ATTACHMENT 5

COOLING TOWER

MAINTENANCE PROGRAM AND PLAN

Name of Facility New York State Insurance Fund

Total number of cooling towers: 1

NYC Department of Buildings (DOB) Registration Number(s):

_____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

Check one - □ Plan Follows MPP Model □ Model was Modified	
Plan Preparer's Name (First and last)	Robert Eimer
Plan Preparer's Address	690 Delaware Avenue Buffalo, NY 14209
Plan Preparer's Phone Number	716-970-4267 x443
Date completed (MM/YYYY)	06/2021

ATTACHMENT 5

MAINTENANCE PROGRAM AND PLAN SIGN-OFF

OWNER

Print Name (First and Last) as noted on the DOB's cooling tower registration profile

Building Identification Number (BIN #)	
Facility Address	199 Church Street, New York, NY 10007
Owner's Contact Address	15 Computer Drive West
Telephone	212-312-7141
Email Address	

PLAN PREPARER **Robert Eimer**

Print Name (First and Last)

Certification, Licensure or Experience	Professional Engineer
Company	The LiRo Group
Address	690 Delaware Avenue, Buffalo, NY 14209
Telephone	716-970-4267 x443
Email address	EimerR@liro.com

Signature attestation statement: The attached information is correct and complete to the best of my knowledge and represents integrated cooling tower management including appropriate water treatment, equipment operation and maintenance, and monitoring procedures. It will be implemented as required by the New York City Health Code ***Title 24, Chapter 8 (Cooling Towers) of the Rules of the City of New York***, as well as other applicable rules and regulations.

Plan Preparer/Lead Author _____ DATE _____

Signature of plan preparer

Owner _____ DATE _____

Signature of owner

TABLE OF CONTENTS

OVERVIEW

Cooling Tower Requirements
In August 2015, New York City and New York State created new requirements for owners of buildings with cooling towers.

The City's requirements became Local Law 77 of 2015. Local Law 77 required registration, inspection, cleaning, disinfection and testing of all New York City cooling towers. Local Law 77 also required that building owners annually certify that they were in compliance with the law. The standards for these new requirements were specified in the subsequent New York City Health Code, Title 24, Chapter 8, developed by the New York City Department of Health and Mental Hygiene (DOHMH). Chapter 8 of the Health Code also describes mandatory maintenance and other long-term management procedures. Besides DOHMH, the New York City Department of Buildings (NYCDOB) is also involved in the City's requirements; for example, building owners submit cooling tower registrations to NYCDOB. They also certify that they are complying with Local Law 77 with NYCDOB annually.

The State's requirements derive from its emergency regulations. Those regulations cover the topics within Local Law 77, along with cooling tower maintenance.

How to use this Document
This document is intended for building owners with one or more cooling towers. The owner of a facility with one or more cooling towers must develop, implement and update as necessary, a written **Maintenance Program and Plan (MPP)** for each cooling tower(s).

This document describes all the major elements of a MPP. The MPP preparer is expected to modify this document to develop a comprehensive individual MPP for the facility. The MPP document should reflect exceptional conditions or circumstances where they exist.

Use and modify this document according to the specifications of each unique facility.

1. Complete the required fields.

2. Overwrite the instructions noted in red with your specific information.

3. Use "N/A" if an item is not applicable and describe the reason. The MPP preparer must also state that the MPP will be revised if this changes.

4. Append flow plans or schematics of the cooling system and individual cooling tower operations. Additional information, sheets, plans, diagram, etc. as deemed necessary.

Who Must Prepare the MPP
The MPP preparer must be a qualified person, such as a licensed professional engineer, a certified industrial hygienist or a certified water technologist with training and experience developing management plans in accordance with current standard industry protocols including ANSI/ASHRAE 188-2015.

Alternatively, the MPP may be developed by a general environmental consultant not possessing the above listed certifications or licensure provided he/she possesses at least 2 years of operational experience in water management planning and operation.

Requirements of the MPP

In addition to ANSI/ASHRAE Standard 188-2018 or successor standard, the MPP must meet the requirements of Chapter 8 Section §8-03. This includes the procedures to be followed at the facility by the management and maintenance team in order to protect the public's health and safety, consisting of

- assessment of risk management
- procedures for implementing control measures and routine maintenance
- specific detailed seasonal or temporary shutdown and start-up procedures
- notification and communication strategies among team members regarding the required corrective actions.

The owner is responsible for full implementation while any cooling tower is operating. Registrants must periodically update the MPP whenever a change occurs in the facility. The MPP must be maintained onsite or nearby as a tool and guide for members of the management and maintenance team. The owner and plan preparer must sign and date the MPP.

In Agreement with ASHRAE 188-2018 section 6.2.8, bidders (in coordination with building owner) must establish procedures to confirm initially and on an ongoing basis that the MPP is being implemented as designed, and that when implemented as designed, controls the hazardous conditions throughout the cooling tower water system.

Inspection Requirements

Registrants must maintain the MPP onsite, or in an adjacent location on the same campus, complex or lot. It must be made immediately accessible for use and inspection by DOHMH, Department of Buildings (DOB) and other oversight agencies at all times and upon request (*Section §8-03*).

Registrants must have these elements ready before the start of the inspection:

1) Documents indicating proof of compliance.
2) Records of any maintenance, inspection, deficiency, corrective action, water treatment, test result, cleaning or disinfection performed on the cooling tower(s) in the previous 3 years.

Resources

For more information, questions or comments, contact:

New York City Department of Health and Mental Hygiene
Office of Public Health Engineering
42-09 28 Street, 14th Floor, CN 56
Long Island City, NY 11101
Telephone: (347) 396-6001
Fax: (347) 396-6089
Email: phe@health.nyc.gov

ATTACHMENT 5

MPP Reference information and compliance requirements

The following table is to be used as a reference for NYC Health Compliance & New York State compliance and is an overall summary of required information in the MPP as well as examples of how the requirements would not be met (violations). More detailed information is provided in each respective referenced "Section of Law." The Complying column is to be used by the contractor for their confirmation of code compliance.

Section of Law	Description	Violation	Complying (Y/N)
24 RCNY §8-03	Cooling tower site must have a MPP present	No maintenance program and plan	
24 RCNY§8-03	MPP must describe management and maintenance team, cooling tower system, Legionella risk management assessment, and tower operation, and be kept in building where tower is located, or in an adjacent building or structure on same campus, complex, lot, mall or on-site central engineering division, and must be made available to DOHMH upon request	Maintenance program and plan incomplete or not on premises	
24 RCNY §8-04(a)	Routine monitoring of wetted surfaces, tower basins, drift eliminators, chemical dosing and control equipment, bleed-off system and chemical storage must be recorded weekly by responsible person on checklist and reported for corrective actions	Routine monitoring not conducted, documented at least once a week when tower is in use	
24 RCNY§8-04(b)	Compliance inspections of tower contaminants, basin, packing material and drift eliminator condition, water makeup connections and control, conductivity control, dosing equipment, and maintenance records must be recorded quarterly by qualified person on checklist	Compliance inspections not conducted, documented at least once every 90 days when the tower is in use	
24 RCNY §8-04(c)	Routine maintenance must review system cleanliness, drift eliminator and fill material condition, distribution operation, water treatment system, basin/remote sump cleaning, and purging of stagnant and low-flow zones, and ensure proper part replacement	Routine maintenance according to maintenance program and plan not conducted or documented	
24 RCNY§8-04(d)	Cooling tower must be cleaned twice per year following industry and worker safety standards and ensuring proper access to key water contact areas	Twice yearly or other required cleaning not conducted or documented	
24 RCNY §8-04(e)	Owners must install and maintain drift eliminators in accordance with the manufacturer's specifications and NYC Construction Codes to ensure appropriately-low drift loss	Aerosol control do not meet manufacturer's design specifications or drift loss reduction requirements in new or existing towers when required	
24 RCNY §8-04(f)	Cooling tower system must undergo a summertime hyperhalogenation at least once each year between July 1 and August 31, performed by person qualified to apply biocide	Failure to submit declaration of hyperhalogenation performed at least once each year between July 1 and August 31	
24 RCNY§8-05(a)	Chemical treatment must be daily and automated unless the MPP states how the alternative will effectively control Legionella growth	Daily automatic or approved alternative water treatment plan not provided	

