

From: [Dan Coday](#)
To: [Resolution Comments](#)
Cc: mfarrell@meshvac.com; jkelly@meshvac.com; [Don Miller](#)
Subject: Proposed resolution to add new Chapter 8 (Cooling Towers) to Title 24
Date: Thursday, December 17, 2015 11:49:42 AM
Attachments: [image001.png](#)

Dear Svetlana,

Congratulations to NYC Health for moving forward with a proposed resolution for a new Chapter 8 of Title 24 of the Rules of the City of New York for maintenance of cooling towers. These draft regulations for routine inspection, operation, maintenance, and water treatment are a definite positive step in the right direction and I'm very happy to see them. However, it's not enough to substantially curb Legionnaires' disease from cooling towers next summer and the summers to come.

Because the basic design of the cooling tower can either accelerate or greatly limit the ability for Legionella to feed, breed, and spread to humans, Chapter 8 must include regulations on minimum cooling tower design requirements for Chapter 8 to move the needle. Whatever little wording that currently exists about design does not improve what already commonly exists across the Bronx and rest of NYC. I posted a public [comment](#) on the NYC Rules web site about this with three (3) specific and simple recommendations that do not limit or prohibit competition and do not place undue burden on building owners (those comments can be seen below my signature line). These comments are a culmination of feedback and comments I received from an online [post](#) I made about the subject on November 10th. That post has been viewed by over 700 professionals in the health, mechanical engineering, mechanical equipment, cooling tower manufacturing, water treatment, and environmental science professions around the globe.

Please forward this email to anyone in your department who would have capability and interest in ensuring Chapter 8 does indeed substantially curb Legionnaires' disease from cooling towers. Should you or anyone within NYC Health wish to discuss from the perspective of industry expertise and not targeted toward a single vendor, please let me know.

Our local NYC representative firm, MES HVAC, has been made aware of the January 4th public hearing about the proposed resolution to add Chapter 8 to Title 24.

Sincerely,
Dan

Dan Coday

Sales Manager - Offshore FRP & Concrete Towers
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These amendments are helpful as they provide greater specificity on proper requirements for routine inspection, operation, maintenance, and water treatment. However, they lack a critical component of cooling tower Legionnaires' disease risk mitigation, which is the specificity on minimum cooling tower design requirements.

There is no meaningful deviation in acceptable design features contained within this document compared to the cooling towers associated with the 2015 outbreaks, the same basic design still being installed throughout NYC on a daily basis. As reported by the New York Times on October 1, 2015, a new cluster of Legionnaires' disease took place in the Bronx less than two (2) months after the cooling towers were disinfected. Routine inspection, maintenance, and water treatment is not enough, and the root cause has to be addressed through minimum cooling tower design requirements.

Cooling towers can feed, breed, and spread Legionella in an accelerated or limited manner, depending on their design. Readily available technology already commonly exists and is offered by the major manufacturers that substantially reduces the ability for the cooling tower to feed, breed, and spread Legionella. These design features that can help dramatically reduce the potential for a person to become infected with Legionnaires' disease from a cooling tower are rarely installed. This is because they cost slightly more, are not in "base" specifications, and are not required by building code.

Not all cooling towers have the exact same design, and design features for significantly reducing the feeding, breeding, and spreading of Legionella vary by design. Design features that allow almost any manufacturer to immediately participate in substantially reducing the ability for Legionella to feed, breed, or spread include:

- 1) Feed – scale and algae are commonly present in cooling towers and are primary food sources for Legionella. Many forced draft cooling towers block 100% of the sunlight contact from the circulating water, and therefore eliminate algae. Induced draft cooling towers can

be outfitted with antimicrobial fill media and drift eliminators that substantially reduce scale build up. Require either a design that allows no sunlight to contact the water so algae is no longer present or the use of antimicrobial fill media and drift eliminators for reduced scale build up to significantly help the effectiveness of routine maintenance and water treatment.

- 2) Breed – cold water basins commonly have stagnant zones, making it easy for bacteria to breed. Increased water velocity and turbulence in the basin can be accomplished making it more difficult for Legionella to breed. Require either the use of a “flow through” basin, sloped basin, or basin sweeper system to significantly help the effectiveness of routine maintenance and water treatment.

Corrosion can be a source for breeding. Many cooling towers are constructed from galvanized metal and susceptible to corrosion. Although this can be a more expensive upgrade, consider requiring a minimum of 304 stainless steel or FRP (with fire sprinkler system if FRP and over 250 ft² in base area) construction and compatible piping materials to reduce the possibility of corrosion to significantly help the effectiveness of routine maintenance and water treatment.

- 3) Spread – once Legionella feeds and breeds inside the cooling tower, it is spread from the cooling tower to the susceptible host through mist or drift. Section 8-04.c.e. calls for drift losses between 0.005% and 0.002%. This is already the same drift loss percentage in most base specifications and likely the cooling towers that caused the 2015 outbreaks. It doesn't help. The major cooling tower manufacturers and OEM/aftermarket providers of drift eliminators promote drift eliminators with maximum drift loss of 0.0005%. Some variance may be needed for some designs based on specific applications. Require a maximum drift rate of 0.001% when operating at design conditions across the board for all cooling tower designs. This represents an average 71% reduction in the amount of mist or drift that's able to travel from a cooling tower to a susceptible host.

With 5,000 cooling towers registered, there is a cooling tower being installed, replaced or rebuilt almost every day in NYC. There are many additional minimum design feature requirements that can incrementally reduce the potential for Legionnaires' disease from cooling towers. However, these are very simple and significantly meaningful requirements that can be added to building code now for new and replacement or rebuilt cooling towers to ensure a substantial reduction in the root cause feeding and breeding Legionella in cooling towers. When combined with 71% fewer emissions working in conjunction with Chapter 8 inspection, operating, maintenance, and water treatment guidelines, we hold the keys to substantially reducing Legionnaires' disease from cooling towers.

From: [Radmila Miletich](#)
To: [Resolution Comments](#)
Cc: [Gavin Donohue](#)
Subject: IPPNY's Comments Requesting 30 day extension of public comment period on the City's draft regulation on cooling towers and Legionella
Date: Tuesday, December 22, 2015 10:34:45 AM
Attachments: [NYC Cooling Towers and Legionella 12 22 15 IPPNY Comments.pdf](#)

Dear Ms. Burdeynik:

Please find attached IPPNY's comments on the New York City Department of Health and Mental Hygiene's draft regulation on cooling towers and Legionella.

IPPNY's comments strongly urge the New York City Department of Health and Mental Hygiene to extend for an additional 30 days the due date for public comments on this draft regulation, in order to allow additional time for the City to work with the NYS Department of Health and the NYS Department of Environmental Conservation on the development of a more workable approach to the regulations, as they relate to energy production systems, in a manner that ensures that State Pollutant Discharge Elimination System permits of cooling tower owners are not contravened.

Thanks so much for the opportunity to provide these comments.

Regards,

Radmila P. Miletich
Legislative & Environmental Policy Director
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DEC 29 REC'D

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Gavin J. Donohue, *President & Chief Executive Officer*

December 22, 2015

Via email at: resolutioncomments@health.nyc.gov

New York City Department of Health and Mental Hygiene
Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th Street, 14th Floor
Long Island City, NY 11101-4132

Re: Request for 30 day extension of public comment period on the City's draft regulation on cooling towers and Legionella

Dear Ms. Burdeynik:

The Independent Power Producers of New York, Inc. (IPPNY) is a not-for-profit trade association representing the independent power industry in New York. IPPNY's Members¹ are companies involved in the development of electric generating facilities, the generation, sale, and marketing of electric power, and the development of natural gas facilities in the State of New York. IPPNY's Members drive the state's economic engine by producing over 75 percent of New York's electricity using a wide variety of generating fuels and technologies including cogeneration, nuclear, hydro, coal, wind, oil, landfill gas, natural gas, and biomass.

The New York City Department of Health and Mental Hygiene has proposed for public comment a new regulation² that would require owners of facilities with cooling towers to take steps to protect the health and safety of New Yorkers from exposure to Legionella. The definition of a cooling tower includes those at energy production systems.

IPPNY urges the New York City Department of Health and Mental Hygiene to extend for an additional 30 days, until February 3, 2016, the due date for public comments on this draft regulation. The draft regulation, which has been made available for public comment until January 4, 2016, was signed on November 20, 2015. Three major holidays fall within this public comment period: Thanksgiving, Christmas, and New Year's Day. IPPNY points out that an

¹ All of the views expressed in IPPNY's comments do not necessarily represent the positions of each of our Members. Since IPPNY represents a broad spectrum of companies, we anticipate some of our Members also may submit comments on their own.

² http://rules.cityofnewyork.us/sites/default/files/proposed_rules_pdf/p-dohmh_12-3-15_a_ch_8.pdf

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extension of the comment due date would allow additional time for the development of a more workable approach to the regulations, as they relate to energy production systems, while also preserving public health, safety and general welfare.

The New York State Department of Health (DOH) has issued emergency regulations³ on this same topic that also pertain to energy production systems. IPPNY has been working with the DOH and the New York State Department of Environmental Conservation (DEC) on a more workable approach to these regulations, but more time is needed for the details to be developed. **IPPNY urges the New York City Department of Health and Mental Hygiene to take the necessary time to coordinate with the DOH and the DEC** and to develop the most efficient approach. The draft regulations of the New York City Department of Health and Mental Hygiene on this matter would benefit from being informed by how the DOH works with the DEC to develop regulations that appropriately treat cooling towers at energy production systems. The DOH has indicated that it intends to issue a draft permanent regulation for public comment early in 2016 but most likely after January 4, 2016. The DOH's emergency rule remains in effect until February 10, 2016, and that effective date allows for a continuity of protectiveness of public health, safety and welfare *statewide*, while the details of permanent regulations at both the State and City levels are in the process of being developed.

Power plants, including those that have cooling towers, are essential for maintaining the reliable operation of the State's electric system. The reliable operation of power plants helps maintain public health and safety, especially as evidenced by the health and safety consequences experienced in New York City as a result of the 2003 Blackout.

Cooling towers at energy production systems, which are major electric generating facilities, are different than building system cooling towers. The cooling towers at major power plants are much larger in size. Cooling towers at power plants are essential components of the operations of the facilities, and they are monitored, treated, and maintained by on-site power plant trained personnel (or through expert consultants) in a manner that ensures the cooling towers are free of foreign matter in order to maintain optimal operations of power plants. The discharge of water from cooling towers is highly regulated by the DEC pursuant to the State Pollutant Discharge Elimination System (SPDES) permits of cooling tower owners pursuant to Part 750 of Title 6 of New York State Codes, Rules & Regulations. The cooling tower water treatment requirements for power plants pursuant to SPDES permits sufficiently satisfy the intent of preventing the growth and dissemination of Legionella bacteria.

