

**STATE OF CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
DRINKING WATER SECTION**

10 YEAR ATMOSPHERIC STORAGE TANK INSPECTION GUIDELINES

Effective Date: June 29, 2009

Authority: Section 19-13-B102(f)(5)(C) of the Regulations of Connecticut State Agencies (RCSA) requires that all atmospheric finished water storage tanks, basins and clearwells be inspected at a minimum of once every ten years for sanitary conditions and structural integrity. The inspection report shall be retained for reference and submitted to the department upon request.

Purpose: This document is intended to clarify the requirements of the Regulations of Connecticut State Agencies (RCSA) Section 19-13-B102 (f)(5)(C) related to the required and recommended components of 10 year atmospheric finished water storage tank inspections.

Applicable Regulation: RCSA Section 19-13-B102(f)(5)(C).

Definitions: "Atmospheric finished water storage tanks, basins and clearwells" include all finished water storage facilities of any volume or material that are not pressurized. The term "tank" will be used for the remainder of this document and includes all finished water atmospheric storage facilities.

Guidelines: The Drinking Water Section (DWS) expects all inspections to minimally incorporate the elements outlined in the following section to assess "sanitary conditions and structural integrity":

- A qualified inspector should conduct the inspection (refer to Qualifications on last page).
- A detailed inspection of all overflows, vents, fill pipes, drain lines, and hatches must be conducted to ensure that the tank is protected from contamination in accordance with RCSA Section 19-13-B102(f)(5)(A). An investigation of any other appurtenances associated with the tank must be performed to ensure that the entrance of contaminants is not possible. This includes, but is not limited to, cathodic access plates, cell phone towers mounted on tanks, level probe/sensor wiring, site tubes, etc. The most critical components of a tank inspection are a thorough investigation of the tank vent(s), overflows, and roof hatches regardless of their inaccessibility.
- The exterior of the tank should be inspected for corrosion, cracks, holes, deterioration of paint/exterior coating, pitting, spalling, etc., that may create the potential for contamination per RCSA Section 19-13-B102(f)(5)(A) or loss of structural integrity of the tank.
- The interior of the tank should be inspected for corrosion, cracks, holes, pitting, spalling etc. that may create the potential for contamination per RCSA Section 19-13-B102(f)(5)(A) or loss of structural integrity of the tank. The interior coating of the tank should be analyzed by a qualified individual to determine its condition and estimated useful life. This analysis should include measurements of the depth and rate of corrosion of steel tanks. The sediment in the tank should be evaluated, and removed, as necessary. Under normal conditions, the tank should be emptied for this portion of the inspection. If the water system is incapable of taking the tank off line, a diver or ROV (remote operated vehicle) may be used, provided that adequate sanitary procedures are in place to prevent contamination. In which case, the quality and quantity of water to the system should be maintained during the tank inspection.
- The controls, probes, alarms, sensors, etc. associated with a tank should be inspected and tested to ensure proper, reliable operation.

