



Dear Building Owner, Manager, or Operator:

You are receiving this letter because you may operate a **cooling tower** on your property. Cooling towers are crucial for removing heat from buildings, commonly as part of HVAC and refrigeration systems. They are used in various settings, including schools, hospitals, hotels, dry cleaners, supermarkets, and commercial offices, as well as in industrial processes like metal manufacturing, energy production, water treatment, chemical processing, and food processing.

Cooling towers vary in shape and size (examples on page 2). They work by using water to remove excess heat. However, without proper maintenance, cooling towers can grow and spread harmful bacteria, such as *Legionella* which causes **Legionnaires' disease**. Neglected cooling towers can pose significant health risks due to *Legionella* contamination. During operation, cooling towers release water droplets into the air, potentially carrying *Legionella* bacteria. Breathing in these droplets can lead to Legionnaires' disease, a severe form of pneumonia. Contaminated cooling towers have caused community outbreaks, as droplets can travel miles through the air.

To minimize these risks, the New Jersey Department of Health (NJDOH) recommends:

1. **Annual offline cleaning and disinfection (at minimum)**: Schedule this procedure with a qualified water treatment professional if not done in the past year (detailed instructions on page 3).
2. **Adherence to manufacturer's recommendations and industry best practices** (page 4).
3. **Regular *Legionella* testing**: Consult your water treatment professional to determine a suitable testing frequency. Some organizations recommend monthly testing, but NJDOH recommends a minimum of every 3 months while operational.

By following these recommendations, you can significantly reduce the risk of Legionnaires' disease in your building and surrounding community.

For more information regarding Legionnaires' disease, please visit our website at <https://www.nj.gov/health/cd/topics/legion.shtml>.

Thank you,

The New Jersey Department of Health

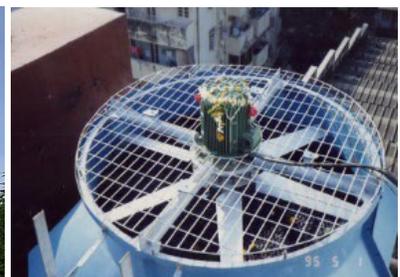
## Example Photos of Cooling Towers



A large cooling tower with easily visible water pipes (highlighted with an arrow).



A cooling tower with easily visible fan blades (highlighted with arrows).



Round-shaped cooling towers. Cooling towers come in various shapes, sizes, material including fiberglass, and configurations.



A cooling tower with front facing fans (highlighted with arrows).



An elevated fully enclosed cooling tower basin with access hatch and a side fan that is not visible.

### **Step-By-Step Instructions: Offline Cleaning and Disinfection Process**

1. **Review** the current water treatment program (e.g., cleanliness, maintenance, disinfectant program).
2. **Remove** heat load from the cooling system. Shut off fans associated with the cooling tower. Disengage all automated chemical feed and control equipment.
3. **Shut off** system blowdown and keep make-up water valves open and operating.
4. **Close** building air intake vents near the cooling tower, especially those downwind, until after the cleaning procedure is complete.
5. **Circulate** water through all system equipment, including any bypasses, equalizers, or standby components.
6. **Add** an oxidizing disinfectant sufficient to achieve a disinfectant residual of at least 10 ppm (mg/L) as free available oxidant.
7. **Add** an appropriate dispersant and apply antifoam, if needed. Apply appropriate corrosion inhibitors.
8. **Reduce** the cycles of concentration (if necessary) to achieve and maintain a pH of less than 8.0 for chlorine-based disinfectants or less than 8.5 for bromine-based disinfectants.
9. **Maintain** a free available oxidant residual of 5 mg/L for a minimum of five hours. Shorter contact times can be effective at higher oxidant concentrations.
10. **Drain** the system after the disinfection period to the sanitary sewer, following all applicable rules, regulations, and permits that may be required.
11. **Physically** clean all accessible system equipment. Consideration should be given to all cooling tower equipment, including fill pack, drift eliminators, equalizer lines, remote sumps, basins, strainers, chillers, free cooling heat exchangers, and any bypass or standby components.
12. **Refill** the system and circulate water through all system equipment including any bypass or standby components.
13. **Add** an oxidizing disinfectant and maintain a free available oxidant residual of at least 10 mg/L for one hour.
14. **Drain** the system after the disinfection period to the sanitary sewer following all applicable rules, regulations, and permits that may be required.
15. **Refill** the system and return all chemical feed and control equipment to normal operation.