The DOH regulation may involve actions, such as changes in chemical use or changes to operational manuals, that may affect compliance with SPDES permits. DOH acknowledges the importance of the DEC's SPDES permit program and that DOH regulations cannot conflict with compliance with DEC SPDES permits. As a result, the DOH and DEC are developing jointly a DEC guidance document, to be posted on the DEC's website,⁴ to allow biocides based upon chlorine and bromine to continue to be used to treat the presence of Legionella within cooling towers in a manner consistent with SPDES permits. If companies use a chemical other than one that is chlorine or bromine, then they would need to submit information for DEC approval prior to discharge. The DEC has indicated that it would like to have a streamlined approach that is

³ <https://www.health.ny.gov/diseases/communicable/legionellosis/>

⁴ <http://www.dec.ny.gov/chemical/102964.html>

protective of the environment, simple for compliance, and addresses the Legionella concern. Likely, the New York City Department of Health and Mental Hygiene would desire a similar approach and would benefit from being informed by the process that the DOH and DEC are working to develop.

Several significant provisions in the City's draft regulation raise concerns for energy production cooling towers. The City's draft regulation envisions a "one size fits all" approach that is not the best for all circumstances, and much more flexibility is needed. Below are examples of major concerns, based upon IPPNY Member feedback to date, although not necessarily an exhaustive list of concerns.

- ***Section 8-06 - System shutdown and start-up; commissioning and decommissioning cooling towers***

This proposed provision, which requires complete de-watering and cleaning of cooling towers when the cooling towers are shutdown or idle for more than five days, is simply not practical or workable for cooling towers at power plants. In addition, a Legionella sample is required before the startup of a cooling tower system after an extended shutdown of five or more days.

It is not uncommon for a seasonal scheduled power plant outage in the Spring or Fall to improve the operations of the facility to last for more than five days. This normal outage period automatically would be subject to the draining and cleaning portions of the City's draft regulation, regardless of whether Legionella may be present and whether improvements to the operations of cooling towers are part of the scheduled maintenance activities under the planned outage period. Draining and cleaning a cooling tower at a power plant is a humongous undertaking, due to the enormous amount of water involved, the time it would take to drain and clean the tower, and the huge associated costs. However, in order to meet the requirements of a reliable electricity system in operation according to the enforceable rules of the competitive wholesale electricity market, energy production facilities must have the ability to come back on line and start producing electricity expeditiously, without additional unnecessary regulatory burdens to the facility.

Also, it is not unusual for power plants that operate in a cyclical manner on a merchant basis according to the fluctuating demands for power under the rules of the competitive wholesale electricity market to not be in operation for more than five days, simply because their power production is not needed to meet electricity demand. It would be utterly impractical for power plant cooling towers to be completely drained and cleaned every time this market-induced and temporary lapse in power production occurs. This draining and cleaning requirement would prevent power plant owners from participating in the day-ahead bidding activity of the enforceable rules of the competitive wholesale electricity market, because their power plant would be off-line for an extraordinary period as a result of the inappropriate need to drain and clean the cooling tower. In the alternative, it would not be cost-effective or practical to continue to circulate water through the cooling tower, when the power plant temporarily ceases to operate because it is not needed to meet power demands.

Importantly, public health and welfare is safeguarded when power plants temporarily are not operating. Expert personnel continue to monitor the cooling towers and maintain water chemistry within the towers according to SPDES permit requirements, even though the power plant is off-line. In addition to the SPDES permit requirements, power plants are required to have an

operation and maintenance manual for the cooling towers to address procedures, including but not limited to, start-up and shut-down procedures. Power plants should not be lumped together with other types of facilities that have cooling towers and may have problems due to less constant vigilance.

A shutdown under the City's draft regulation is very different than the normal electricity industry meaning of that term. If a power plant is not making electricity, a cooling tower still is in-service and available; otherwise, the power plant would not be able to bid into the day-ahead wholesale electricity market and would not be able to resume operations in a timely manner when it is needed to operate again to meet electricity demand.

Power plants with cooling towers conduct proactive testing at least annually in the Summer months because the water is warmer in the tower at that time, meaning that this period makes the most sense to test for agents such as Legionella. Tests are not conducted during other seasons because the water is cooler. This seasonal temperature is the reason that testing is done annually and not quarterly.

Public health and welfare are safeguarded because the public simply cannot access the power plant cooling tower from the roadway. Power plants are critical infrastructure due to security reasons and are not publically accessible facilities, such as those facilities which the public easily can contact and which were the main focus of the Legionella concern in New York City.

Power plants protect their employees from Legionella concerns by avoiding the presence of the agent through compliance with the SPDES permit process. Power plant employees have hazard communications, have personal protective equipment, and are trained in chemical use.

- ***Section 8-03 Maintenance program and plan – (c) Risk management assessment***

This section lists nine conditions that may pose risk factors for Legionella proliferation. These nine parameters could lead to potentially upgrading the cooling tower equipment and modifications to the operation and maintenance manuals, which could result in a potential SPDES permit modification for the power plant.

- ***Section 8-04 Process control measures - (c) Maintenance - (2) Replacement in kind***

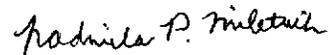
The language in this section is similar to Occupational Safety & Health Administration (OSHA) Process Safety Management requirements. New equipment must be as good as existing equipment. Flexibility is needed, if other equipment is not available or cannot be used without a cumbersome process.

In terms of a potentially beneficial provision of the New York City Department of Health and Mental Hygiene's draft regulation, a proposed provision would allow a cooling tower owner to apply for a modification from the regulation if significant hardship or difficulty would result. The nature and details of this process would benefit from being informed by the outcome of the discussions between the DOH and the DEC.

IPPNY strongly recommends that the New York City Department of Health and Mental Hygiene coordinate with DOH, DEC, and industry to develop workable regulations for cooling towers at energy production facilities. In addition, the New York City Department of Health and Mental Hygiene should allow time in the public comment process on the regulation for inclusion of the approach being developed by the DOH and the DEC.

Thank you for the opportunity to provide these comments, and IPPNY urges you to incorporate them into your decision-making. **We urge New York City Department of Health and Mental Hygiene to extend for an additional 30 days the due date for public comments on this draft regulation to allow additional time for the development of a more workable approach to the regulations, as they relate to energy production systems, in a manner that ensures that SPDES permits of cooling tower owners are not contravened.** If you have any questions or need additional information, please feel free to contact IPPNY.

Sincerely,



Radmila P. Miletich
Legislative & Environmental
Policy Director

ENVIRONMENTAL ENERGY ALLIANCE OF NEW YORK

7679 Bay Circle
Liverpool, NY 13090

December 23, 2015

Via email at: resolutioncomments@health.nyc.gov

New York City Department of Health and Mental Hygiene
Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th Street, 14th Floor
Long Island City, NY 11101-4132

Re: Request for 30 day extension of public comment period on the New York City draft regulation on cooling towers for control of *Legionella*

Dear Ms. Burdeynik:

The Environmental Energy Alliance of New York, LLC (the Alliance; see list of company members highlighted below on this page) is an ad hoc, voluntary group of electric generating companies, transmission/ distribution companies and other providers of energy services in the State of New York. The Alliance supports the efforts of its members in understanding of state and national environmental regulatory initiatives in order to permit them to more effectively formulate and achieve their business goals and proactively advocate cost-effective regulations and policies. The operations of Alliance members contribute to the reliability of the State's electric grid and to the economic well-being of New York State.

We are writing to request a 30-day extension to the public comment period on the New York City Department of Health and Mental Hygiene proposed regulation¹ that would require owners of facilities with cooling towers to take steps to protect the health and safety of New Yorkers from exposure to *Legionella*. Alliance member companies operate both building service cooling towers and power plant cooling towers. An additional 30 days for comment would allow the necessary time for to offer the City a workable approach for some of the unique considerations of our cooling towers that are already subject to State Pollutant Discharge Elimination System (SPDES) permit requirements.

The New York State Department of Health (DOH) has issued emergency regulations on this same topic and the Alliance has been working with the DOH and the New York State Department of

¹ http://rules.cityofnewyork.us/sites/default/files/proposed_rules_pdf/p-dohmh_12-3-15_a_ch_8.pdf

*Central Hudson Gas & Electric Corporation
Consolidated Edison Company of New York, Inc.
CCI Roseton
Dynergy Power LLC.
PSE&G Long Island
National Grid
New York Power Authority*

*New York State Electric & Gas Corporation
NRG Energy, Inc.
Orange & Rockland Utilities, Inc.
Rochester Gas & Electric Corporation
Selkirk Cogen
TransCanada
US Power Generating Co.*

Environmental Conservation (DEC) on an approach to these regulations that provides assurance of Legionella protection while at the same time addressing specific power plant facility concerns. Our primary concern in those discussions is making sure that whatever is in the Legionella protection regulation is consistent with the SPDES permit requirements at those facilities.

Cooling towers at energy production systems are different than building system cooling towers. The cooling towers at major power plants are much larger and are critical components of the operations of the facilities. Because they are essential to operations they are monitored, treated, and maintained by on-site trained personnel (or through expert consultants) on a much more stringent basis compared with building system cooling towers. Importantly, a critical operating parameter for power plants is routine treatment for biologic fouling. We expect, but have not yet demonstrated, that those actions likely keep *Legionella* contamination at near non-detection levels. Our comments when complete will suggest that a Legionella sampling regime consistent your proposed regulation in conjunction with many of the activities already in place will meet the intent of your regulation.

A major concern for us is the potential conflicts with requirements of power plant SPDES permits. The discharge of water from cooling towers is regulated by the DEC pursuant to the SPDES permits of cooling tower owners pursuant to Part 750 of Title 6 of New York State Codes, Rules & Regulations. The problem we are wrestling with now is how to respond in the unlikely event *Legionella* is detected at the action levels proposed by the state and city regulations because parts of those requirements are inconsistent with the operating characteristics and the permit conditions managed under SPDES. We will suggest that whatever we work out with DEC and DOH be incorporated in your regulation for power plant cooling towers. Unfortunately that process will not be complete by January 4.

Therefore, we request a 30-day extension so that our discussions with the agencies can lead to an acceptable plan for power plant cooling towers. If you have any questions or comments, please contact me (roger.caiazza@eanyweb.org or 315.529.6711). Thank you.

Sincerely,

A handwritten signature in cursive script, appearing to read "Roger Caiazza".

Roger Caiazza
Director

ENVIRONMENTAL ENERGY ALLIANCE OF NEW YORK

7679 Bay Circle
Liverpool, NY 13090

January 4, 2016

Via email at: resolutioncomments@health.nyc.gov

New York City Department of Health and Mental Hygiene
Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th Street, 14th Floor
Long Island City, NY 11101-4132

Re: Comments on New York City draft regulation on cooling towers for control of *Legionella*

Dear Ms. Burdeynik:

The Environmental Energy Alliance of New York, LLC (the Alliance; see list of company members highlighted below on this page) is an ad hoc, voluntary group of electric generating companies, transmission/ distribution companies and other providers of energy services in the State of New York. The Alliance supports the efforts of its members in understanding of state and national environmental regulatory initiatives in order to permit them to more effectively formulate and achieve their business goals and proactively advocate cost-effective regulations and policies. The operations of Alliance members contribute to the reliability of the State's electric grid and to the economic well-being of New York State.