24 RCNY§8-05(b) & Title Subpart 4-1.4 (7)	Continuous recirculation is required unless the MPP specifies how idling during treatment will not limit effective biofilm and microorganism control. MPP must provide provisions for treatment and manual or automatic flushing of any piping, basin, sump, or wetted surface during idle conditions	Cooling water system not continually recirculated and no acceptable alternative	
24 RCNY §8-05(c)(1)	Applicator must be certified according to Article 33 NYS Environmental Conservation Law (NYS DEC 7G license) and 6 NYCRR Part 325, or supervised by certified applicator	Use of an unqualified biocide applicator	
24 RCNY §8-05(c)(2)	Biocides must be registered with NYS DEC	Use of an unregistered biocide product	
24 RCNY §8-05(c)(3)	Chemical and Biocide records must be present, noting purpose of use, manufacturer's name, brand name, safety data sheet, date and time of addition, and weekly amount added	No records of all chemicals and biocides added	
24 RCNY §8-05(c)(4)	Chemical and Biocide must be added according to the MPP, product label, and manufacturer's instructions addressing, as applicable, feeding mechanism, location, frequency, set timer, duration, triggering events, control procedures, and target biocide residuals	Sufficient quantities and combinations of chemicals not added as specified in the maintenance program and plan	
24 RCNY §8-05(d)	Non-chemical water treatment devices must be approved by DOHMH and incorporated within MPP, provided that required chemical treatment adequately controls for Legionella	Using unacceptable alternative non- chemical water treatment device	
24 RCNY §8-05(e)	Users of rainwater or recycled water for makeup water must install a drift eliminator and test and treat water in accordance with specific plan, which must ensure adequate design of treatment/control and ongoing evaluation to eliminate risk to public health	Use of captured rainwater or recycled water as makeup water not in accordance with approved alternative water source plan	
24 RCNY §8-05(f)(1)	Temperature, pH, conductivity and biocidal indicator must be measured and recorded 3 times per week (with no longer than 2 day gaps), with records made available	Minimum daily water quality measurements not taken or recorded (or if automated, not viewable)	
24 RCNY §8-05(f)(2)	Bacteriological indicator (e.g. HPC) must be collected and interpreted in accordance with Table 8-2 at least weekly during tower use	Failure to collect, analyze or record weekly biological process control indicators	
24 RCNY §8-05(f)(3)	Perform legionella culture quarterly during tower use via approved lab, with level 4 results (>1,000 CFU legionella) reported within 24 hours and sampling merited for power treatment or conductivity failure, legionellosis, 2 consecutive HPC level 4 results (>1,000,000 CFU), or other request	Legionella samples not collected or analyzed, or results not recorded or reported to DOHMH as required	
24 RCNY §8-05(f)(4)	System monitoring and sampling locations must be representative of the entire cooling tower system (e.g. with water circulating for at least 1 hour before test)	Failure to monitor and sample from representative locations and times	
24 RCNY §8-05(f)(5)	MPP must identify the procedures, responsible parties, required response time(s) and notification protocol for corrective actions, including at minimum those in Tables 8-1/8-2	Required corrective actions not taken based on bacteriological results	
24 RCNY §8-06(a)	Shutdown must conform to manufacturer's recommendations, including complete drainage and protection	Improper or inadequate shutdown procedures	
24 RCNY §8-06(b)(1)	Start-up of tower idle >5 days must entail the following within 15 days before use: either fully cleaning/disinfecting, fully draining and disinfecting, or hyperhalogenating; and pre-start-up inspection by qualified person	Improper or inadequate start-up procedures	

24 RCNY §8-06(b)(2)	Start-up of tower idle >5 days must entail Legionella culture	Legionella samples not collected, analyzed before system start-up	
24 RCNY §8-06(c)	New systems must be disinfected and cleaned prior to use according to this Rule and MPP, and be registered with DOB	New cooling tower not or inadequately cleaned and disinfected prior to operating	
24 RCNY §8-07(a)	Records of any maintenance, inspection, deficiency, corrective action, water treatment, test result, cleaning or disinfection performed on the tower must be kept	Failure to document all inspections, logs, tests, cleaning, and disinfection in accordance with the MPP	
24 RCNY §8-07(a)	Such records must be kept for at least 3 years	Failure to retain records for at least 3 years	
24 RCNY §8-07(a)	Such records must be kept in the same building or adjacent one on the same campus, complex, lot, mall or on-site central engineering division	Required records not kept at the cooling tower premises	
24 RCNY §8-07(c)	The DOB Registration Number must be posted securely and visibly and made of durable, weather resistant material	Department of Buildings Cooling Tower Registration Number not posted as required	
Title Subpart 4-1.9 & §17-194.1(h)(1)	All records and plans shall be made available to the Department immediately upon request	Records not made immediately available to Department upon request	

SECTION 1: MANAGEMENT AND MAINTENANCE TEAM

Individuals who are legally and practically responsible for the continued effective and safe operation of a cooling tower.

RESPONSIBLE PERSON (DAILY OVERSIGHT)

Print Name (First and Last)

Company

(note if building staff)

Address

Telephone

Email

BACKUP TO THE RESPONSIBLE PERSON

Print Name (First and Last) IF APPLICABLE

Company

Address

Telephone

Email

QUALIFIED PERSON (INSPECTION/GUIDANCE)

Print Name (First and Last)

Qualifications

Company

Address

Telephone

Email

CLEANING/CHEMICAL APPLICATION PERSON

Print Name (First and Last)

Qualifications

(such as NYS DEC applicator # for person or their supervisor if applicator apprentice)

Company

Address

Telephone

Email

OTHER
(ENVIRONMENTAL CONSULTANT, ETC.)

Print Name (First and Last)

Role

Company

Address

Telephone

Email

1.1 Staff Responsibilities

Requirement: Title 24, Chapters §8-03 and §8-04

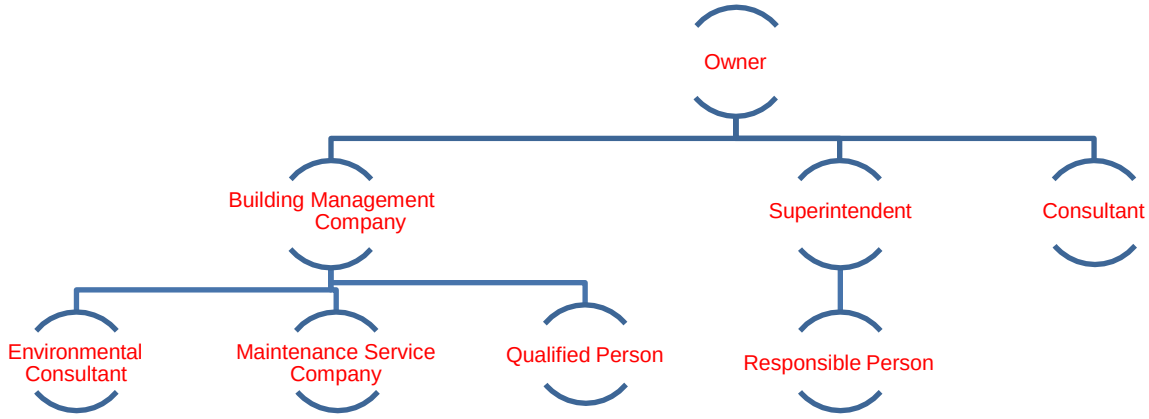
Provide a description of the persons responsible for various aspects of the cooling tower system's management in the following table. This table does not include the owner, responsible for compliance and who commissions the plan preparer.

Title	Staff Responsibilities
Building Management Company (Such as manages building administration and operations.)	
Responsible Person (as defined under §8- 02) (Such as performs duties as outlined in §8- 04(a), including filling out Appendix C Water Quality Parameter Log and Routine Monitoring Checklist.)	
Qualified Person (as defined under §8-02) (Such as performs inspections as outlined in §8-04(b), and Appendix C Compliance Inspection Checklist, as well as emergency/other inspections as needed.)	
Cleaning/Chemical Application Person Service Provider (Such as performs at least twice per year cleaning and oversees application of daily or other approved chemical treatment procedures.)	
Environmental Consultant/Other (Such as executes other plan components or tasks as needed.)	

