement that suppliers of water perform periodic and comprehensive inspections of each finished water storage tank that are part of the public water system.
- A requirement that suppliers of water operate and maintain finished water storage tanks so that they are free of sanitary defects.
- A requirement to develop and implement a corrective action schedule for correcting any sanitary defect identified during a periodic or comprehensive inspection.
- A requirement to develop an inspection summary no later than 60 days after each completed periodic or comprehensive inspection.
- A requirement that prohibits suppliers of water from using uncovered finished water storage tanks.
- Definitions of "finished water storage tank", "comprehensive inspection", and "periodic inspection".

Sanitary defects in finished water storage tanks can lead to the contamination of the stored finished water. The department expects suppliers of water to immediately notify

the department by calling the 24-hour Incident Reporting Line at 1-877-518-5608 in cases where contamination is discovered within a tank that could adversely affect public health. Examples of such situations include:

- Animal carcasses discovered within a tank,
- Confirmed microbial contamination within a tank (e.g., presence of e.coli or total coliform with no chlorine residual), and
- Presence of chemical contamination (e.g., oil slicks, foaming agents, or other volatile chemicals).

3 DEPARTMENT POLICIES

3.1 Sanitary Defects

As part of the March 10, 2015 revisions to Regulation 11, the definition of "Sanitary Defect" was added to section 11.3 of Regulation 11 to address references to sanitary defects in the Revised Total Coliform Rule, Section 11.16 and the Storage Tank Rule, Section 11.28. The Sanitary Defect Policy, DW-010 has been developed to clarify those situations, practices or conditions at a public water system that the Department considers to be sanitary defects. Policy DW-010 is available online at https://www.colorado.gov/pacific/cdphe/wq-current-drinking-water-policies.

3.2 Storage Tank Rule Inspection Methods

The department developed the Storage Tank Rule Inspection Methods Policy, DW-00X (under development), to clarify the department's interpretation of what constitutes acceptable inspection methods, as well as the qualified personnel conducting finished water storage tank inspections. Policy DW-00X (under development) is available online at https://www.colorado.gov/pacific/cdphe/wq-current-drinking-water-policies.

3.3 Storage Tank Rule Alternative Inspection Schedule

The department developed the Storage Tank Rule Alternative Inspection Schedule Policy, DW-00X (under development), to clarify the department's interpretation of what constitutes an acceptable alternative schedule and the department's criteria for approving such schedules. Policy DW-00X (under development) is available online at https://www.colorado.gov/pacific/cdphe/wq-current-drinking-water-policies.

4 REGULATORY REQUIREMENTS

This section identifies the regulatory requirements identified in section 11.28 of Regulation 11 that apply to public water systems that include finished water storage tanks. Suppliers of water are prohibited from using uncovered finished water storage tanks.

4.1 Finished Water Storage Tank Inspection Plan

Effective April 1, 2016, all suppliers of water that use finished water storage tanks must develop, maintain and implement a written plan for finished water storage tank inspections (Appendix A provides a template for a finished water storage tank inspection plan). The supplier's written finished water storage tank inspection plan is subject to department review and revision during sanitary surveys. This plan does not need to be submitted to the department unless requested for a specific reason (e.g., during a survey the inspector found that the plan needed revisions).The written inspection plan must include all of the following:

4.1.1 Tank Inventory

The inventory must include the following:

- Tank type and construction materials
- Volume in gallons
- Approximate dimensions
- Location
- Number of inlets, outlets, overflows, hatches, and vents
- Coating systems
- Date put in service
- Rehabilitation and major maintenance history

4.1.2 Inspection Methods

The inspection plan must include the methods for how the supplier will conduct both periodic and comprehensive tank inspections which includes identification of qualified personnel to perform such inspections.

4.1.3 Inspection Schedule

The inspection plan must include the schedule for performing periodic and comprehensive inspections for each finished water storage tank.

- Periodic inspections must be scheduled at least quarterly or on an alternative schedule.
- Comprehensive inspections must be scheduled at least every five years or on an alternative schedule.
- If an alternative schedule is used, a justification for such schedule must be included in the written finished water storage tank inspection plan.