We are writing to comment on the New York City Department of Health and Mental Hygiene proposed regulation¹ that would require owners of facilities with cooling towers to take steps to protect the health and safety of New Yorkers from exposure to *Legionella*. Alliance member companies operate both building service cooling towers and power plant cooling towers. The New York State Department of Health (DOH) has issued emergency regulations on this same topic and the Alliance has been working with the DOH and the New York State Department of Environmental Conservation (DEC) on an approach to these regulations that provides assurance of *Legionella* protection while at the same time addressing specific power plant facility concerns. Our primary concern in those discussions is making sure that whatever is in the *Legionella* protection regulation is consistent with the State Pollutant Discharge Elimination System (SPDES) permit requirements at those facilities.

¹ http://rules.cityofnewyork.us/sites/default/files/proposed_rules_pdf/p-dohmh_12-3-15_a_ch_8.pdf

*Central Hudson Gas & Electric Corporation
Consolidated Edison Company of New York, Inc.
CCI Roseton
Dynergy Power LLC.
PSE&G Long Island
National Grid
New York Power Authority*

*New York State Electric & Gas Corporation
NRG Energy, Inc.
Orange & Rockland Utilities, Inc.
Rochester Gas & Electric Corporation
Selkirk Cogen
TransCanada
US Power Generating Co.*

The discharge of water from cooling towers is regulated by the DEC pursuant to the SPDES permits (Part 750 of Title 6 of New York State Codes, Rules & Regulations). The problem we are wrestling with is how to respond in the unlikely event *Legionella* is detected at the action levels proposed by the state and city regulations because parts of those requirements are inconsistent with the operating characteristics and the permit conditions required under SPDES. We suggest that whatever we work out with DEC and DOH be incorporated into your regulation that will apply to power plant cooling towers. Unfortunately that process is not complete at this time so we strongly recommend that promulgation of the final rule be delayed to incorporate that information.

If you have any questions or comments, please contact me (roger.caiazza@eeanyweb.org or 315.529.6711). Thank you.

Sincerely,

A handwritten signature in cursive script that reads "Roger Caiazza".

Roger Caiazza
Director

**Environmental Energy Alliance of New York Comments on
New York City draft regulation on cooling towers for control of *Legionella***

General Comments

The Environmental Energy Alliance of New York, LLC (Alliance) provides the following comments on the proposed amendment to Title 24 of the Rules of the City of New York addition of a new Chapter 8 (Cooling Towers).

A major concern for us is the potential to contravene requirements of State Pollutant Discharge Elimination System (SPDES) permits. The discharge of water from cooling towers is regulated by the DEC pursuant to Part 750 of Title 6 of New York State Codes, Rules & Regulations. The problem we are wrestling with is how to respond in the unlikely event *Legionella* is detected at the action levels proposed by the state and city regulations because parts of those requirements are inconsistent with the operating characteristics and the permit conditions required under SPDES. We suggest that whatever we work out with DEC and DOH be incorporated in your regulation for cooling towers; unfortunately that process is not complete at this time so we strongly recommend that promulgation of the final rule be delayed to incorporate that information.

Our overarching issue is that the proposed rule appears to be directed to control of *Legionella* in building system cooling towers which are very different than power plant cooling towers. Some power plant towers are part of the critical utility infrastructure and provide cooling for underground power feeders and chilling for liquid natural gas storage. Other cooling towers are located at power plants and cool water used to generate electricity. Because they are essential to power plant operation they are monitored, treated, and maintained by on-site trained personnel (or through expert consultants) on a much more stringent and routine basis compared with building system cooling towers. Importantly, a critical operating parameter for power plants is routine treatment for biologic fouling. We expect that those actions likely keep *Legionella* contamination at near non-detection levels. In our specific comments we suggest that a *Legionella* sampling regime consistent with your proposed regulation in conjunction with many of the activities already in place will meet the intent of your regulation.

Specific Comments

Section 8-02. Definitions

The Alliance recommends adding a cooling tower definition for power plants and modifying the definition for building and industrial systems:

“Power plant cooling tower” means a cooling tower, evaporative condenser or fluid cooler that is part of a recirculated water system incorporated into a stationary fossil-fired boiler or combustion turbine system producing electricity for sale.

“Cooling tower” means a cooling tower, evaporative condenser or fluid cooler that is part of a recirculated water system incorporated into a building’s cooling, industrial process, or refrigeration.

The Alliance recommends adding chemical cleaning to the definition of cleaning:

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

Section 8-03. Maintenance program and plan.

This section identifies responsible and qualified persons that prepare, update and execute the program and plan for each cooling tower. We request the definition of qualified and responsible persons also include the cooling tower operator; the chemist responsible for water quality testing and treatment; and the power plant engineer, maintenance manager, power plant production and operations manager. Persons serving in these positions are trained and capable of any inspections and certifications required of this regulation.

Section 8-04(d). Process control measures: Cleaning.

Power plant cooling towers are treated with biocides and receive cleaning as described in each tower's operating plan and in accordance with SPDES permit requirements to minimize biofouling on a continuous basis. The proposed mandate of cleaning no less than twice per year is inappropriate for power plant cooling tower systems with existing operating plans and SPDES permits requirements because cleaning is done continuously.

Change:

d) *Cleaning*. The cooling tower system must be cleaned whenever routine monitoring indicate a need for cleaning, but no less than twice a year, as specified in the maintenance program and plan. Cleaning must be conducted in accordance with the maintenance program and plan. Water contact areas such as the basin, sump, fill, spray nozzles and fittings, drift eliminators, air intake louvres must be properly accessed or removed to facilitate cleaning.

To:

d) *Cleaning*.

1) The cooling tower system must be cleaned whenever routine monitoring indicate a need for cleaning, but no less than twice a year, as specified in the maintenance program and plan. Cleaning must be conducted in accordance with the maintenance program and plan. Water contact areas such as the basin, sump, fill, spray nozzles and fittings, drift eliminators, air intake louvres must be properly accessed or removed to facilitate cleaning.

2) There is no additional requirement for routine cleaning of power plant cooling tower systems beyond that prescribed in the owner's operating plans.

Section 8-05(d). Water treatment: non-chemical water treatment device prohibited.

Non-chemical treatment for control of biofouling is currently allowed for certain power plant operations under existing SPDES permits. While we appreciate there may be limited experience for control of *Legionella* with non-chemical treatments, we suggest that alternative treatments should be considered on a case-by-case basis if supported with sample data for *Legionella*.

Section 8-05(f)(5). Water treatment: water quality corrective action.

Table 1 identifies corrective actions to be taken in the event *Legionella* sampling indicates unacceptable levels of bacteria are present in the cooling tower.

Given the large volume of water (> 100,000 gal/d) in power plant cooling towers and the ongoing biofouling treatments regulated by SPDES permits, we are working with the

NYSDOH and NYSDEC to design a plan of action that is responsive to the need for *Legionella* control but does not contravene water quality standards and SPDES requirements. Specifically, in the unlikely event that *Legionella* is detected at > 1,000 CFU the proposed dosing of the cooling water system to 5 to 10 ppm for one hour is problematic. *Legionella* has not been detected at the 1000 CFU action level in any power plant cooling water, most likely owing to biocide treatments required under SPDES that typically are dosed at 0.2 ppm. A requirement to dose at 5 ppm is very difficult to do given the volumes of power plant cooling water systems, is also counter to SPDES permit limits and likely is considerably higher than what would be necessary to control the bacteria. Further, the additional biocide would necessitate dehalogenation prior to discharge, which presents an unnecessary burden to the plant operations if a lower concentration of biocide would be effective. We suggest exceptions to Table 1 prescriptive treatment for power plants be provided until a solution is found with the state agencies.

In the case where biocides are necessary for *Legionella* treatment at any levels about 100 CFU, we suggest the resampling schedule post-treatment be extended to allow adequate treatment time to be effective for such large volumes of water.

**AWTC****Ambient Water Treatment Consulting, Inc.**

Water Treatment Monitoring
Cooling and Boiler Water Analyses
Water Treatment Bid Evaluations
Equipment Inspections
Pipe Analyses

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December 28, 2015

New York City Department of Health and Mental Hygiene
Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th Street, 14th Floor
Long Island City, NY 11101-4132

Re: Proposed Amendments to Title 24 of the Rules of the City of New York

Dear Ms. Burdeynik:

Ambient Water Treatment Consulting, Inc. (AWTC) appreciates the opportunity to provide the attached comments on the proposal to add Chapter 8 to the Title 24 of the Rules of the City of New York (RCNY).

AWTC provides water treatment consulting services to many clients in NYC who have been affected by the enactment of Local Law 77 of 2015. AWTC also provides consulting services to clients outside of NYC who have been affected by the adoption of 10 NYCRR Part 4 by NYS.

AWTC has been providing water treatment consulting services since 1998. These services include providing clients with guidance on the best practices for controlling corrosion and fouling in cooling tower systems, including guidance for controlling *Legionella*.

AWTC's clients include the owner and operators of many Class-A office building in NYC, but regardless of the size of their properties, all of AWTC's clients are aware of the need to maintain their cooling water systems in optimum condition. Our clients also understand the circumstances that led NYC and NYS to enact their respective regulations.

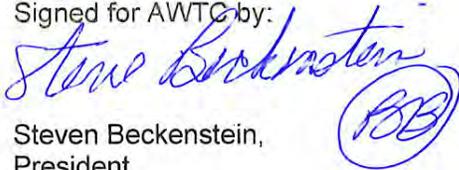
The outbreak that occurred in the South Bronx in 2015 is the exact situation that drives our clients to implement and maintain best practices for controlling *Legionella* in their cooling water systems. AWTC's clients, using the guidance of their consultants and vendors, have been successfully employing best practices for many years.

New York City Department of Health and Mental Hygiene
Office of General Counsel
Re: Comments to RCNY Title 24
December 28, 2015
Page 2

The intention of NYCDOHMH to address the seriousness of *Legionella* in cooling water systems is made clear of by the level of detail in the proposed regulations and the comprehensive scope of the regulations. The success of these regulations to prevent future outbreaks will depend on adopting regulations that are clearly defined and can be implemented by cooling tower owners. The regulations will be enhanced by including practices that have been proven to be effective, and by eliminating practices that, while arguably effective, also present a significant burden to owners. These burdensome practices can be replaced by less burdensome practices that are equally if not more effective.

AWTC believes that the collective experience of its clients in controlling *Legionella* in their cooling water systems is a valuable resource of regulatory agencies. The attached comments are based on this cumulative experience, with the hope that the regulations can be made more effective by making them easier to understand and implement.