1.2 Notification and Communication for Corrective Actions

Requirement: Title 24, Chapter §8-03(d)(3)

Describe the notification and communication strategies for implementing corrective actions in the table below, which can be modeled according to the example chain of command schematic given below (please insert/attach your chain of command in Appendix D). Notification procedures must also agree with the timeline requirements for notification of proper authorities in Table 8-1, as well as NYSIF's Water Treatment & Maintenance Specification (232500) section C.2.c.



A list of conditions requiring corrective action	**Instructions**	**Contractor's Description of Notification Procedure and Corrective Actions**
Routine System and Water Quality Monitoring: detection of anomaly in cooling tower condition and process as described in §8-04(a)	Describe how requirements of section 8-04(a) (*Routine System Monitoring* – Detailed in Section 3.1) will be fulfilled on a weekly basis. Provide an outline of test procedures, along with control limits for each parameter. Describe notification strategies for routine system and water quality monitoring corrective actions, including chain of command.	

Compliance Inspections: detection of presence of conditions as described in §8-04(b)	Describe how requirements of section 8-04(b) (*Compliance Inspections* – Detailed in Section 3.2) will be fulfilled. Provide an outline of test procedures, along with control limits for each parameter. Describe notification strategies for compliance inspections corrective actions, including chain of command.	
Routine Maintenance and Part Replacement: inspection results trigger replacement and repair as described in §8-04(c)	Describe how requirements of section 8-04(c) (*Maintenance* – Detailed in Section 3.3) will be fulfilled. Describe notification strategies for routine maintenance and part replacement, including chain of command.	
Legionella and Bacteriological Indicator Sampling: results trigger corrective action levels as described in §8-05(f)	Describe how requirements of section 8-05(f) (*Water Quality Monitoring* – Detailed in Sections 6.2 - 6.3) will be fulfilled. Describe notification strategies for required legionella and bacteriological indicator sampling corrective actions, including chain of command and Departmental notification.	
Others as Needed	Describe notification strategies for any other corrective actions.	

SECTION 2: COOLING TOWER SYSTEM

Requirement: Title 24, Chapter §8-03(b)

A clear understanding of the principles of operation and basics of the cooling tower(s) is essential for the efficiency of the operation, proficiency of personnel and public safety. Cooling tower operations are governed in part by the nature of the cooling load of the serviced facility or facilities.

The information in this section captures the defining characteristics of the cooling tower system and is used throughout the MPP. This informs the framework for assessing each individual cooling tower and how it comprises part of/or the entire cooling system.

Total number of cooling towers: **1**

Origin of the water supply: Municipal Water Supply

COOLING TOWER #1 DOB Registration Number _____

Manufacturer _____ Model _____ Serial # _____
(BAC, etc.) (Series 3000, etc.)

Configuration _____ Cells _____ Circulation pumps _____
(Number) (Number)

Other Systems ☐Equalization line ☐Remote Sump ☐Side Stream Filtration ☐Other (describe)

Side Stream Filter Type _____ Distance to Nearest Building Air Intake _____
(Feet)

Location Description _____
(Floor number and enclosed status: full, partial, or none/outdoors)

Size _____
(Tonnage, recirculating water volume, and flow rate)

Purpose _____
(Refrigeration, commercial or residential cooling)

Time of Operation _____
(Year-round, standby, or seasonal with start-up and shut-down dates)

Biocide Delivery and Bleed Methods _____
(Methods of Disinfection and Bleed Type, such as Conductivity- or Proportional-based)

Cooling Tower System Schematic and Flow Diagram - Chapter §8-03(b)(7)

(Develop and insert a detailed system schematic which contains all of the components noted below, below or in Appendix D)

- Cooling towers with their individual number of cells and circulation pumps marked
- System pumps and control valves
- Standby equipment, e.g., spare pumps
- Locations of system bleed valves
- Associated storage tanks
- Associated pipework
- Location of chemical dosing points and/or injection points
- Location of the system drain valve
- Any parts that may be temporarily out of use
- Other systems (as marked above)
- Water quality monitoring points for water quality measurements, bacteriological indicator sampling, and *Legionella* sampling

SECTION 3: PROCESS CONTROL MEASURES

3.1 Routine System Monitoring

Requirement: Title 24, Chapter §8-04(a)

The responsible person for each cooling tower system must monitor the system while it is in use on a weekly basis (at minimum) under the guidance of a qualified person. The responsible person must conduct routine monitoring by:

- using a written or electronic checklist (insert checklist in Appendix C) to record visual observations of the cooling tower system and associated equipment;
- observing all wetted surfaces (safely visible during tower operation), tower basins and drift eliminators and recording the presence of organic material, biofilm, algae, scale, sediment and silt/dust deposits, organics (oil and grease), and other visible contaminants;
- performing a check of chemical dosing and control equipment, including sufficient storage and delivery of treatment chemicals, and the bleed-off system;
- reporting any system anomalies or problems to the management and maintenance team for immediate corrective action.

3.2 Compliance Inspection

Requirement: Title 24, Chapter §8-04(b)

The qualified person must conduct a compliance inspection at least once every ninety (90) days while a cooling tower system is in operation. The qualified person must complete a written or electronic checklist (insert checklist in Appendix C) and keep this on-site. It must reflect observations and findings including:

- presence of organic material, biofilm, algae, and other visible contaminants
- general condition of the tower, the basin, packing material and drift eliminator
- quality of the water make-up connections and control
- proper functioning of the conductivity control
- proper functioning of all dosing equipment (pumps and strain gauges)
- review of routine maintenance records to ensure proper implementation of required activities and corrective actions as needed.

3.3 Routine Maintenance and Part Replacement

Requirement: Title 24, Chapter §8-04(c)

Ensure appropriate general maintenance and part replacement. Routine maintenance activities must conform to manufacturers' recommendations and include, but are not limited to, general system cleanliness, drift eliminator and fill material condition, overall distribution operation, water treatment system, basin/remote sump cleaning, and purging of stagnant and low-flow zones.

Maintain and operate cooling tower systems in accordance with the manufacturer's specifications and keep a copy of the tower manufacturer's "Operation and Maintenance Manual" or related documents on site for DOHMH representative review.

Insert the Routine Maintenance protocol including inspection frequency and maintenance checklists in accordance with manufacturer's specifications (attach the manufacturer's checklist in Appendix D, if applicable).

In addition, any part or equipment used in a cooling tower must comply with the manufacturer's original design and performance specifications and any part or equipment used in an associated cooling tower system must comply with the New York City Construction Codes. As applicable, replacement materials must be corrosion-resistant and effectively prevent the penetration of sunlight.

3.4 Cleaning

Requirement: Title 24, Chapter §8-04(d)

The cooling tower system must be cleaned whenever routine monitoring and inspections indicate a need for cleaning, but no less than twice a year (which can include a pre-startup cleaning for seasonal systems), in accordance with the manufacturer's recommendations. Cleaning protocol and personnel safety protective measures must be specified. Water contact areas such as the basin, sump, fill, spray nozzles and fittings, drift eliminators, and air intake louvres must be properly accessed or removed to facilitate cleaning.

If packs (fill sections) are present and cannot be removed, are there alternative methods of making sure they remain clean in place?

List methods and describe the routine cooling tower cleaning schedule including pack areas where scale, debris and biofilm are likely to accumulate, which may require a complete system shutdown and impact business operations.

3.5 Cooling Tower System Aerosol Control

Requirement: Title 24, Chapter §8-04 (e)

The cooling tower system must be operated at all times to minimize the formation and release of aerosols and mist. Owners must install and maintain drift eliminators in accordance with the manufacturer's specifications and the NYC Construction Codes. Drift eliminators must be maintained, installed and inspected to ensure good working order and proper function and to verify that they are not physically damaged or contaminated with

scale or algae. The calculated drift loss at maximum design water circulation must not exceed the manufacturer's tested value for maximum drift loss. Counter-flow cooling towers must achieve a reduction of drift loss to no more than 0.002% percent of the recirculated water volume; cross-flow cooling towers must achieve a reduction of drift loss to no more than 0.005% of the recirculated water volume.

Insert text affirming that routine cooling tower drift loss reduction, driven by implementation of drift eliminators (list product name/number), will be in accordance with the manufacturer's specifications and NYC rules and regulations.