## Recommended Best Practices for Cooling Tower Maintenance

<b>Design Recommendations</b>	
<ul style="list-style-type: none"> <li>• Use high-efficiency drift eliminators.</li> <li>• Cooling tower exhaust should be at least 25 feet from building air intakes.</li> <li>• Ensure system piping is designed to avoid stagnation or dead zones.</li> <li>• Cooling tower water collection basins should be designed to minimize sediment and dirt accumulation.</li> <li>• Recirculate water during intermittent operation.</li> <li>• Design and install an automated water treatment system.</li> </ul>	
<b>Operation Recommendations</b>	
<ul style="list-style-type: none"> <li>• Follow manufacturer's recommendations for cleaning and disinfection prior to commissioning, before startup, when idling, and after shutdown.</li> <li>• Automate anti-corrosion, anti-scale, and disinfectant addition and monitoring.</li> <li>• Balance operating times among cooling towers to when multiple cooling towers or cells exist.</li> <li>• Implement automated blowdown (intentional discharge of circulating water and replacement with fresh makeup supply water) to maintain system water quality within the established control limits.</li> <li>• Consider filtration and basin sweeper piping to reduce the level of suspended solids in the cooling water based on system factors (e.g., location, particle load).</li> <li>• Inspect cooling towers on a regular basis for scaling, biofilm, sediment or dirt, leaks and structural integrity including rust or corrosion.</li> <li>• Monitor water quality parameters, like biocide oxidant residual, pH, conductivity, and temperature on a regular basis.</li> <li>• Monitor cooling towers for water service disruptions and develop plans to respond accordingly.</li> <li>• Consider routine testing for <i>Legionella</i> bacteria.</li> <li>• Maintain site-specific log sheets (operational records), test procedures, service reports, and test results on-site.</li> </ul>	
<b>Maintenance Recommendations</b>	
<p style="text-align: center;"><b>Sediment and Biofilm</b></p> <p><i>Why? Sediment and biofilm can deplete disinfectant residual and harbor growth of Legionella</i></p>	<ul style="list-style-type: none"> <li>• Cleaning frequency varies based on operational factors.</li> <li>• Remove from service, clean, and disinfect at least annually.</li> <li>• Monitor scale and corrosion inhibitor levels frequently.</li> </ul>
<p style="text-align: center;"><b>Temperature</b></p> <p><i>Why? Legionella grows best between 77-113°F</i></p>	<ul style="list-style-type: none"> <li>• Operate cooling tower systems at the lowest possible water temperature, preferably below 77°F, if possible.</li> </ul>
<p style="text-align: center;"><b>Water Age</b></p> <p><i>Why? Increased water age leads to conditions favorable for Legionella growth.</i></p>	<ul style="list-style-type: none"> <li>• Flush low-flow and dead zone areas within the cooling tower water loops at least weekly.</li> <li>• During standby (wet) mode (i.e., when the system is not drained and shutdown for less than 5 days), maintain the water treatment program and circulate water 3x per week through the open loop of the closed-circuit cooling towers and the entire loop of open-circuit cooling towers. Ensure water quality conditions of the circulating water is managed through automated system blow down.</li> <li>• Use potable water for system make-up water or ensure reclaimed or condensate sources are appropriately managed.</li> </ul>
<p style="text-align: center;"><b>Biocide Residual</b></p> <p><i>Why? Water with low or no biocide residual oxidant can increase the risk of Legionella growth.</i></p>	<ul style="list-style-type: none"> <li>• Oxidizing biocides (e.g., chlorine &amp; bromine): Regular doses throughout the day or automated dosing may be needed to maintain a measurable oxidant residual. Follow manufacturer's recommendations, product label instructions, and consult a water treatment professional to determine effective concentration and contact time.</li> <li>• Non-oxidizing biocides: Maintain concentration and contact time as specified on the product label and consult a water treatment professional for guidance.</li> <li>• pH: Maintain based on type of disinfectant used and manufacturer recommendations to prevent corrosion.</li> </ul>

## **Resources**

- Toolkit for Controlling *Legionella* in Common Sources of Exposure: <https://www.cdc.gov/control-legionella/php/toolkit/control-toolkit.html>
- Toolkit: Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings: <https://www.cdc.gov/control-legionella/php/toolkit/wmp-toolkit.html>
- *Legionella* Environmental Assessment Form: <https://www.cdc.gov/investigate-legionella/Legionella-Environmental-Assessment-Form.pdf>
- PreventLD Training: <https://www.cdc.gov/control-legionella/php/training/index.html>
- ASHRAE Guideline 12-2023: <https://www.ashrae.org/technical-resources/standards-and-guidelines>
- Cooling Technology Institute Guideline 159(20): <https://cti-marketplace.myshopify.com/products/gdl-59>
- AIHA Recognition, Evaluation, and Control of Legionella in Building Water Systems: <https://www.aiha.org/education/marketplace/legionella-guide>