Sincerely,
Signed for AWTC by:


Steven Beckenstein,
President

Attachment – Comments to Proposed Amendments to RCNY Title 24

**Comments on Proposed Amendments to Title 24 of the Rules of the City of New York
Provided by: Ambient Water Treatment Consulting, Inc.**

No	Section	Comment	Proposed Change
01	N/A	The scope of the proposed regulations are much more detailed and comprehensive than the existing NYS regulations and may require training on-site personnel and the procurement and installation of conductivity control and feed equipment. The NYS regulations as adopted provided a six-month period for developing and implementing the MPP. Even if the proposed NYCDOHMH regulations are adopted immediately, it will only allow seven weeks for developing and implementing the plan. If adoption of the proposed regulations is delayed, it will further shorten the window for development and implementation, training, and equipment procurement.	Add a section to the regulations that sets a deadline for implementation six months after adoption of the proposed regulations. Please note that Owners will still be required to implement a NYS-compliant MPP on March 1, 2016.
02	§8-02	"Management and Maintenance Team" is a term unique to the proposed regulation.	Change to "Program Team" for consistency with ASHRAE 188
03	§8-02	"Responsible Person" (RP) is defined as performing his or her duties "under the supervision of a "Qualified Person" (QP). An Owner or Designee will most likely not have a QP on staff. The QO will be a vendor or consultant of the Owner, while an RP will most likely be an employee of the Owner or Designee. Having a QP "supervise" an RP who is an employee of the Owner or Designee and not an employee of the QP is problematic.	Eliminate the requirement that the RP perform his or her duties "under the supervision" of the QP or change to "under the guidance" of the QP.
04	§8-02	"Water Quality Parameters" are "temperature, pH, total dissolved solids (TDS), conductivity, oxidation-reduction potential (ORP), bacteriological indicator and other chemical and physical indicators of system." This term appears in only one other location in the proposed regulations [§8-05(f)(1)] and is defined differently than it is in the Definitions section. Section 8-05(f)(1) references "[w]ater quality parameters, including but not limited to pH, temperature, conductivity and biocide residual (free and total)" as the "Minimum Daily Water Quality Requirements." Please note that ORP cannot be used to determine free or total halogen concentrations directly and can only indicate that a halogen feed occurred. Also, please note that ORP is not commonly used to control feed of stabilized liquid bromine. Finally, please note that TDS is rarely measured directly but is calculated from conductivity.	Change the term "Water Quality Parameters" to "Minimum Daily Water Quality Requirements" and define as "temperature, pH, conductivity, free halogen, and bacteriological indicator". Eliminate total halogen as a required parameter.
05	§8-03	Maintenance Program and Plan (MPP) "must be kept in the building where the cooling tower system is located and be made available to the Department for inspection on request". Please note that Owner or Designee of multi-building facilities, including academic and institutional facilities, often have a central engineering office where all records are maintained, as opposed to maintaining records at the individual buildings.	Allow MPPs to be kept in a central location for multi-building facilities and facilities without on-site maintenance personnel.
06	§8-04(a)(2)	See Comment 01.	See Comment 01.

**Comments on Proposed Amendments to Title 24 of the Rules of the City of New York
Provided by: Ambient Water Treatment Consulting, Inc.**

No	Section	Comment	Proposed Change
07	§8-04(c)(2)	"Replacement in kind. Any part or equipment used in a cooling tower system must comply with the manufacturer's design and performance specifications and the New York City Construction Codes. As applicable, replacement materials must be corrosion resistant and effectively prevent the penetration of sunlight." Please note that the rule as written applies to the entire system and not just the cooling tower; consequently, it can be broadly interpreted to mean that system piping must also be "corrosion resistant".	Limit the application of this section to the cooling tower specifically.
08	§8-04(e)	MPP must address "aerosol and mist" control. Section §8-04(e) provides specific performance objectives for drift loss for counter-flow and cross-flow CTs. Please note that the rule as written can be broadly interpreted to mean that CT drift loss must be measured continually to ensure compliance. Also, note that failure to comply is indicated as a violation in §8-09 Penalties.	Limit the scope of this section to requiring operation within the drift control limits, based on manufacturers' certifications, when installed, provided that drift reducers are maintained in good working order.
09	§8-05(a)	Calls for "daily automatic treatment" of the CT system "at least once per day, when the system is in operation" as the default program. Manual feed and/or less than once-daily treatment must be justified in the MPP as providing "effective control of Legionella growth." Please note that intermittent biocide treatment (e.g., halogen feed 3 x weekly and non-oxidizer feed 1 x weekly) is effective and a standard practice in NYC. Buildings that are effectively controlling Legionella using intermittent feed should be allowed to do so without having to justify it in the MPP.	Eliminate this paragraph or allow for intermittent biocide feed in accordance w/ CTI and ASHRAE guidelines without having to justify it in the MPP.
10	§8-05(b)	Calls for the default CT operation to be continual circulation "irrespective of the building's cooling demand." For deviation from the default operation, the MPP must specify "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 system is idle during the scheduled chemical injection." Please note that this requirement does not define continual circulation with respect to the entirety of the CW system piping and CT capacity or the impact of circulating pumps with VFDs. As written, the regulation lacks the necessary detail to ensure compliance.	Eliminate the requirement for continual circulation regardless of cooling demand and limit the section to having the MPP specify "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 system is idle during the scheduled chemical injection."

**Comments on Proposed Amendments to Title 24 of the Rules of the City of New York
Provided by: Ambient Water Treatment Consulting, Inc.**

No	Section	Comment	Proposed Change
11	§8-05(c)(1)	Requires that “[a]ny person who cleans, disinfects, or applies biocides to a cooling tower system must be a commercial pesticide applicator or a pesticide technician....” Please note: The use of the conjunction “or” would indicate that NYS-certification would be needed just to clean a CT, even if no biocide additions were involved. NYS regulations require NYS certification for “[a]ny person who performs cleaning and disinfection....”.	Change wording to “[a]ny person who cleans, and disinfects, or applies biocides....”, or eliminate the word "cleans".
12	§8-05(c)(3)	Requires the recording of the date, time, and amount of “all chemicals and biocides” that are added. Please note: The amounts of chemicals and biocides that are routinely added to a cooling system (i.e., for routine treatment and not for CT disinfection) are estimated typically and not measured directly (i.e., there is no meter for determining actual amounts). Additionally, chemical and biocide storage tanks are typically too large to be able to measure a single addition of product by monitoring the level gauge or site glass.	Eliminate the requirement to record the amount of chemical and biocide for routine treatment, requiring only the date and time of addition and weekly or monthly usage rates instead of daily. The amount of chemical and biocide added for non-routine treatment (e.g., semi-annual disinfection) should continue to be required.
13	§8-05(f)(1)	See Comment 03. Additionally, please note: The rule as written would require testing seven days per week, including holidays, if the system is operating. Some buildings with cooling water systems are not staffed 24/7/365, particularly buildings with systems with automatic feed and control that can be operated remotely.	Require monitoring no less than (5) days per week, and exclude holidays and/or consider requiring the use of "smart" controllers with remote access and alarm capability and data-logging as a substitute daily monitoring.
14	§8-05 Table 1	Table 1 also includes response actions for total bacteria results by HPC or dip slide, with Level 4 indicated as $\geq 200,000$ CFU/mL. Please note: dip slides typically cannot resolve total bacteria results more precisely than by order of magnitude (i.e., 10^2 , 10^3 , 10^4); consequently, Table 1 can only apply to HPC results, or to dip slide results at or above 10^6 CFU/mL. Furthermore, the rule as written would appear to require response actions for total bacteria results even in the absence of <i>Legionella</i> sampling or <i>Legionella</i> results that meet a lower action level than the total bacteria results. It should be noted that there is no established correlation between HPC results and the presence of <i>Legionella</i> .	Modify Table 1 to provide separate action levels for dip slides, with Level 4 for dip slides at 10^6 CFU/mL. Also, modify Table 1 to indicate that the when total bacteria and <i>Legionella</i> samples are obtained, the <i>Legionella</i> result shall determine the response action.
15	§8-05(f)(3)	See Comment 13.	Require "additional emergency Legionella sampling" based on dip slide results when (2) consecutive dip slide tests results are $\geq 10^6$ CFU/mL.

**Comments on Proposed Amendments to Title 24 of the Rules of the City of New York
Provided by: Ambient Water Treatment Consulting, Inc.**

No	Section	Comment	Proposed Change
16	§8-06(a)	Provides the description of a “full system shutdown” (defined as being “completely drained and protected from offline contamination.”). Please note: This section is the only reference to “full system shutdown” in the entire document.	If this section refers to the requirement for removal or permanently discontinuing use of a cooling tower [§8-06(d)], revise §8-06(d) to refer specifically to "full system shutdown" and/or §8-06(a); otherwise delete §8-06(a).
17	§8-06(b)	Requires cleaning and disinfection of a CT that has been shut down or idle for >5 days. The cleaning and disinfection must occur “no later than 15 days before the first seasonal use of such tower”. The term “no later than 15 days before the first seasonal use of such tower” is somewhat ambiguous and should be re-worded to make the intent clear. The use of the word “later” with “before” is confusing. “Later” is used more appropriately with the word “after”; “earlier” is more appropriately used with the word “before”.	Revise the section to read “...no later <u>earlier</u> than 15 days before the first seasonal use of such tower”
18	§8-06(b)(2)	Requires sampling the CT for <i>Legionella</i> “[b]efore the startup of a cooling tower system after an extended shutdown of five or more days.” Please note: The requirement for <i>Legionella</i> sampling does not explicitly indicate that the CT cannot be placed on line prior to the receipt of the <i>Legionella</i> results; however, the 15-day period imposed for the cleaning and disinfection apparently provides for the <i>Legionella</i> sampling and receipt of results prior to actual start-up. At the same time, the system must remain in circulation pending receipt of the <i>Legionella</i> results in order to avoid the 5-day idle interval.	Revise the section to indicate that the 15-day window only applies to the "first seasonal use" and not to subsequent disinfections due to the 5-day idle period. Also, revise the section to indicate that the system can be placed on line before the receipt of the <i>Legionella</i> results.
19	§8-07(a)	See Comment 04.	Allow records to be kept in a central location for multi-building facilities.
20	§8-07(d)	Indicates that “[f]ailure to immediately provide a report or record...upon the request of the Department shall be considered <i>prima facie</i> evidence that an inspection or other required action was not conducted or performed.” Please note: The implementation of these regulations will result in the generation of numerous reports and logs, resulting in a paper-work intensive process. That a single record of a response action may be temporarily misplaced or otherwise unavailable “immediately” should be accepted as reasonable.	Revise the section to allow the Owner or Designee the an opportunity to produce missing documentation within a reasonable period (e.g., 24h), except that missing entries in test logs that should be recorded extemporaneously records would indicate failure to perform the respective activity.
21	§8-08(a)	Provides that the “Commissioner or designee may grant a modification when strict application of any provision of this Chapter presents practical difficulties or unusual hardships. The Commissioner in a specific instance may modify the application of such provision consistent with the general purpose of this Chapter and in compliance with Administrative Code §17-194.1 and upon such conditions as, in his or her opinion, are necessary to protect the health or safety of the public.”	NYCDOHMH should indicate if this rule provides a means by which an Owner or Designee can request specific relief from one or more regulations, and, if so, NYCDOHMH should provide more complete instructions for applying for relief.