3.6 Summertime Hyperhalogenation

Requirement: Title 24, Chapter §8-04 (f)

The cooling tower system must undergo a summertime hyperhalogenation at least once each year between July 1 and August 31 and must be performed by a person qualified to apply biocide pursuant to 24 RCNY § 8-05(c)(1). The hyperhalogenation must be performed with a registered chlorine or bromine based biocide that is effective at Legionella control in accordance with 24 RCNY § 8-05(c). The cooling tower system is exempt from this requirement if it is in full system shutdown and completely drained of water, in accordance with 24 RCNY § 8-06(a), for the entire period between July 1 and August 31.

Within 30 days of completing the summertime hyperhalogenation, a declaration form must be completed and filed with the Department through the NYC cooling tower registration portal. A copy of this form is included in Appendix C.

List methods and describe the summertime hyperhalogenation plan in agreement with the manufacturer's recommendations and requirements of RCNY §8-04(f)(1 – 5).

3.7 System Shutdown and Startup

Requirement: Title 24, Chapter §8-06

Procedures to shut down a cooling tower system must conform to the manufacturers' recommendations. When shut down, the system must be completely drained and protected from offline contamination.

At a minimum, before cooling tower system startup, a cooling tower(s) that has been shut-down or idle for more than five days must be cleaned and disinfected (*Administrative Code §17-194.1*). Cleaning and disinfection must be done no later than 15 days before the first seasonal use of such tower. The MPP must contain detailed seasonal and idle period start-up procedures that, at a minimum, include:

- before the startup of a cooling tower, either fully cleaning and disinfecting, draining to waste and disinfecting, or sufficiently hyperhalogenating the recirculated water;
- before the startup of a cooling tower after an extended shutdown of five or more days, collecting a *Legionella* culture sample and taking appropriate actions once results are received (as defined in Chapter 8); and
- before the seasonal startup of a system that has been fully shutdown, performing a pre-startup inspection by a qualified person.

You must notify the DOB electronically within 30 days of removal or permanent disuse of a cooling tower in accordance with § 28-317.3.1 of the Administrative Code. Such notice must include a statement that the cooling tower has been drained and sanitized.

Provide detailed procedures for system shutdown and start up to supplement the minimum requirements described above.

Shutdown, Startup and Idling Procedure Summary	
Seasonal Shutdown (Describe seasonal shutdown procedure)	
Seasonal Startup (Describe seasonal startup procedure - insert pre-startup inspection protocol in Appendix D)	
Idling (Describe system idling procedures)	

SECTION 4: WATER TREATMENT

Requirement: Title 24, Chapter §8-05

A qualified person must evaluate the cooling tower design, installation, operation, and maintenance prior to changing or using a chemical treatment system, or introducing a new chemical treatment agent in order to ensure compatibility between the chemicals and the cooling tower system's materials, and to minimize microbial growth and the release of aerosols. The evaluation must describe the optimum level of chemicals to achieve the desired result in a manner which can be used as a system performance measure.

4.1 Daily Treatment

Requirement: Title 24, Chapters §8-05 (a) and (c)

Water in the cooling tower system must be treated at least once a day when the system is operating. The treatment is to be automated unless the MPP explicitly states how manual or less-frequent biocide addition will provide effective control of *Legionella* growth.

Does the system have automatic, daily biocide treatment? (Yes or No) _____

If the system does have automatic biocide treatment, describe it below.
(ORP-feedback, direct measurement feedback, proportional, or timed dosing.)

If the system does not have automatic biocide treatment, describe it below.
(Specifically, describe how manual or less frequent, intermittent biocide application will effectively protect against Legionella growth, and why an alternative method is being used).

4.2 Detailed Treatment Description

Chemicals and biocides must be used in quantities and combinations sufficient to control the presence of *Legionella*, minimize biofilms, and prevent scaling and corrosion that may facilitate microbial growth. The following conditions must be met:

- Any person who performs cleaning or disinfection, or applies biocides to a cooling tower system must be a commercial pesticide applicator or a pesticide technician certified in accordance with the requirements of Article 33 of the New York State Environmental Conservation Law and 6 NYCRR Part 85, or a pesticide apprentice under the supervision of a certified applicator.
- Only biocide products registered with the New York State Department of Environmental Conservation may be used as the primary biocide control.
- Non-chemical water treatment devices that employ alternative technologies to control biological growth may not be used in lieu of chemical biocide. Only biocide products registered with the New York State Department of Environmental

Conservation may be used in disinfection. Provided that chemical treatment is demonstrated as adequate to control *Legionella* in the maintenance and management plan, non-chemical water treatment devices may also be installed as a part of the cooling tower system.

- Water treatment records must be kept for all chemicals and biocides added noting: purpose of their use; manufacturer's name; brand name; safety data sheet; date and time of each addition; and amount added per week.
- For systems where oxidizing chemicals cannot be used as the primary biocide to control the presence of *Legionella*, building owners must submit an alternative plan for effective bacteriological control for approval by the Department.

Chemicals and biocides must be added in accordance with the procedures described in the MPP, with details on feeding mechanism, location, frequency, set timer system, duration, feed rate, triggering events (prompting corrective actions), control procedures, and target biocidal indicator levels. Water treatment chemicals and biocides must be used in accordance with the product label and manufacturer's directions.

Prior to changing an existing chemical treatment system or introducing a new chemical treatment agent, cooling tower design, installation, operation, and maintenance must be evaluated by a qualified person to ensure compatibility between the chemicals and the cooling tower system's materials, and to minimize microbial growth and the release of aerosols. The evaluation must describe the optimum level of chemicals to achieve the desired result in a manner which can be used as a system performance measure.

Water Treatment Summary		
Item	**Instructions**	**Contractor's Description of Procedures**
Chemicals and Biocides	Describe all chemicals and biocides applied to the system and target biocide levels; biocide(s) must have proof of NYS-DEC registration, e.g. DEC stamp or PIMS printout	
Feeding	Describe chemical and biocide feeding mechanism, location, frequency, set timer system, duration and feed rate	
Corrective Actions	Describe trigger events and chemical and biocide corrective action implementation procedures	

4.3 Recirculating System

Requirement: Title 24, Chapter §8-05 (b)

The cooling tower system must be operated and programmed to continually recirculate the water irrespective of the building's cooling demand of the system, unless the MPP specifies in detail how the intended water treatment schedule will be carried out, and how effective biofilm and microorganism control will be achieved when the whole or a part of the cooling tower system is idle during the scheduled chemical injection.

Does the cooling tower system have a continuous recirculating system?
(Yes or No) _____

If the system does *not* have a continuous recirculating system, describe the operating program/rules below. Specifically, explain how effective chemical treatment will occur when part or all of the system is idle (such as during periods of low cooling demand) at the time of a scheduled chemical application.

4.4 Hyperhalogenation Disinfection

As required by corrective actions in Section §8-05(f)(5) (Table 8-1), start up procedures in Section §8- 06(b) and as otherwise described in this Plan, procedures for hyperhalogenation disinfection must be followed.

Describe the hyperhalogenation disinfection procedures including referenced standards or protocols (e.g. Cooling Technology Institute 2008), minimum concentrations, holding times and monitoring procedures.

SECTION 5: RISK MANAGEMENT ASSESSMENT

Requirement: Title 24, Chapter §8-03(c)

It is essential to understand system design and operation and components, water chemistry and water treatment principles, and risk management techniques in the development of a risk-based MPP. Risk management assessment consists of the following components:

- understanding system operation,
- identifying critical risks and potential hazards,
- analyzing risks,
- evaluating risks,
- monitoring risks,
- controlling and managing risks,
- performance and control measures review and consultation.

5.1 Risk Assessment – This section must be completed by bidding contractors upon visiting the site and investigating the system

The assessment of the risk of *Legionella* growth within and transmission from the cooling tower system should be conducted for each process step. As applicable, risk management procedures to mitigate the potential conditions listed in the below table should be undertaken, with additional sampling, measurement, and general observation to be implemented at high risk locations within the cooling tower system as identified by the risk management assessment conducted for that monitoring period.