4.1.4 Sanitary Defect Corrective Action Schedules

The supplier of water must operate and maintain finished water storage tanks so that they are free of sanitary defects. If any sanitary defects are identified during a finished water storage tank periodic or comprehensive inspection, the supplier of water must develop and implement a corrective action schedule for correcting each

sanitary defect as required by section 11.28(e).

- The inspection plan must include timelines for correcting typical storage tank sanitary defects, including but not limited to improper screening or protection on vents and overflows, inadequate hatches, and unprotected openings. The supplier is to use timelines in their plan to develop corrective action schedules for 'typical', as well as any other sanitary defects identified during inspections. See section 3 above for additional information on sanitary defects identified during finished water storage tank inspections.
    - It is up to the supplier of water to determine the corrective action schedule for any sanitary defect identified during periodic or comprehensive inspections.
    - The schedule should be both reasonable and practical and is subject to the department's review and revision during sanitary surveys provided the schedule is in place at the time of the survey (the corrective action will occur at a date after the survey).
    - Various factors including severity of the sanitary defect, complexity of the correction, tank accessibility and corrective action costs could be considered in determining corrective action schedules.
    - Corrective action schedules would range from short turnarounds for quick and easy corrections such as vent screen replacements to longer scheduled completions such as hatch replacements and possible longer completions for more complex corrections such as replacing a tank roof.
    - Some example corrective action schedule guidelines include the following (these are not intended to be all inclusive but provide guidance only):
        - Vent Screen/Sanitary Seal Replacement: from same day of the inspection to within two weeks from the date of the inspection
        - Hatch riser repair: Range of 2 to 8 weeks from the date of the inspection
        - Hatch Replacement: Range of 30 to 120 days from the date of the inspection
        - Tank interior re-coating: Range of 4 to 12 months from the date of the inspection.
    - If any sanitary defect is serious enough that it could lead to the contamination of the stored finished water, then the department expects the supplier to prioritize the corrective action and complete it as soon as possible. In such cases, the supplier could consult with the department to discuss possible resolutions.
    - The department expects suppliers of water to immediately notify the department by calling the 24-hour Incident Reporting line at 1-877-518-5608 in cases where contamination is discovered within a tank that could adversely affect public health as stated above in Section 2 (Overview of the Storage Tank Rule).

The department prepared storage tank periodic and comprehensive inspection checklists for suppliers to use for documenting such inspections (Appendix B provides periodic and comprehensive inspection checklists along with instructions for each). The checklists distinguish which storage tank component issues result in a sanitary

defect under certain conditions. Although the supplier may develop and use their own checklists, the department recommends that the supplier use the department checklists since they facilitate identifying sanitary defects.

The written finished water storage tank inspection plan is subject to Department review and revision.

4.2 Finished Water Storage Tank Inspection Summary

No later than 60 days after each completed finished water storage tank inspection, the supplier of water must develop an inspection summary that includes all of the following:

- The date and type of inspection (periodic or comprehensive) performed.
- Inspection findings and tank conditions
- Any sanitary defects identified during the inspection.
- If sanitary defects are identified, the corrective action schedule for correcting sanitary defects.
- The corrective actions completed and the associated completion dates.

The department's storage tank periodic and comprehensive inspection checklists were prepared so that if completed in full and properly (per the instructions), the checklists provide the inspection summary (Appendix C provides instructions for creating an inspection summary by using the department's checklists).

5 OTHER REGULATION 11 REQUIREMENTS

There are other Regulation 11 requirements that are beneficial to reference when addressing the Storage Tank Rule, section 11.28. These include the following:

5.1 Facility Plans and Specifications Approval

Regulation 11 requires new public waterworks to obtain approval prior to commencing construction. Specifically, section 11.4(1)(b) of Regulation 11 requires:

> *For all public water systems, the supplier must not begin construction of any new waterworks, make improvements to or modify existing waterworks, or begin using a new source until the supplier submits and receives Department approval of plans and specifications for such construction, improvements, modifications, or use.*

In accordance with Section 11.4(1)(b) of Regulation 11, when adding a new finished water storage tank or any other tanks such as a clearwell or contact time tanks to the public water system, the supplier of water must submit an application for approval for the tank(s). Applications are located on the department's website at

https://www.colorado.gov/cdphe/design. For questions, please contact the department's Engineering Section at 303-692-6298.