From: [Bryan Brown](#)
To: [Resolution Comments](#)
Cc: [Steve Beckenstein](#)
Subject: Follow-Up Comment for CT Regulations (Title 24 RCNY)
Date: Thursday, December 31, 2015 11:47:08 AM

On December 28, we provided comments on the proposed amendment to the cooling tower regulations (Title 24 of RCNY). We would like to supplement our comments by revising and adding to Item #7. The revised comment is provided below (the added text is underlined):

No	Section	Comment	Proposed Change
07	§8-04(c)(2)	"Replacement in kind. Any part or equipment used in a [CT] system must comply with the manufacturer's design and performance specifications and the New York City Construction Codes. As applicable, replacement materials must be corrosion resistant and effectively prevent the penetration of sunlight." <u>Please note that sunlight can penetrate a CT through the fan plenum, uncovered distribution decks, and the exposed portion of the CT basin. Eliminating sunlight exposure via the plenum and basin would be difficult; however, distribution decks can and should be covered. Also,</u> please note that the rule as written applies to the entire system and not just the CT; consequently, it can be broadly interpreted to mean that system piping must also be "corrosion resistant".	Limit the application of this section to the CT specifically <u>and limit the control of sunlight exposure to requiring covers for all CT distribution decks.</u>

Thank you.

Bryan H. Brown,
Project Manager

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H₂O MEYER

CONSULTING SERVICES, INC.

WATER BASED SYSTEMS ANALYSIS FOR INDUSTRY

December 22, 2015

Ms. Svetlana Burdeynik
New York City Department of Health and Mental Hygiene
Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th Street
14th Floor
Long Island City, NY 11101-4132

DEC 29 REC'D

Via E-Mail: SBurdeyn@Health.NYC.gov; FedEx

Re: Proposed Amendments to Title 24 of the Rules of New York City

Dear Department of Health and Mental Hygiene:

I commend the New York City (NYC) Department of Health and Mental Hygiene (DHMH) for addressing the *Legionella* concerns relating to cooling towers. I also support the long-awaited ASHRAE Standard 188-2015.

The Proposed Amendments to Title 24 have a number of items that I would like to address are as follows:

8-06 System Shutdown and Startup:

- (b) Full System Start-Up: At a minimum, before cooling tower system start-up, an owner must clean and disinfect a cooling tower that has been shut down or idle for more than five days according to 17-194.1 of the Administrative Code. Cleaning and disinfection must be done no later than 15 days before the first seasonal use of such tower.
 - Background:
 - Open, recirculating systems use water as a heat-exchange method to take heat from a process and transfer that heat to the tower water (may be called condenser water), which then rejects that heat to the atmosphere. Cooling towers are that part of the system which are on the outside of the building where the heat rejection occurs. They may be connected to thousands of feet of piping and hundreds of heat exchangers with surface areas hundreds of times greater than the cooling tower. In essence, the cooling tower is the tip of the iceberg.
 - Cooling towers are that portion of the system which reject the heat, but are also giant air washers. Air is used to flow over the water to help reject heat. Cooling towers get dirty. Normally when you have a dirty tower biological control within, the entire system becomes difficult.

- Cooling towers have any number of components, but the three that are problematic are the cooling tower hot deck (these are components of the larger towers) where water is distributed before the water enters the main structure of the cooling tower; the tower fill (where the water cascades to reduce droplet size to enhance heat exchange); and the tower sump (which by design collects a lot of debris).
 - Cooling towers need to be cleaned periodically to remove biofilm and sludge (dirt, corrosion products, scale, airborne debris, dead birds, dead insects, etc.).
 - Complete professional cooling tower cleanings take time. Small towers may be cleaned in a few hours and larger ones may take eight hours, or even days depending on the number of cells.
 - OSHA has recommended for years that this portion of the water-based system be cleaned twice per year. In practice, the Class A buildings or industrial plants clean the cooling towers at least once per year.
 - Many cooling towers operate seasonally. This means somewhere around April 15th, the seasonal cooling towers start up.
- Problem:
 - NYC is requiring that all cooling towers be cleaned within 15 days of startup. The industry does not have the manpower to clean thousands of cooling towers in a 15-day window. Furthermore, once a tower has been cleaned, it is clean, and the risk of having a dirty cooling tower has been removed from the biological fouling equation.
 - Solution:
 - Seasonal cooling towers must be cleaned within 90 days of startup and the **entire system** must be disinfected with 10 PPM free halogen for 24 hours upon startup. *Legionella* testing must occur within seven to ten days after startup. This is reasonable and addresses the concern of a dirty tower and a biologically-controlled tower upon startup.

8-05 Water Treatment:

- (4) Chemical and Biocide Additions – (f) Water Quality Monitoring (5) Water Quality Corrective Actions – Table 1
 - Background:
 - The biological health of a cooling system is determined by the biological count in the bulk, recirculating water of that system.
 - To the best of my knowledge, all *Legionella* outbreaks attributed to cooling towers have been associated with *Legionella* proliferation at or above 1,000 cells/ml sero group 1. There is no direct correlation between total aerobic (heterotrophic) bacteria counts and *Legionella* counts.
 - At the site level, dip slides are used to determine total aerobic counts. Standard Methods states cultures (dip slides are cultures) be incubated at 48 hours at 35-37° C. Most of the Class A properties have incubators. They cost around \$300.00.

- Problem #1:
 - NYC is requiring that all cooling towers that exceed 200,000 cells/ml undergo a full remediation. This count is not an uncommon count and should not require a full remediation. This is tantamount to any child with sniffles must go on Tamiflu.
- Problem #2:
 - NYC uses a 200,000 cells/ml metric as an action level. There is no method to determine 200,000 cells/ml via a dip slide. The guidance on dip slides is in factors of 10. You can read 100,000 cells/ml (which is not an unusual count), and the next point of reference is 1,000,000 cells/ml (which is also not an unusual count). Any count over 10,000 cells/ml indicates a problem and needs a reaction protocol, but the reaction protocol must be reasonable and possible.
- Problem #3:
 - NYC reaction protocol for 1,000 cells/ml *Legionella* is not consistent with New York State (NYS) protocol, as NYS protocol which mandates a pH reduction to 7.0-7.5.
- Problem #4:
 - Note 3 on Table 1 has a reaction protocol of 5-10 PPM free halogen for one hour. One hour is grossly insufficient to effect a proper disinfection.
- Solution:
 - Remove full remediations from any of the total aerobic count protocols.
 - Change 200,000 cells/ml metric to 1,000,000 cells/ml metric.
 - Change reaction protocols to be consistent with NYS.
 - Add a protocol for disinfections (5-10 PPM free halogen for 24 hours) for system disruptions or high *Legionella* counts (greater than 1,000), but remove tower cleanings in all instances except for the required minimum of twice-per-year physical cleanings.
 - Adjust reaction protocols on total aerobic count to more realistic reaction protocols. Recommended:

0-10,000	<ul style="list-style-type: none"> • No action required
10,001-100,000	<ul style="list-style-type: none"> • Inspect testing logs and ORP curves for the prior week • Double the halogen feed for the next three feeds
100,000-1,000,000	<ul style="list-style-type: none"> • Inspect testing logs and ORP curves for the prior two weeks • Inspect the cooling tower for visible signs of biological fouling conditions • Inspect biocide feed pumps • Increase the free halogen to 2 PPM for 24 hours
>1,000,000	<ul style="list-style-type: none"> • Inspect the cooling tower for visible signs of biological fouling conditions and photograph conditions for team review • Inspect the testing logs and ORP curves for the last month • Inspect the biocide feed pumps • Institute a decontamination plan and begin feed of 5 PPM free halogen for 24 hours • Notify all team members

8-05 Water Treatment (continued):

- (4) Chemical and Biocide Additions – (f) Water Quality Monitoring (1) Minimum Daily Water Quality Measurements:
 - Background:
 - NYC is requiring daily testing of cooling towers and has listed parameters to be tested each day. We have mentioned below and separately that total halogen be removed from the testing regime.
 - Daily testing involves securing a water sample and running tests by hand.
 - “Smart controllers” take continuous measurements of key program parameters (temperature, pH, conductivity, trace [indicator of corrosion inhibitor levels], and ORP [indicator of free halogen levels]), plus have communication features which will “call out” (email or text) if a key program parameter is outside of the control range and allow for “call in” via the web to examine the controller or look at trends.
 - Normal operation of a “smart controller” still involves physical testing to compare measurements by hand to the actual measurements on the controller.
 - Most clients run tests by hand three times per week and inoculate dip slides once per week on a non-biocide feed day.
 - Problem:
 - Most buildings do not have manpower seven days per week that could accomplish this task.
 - Solution:
 - Add “smart controllers may be utilized in lieu of daily testing provided the smart controller is checked for calibration at least once per operating week.”
- (4) Chemical and Biocide Additions – (f) Water Quality Monitoring (1) Minimum Daily Water Quality Measurements:
 - Background:
 - NYC is requiring testing of halogen biocide of both free and total halogen.
 - Problem:
 - Total halogen has nothing to do with available biocide to effect a biological kill. There are not metrics that involve total halogen. We have no way of continuously monitoring total halogen. In NYC due to the normal pH in cooling towers and the dissociation of hypochlorous acid and hypobromous acid (actual biocidal species), we employ stabilized bromines which, by definition, have a large total halogen component. Only free halogen is biocide.
 - Solution:
 - Remove total halogen from required testing.

8-05 Water Treatment (continued):

- (a) Daily Automatic Treatment While in Operation:
 - Background:
 - NYC is requiring “Water in a cooling tower system must be treated at least once per day.” We assume this means “add biocide once per day,” as “treatment” is misleading and could refer to corrosion inhibitor.
 - Problem:
 - In order to effect a proper kill, biocides need to reach an effective dose and then have sufficient contact time. Frequent additions of biocides at low dose are ineffective. Continuous feed of halogens at 0.2-0.3 PPM free are somewhat effective. Our programs involve three halogen feeds per week over a four-hour period, reaching 1 PPM free at the end of the feed, combined with a heavy dose of a non-oxidizing, penetrating biocide once per week, with reductions of the halogen to at least one feed per week during the cooler months if total aerobic counts consistently are 0 cells/ml.
 - Solution:
 - Change wording to continuous feed of halogen to achieve at least 0.2 PPM free, combined with a non-oxidizing biocide fed at least once per week, or an intermittent biocide feed program of a sufficient strength and duration to control total aerobic bacteria at or below 10,000 cell/ml.