Critical Risks and Hazards	Risk Management Assessment and Management
Dead legs or stagnant water in the recirculation system Title 24, Chapter §8-03 (c)(1) (High risk means dead legs or stagnant water exist, while low risk means none exist, typically due to use of a recirculation pump to provide continuous water circulation) (Identify and describe high risk locations or processes and mitigation measures)	
Operating configurations and conditions that may occur after periods of extended inactivity lasting more than three (3) days, including idling or low circulation while not being fully drained Title 24, Chapter §8-03 (c)(2) (High risk means conditions like idling without a recirculation pump controlled by a timer to circulate biocide and other water treatment through the system, while low risk means such conditions are avoided e.g. through use of a recirculation pump with a set timer to operate continuously under all operational phases) (Identify and describe high risk locations or processes and mitigation measures)	

Critical Risks and Hazards	Risk Management Assessment and Management
System parts that require continual operation throughout the year making regular, periodicoffline cleaning and disinfection difficult Title 24, Chapter §8-03 (c)(3) (High risk means consistent high demands for cooling e.g. in data centers exist, while lowrisk means no such conditions exist) (Identify and describe high risk locations or processesand mitigation measures)	
Any components that may add additional risk factors for organic material buildup and microbial growth such as strainers and out-of-use filters Title 24, Chapter §8-03 (c)(4) (High risk means components like disused sand filters or strainers are present [or in-use ones lack maintenance protocols and oversight or elements such as pressure gauges, backwash equipment and filter media], while low risk means no such components are present) (Identify and describe high risk locations or processesand mitigation measures)	
Sources of elevated organic contamination, including, but not limited to windblown debris, bird waste and plant material Title 24, Chapter §8-03 (c)(5) (High risk means sources like nesting birds and weeds are proximal and able to introduce contamination, while low risk means no such sources can contaminate the system) (Identify and describe high risk locations or processesand mitigation measures)	
Design configurations that present risk of directsun exposure on basin, deck or fill Title 24, Chapter §8-03 (c)(6) (High risk means basin, deck or/and fill are not protected from direct sun, while low risk means those areas are protected) (Identify and describe high risk locations or processesand mitigation measures)	
Ventilation intakes or other routes for human exposure to cooling tower aerosols Title 24, Chapter §8-03 (c)(7) (High risk means high numbers of people are potentially exposed given proximity to a health care facility, major places of assembly, public transportation, high density residential buildings and commercial district, and busy streets, while low risk means ventilation is located and aimed away from occupied areas, pedestrians, transportation and traffic areas) (Identify and describe high risk locations or processesand mitigation measures)	

Critical Risks and Hazards	Risk Management Assessment and Management
System components adversely affecting water quality management procedures Title 24, Chapter §8-03 (c)(8) (High risk means components like aged, lower efficiency drift eliminators or heat exchange equipment associated with high head pressure or approach temperatures are present, while low risk means no such components exist) (Identify and describe high risk locations or processes and mitigation measures)	
Other risk or limiting factors or constraints in the cooling tower system's design and functioning Title 24, Chapter §8-03 (c)(9) (High risk means risk factors like high water temperature or difficult cooling tower access exist, while low risk means no other risk/limiting factors are present). (Identify and describe high risk locations or processes and mitigation measures)	

5.2 Makeup Water Source

Requirement: Title 24, Chapter §8-05(e)

In accordance with ASHRAE 188-2018 section 7.2.7, the MPP must include requirements for the location of the cooling tower makeup water valve and for maintaining compliance with all applicable local, regional, and national codes for air gaps and backflow preventers. If such codes and regulations do not exist, the plan shall include requirements for maintaining compliance with ASME/ANSI A112.1.2 for air gaps and for maintaining compliance with codes and regulations applicable in other locations, selected by the owner, for backflow preventers.

If the existing makeup water valve is found to be in violation of any local codes or ASME A112.1.2, it shall be brought to the attention of the building superintendent to discuss, review and determine corrective actions in coordination with building owner.

Owners using water derived from rainwater capture or recycling water systems as a source of cooling tower system makeup water must install a drift eliminator and test and treat water in accordance with a specific alternative source water plan. This plan is in addition to the MPP treatment requirements, *and must be approved by the Department*. The alternative water source plan must include provisions for adequate design of the treatment and control components and ongoing evaluation to eliminate any risk to public health.

Describe how the makeup water valve is installed and if it meets all applicable codes and regulations, or compliance with ASME/ANSI A112.1.2, and communication strategy for corrective action if found not to be in compliance.

If rainwater or recycling water systems are used, provide an additional alternative water source plan as described above.

SECTION 6: WATER QUALITY MONITORING PROCEDURES

System monitoring and sampling locations must be representative of the entire cooling tower system. The system must be operating with water circulating in the system for at least one hour prior to water quality measurements or collection of samples. Additionally, you must conduct sampling, measurement, and general observation at high risk locations within the cooling tower system, if identified by the risk management assessment conducted for that monitoring period, as outlined in Section 5 of the MPP.

The MPP must identify the procedures, responsible parties, required response time(s) and notification protocol for corrective actions and must include at the minimum bacteriological corrective actions that must be implemented according to Tables 1 and 2 in *Title 24, Chapters §8-05(f)*. Space for description of such protocol for corrective actions in response to high *Legionella* or bacteriological indicator sampling results is given in the tables below.

6.1 Water Quality Parameters

Requirement: Title 24, Chapter §8-05 (f)(1)

Water quality parameters, including but not limited to pH, temperature, conductivity and biocidal indicator, must be measured and recorded at least 3 times per week, with no more than 2 days between any measurement, when the cooling tower system is operating, unless this plan explicitly states how automatic or remote measurement and recording will provide effective measurement of system process control. Any automatic measurement must be properly recorded and be made available at the time of inspection.

Describe specific sampling plan, including monitoring location and time, along with corrective actions for abnormal values. Insert (blank) sample log sheet in Appendix C.

Insert sampling point(s) on Section 2, Figure 1 Cooling Tower System Schematic and Flow Diagram.

6.2 Bacteriological Indicator Sampling

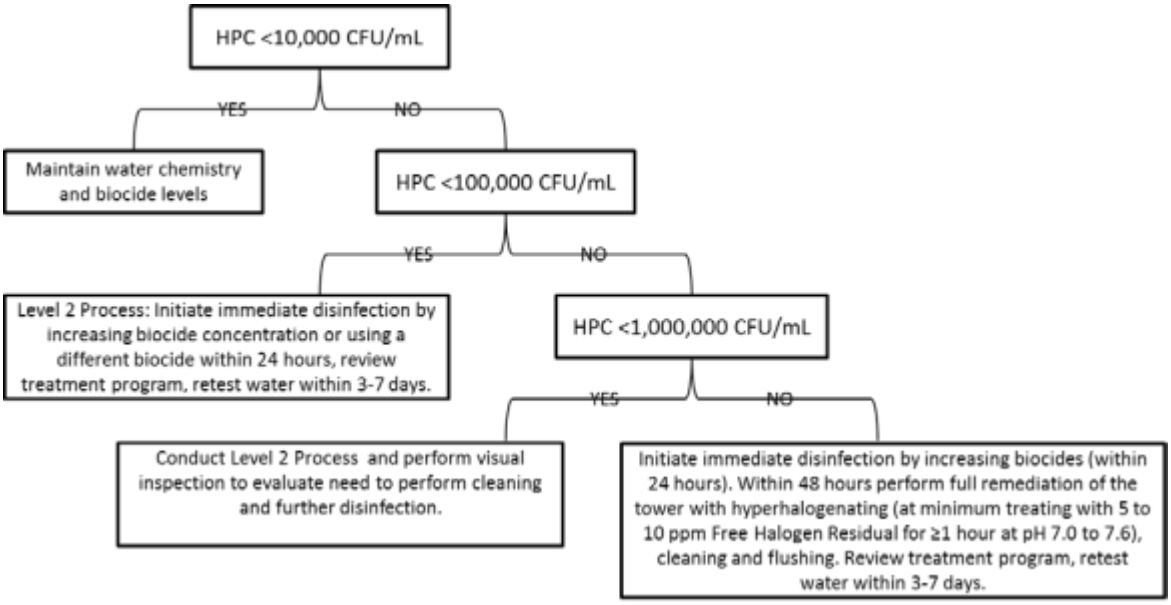
Requirement: Title 24, Chapter §8-05 (f)(2)

A bacteriological indicator to estimate microbial content (such as HPC) of recirculating water must be collected and interpreted according to Table 2 of Chapter 8, at least once each week while the cooling tower system is operating. Indicators must be taken at times and from water sampling points, detailed in the MPP, that will be representative of water microbial content. Indicators may be taken at any time from constant chemical treatment systems. Indicators from systems that use intermittent biocide applications must be taken before biocide application and reflect normal cooling tower operating conditions.