5.2 Sanitary Surveys

Routine sanitary surveys are required by Regulation 11 for all public water systems every three to five years, depending on the system classification type:

- Community water systems every three years
- Non-transient non-community water systems every five years
- Transient non-community water systems every five years

The department has the authority to conduct more frequent sanitary surveys based on water quality concerns or to follow up on previous sanitary surveys.

During the sanitary survey, in addition to observing and evaluating storage facilities, the department inspector will check for and review the supplier's written finished water storage tank inspection plan. During this review, the inspector will check to see if the plan contains the required elements specified in section 11.28(2)(a) of Regulation 11 and covered in section 4.1 (Finished Water Storage Tank Inspection Plan) above. In addition, the inspector will ensure that the plan is being implemented. Specifically, the following will be checked:

- Periodic and comprehensive inspections are being performed and documented.
- Any sanitary defects identified during the aforementioned inspections are documented as a corrective action with a schedule that has been completed or is being followed.
- Complete inspection summaries have been developed within 60 days after each inspection.

Regulation 11 is available online at https://www.colorado.gov/cdphe/wqcdcompliance.

6 STORAGE TANK MANAGEMENT GUIDANCE

The following is guidance for storage tank management and inspections, which is **not** specifically required by Regulation 11.

6.1 Finished Water Storage Tank Management

Storage tank maintenance plans that include cleaning are essential for ensuring that storage tanks are a safe and viable component of the water system. In addition to the required inspections per section 11.28 of Regulation 11, preventive maintenance and routine cleaning will help prolong the life of the tank and ensure early detection of needed repairs.

Suppliers of water should have finished water storage tanks drained and cleaned every three to five years as recommended by the American Water Works Association (AWWA Manual M42). Furthermore, section 11.17(2)(b) (Best Available Technologies MCLs for Microbiological Contaminants) of Regulation 11 identifies proper operation and maintenance of storage tanks as a means for achieving compliance with the maximum contaminant level (MCL) for total coliforms. The department recommends that the supplier have their tanks cleaned in conjunction with the comprehensive inspections.

The department also recommends that suppliers of water keep their consumers informed of major storage tank maintenance activities such as cleaning if water quality, pressure or aesthetics are impacted. The supplier should ensure that discolored water that could result from storage tank cleaning operations be kept out of the distribution system. The supplier must also disinfect finished water storage tanks before they are returned to service and after extensive repairs or cleaning. Storage tank operators should disinfect the tank according to AWWA Standard *C652-11: Disinfection of Water Storage Facilities.*

The department also provides the following guidance for finished water storage tank management:

- For tanks located outside:
    - should have a lockable security fence or other security features such as a camera to prevent potential tampering or vandalism
        - Tanks located on fenced in property are considered secured/fenced tanks.
    - for above ground tanks that have ladders, the ladders should be locked, secured and damage and corrosion free
    - should have intrusion alarms or warning lights
    - should be clear of vegetation near or around the tank
- Exterior tank coatings should be maintained to be free of blistering, peeling, scaling or rusting. Preventive maintenance when needed will prevent progression of these issues to becoming a sanitary defect (e.g., corrosion hole or cracks).
- Storage tank overflow pipes should be kept clear of any vegetation, dirt/rocks or any other blockages.
- Fluctuation of stored water levels should be occurring or routine flushing or mixing should be implemented to prevent stagnation and minimize water age.
- Interior ladders, when present, should be damage/corrosion free.

6.2 Finished Water Storage Tank Inspection

The department provides the following guidance for finished water storage tank inspections:

- Document inspection findings with photographs. In addition to taking photographs of sanitary defects, problems, or impending problems, photographs of good tank management are recommended.
- During periodic inspections, finished water storage tanks should be checked for exterior signs of wind damage or damage to the roof due to excessive snow accumulation.