- (e) Water Quality Monitoring:
 - Background:
 - NYC requires an “alternate source water plan...must be approved by the department.”
 - Problem:
 - Many of the buildings in NYC capture steam condensate or air-handler condensate and then use this water for tower water make-up. This water is relatively pure and has not been exposed to the outside environment (as rainwater would be). The reuse of this water provides an environmentally-friendly method of disposing the water. Cooling towers evaporate as pure water and this water arrives close to a pure water state. There are normally no collection basins to treat this water source prior to tower introduction. The NYC rules have no mechanisms for prior approval and this water reuse is heavily utilized in the city. Use of this water would of course have program parameters designed as part of the ASHRAE Standard 188 Plan. We are just looking for broad acceptance under the rules.
 - Solution:
 - Amend 8-05 (e) section to exclude “condensate” from prior approval.
 - Amend Penalties 24 RCNY 8-05 (e) to exclude “condensate.”

8-09 Penalties:

- 24 RCNY 8-05 (a) Daily Automatic Treatment or Approved Alternative Water Treatment Plan Not Provided:
 - Background:
 - NYC has a fine for utilizing a water treatment plan that is not approved.
 - Problem:
 - We do not see an approval process in the Rule.
 - Solution:
 - Change "approved" to "acceptable."

If you should have any questions or comments, please feel free to contact me at (978) 569-2412.

Sincerely,

H₂O MEYER
CONSULTING SERVICES, INC.



Robert L. Homeyer
President/Water Consultant
RHomeyer@Homeyer.com

Cc: Christiana Homeyer - Homeyer Consulting Services, Inc.
Kathryn Alleva - Homeyer Consulting Services, Inc.



ENVIRONMENTAL HYGIENE SERVICES
1601 W. DIEHL ROAD
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December 26, 2015

New York City Dept. of Health and Mental Hygiene
Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th St. 14th Floor
Long Island City, NY 11101-4132

Re: Nalco Comments to Proposed Amdts. to Title 24 of the Rules of the City of New York

Dear Ms. Burdeynik:

Nalco, an Ecolab Company, respectfully submits the following comments to the Proposed Amendments to Title 24 of the Rules of the City of New York herein referred to as the "NYC Rule".

Nalco - Company Background

Headquartered in Naperville, IL, Nalco specializes in industrial water, energy and air applications, helping customers reduce natural resource consumption, enhance air quality, minimize environmental releases and improve productivity. Nalco's Water and Process Services Division (WPS) provides commercial, industrial and institutional customers with comprehensive water management and treatment services. Within WPS, our Environmental Hygiene Services group offers customers comprehensive water safety solutions to protect public health including solutions focused on water borne pathogens such as *Legionella* (services include: detection, culture testing - via our CDC ELITE Proficient - certified lab, remediation and control).

General Comment

Next year will mark the 40th anniversary since the tragic outbreak of Legionnaires' disease that occurred at a hotel in Philadelphia, PA. Many of the people who were sickened and tragically died were attending the American Legion's state convention during the summer of 1976. The U.S. CDC estimates between 8,000 and 18,000 hospitalizations annually are due to Legionnaires' disease and an annual fatality rate between 5% and 30%. *Legionella pneumophila* and related species that cause the disease are waterborne pathogens that cause infection when *Legionella*-contaminated mists, aerosols and sprays are inhaled by susceptible people. Cooling towers, decorative fountains, hydrotherapy pools and other sources of aerosolized water have been linked to outbreaks of Legionnaires' disease.

We applaud NYC's leadership in seeking to improve public health by reducing the risk of exposure and infection from the bacteria that causes Legionnaires' disease. Our comments that follow are based on the preponderance of public health evidence that demonstrates that *Legionella pneumophila* and related species are reasonably likely to occur in building water systems. Building water systems are the source or reservoir for this pathogenic bacteria and

aerosolization - whether from a cooling tower, decorative fountain or other source of water mists, aerosols or sprays - is the vector of infection.

Specific Comments

A. The *NYC Rule* only covers water cooling towers and excludes other building water systems

We are of the view that the *NYC Rule* should cover a building's entire water system versus just the cooling tower. Nalco urges NYC DOHMH to consider adopting the entire ANSI/ASHRAE Standard 188-2015 to address the need to implement a plan for all building water systems. Any open building water system, no matter the size, can be the source of legionellae bacteria and thus, must be managed within the context of a properly designed risk management plan or program.

Cooling towers represent only one of several sources of *Legionella*. Others include decorative fountains, showers, hydrotherapy pools, faucets and, occasionally even ice machines where hospitalized patients have aspirated legionellae from contaminated ice chips. On August 14, 2015, public health experts from the U.S. CDC and the U.S. EPA published surveillance data that included outbreaks of *Legionella* from environmental sources (including cooling towers) and potable water sources. During the 2011 – 2012 reporting period, there were 15 outbreaks of *Legionella* associated with environmental and undetermined water exposures. The source of the outbreaks was identified in only 5 of the 15 outbreaks. Three of the outbreaks were associated with decorative fountains and only one was associated with a cooling tower. During the same timeframe, there were 21 outbreaks of *Legionella* associated with drinking water sources. The public health evidence indicates that cooling towers are but one of several sources of *Legionella* (source: *Morbidity and Mortality Weekly Report*: (64/31) August 14, 2015 pp 842-848 and 849-851).

In October, 2015, US EPA, US CDC and public health officials from several states (including New York State - Dr. David Dziewulski) published a draft document entitled “Technologies for *Legionella* control: Scientific Literature Review.” The authors cite that *Legionella* can be transmitted through “showerheads, faucets, whirlpool spas, respiratory therapy devices, ultrasonic mist machines, humidifiers, cooling towers, decorative fountains.” Ice machines are also cited as a link to outbreaks of Legionnaires’ disease (source: “Technologies for *Legionella* control: Scientific Literature Review” 2015).

ANSI/ASHRAE Standard 188 is the first practice standard published in the United States. This standard was prepared by a committee comprised of government and industry experts, including committee representation by Nalco. Nalco endorses ANSI/ASHRAE Standard 188 and recommends that as NYC DOHMH considers a permanent regulation it should adopt the complete standard as best practice for establishing minimum legionellosis risk management requirements for all building water systems.

Nalco also strongly urges that NYC and NYS work collaboratively to adopt consistent regulatory requirements to maximize public health results and avoid unnecessary and confusion.

B. Process Control Measures

8-04 (d) "Cleaning" of the *NYC Rule* contains requirements for cleaning the system. Nalco recommends including the following additional requirements:

1. Include a disinfection step prior to and after physical cleaning activities. A disinfection step prior to system cleaning is recommended to reduce the bio-burden prior to cleaning, while after cleaning, it will reduce the bio-burden prior to resuming system startup. Refer to the Cooling Technology Institute, Legionellosis Guideline: Best Practices for Control of Legionella. CTI-WTB-148(08) for recommended disinfection procedure (See Routine On-Line Disinfection, Hyperhalogenation).
2. Include an informative note that systems must be cleaned using appropriate personal protective equipment (PPE) including, but not limited to: gloves, steel toed boots, protective clothing, respiratory protection, eye protection, and hearing protection.
3. Include an informative note that systems must be cleaned by personnel with proper and established safety training including, but not limited to, a safety risk assessment; chemical handling; hazard communication; confined space entry; lockout tagout (LOTO); fall protection; working at heights; and proper use of PPE.

§8-04 (e) "Aerosol and Mist Control" of the *NYC Rule* contains the requirement to calculate "drift loss". Drift loss is a function of water evaporation (water vapor) and water mists or droplets that can be released during system operation. Manufacturers rate drift loss or efficiency under standard controlled conditions. Calculating drift loss under "field" conditions is likely to produce highly inaccurate data due to variables that cannot be controlled, e.g., wind, ambient temperature and humidity, to name a few. In addition, 100% of drift loss is not necessarily exclusive to the drift elimination device because water also can be lost through evaporation from the basin, system leaks or other factors.

Nalco recommends that, at a minimum, systems must be fitted with high efficiency drift elimination devices recommended by the manufacturer, and that these devices must be inspected routinely to confirm these devices are fitted correctly and are not defective due to physical damage, contamination with scale and algae, or anything else that would inhibit proper function.

C. Water Treatment

1. **8-05 (f) (1) Minimum daily water quality measurements:** There are many New York City buildings with cooling towers that operate without continuous staffing by operating engineers or similarly knowledgeable individuals. Meeting this requirement will be impossible for many buildings without hiring additional manpower, significantly increasing the cost of compliance. Water chemistry control technology is available that could achieve the goal of performing routine chemistry surveillance and providing remote alarming and reporting for important parameters such as the verification of oxidizing biocide feed and conductivity. We propose that control systems be allowed as an acceptable alternative to performing daily water quality measurements provided the functionality of the technology is routinely checked and can be demonstrated when inspected. Such control systems must be used to verify that oxidant feed is occurring and that blowdown (conductivity control) is maintained and must continuously communicate to the responsible person, including data logging and alarming.

2. 8-05 (f) (2) Minimum weekly biological process control indicators.

Table 1 – Heterotrophic Plate Count and Dip Slide Results. The dip slide is by far the most commonly used method for evaluating total bacteria counts in a cooling tower. But using a dip slide makes it impossible to distinguish a reading of 200,000 CFU/mL, the trigger point for Action Level 4. Dip slide results are essentially graduated on a logarithmic scale – 100, 1,000, 10,000, 100,000 CFU/mL and so on. In lieu, we propose that the trigger point for Action Level 4 be adjusted to 1,000,000 CFU/mL. Although the correlation between total bacteria counts and legionella culture results is not extremely good, a total count of 1,000,000 CFU/mL would be more suggestive vs. the poor control that would be associated with a legionella count of 1,000 CFU/mL.

Table 1 - Level 2 Threshold for legionella. We propose that the trigger point for legionella cultures be GREATER THAN but NOT EQUAL TO 10 CFU/mL. Most laboratories use 10 CFU/mL as the minimum detection level for cooling towers. The way this test is performed, a single colony growing on the agar plate is reported as 10 CFU/mL, so that 10 CFU/mL is a very common result. In our opinion a disproportionate amount of activity, including re-sampling, will be required relative to the negligible health risk benefit. We realize that this must align with New York State as well, but we would urge the Department to confer with NYS officials to consider this adjustment.

Table 1 – Definition of hyperhalogenating. Our experience suggests that the hyperhalogenation process as defined by Chapter 8, attaining 5-10 PPM free chlorine for 1 hour, can be insufficient in attempting to restore microbiological control in a cooling tower system. The contact time required to get an effective kill is usually longer. In addition, we have found that bleeding the cooling tower system afterward is an important step in regaining control as the biofilm that sloughs off of surfaces must be purged from the system or rapid regrowth occurs. We propose that hyperhalogenation be defined as a minimum of 5 PPM free chlorine concentration maintained continuously over a 6-hour period, ensuring the entire system is exposed to the disinfectant and following the disinfection, a system bleed for at least 24 hours.