Will HPC be used as a bacteriological indicator? (Yes or No) _____

If HPC will not be used, state and justify what alternative test will be used:

This decision tree describes the corrective actions that must be taken based on bacteriological indicator sampling (e.g., HPC) and re-sampling results (in conformance with Chapter 8)*. Subsequent test results must be interpreted with this table until level 1 (< 10,000 CFU/ml) is reached.



* If 2 consecutive bacteriological indicator sample results are at least 1,000,000 CFU/mL, *Legionella* culture testing is required.

Bacteriological Indicator Sampling Summary		
Item	**Instructions**	**Contractor's Description**
Responsible Party for Indicator Collection	Describe who is responsible for indicator collection.	
Indicator Collection Location(s)	Describe where in the cooling tower system the sample(s) will be taken from, and insert sampling point(s) on Section 2, Figure 1, Cooling Tower System Schematic and Flow Diagram.	
Indicator Sample Protocol	Describe how the sample will be taken managed (e.g. if it will be incubated onsite, or if it will be sent to a lab for analysis).	
Responsible Party for Corrective Action(s)	Describe who is responsible for interpreting sample results and implementing required corrective action(s).	

Corrective Action(s) and Timeline	Describe corrective action(s) and timeline including at minimum those described in Table 2 of §8-05 and §8-05(f)(3)(E), along with documentation procedure. Full description of notification procedures to be provided in Section 1.2.	

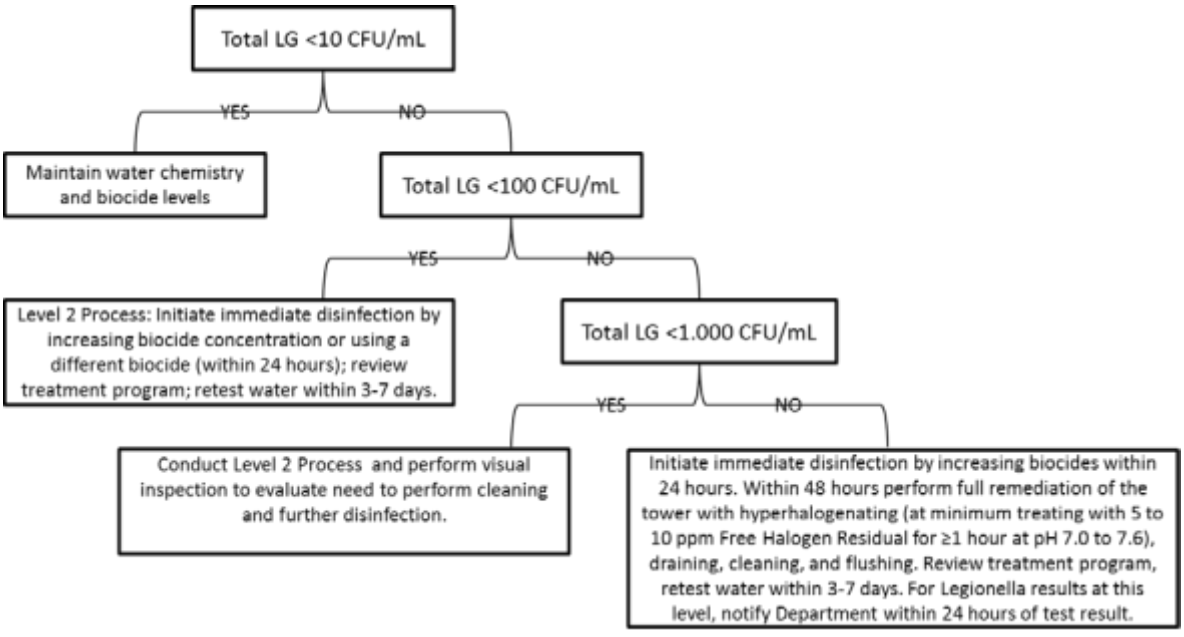
6.3 Legionella Culture Testing

Requirement: Title 24, Chapter §8-05 (f)(3)

Legionella culture testing must be conducted no less frequently than every ninety (90) days during cooling tower system operation, and before the startup of a cooling tower that has been shut down for five or more days. A *Legionella* sample must be analyzed by the New York State Department of Health Wadsworth Center or other ELAP laboratory approved by the Department. You must report test results of all Legionella species at or above the magnitude of level 4, as indicated in Table 1 of Chapter 8, to the Department within 24 hours of receiving the test results. If any of these occur, additional emergency *Legionella* sampling must be conducted:

- power failure of sufficient duration to allow for growth of bacteria;
- loss of biocide treatment sufficient to allow for growth of bacteria;
- failure of conductivity controls to maintain proper cycles of concentration;
- at the request of the Department upon a determination that one or more cases of legionellosis is or may be associated with the cooling tower, based on epidemiological data or laboratory testing;
- any time two consecutive bacteriological indicator sample results are at least 1,000,000 CFU/mL; or
- any other conditions specified by the Department.

This decision tree describes the corrective actions that must be taken based on *Legionella* (LG) sampling and re-sampling results (in conformance with Chapter 8, with the result representing total LG species concentration). Subsequent test results must be interpreted with this table until level 1 (< 10 CFU/ml) is reached.



If legionella results > 1,000 CFU/ml, in addition to the information above; (1) Refill and dose to 1 - 5 ppm of free residual halogen and circulate for 30 minutes. Refill, reestablish treatment, and retest for verification of treatment. And for dosing levels (2) 7 - 7.6 for chlorine, 7 - 8.7 for bromine. Higher pH levels may require longer treatment times. The public must also be notified in a manner determined by the department.

Legionella Sample Collection Summary	
Responsible Party for *Legionella* sample collection (Describe who is responsible for Legionella sample collection)	
Legionella Sample Collection Location(s) (Describe where in the cooling tower system the *Legionella* sample(s) will be taken from, and insert sampling point(s) on Section 2, Figure 1, Cooling Tower System Schematic and Flow Diagram.)	
Legionella Sample Protocol (Describe how the *Legionella* sample(s) will be taken and managed, and to which lab the sample will be sent to for analysis.)	
Responsible Party for Corrective Action(s) (Describe who is responsible for interpreting sample results and implementing required corrective action(s))	
Corrective Action(s) and Timeline (Describe corrective action(s) and timeline including at minimum those described in Table 1 of §8-05, along with documentation procedure. Full description of notification procedures to be provided in Section 1.2.)	

SECTION 7: SUMMARY TABLE OF ACTIVITY FREQUENCY

You must record the frequency of cooling tower operational procedures such as inspection, maintenance, monitoring, cleaning and treatment activities. This table provides an outline of these requirements. Minimum frequencies are marked with 'X' and should be adjusted to higher frequencies, if necessary.

You can attach separate plans published by the cooling tower manufacturer within the "Operation and Maintenance Manual" or related materials in the Appendix.

Activity Title (Rule Section)	Description of Service (if applicable)	Seasonal Start-up	Daily	Weekly	Quarterly (every 90 days in use)	Biennial
Routine Monitoring (8-04(a)(3))	Check all wetted surfaces (safely visible during cooling tower operation), cooling tower basins and drift eliminators for the presence of organic material, biofilm, algae, scale, sediment and silt/dust deposits, organics (oil and grease), and other visible contaminants. Check sufficiency of chemical dosing and control equipment, of storage and delivery of treatment chemicals, and the bleed-off system.			X		
Compliance Inspection (8-04(b))	Inspect for the presence of visible contaminants, the general condition of the cooling tower, the basin packing material and drift eliminator; the quality of the water make-up connections and control; the proper functioning of the conductivity control; the proper functioning of all dosing equipment (pumps and strain gauges); and the review of routine maintenance records to ensure proper implementation of required activities (including those specified in 8-04(b)) and corrective actions as needed.	X			X	
Cleaning (8-04(d))	Clean water contact areas such as the basin, sump, fill, spray nozzles and fittings, drift eliminators, air intake louvres in accordance with manufacturer's recommendations, after properly accessing and/or removing equipment.					X
Summertime Hyperhalogenation (8-04(f))***	The cooling tower system must undergo a Summertime hyperhalogenation at least once each year between July 1 and August 31. This must be performed by a person qualified to apply biocide. This must be performed with a registered chlorine or bromine based biocide that is effective at legionella control.					x
Daily treatment (8-05(a))	Cooling Tower water must be treated daily and such treatment must be automated, unless the MPP explicitly states how manual or less frequent biocide additions will provide effective control of legionella growth.		X			
Tower Start-up (8-06(b)(1))	Fully clean and disinfect, drain to waste and disinfect OR sufficiently hyperhalogenate the recirculated water before start-up; in both cases sample *Legionella.*	X				
Water Quality Monitoring (8-05(f))	Measure the water quality parameters pH, conductivity, temperature, and biocidal indicator.		X*			
Bacteriological Indicator Sampling (8-05(f))	Sample bacteriological indicator at given point and time of day.			X		
Legionella* Sampling** (8-05(f))*	Sample *Legionella* during regular operation and emergency events	X**			X	

* At least 3 times per week, with no more than 2 days between any measurement
**Counts as one of the required quarterly *Legionella* samples
***This is not required if the cooling tower system is in full shutdown and completely drained of water for the entire period between July 1 and August 31.
**** Must also be performed when any of the conditions in 8-05(f)(3) occur.