- Level indicators and cathodic protection, when present, should be checked for proper operation during periodic tank inspections.

7 OTHER HELPFUL RESOURCES

- AWWA Standard for Disinfection of Water Storage Facilities, ANSI/AWWA C652-92 and C652-02, American Water Works Association
- AWWA Standard for Welded Steel Tanks for Water Storage, ANSI/AWWA D100-96, American Water Works Association
- AWWA Standard for Factory Coated Bolted Steel Tanks for Water Storage, ANSI/AWWA D103-97, American Water Works Association
- The Colorado Primary Drinking Water Regulations, 5 CCR 1002-11, https://www.colorado.gov/pacific/cdphe/water-quality-control-commission-regulations

8 FREQUENTLY ASKED QUESTIONS

Q1: What if a finished water storage tank is not owned by the supplier but rather is leased or borrowed? Considering that the definition of finished water storage tank states that the tank or vessel is owned by the supplier of water.

A: All finished water storage tanks that are in use, regardless if owned, leased, or borrowed, are subject to the Storage Tank Rule, section 11.28 of Regulation 11.

Q2: Are tanks that are used to haul finished water subject to the Storage Tank Rule?

A: Yes. The Storage Tank Rule, section 11.28 of Regulation 11, is applicable to tanks used for hauling finished water. Both public water systems that haul water and suppliers of water that haul finished water with their own hauler tanks must include all of the tanks they use to haul finished water in their inspection plan inventory and comply with all the requirements of the Storage Tank Rule.

An exception may apply when hauler tanks are used for emergency purposes for less than 30 days (e.g., man camp during a forest fire). The department should be notified by calling 303-692-3556 if a hauler tank needs to be used for an emergency.

Q3: The definition of finished water storage tank states "excludes tanks pressurized at the air water interface". Can this be clarified?

A: Tanks that have the means of maintaining a specific pressure, or certain pressure range, in the tank (such as hydropneumatic tanks) are excluded from the Storage Tank Rule. Pressure is typically maintained by a pressure switch tied to a pump of some sort (i.e., well or booster pump). However, these tanks need to be properly operated and maintained since they are part of the water system. Any significant deficiencies identified with pressure tanks or associated sanitary defects must be corrected.

Q4: The written inspection plan must include an inventory of all finished water storage tanks and include the eight descriptive elements outlined in section 11.28(2)(a)(i) of Regulation 11 and referenced in section 4.1.1 above. What happens if the supplier of water does not have any or all of these elements?

A: All finished water storage tanks must be listed in the inventory section of the plan. If a good faith effort has been made, the other information about a tank can be listed as 'Unknown' if the supplier doesn't have such information. The department realizes that all or some of these elements may be unavailable or difficult to obtain (especially in the case of buried tanks).

During sanitary survey reviews of the inspection plan, the department inspector will check the tank inventory and will make note of any missing data to discuss with the supplier. The department developed the Storage Tank Rule Guidance - Department Review of Supplier's Written Inspection Plan, to clarify the department's review of the written inspection plan and what constitutes a complete and acceptable plan. This guidance is included in this handbook as Appendix D (under development).

Q5: When completing the inventory in the inspection plan and the supplier does not know the date put in service, what should be indicated in the inventory?

A: The department expects the supplier to locate and provide the best available information. The supplier can provide an estimated date or date range if an exact date cannot be documented. In cases where no information can be found, 'Unknown" is acceptable.

Q6: When completing the inventory in the inspection plan, when does the rehabilitation and major maintenance history start?

A: The department envisions that suppliers of water do their best to document what they know over the past years and then keep records starting April 1, 2016 and going forward.

Q7: Concerning maintenance history in the inventory in the inspection plan, what constitutes rehabilitation and major maintenance versus minor?

A: Examples of rehabilitation and major maintenance includes: hatches being replaced, rebuilding of overflows/vents, re-lining of storage (or lining), and sandblasting to fix metal tank issues; activities which require draining the tank commonly belong in this category.
Minor maintenance includes: access hatch repairs, fixing corrosion spots, repainting exterior, vent screen replacement.
These maintenance activities are not intended to be all inclusive but rather provide examples so that the Supplier can distinguish between them.