3. 8-05 (f) (5) “Water quality corrective action” of the NYC Rule defines requirements for corrective action for specific biological indicators. Nalco makes the following comments for aerobic bacteria.

Table 1 defines four levels to take corrective action for aerobic bacteria counts. Level 3 indicates a range from >100,000 CFU/mL to <200,000 CFU/mL. Using 200,000 CFU/mL is not recommended for the following reasons:

- a. A dip slide cannot measure to that precision
- b. There is no log difference from 100,000 to 200,000 as it is within the margin of error for culture testing.

Nalco recommends setting the action levels as follows:

- c. Level 1 = <10,000 CFU/mL
- d. Level 2 = ≥10,000 CFU/mL to <100,000 CFU/mL
- e. Level 3 = ≥100,000 CFU/mL to <1,000,000 CFU/mL
- f. Level 4 = ≥1,000,000 CFU/mL

8-05 (f) (5) "Water quality corrective action" defines requirements for corrective action for specific biological indicators. Nalco makes the following comments for legionellae bacteria.

Table 1 lists four action levels. New York State regulations list three action levels. Nalco recommends that NYC set the same three action levels to prevent confusion by system owners who must comply with the regulations. Nalco also recommends that the corrective actions be consistent between NYS and NYC.

D. 8-06 (b) Full System Start-Up

There are thousands of cooling towers in New York City that operate seasonally. These cooling towers are started up within a very short time frame each spring that is determined by the ambient temperature. The requirement that cooling towers be cleaned and disinfected at start-up will overwhelm labor and other resources at the outset of spring. Specifically, the cleaning requirement will stress available labor resources because a proper cleaning of a cooling tower takes significant time. Larger cooling towers take several days to clean. To avoid this, we propose that the physical cleaning be permitted to be performed at seasonal shutdown (the tower will not foul if it is not in operation over the winter) or within 90 days of start-up. At start-up all cooling towers should be required to be disinfected. And, we recommend a more robust halogen disinfection requiring systems at start-up to attain 5 PPM free chlorine and maintained for 6 hours. This would accomplish the goal of reducing risk without potentially exceeding the labor resources available for cleaning cooling towers in a very short, concentrated period of time.

If we can help clarify any of the forgoing comments please do not hesitate to call me at 202.258.8740. We very much appreciate the opportunity to comment and we look forward to participating in the Jan. 4 hearing.

Regards,



Nancy Levenson

Nancy Levenson

Vice President, Government Relations

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From: [Marcy Savage](#)
To: [Resolution Comments](#)
Subject: Comments on Proposed Amendments to Title 24 of the Rules of the City of New York adding a New Chapter 8 (Cooling Towers)
Date: Wednesday, December 30, 2015 4:52:20 PM
Attachments: [Dec 30 2015 NYCDOH-MH Letter.pdf](#)
[NYC DOHMH Proposed Regulation - 12-30-15.pdf](#)

December 30, 2015

New York City Department of Health and Mental Hygiene

Office of General Counsel

Attn: Svetlana Burdeynik

42-09 28th Street, 14th Floor

Long Island City, NY 11101-4132

Re: Proposed Amendments to Title 24 of the Rules of the City of New York adding a New Chapter 8 (Cooling Towers)

Dear Ms. Burdeynik:

On behalf of my clients, Baltimore Aircoil Company, Evapco and SPX, the leading cooling tower manufacturers in the world, I am writing to respectfully submit the attached cover letter and "mark up" of the Proposed Rule as their comments on the Department's Proposed Amendments to Title 24 of the Rules of the City of New York adding a New Chapter 8 (Cooling Towers).

We would welcome the opportunity to discuss the comments and recommendations included in these documents further at the earliest convenience of the Department staff involved.

Please do not hesitate to contact me with any questions or for any additional information

in this regard.

Sincerely,

Marcy E. Savage

--

Marcy Savage

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Baltimore Aircoil Company (BAC)
Evapco
SPX

December 30, 2015

New York City Department of Health and Mental Hygiene
Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th Street, 14th Floor
Long Island City, NY 11101-4132

Re: Proposed Amendments to Title 24 of the Rules of the City of New York adding a New Chapter 8 (Cooling Towers)

Dear Ms. Burdeynik:

As representatives of the leading cooling tower manufacturers in the world, we thank you for the opportunity to comment on the *Proposed Amendments to Title 24 of the Rules of the City of New York adding a New Chapter 8 (Cooling Towers)*. Based on our technical knowledge and expertise specific to cooling tower equipment and operation, we have provided extensive comments focused on the proper maintenance and monitoring of cooling towers in the attached mark up to the Department's Proposed Rule. Our comments are based primarily on the principles of Standard 188-2015 as developed by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) and released in June 2015. Standard 188 was created following a decade-long effort by ASHRAE in coordination with water treatment experts, public health experts including the federal Centers for Disease Control and Prevention (CDC), engineers, and other technical experts with the exclusive focus on proper maintenance of entire building water systems including potable water and all related equipment including cooling towers in order to effectively manage risks associated with Legionella bacteria.

In addition to the attached mark up to the Department's Proposed Rule, this letter provides an outline of the key areas where we have focused our recommendations for technical changes to the Rule as it is currently written focused exclusively on cooling towers in order to protect against Legionella. Please note, our comments here are consistent with those submitted to the State Department of Health related to their Emergency Rule Making published August 17, 2015 *Protection Against Legionella*. First however, we feel that it is critical to articulate our strong concerns that based on the following facts, the NYC DOHMH Proposed Rule and Local Law 77's exclusive focus on cooling towers will not effectively reduce the incidence of Legionnaire's Disease in the five boroughs of New York City and as a result leaves the public at risk.

Instead, as recommended by countless experts, we strongly urge New York City to broaden the scope of the Local Law to apply to management of the entire building water system including proper management of potable (drinking) water. Also we believe that it is

essential that a protocol be put in place to require testing of the relevant drinking/potable water sources whenever individuals are identified as having Legionnaire's Disease in order to ensure that the proper cause is identified quickly so the correct solution can be put in place. We are aware of the provision in New York City Local Law 77 which calls on the NYC DOHMH to consider and submit a report to the Mayor and City Council that includes an assessment and recommendations on whether Local Law 77 should be amended to include requirements for any of the building water systems described in ASHRAE Standard 188 in addition to cooling towers.

Based on the facts presented below and recommendations from many experts in this area, we respectfully urge the NYC DOHMH to recommend expansion of Local Law 77 to require management of the whole building water system including potable water, particularly for those building characterized by ASHRAE Standard 188 as being "high risk." This includes those that are more than 10 stories high, multiple housing units with centralized potable water-heater system(s), and all buildings with cooling towers, whirlpools, fountains, misters, and humidifiers. We would welcome the opportunity to discuss this information and our recommendations further with the NYC DOHMH at the earliest convenience of the Department staff involved.

Again, below please find the key facts that support management of entire building water systems to effectively protect against Legionella followed by an outline of our primary recommendations for technical changes to the Proposed Rule as it is currently written focused exclusively on cooling towers.

Facts to Support Management of Entire Building Water System in Order to Effectively Protect Against Legionella

- The World Health Organization, Environmental Protection Agency, CDC, Occupational Safety & Health Administration, Veterans Health Administration and other government agencies all focus on the entire water distribution system including the potable water system in their Legionella prevention guidelines/recommendations.
- Numerous studies and peer-reviewed literature have found potable water to be the primary source of Legionella and resultant Legionellosis incidents.
- In many cases where outbreaks have been initially linked to cooling towers, further studies later found the water supply to be the source. To quote Dr. Stephen Edberg, public health microbiologist at Yale, "It seems as though, if the cooling towers are contaminated, the [building's] water towers would [also] be contaminated."¹
- Claims have recently been made that New York City's drinking water is unaffected and that the NYC Local Law has addressed any issues by requiring disinfection of all cooling towers. However, upon testing of patient homes Legionella bacteria have

¹ City & State, *City did not test drinking water in buildings linked to legionnaires*, 8/12/15

been found in the potable water of some and despite the city-wide cooling tower disinfection subsequent outbreaks occurred in early and late September.

- A much-broader, whole building approach including potable water testing and management is utilized by hospitals and has been very effective. There is no reason that same approach should not apply to all high risk buildings as identified in ASHRAE Standard 188 (i.e. more than 10 stories high, multiple housing units with centralized potable water-heater system(s), and all buildings with cooling towers, whirlpools, fountains, misters and humidifiers).
- ASHRAE Standard 188 can serve as the basis to establish comprehensive water management programs for all high risk buildings. Standard 188 was developed by a diverse group of national experts including the CDC after 10 years of work. To quote one of its authors and longtime Legionella researcher, Dr. William McCoy, “There’s no technical or scientific reason anyone should ever get sick from the water in their buildings, and yet it happens because we don’t manage the water the way we should.”²

While we feel strongly that a whole building approach is optimal to reducing the risk of Legionellosis, we offer the following technical and other comments on the Proposed Rule relative to cooling towers.

Primary Comments on NYC DOHMH Proposed Amendments to Title 24 of the Rules of the City of New York adding a New Chapter 8 (Cooling Towers)

- *Add Definitions for Water Treatment Professional and Water Management Program:* The regulation includes varying references to the types of individuals that building owners could hire/contract with to assist with properly managing their cooling tower water systems (as qualified person). In order to provide clarity and consistency in this regard, we have recommended specific definitions for “water treatment professional” and “water management program” using ASHRAE Standard 188 as a guide for these definitions. Further, we have made recommended changes to the definition of “responsible person” to provide clarity regarding this role.
- *Include a Greater Role for Owner Certification of the Water Management Program:* The Proposed Rule currently requires building owners to have a “maintenance program and plan” (what we recommend calling the water management program) for their cooling tower system in accordance with section 5, 6 and 7.2 of ASHRAE Standard 188-2015. As part of this requirement, we believe that certification could play a greater role whereby the owner would certify annually that he or she has a water management program in place which is specific to each unique building, its complexity and risk factors including population inhabiting the building. Since such programs are very comprehensive, this could eliminate the need to require

² The New York Times, *Officials Seek Source of Legionnaires’ Outbreak in the Bronx*, 8/2/15

burdensome reporting of a number of data elements since these would already be incorporated into the program.

Further we are recommending that the owner or his/her water treatment professional be permitted to make the certification since they would be most familiar with the specific water system.

Finally, the water management program includes inspection-ready documentation that the NYC DOHMH could review when conducting random audits to inspect the building, its program and the associated records to ensure that the control protocols have been validated and are being followed. Based on our expertise, we believe this would be far more effective in properly managing individual building Legionella risks as opposed to a very prescriptive series of cooling tower monitoring and testing requirements that would be “one-size-fits-all.” Instead, required certification that each building has a water management program in effect backed by random NYC DOHMH compliance audits would be more effective.