SECTION 8: RECORD KEEPING

Requirement: Title 24, Chapter §8-07

The owner must keep a record of any maintenance, inspection, deficiency, corrective action, water treatment, test result, cleaning or disinfection performed on the cooling tower for at least the past 3 years. This information must be maintained in the building where the cooling tower is located or in an adjacent building or structure on the same campus, complex, lot, mall or on-site central engineering division.

All of the required records should be attached to this plan. Include a summary checklist of the records or protocols provided in Appendix C.

COOLING TOWER MAINTENANCE PROGRAM AND PLAN

Appendices

Appendix A: REFERENCES

One can search the New York State Cooling Tower website www.health.ny.gov/ to find the most up-to-date reference information and links.

ASHRAE Standard 188-2018, Legionellosis: Risk Management for Building Water Systems:
Standard 188-2018 - American Society of Heating, Refrigerating and Air-Conditioning Engineers (iwrapper.com)

CTI WTP-148 (2008) Legionellosis Guideline: Best Practices for Control of Legionella:
http://www.cti.org/downloads/WTP-148.pdf

New York City DOHMH Legionnaires' Disease Main Page:
Legionnaires Disease - NYC Health

New York State DOH Legionnaires' Disease Main Page:
https://www.health.ny.gov/diseases/communicable/legionellosis/

US Centers for Disease Control (2015) Environmental Investigation Tools:
http://www.cdc.gov/legionella/health-depts/inv-tools-cluster/environmental-inv-tools.html

Appendix B: DEFINITIONS

When used in this document, in accordance with Title 24, Chapter 8 (Cooling Towers) of the Rules of the City of New York, the following terms have these meanings:

ANSI/ASHRAE Standard 188-2018 means *ANSI/ASHRAE Standard 188-2018 Legionellosis: Risk Management for Building Water Systems*" a publication issued by the American Society of Heating, Refrigeration and Air-Conditioning Engineers and the American National Standards Institute (ASHRAE/ANSI), final approval date June 28, 2018.

Building means any structure or premises used or intended for supporting or sheltering any use or occupancy. The term shall be construed as if followed by the phrase "structure, premises, lot or part thereof" unless otherwise indicated by the text.

Bacteriological Indicator means a biological process control indicator that estimates microbial content in the circulating water of a cooling tower system, such as heterotrophic plate count (HPC) as measured in a water sample or by a dip slide.

Biocidal Indicator means a direct or indirect measurement of biocide in the cooling tower recirculating water, such as free halogen residual concentration or oxidation reduction potential (ORP).

Building Identification Number (BIN) means a unique 7-digit number, assigned by NYC City Planning, to a specific building.

Chain of Command means a supervisory structure for MPP personnel to follow in carrying out their duties.

Cleaning means physical, mechanical or other removal of biofilm, scale, debris, rust, other corrosion products, sludge, algae and other potential sources of contamination.

Cleaning/Chemical Application Person means the service provider who performs biannual and seasonal start-up (if applicable) cleaning and oversees application of daily or other approved chemical treatment procedures.

Cooling Tower means a cooling tower, evaporative condenser, fluid cooler or other wet cooling device that is capable of aerosolizing water, and that is part of, or contains, a recirculated water system and is incorporated into a building's cooling process, industrial process, refrigeration system, or energy production system.

Cooling Tower System means one or more cooling towers and all of the recirculating water system components, process instruments and appurtenances through which water flows or comes into contact with key parts consisting of biocide, anti-scaling and anti-corrosion chemical applicators, valves, pumps, the cooling tower superstructure, condensers and heat exchangers and other related components. The cooling tower system may comprise multiple cooling towers that share some or all superstructure components.

Corrective Actions mean disinfection, cleaning, flushing, and other activities to remedy biofilm growth, *Legionella* proliferation, or other system mechanical problems identified through monitoring, inspections and/or other activities as may be determined by the Department, in order to return control values to within established limits when monitoring or measurement indicates the control values are outside of the established control limits.

Compliance Inspection means the observations, inspections, testing and other activities that are required on a regular basis (at least every 90 days) in accordance with the MPP and Chapter 8, including the completion of a written or electronic checklist, which must be conducted and certified by a qualified person.

Dead legs mean lengths of pipe normally closed at one end or ending in a fitting within the cooling tower system that limits water circulation and is likely to result in stagnation.

Department means the New York City Department of Health and Mental Hygiene.

Dip Slide means a method to test for microorganisms (such as HPC) consisting of a sterile culture medium affixed to a sterile slide, that is dipped directly into the liquid that is to be sampled.

Disinfection means using one or more biocides at a defined concentration, under specific conditions and for an established period to kill or inactivate pathogenic microorganisms.

Drift Eliminator means a system of baffles or cells that cause separation of entrained water, designed to remove aerosols from cooling tower exhaust.

Heterotrophic Plate Count or **HPC** means a measure of the concentration of microorganisms that require an external source of organic carbon for growth including bacteria, yeasts and mold in water samples.

Idling means turning off or limiting water circulation within the cooling tower system but not draining the system water.

Immediate or **Immediately** means within 24 hours when used in regards to (i) actions required to be taken under this specification, or (ii) incidents or results required to be reported under this specification, or (iii) records required to be made available to the Department under this Chapter.

Legionella means the genus of bacteria which is ubiquitous in aqueous environments, including the recirculated water of cooling tower systems that are not properly or regularly maintained. There are more than 50 different species of *Legionella*, all of which are potentially pathogenic.

***Legionella* Sample** means water or other sample to be examined for the presence of viable *Legionella* bacteria using semi-selective culture media and procedures specific to the cultivation and detection of *Legionella* species, such as those outlined in International Organization for Standardization (ISO) Standards 11731-1:1998 and 11731-2:2004.

Maintenance Program and Plan (MPP or Plan) means a written set of measures (a risk management plan) describing monitoring, cleaning, disinfection and all other activities for the prevention and control of *Legionella* growth in a cooling tower system, that is in accordance with section 5, 6 and 7.2 of ANSI/ASHRAE 188-2018 and with the manufacturer's instructions, and is developed by a qualified person. This includes documentation of the plan's implementation and operation.

Make-up Water means water added to the cooling tower system on a regular basis to replace water lost by evaporation, drift or leakage and to maintain optimal system operation and process control.

Management and Maintenance Team means the individuals who are legally and practically responsible for the continued effective and safe operation of a cooling tower system.

Owner means any person, agent, firm, partnership, corporation or other legal entity having a legal or equitable interest in, or control of a building or other premises where the cooling tower is located. In all instances, the legal owner of the building shall be deemed an owner within the meaning of the plan. Further, where a tenant owns a cooling tower that services the tenant's leased premises, the tenant is an "owner" within the meaning of this plan. Additionally, if a tenant does not own the cooling tower but has a lease or contractual arrangement to maintain the cooling tower, the tenant shall be deemed an agent having control of the cooling tower, and thus an "owner," for purposes of this plan.

Plan Preparer means the lead author who is responsible for preparing this plan.

Plan Model means the document prepared above giving the major required elements of the MPP, to be modified by the plan preparer for each facility.

Process Control Measures mean actions that must be taken to evaluate internal functioning of the cooling tower system, including monitoring conductivity, pH, temperature, biocidal indicator, bacteriological indicators and other parameters, and observing phenomenon such as scaling, corrosion and biofilm.