Q8: The written inspection plan must include the methods for performing and documenting periodic and comprehensive inspections. Are these methods subject to the department's review and revision? Is there guidance available on acceptable methods for conducting periodic and comprehensive inspections?

A: Yes to both questions. The methods for performing and documenting periodic and comprehensive inspections must be included in the written finished water storage inspection plan. This plan is subject to Department review and revision.
The department developed the Storage Tank Rule Inspection Methods Policy, DW-00X, to clarify the department's interpretation of what constitutes acceptable inspection methods. Policy DW-00X is available online at https://www.colorado.gov/pacific/cdphe/wq-current-drinking-water-policies. In addition, the department developed the Storage Tank Rule Guidance - Department Review of Supplier's Written Inspection to clarify the department's review of the written inspection plan and what constitutes a complete and acceptable plan. This guidance is included in this handbook as Appendix D.

Q9: The written inspection plan must include the identification of qualified personnel to perform periodic and comprehensive inspections. What qualifications should the personnel hold for performing periodic and comprehensive tank inspections?

A: Identification of qualified personnel to perform periodic and comprehensive finished water storage tank inspections is included in the Storage Tank Rule Inspection Methods Policy, DW-00X (under development) available online at https://www.colorado.gov/pacific/cdphe/wq-current-drinking-water-policies. This policy clarifies the department's interpretation of what constitutes qualified personnel for conducting finished water storage tank inspections. In general, the personnel for performing comprehensive inspections require a higher level of expertise in tanks and tank inspections than qualified personnel that conduct periodic inspections.

Q10: What does the department consider acceptable justification for implementing an alternative schedule for either a periodic (quarterly) or comprehensive inspection (every five years)?

A: The department developed the Storage Tank Rule Alternative Inspection Schedule Policy, DW-00X (under development) which includes the department's criteria for approving alternative inspection schedules and is available online at https://www.colorado.gov/pacific/cdphe/wq-current-drinking-water-policies. Acceptable justification ranges from circumstances that are beyond the control of the supplier of water such as weather to tank age along with inspection performance history (e.g., tanks less than 5 years old that have past periodic and/or periodic inspections that reflect no sanitary defects or issues/concerns that could lead to a defect).

Q11: Do comprehensive inspections require sampling of any kind?

A: Sampling is not routinely expected as part of a comprehensive tank inspection, but can be required by the department. For example, if the interior of the tank cannot be observed (e.g., no access hatch), then the department would need to issue a site specific deviation with a requirement to sample to ensure that the quality of the stored water meets Regulation 11 drinking water standards. Also, if an inspection reveals a level of contamination inside a tank that warrants sampling as required by the department, this may or may not be done as a part of an acute response, which

could trigger a Tier I public notice and/or a boil or bottle water advisory.

The department's Storage Tank Rule Inspection Methods Policy, DW-00X (under development) available online at https://www.colorado.gov/pacific/cdphe/wq-current-drinking-water-policies provides more detail on this issue.

Q12: If a supplier of water identifies a sanitary defect during a periodic or comprehensive inspection, how long does the supplier have to correct the defect?

A: Section 11.28(3)(e) of Regulation 11 requires suppliers to develop and implement a corrective action schedule for correcting each sanitary defect. So it is up to the supplier to develop their corrective action schedules. Please note that these schedules must be included in the written inspection plan which is subject to review and revision by the department inspector during sanitary surveys or upon department request. Therefore, the supplier should be reasonable when developing a corrective action schedule for any sanitary defect. For example, if the defect is that the storage tank air vent is not screened, the corrective action schedule should be shorter than a defect that may take longer like correcting a damaged access hatch that may need to be replaced.

Appendices available online at: https://www.colorado.gov/cdphe/tank

Appendix A: Storage Tank Inspection Plan Template

Appendix B: Storage Tank Inspection Periodic & Comprehensive Inspection Checklists and Associated Instructions

Appendix C: Storage Tank Inspection Summary Instructions

Appendix D: Storage Tank Rule Guidance - Department Review of Supplier's Written Inspection Plan (under development)