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- For steel tanks on concrete foundations, an inspection of the juncture between the tank and base should be performed to ensure structural integrity. A check for excessive and/or differential foundation settlement should be performed.
- An inspection of the seams on concrete tanks should be performed to ensure structural integrity.
- An assessment of the appropriateness of the volume and detention time of the tank should be performed. A tank that is too large may cause stagnant water and/or loss of chlorine residual. Accumulated sediment may consume some or all of the available free chlorine and promote bacteria growth. An analysis of flow through the tank (turnover) should be performed, including assessments of any baffles, mechanical mixing systems, or separate inlet/outlets. If none exist, an evaluation should be conducted to determine if such an installation would be beneficial. The DWS has created Storage Tank Design And Construction Guidelines that may aid in this analysis. The document is available at: <http://ct.gov/dph/>.
- An analysis of the water quality should be conducted as part of the tank inspection, including test results for total coliform bacteria, total and free chlorine residual, physical parameters, and volatile organic chemicals collected from or near the tank.
- The tank inspection must include verification that the tank is at least fifty (50) feet from any part of the nearest subsurface sewage disposal system and twenty-five (25) feet from the nearest watercourse or storm drain or other source of pollution, in accordance with RCSA Section 19-13-B102(f)(5)(B). Tanks must be at least fifty (50) feet from the nearest sanitary sewer unless the sewer is constructed in accordance with the technical standards for subsurface sewage disposal systems pursuant to section 19-13-B103d of the RCSA, in which case it may be no closer than twenty-five (25) feet.
- An assessment of any cathodic protection systems, if they are installed, should be performed by an inspector who has experience with their installation and maintenance. Acceptable certifications include NACE International's Cathodic Protection certifications (CP1, CP2, CP3, and CP4) or equivalent.
- The tank inspection must include an evaluation of the valves associated with the tank in accordance with RCSA Section 19-13-B102(q). All valves associated with the tank must be regularly exercised to ensure proper operation.
- An assessment of the tank's vulnerability to tampering, vandalism, terrorism and other security issues should be performed. This information should be kept secure and need not be provided to the DWS. Any deficiencies should be addressed. Water systems should regularly assess ways to make security improvements at or around the tank, including fencing, surveillance, and patrolling. This also includes an assessment of tank ladders and access to hatches, vents, etc.
- In accordance with RCSA Section 19-13-B102(r), the tank inspection should include an assessment of the operations and maintenance necessary to ensure continued sanitary conditions and structural integrity, including: necessary repairs, who will perform the repairs, a timetable for the repairs, and a schedule of the routine maintenance.
- Subsequent to emptying the tank and performing an inspection, RCSA Section 19-13-B47 requires that the tank be effectively disinfected. The disinfection should be in accordance with the latest revision of AWWA C-652 – Disinfection of Water Storage Facilities. This document also contains information on

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the disinfection procedure for inspecting a full tank.

- In accordance with RCSA Section 19-13-B102(f)(5)(C), an inspection report must be completed. The report should include a detailed description of the inspection process, the findings, actions that were taken as a result of the inspection, and photographs and/or video. The report should also include a completed checklist that includes a signed acknowledgement of the certification. If the inspection finds that the tank has deficiencies related to sanitary conditions or structural integrity, a plan of correction that includes a timetable for repairs of the deficiencies should be included. The DWS may request this report after completion of the inspection, and it is standard practice to review this document as part of the routine sanitary survey. It is advisable to submit the report and plan of correction to the DWS any time deficiencies are found. Please note that RCSA Section 19-13-B102(d)(2) requires DWS approval before making changes of “sanitary significance”. This would include replacement of, or significant modifications to, the inspected tank.

Qualifications

The term “qualified” inspector/individual, as used above, includes some or all of the following:

American Petroleum Institute (API) API 653 Certified Tank Inspector;

NACE International Certified Coating Inspector;

A Professional Engineer that has documented experience with atmospheric tank, clearwell and basin inspections; and/or,

A Certified Operator that has documented experience inspecting atmospheric tanks, clearwells and basins.

Safety

Individuals entering tanks or any other confined space should be compliant with guidelines of the Occupational Safety & Health Administration (29 CFR - 1910.146). OSHA, in the Dec. 1, 1998 revision to their regulations, defines a confined space as a space that:

- (1) *Is large enough and so configured that an employee can bodily enter and perform assigned work; and*
- (2) *Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and,*
- (3) *Is not designed for continuous employee occupancy.*

The OSHA website should be reviewed for the most recent definitions of confined spaces and associated precautions.

Inspection Frequency

Although required only once every ten years by regulation, it is strongly recommended that all atmospheric storage tanks, clearwells and basins be inspected at least once every 3-5 years. It is also strongly recommended that all storage tanks (hydropneumatic, etc.) be inspected on a 3-5 year frequency. A routine check of the vents, vent screens, overflow screens, hatches, and drain line screens should be conducted at least quarterly.

Useful References and Links

American Water Works Association Manual of Water Supply Practices – Steel Water-Storage Tanks (AWWA M42). Chapter 9 and Appendix C (formerly AWWA D101-53 (R1986)) provide recommendations for the inspection of steel tanks.

<http://www.awwa.org/>

<http://www.nace.org/nace/index.asp>

<http://10statesstandards.com/waterstandards.html>

<http://api-ep.api.org/certifications/>

<http://www.osha.gov/Publications/osh3138.html>