Process flow diagram means a step-by-step drawing of a building water system that includes the location of all water processing steps - including, but not limited to, conditioning, storing, heating, cooling, recirculation, and distribution – that are part of the building water systems.

Qualified Person means a New York State licensed professional engineer; a certified industrial hygienist; a certified water technologist with training and experience developing management plans and performing inspections in accordance with current standard industry protocols including, but not limited to ASHRAE 188-2018; or an environmental consultant who has at least two (2) years of operational experience in water management planning and operation.

Responsible Person means a person employed or whose services are retained by an owner, who understands and is capable of performing the required daily water quality measurements, weekly system monitoring and operation and maintenance of a cooling tower system in accordance with the MPP, and making recommendations for diagnosing anomalous conditions that require corrective actions, under the guidance of a qualified person. The responsible person

should be capable of: measuring water pH, temperature and disinfectant residual levels at proper locations/frequencies; checking biocide storage container levels; recording dates, amounts and times of biocide injection; and logging all other relevant data and comments.

Risk Management Assessment means a process for comprehensively identifying, describing and evaluating in detail all aspects of a cooling tower system that may potentially contribute to the growth and dissemination of *Legionella* bacteria.

Routine Monitoring means the set of evaluation and other activities that must be completed periodically in accordance with the MPP and Chapter 8.

Stagnant Water means water that is confined, standing, experiencing period of low flow or usage, and not being actively circulated through the cooling tower system.

Standard Methods means accepted protocols for sampling, recording, laboratory testing, reporting and other procedures related to environmental and water quality sampling, including, but not limited to, those set forth in *Standard Methods for the Examination of Water and **Wastewater*** **22nd Edition, 2012**, a publication issued jointly by the American Public Health Association, the American Water Works Association and the Water Environment Federation and the *Standards Microbiological Methods* (TC 147/SC4) published by the International Organization for Standardization, or successor editions.

Summertime hyperhalogenation means a one-time per year dosing of higher than normal levels of chlorine or bromine based biocide conducted between July 1 and August 31 to ensure the maintenance of a minimum of 5 parts per million (ppm) free halogen residual in the cooling tower system for at least 6 hours.

System Shutdown means shutting off or closing and draining the cooling tower system when cooling is no longer needed.

System Start-up means commissioning a new system, or putting the cooling tower system into operation after shutdown or idling.

Testing means conducting a planned sequence of observations or measurements of physical, chemical, or microbial characteristics of water to assess whether conditions throughout building water systems meet the goals set by the management and maintenance team.

Validation means initial and ongoing confirmation that the MPP, when implemented as designed, effectively controls the hazardous conditions throughout the building water systems.

Verification means initial and ongoing confirmation that the MPP is being implemented as designed.

Water Quality Parameters mean temperature, pH, conductivity, biocidal indicator, bacteriological indicator and other chemical and physical indicators of system process control.

Appendix C: LOGS AND MAINTENANCE RECORDS

Checklist of Attached Records

Record of Activity	Yes	No	Comments
Water Quality Parameter Log			
Routine Monitoring Checklist			
Routine Maintenance Checklist (from Manufacturer)			
Compliance Inspection Checklist			
Other record, if applicable			
Other record, if applicable			

Water Quality Parameter Log

(Insert a routine water quality parameter log sheet identical to the model below or develop your own record that includes this information)

Bidding contractor must identify monitoring locations throughout the cooling tower water system.

Monitoring Staff (Responsible Person) Name:						**Month, Year:**		
Day	Location	Time Taken	pH	T(ºF)	Biocidal Residual (ppm, or mV for ORP)	Conductivity (mS)	Staff Initials	Comment
1	(Such as CT basin, return water or point of injection) (High risk Area #1 if applicable)							
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								

Routine Monitoring Checklist

(Insert a weekly monitoring checklist identical to the model below or develop your own record that includes this information)

Name of the Monitoring Staff (Responsible Person):			**Date:** (D/MM/YYYY)
Aspect	**Yes**	**No**	**Comments – Further Action Required**
Wetted surfaces (safely visible during cooling tower operation) are free of organic material, biofilm, algae, scale, sediment and silt/dust deposits, organics (oil and grease), and other visible contaminants			
Tower basins are free of organic material, biofilm, algae, scale, sediment and silt/dust deposits, organics (oil and grease), and other visible contaminants			
Drift eliminators are free of organic material, biofilm, algae, scale, sediment and silt/dust deposits, organics (oil and grease), and other visible contaminants			
Chemical dosing and control equipment is sufficient			
Storage and delivery of treatment chemicals is treatment is sufficient			
Bleed-off system is sufficient			

Routine Maintenance Checklist

Manufacturer's maintenance checklist from the "Operation and Maintenance Manual" is on the following pages.

Compliance Inspection Checklist

(Insert a compliance inspection checklist identical to the model below or develop your own record that includes this information)

Inspection Staff (Qualified Person) Name:			**Date:**
Aspect	**Yes**	**No**	**Comments – Further Action Required**
Cooling tower equipment and basin free of visible contaminants			
Cooling tower general condition observed as satisfactory			
Basin observed as satisfactory			
Packing material observed as satisfactory			
Drift eliminator observed as satisfactory			
Quality of the water make-up connections and control maintained			
Proper functioning of the conductivity control maintained			
Proper functioning of all dosing equipment (pumps and strain gauges) maintained			
Routine maintenance records reviewed to ensure proper implementation of required activities (including those specified in 8-04(b)) and corrective actions as needed			

Declaration of Summertime Hyperhalogenation form

ATTACHMENT 5

DECLARATION OF SUMMERTIME HYPERHALOGENATION (FORM CT SH DF01)
BUILDING WATER SYSTEMS OVERSIGHT
NYC DEPARTMENT OF HEALTH & MENTAL HYGIENE

Please print clearly

NYC CT System ID #	2	0	0	0						

SUMMERTIME HYPERHALOGENATION

✓*Prepare for summertime hyperhalogenation by ensuring water flow through the whole cooling tower system and all components.*
✓*If there is risk of odor or overspray, shut off fans on the cooling tower during summertime hyperhalogenation if present.*

Applicator Name **Company**	**Category 7G Certified Supervisor Name** **Company**	**7G Applicator Certification #**

Hyperhalogenation Protocol (check box and describe protocol, if other) Cooling Tower Institute WTB-148 Other:	**Check Minimum Biocide Residual and Contact Time** Minimum 5 parts per million (ppm) chlorine residual* for at least 6 hours ** Equivalent free halogen residual may be measured if using non-chlorine disinfectant*

Biocide Application

Biocide Feed Date	MM/DD/YYYY	**Feed Pump Start Time**	HH:MM	**Feed Pump End Time**	HH:MM	**Volume Applied** (include unit of measure)

Biocide Product Name	**Biocide Supplier Name**	**NYSDEC Registration #**	**Effective pH Range**

List Other Chemicals Applied

Product Name	Product Supplier Name	NYSDEC Registration # (if applicable)	Volume Applied (include unit of measure)
1.			
2.			
3.			
4.			

Water Quality Measurements

Date	Time	Sample Location #1 Routine representative sampling location per §8-05(f)(4): _____			Sample Location #2 Other representative sampling location per §8-05(f)(4): _____			Initials of Water Quality Monitor
		pH	Chlorine Residual (ppm)*	Other Parameters Measured:	pH	Chlorine Residual (ppm)*	Other Parameters Measured:	
MM / DD / YYYY	HH:MM							

Instructions for Submission

- Upload this completed form to the NYC Registration Portal at coolingtowers.cityofnewyork.us within 30 days of completing summertime hyperhalogenation.
- Collect a *Legionella* culture sample within 3 to 45 days after the summertime hyperhalogenation. The qualified person shall submit the *Legionella* culture test date in the NYC Registration Portal within 5 days of collection.

DECLARATION

By signing below, I attest under penalty of perjury that the summertime hyperhalogenation was performed in accordance with the requirements required by the section 8-04(f) of Chapter 8 of Title 24 of the Rules of the City of New York.

Building Owner / Owner Representative Signature	**Date** MM / DD / YYYY

Appendix D: ADDITIONAL SYSTEM INFORMATION

(Insert any additional relevant information about the cooling tower/system including but not limited to material data safety sheets for chemicals that will be used)