- *Bacteriological Sampling Should Not Be Relied Upon to Correct System Deviations:* Currently the Proposed Rule requires frequent, prescribed timeframes for bacteriological sampling and analysis to assess microbiological activity. Experts agree that relying on such “sampling” is really taking a “wait and see” approach and it is not the appropriate action to take to correct system deviations. Rather, the Rule should require owners to take a proactive approach to properly maintain their water systems by having a building water management program in place which understands the specific water system of the building, assesses hazards, establishes hazard controls, and includes ongoing monitoring, regular treatment, specific corrective actions and program auditing as well as documentation of all procedures, inspections and actions taken, as we have suggested in the mark up.
- *Legionella Monitoring and Disinfection Thresholds are Unnecessarily and Problematically Low (Non-Detectable Levels):* It does not seem appropriate for cooling towers to be held to a higher standard than hospital drinking water supplies, which are allowed non-zero Legionella levels. Yet the Proposed Rule includes a requirement for ongoing monitoring (testing) and disinfection at non-detection levels beginning with ≥ 10 CFU/ml.

Such a disinfection response to low levels of a bacteria is unnecessary, costly, and discourages sampling. Most importantly, this approach, which requires maintaining non-detectable levels of Legionella has not been effective in reducing incidence of Legionella in jurisdictions where it has been implemented. Further, there is no evidence that it will do anything to promote public health and in fact could have the unintended consequence of leading to corrosion in the piping and other equipment which can actually foster growth of Legionella bacteria.

Practically, the existing thresholds in the regulation will put a non-detectible or very low risk system into an endless sample, disinfect, report, retest, disinfect, and report loop, even if culture results show a very low value of 30 CFU/ml for instance.

Further, according to the Elite program for Legionella testing run by the CDC, the error band for measurements is plus or minus approximate 1.5 logs. This implies that a reading of 100 CFU/ml would have an error band from about 3.2 to 3,200 CFU/ml, a very wide variation between actual and measured results. Therefore, a reading of 100 CFU/ml could actually be as low as 3.2 CFU/ml. So having a threshold as low as 10 CFU/ml could easily lead to endless repeat testing and treatment even if the true values were always below 10 CFU/ml. For this reason, the CDC does not recommend using values from culture testing as action level triggers which also speaks to our comment in the bullet above that an effective management program cannot be reliant on sampling as its primary mechanism to identify issues or correct system deviations. Rather experts recommend the use of culture testing to do initial validation of control protocols and utilization of a comprehensive water management program to ensure the safety of building potable and non-potable water systems.

Finally, Table 1 of the Proposed Rule does not distinguish between the various Seriogroups of Legionella bacteria which have different levels of risk. This may lead to over-treatment of the cooling tower system, again resulting in unnecessary corrosion and expense. For dip slide interpretation, monitoring the trend of the readings is often more useful than evaluating individual readings.

For the above reasons, we recommend replacing the current Table 1 in the Proposed Rule with new Tables 1 and 2 which we have inserted in our comments in order to more effectively and accurately use culture results whether for aerobic bacteria or Legionella bacteria, to recommend needed actions for cooling towers.

- *Prohibition on the Use of Non-Chemical Water Treatment Equipment:* As currently written, the Proposed Rule prohibits the use of non-chemical water treatment equipment. As experts on cooling tower maintenance we fail to understand the rationale for such a prohibition. Such non-chemical water treatment equipment was not associated with any of the cooling towers that were suspected as a source of the Legionella bacteria outbreaks in the Bronx. And non-chemical water treatment equipment can be very useful in the routine treatment of water in cooling tower systems. As an alternative to prohibiting them, we recommend in the attached mark up that such non-chemical equipment may not be used in lieu of chemical biocide for decontamination or disinfection. However, their use should be allowed for normal water treatment in cooling towers as long as the water management program based on non-chemical equipment has been properly validated.
- *Penalty Section of Proposed Rule:* We have made recommended changes to the Penalty section to reflect recommended changes in terms and requirements in the

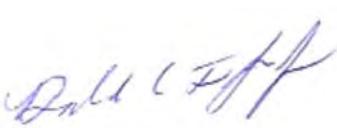
text of the Proposed Rule including referring to “water management program” instead of “maintenance program and plan” for instance. Further, we recommend striking the penalty for aerosol control failing to meet manufacturer’s design specifications or drift loss reduction requirements based on our comments in the text of the Proposed Rule. We as the manufacturers of cooling tower systems believe that there is no effective means for calculating aerosol control and drift loss.

- *Commonality between New York City and New York State Regulations:* There are many similarities between the New York City and State regulations for cooling towers, including registration. As such, we encourage both the City and State to promote commonality between the requirements including for instance having a common registration system.

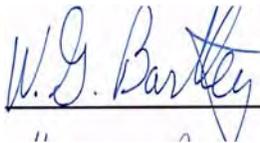
In sum, we thank you for your consideration of our technical comments on the Proposed Rule focused on cooling towers. To be very clear, as part of our broader recommendation related to proper management of the whole building including potable water, we are not recommending that that City’s response to the Legionnaire’s Disease outbreaks not include cooling towers but rather we believe that the facts and evidence support the need for both New York City and the State to take a broader approach to effectively address future outbreaks and properly protect the public against the risk of Legionella. We would welcome the opportunity to discuss this information and our recommendations further at the earliest convenience of the Department staff involved.

For more information, please contact Marcy Savage, Reid, McNally & Savage, LLC at 518/465-7330 or marcys@lobbywr.com

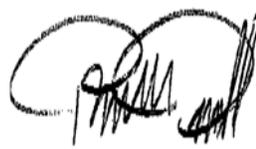
Thank you.



Don Fetzer
President
BAC



William Bartley
President & CEO
Evapco



Randall Powell
Vice President, General Manager
SPX

Cc: Sally Dreslin, MS, RN, Executive Deputy Commissioner, NYS Department of Health
Nathan Graber, M.D., Director, Center for Environmental Health, NYS Department of Health

Baltimore Aircoil Company
Evapco
SPX

*12/30/15 Comments Regarding Proposed Amendments to Title 24 of the Rules of the City of New York
adding a New Chapter 8 (Cooling Towers)*

Introduction:

As representatives of the leading cooling tower manufacturers in the world, we thank you for the opportunity to comment on the *Proposed Amendments to Title 24 of the Rules of the City of New York adding a New Chapter 8 (Cooling Towers)*. Based on our technical knowledge and expertise specific to cooling tower equipment, we have provided extensive comments focused on the proper maintenance and monitoring of cooling towers in the attached mark up (as noted in track changes) to the Department's Proposed Rule. Our comments are based primarily on Standard 188-2015 as developed by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) and released in June 2015. Please note, our comments are consistent with those submitted to the State Department of Health related to their Emergency Rule Making published August 17, 2015 *Protection Against Legionella*.

Further, we feel that it is critical to articulate our strong concerns that based on strong facts and evidence, the NYC DOHMH Proposed Rule and Local Law 77's exclusive focus on cooling towers will not effectively reduce the incidence of Legionnaire's Disease in the five boroughs of New York City and as a result leaves the public at risk.

Instead, as recommended by countless experts, we strongly urge New York City to broaden the scope of the Local Law to apply to management of the entire building water system including proper management of potable (drinking) water. Also we believe that it is essential that a protocol be put in place to require testing of the drinking/potable water whenever individuals are identified as having Legionnaire's Disease in order to ensure that the proper cause is identified quickly so the correct solution can be put in place. We are aware of the provision in New York City Local Law 77 which calls on NYC DOHMH to consider and submit a report to the Mayor and City Council that includes an assessment and recommendations on whether Local Law 866 should be amended to include requirements for any of the building water systems described in the ASHRAE Standard 188 in addition to cooling towers.

Based on the facts and recommendations from many experts in this area, we respectfully urge NYC DOHMH to recommend expansion of Local Law 77 to require management of the whole building water system including potable water, particularly for those building characterized by ASHRAE 188 as being "high risk." This includes those that are more than 10 stories high, multiple housing units with centralized potable water-heater system(s), and all buildings with cooling towers, whirlpools, fountains, misters and humidifiers. We would welcome the opportunity to discuss this information and our recommendations further with NYC DOHMH at the earliest convenience of the Department staff involved.

Thank you, in advance for your consideration of our comments and proposed changes to the Proposed Rule. For more information, please contact Marcy Savage, Reid, McNally & Savage, LLC at 518/465-7330 or marcys@lobbywr.com.

Statement of Basis and Purpose

Background

Legionellosis is an illness that must be reported to the Department in accordance with New York City Health Code §11.03 and State Sanitary Code (SSC) §2.1 (found in title 10 of NYCRR). The more serious form of legionellosis is a pneumonia known as Legionnaires' disease (LD); a less serious form, Pontiac

fever, is a flu-like illness. LD has case fatality rate of 5-30%. The US Centers for Disease Control and Prevention (CDC) estimates that there were between 8,000 and 18,000 cases of LD in the United States annually, and that more than 10% of cases are fatal.¹

People are exposed to *Legionella* through the inhalation or aspiration of aerosolized water (droplets or mist) that contain the bacteria. Person-to-person transmission of *Legionella* has not been demonstrated. Susceptible people at higher risk for LD include the elderly, people who are immune compromised or have other medical conditions, and heavy smokers. In New York City, there were 301 cases of LD in

2013 and 225 cases in 2014. Between 2000 and 2014 there were, on average, 165 confirmed cases a year with the number of annual cases ranging from 44 to 301. This year, there have been 374 confirmed cases

of LD as of October 7, 2015. In July and August, the Department investigated an unusually large cluster of 133 cases of LD that occurred in the Bronx and resulted in 16 deaths.² The Department ~~suspected~~ determined that this outbreak was associated with aerosolized *Legionella* bacteria emanating from one or more building cooling towers to which susceptible persons were exposed. Responding to the outbreak, the City Council and Mayor enacted Local Law 77 of 2015. At the same time, the State Public Health and Health Planning Council (PHHPC) adopted a new Part 4 of the State Sanitary Code ("SSC"), found in 10 NYCRR Chapter

1, on an emergency basis, citing other instances of LD outbreaks and fatalities occurring in other parts of the State that are believed to be associated with cooling towers.³

Both Local Law 77 and the SSC §4.2(c) define a cooling tower as "a cooling tower, evaporative condenser or fluid cooler that is part of a recirculated water system incorporated into a building's cooling, industrial process, refrigeration or energy production system." As the PHHPC's Emergency Justification for Part 4 of the State Sanitary Code states:

Because water is part of the process of removing heat from a building, cooling towers require treatment with biocides – chemicals that kill or inhibit bacteria (including *Legionella*)—as means of controlling bacterial overgrowth. Overgrowth may result in the normal mists ejected from the tower having droplets containing *Legionella*.

Local Law 77 added a new Article 317 to Title 28 of the Administrative Code that required owners of cooling towers to register them with the Department of Buildings ("DOB") by September 17, 2015. Towers must be inspected, tested, cleaned and disinfected in accordance with new Administrative Code

¹ <http://www.cdc.gov/legionella/fastfacts.html>

<http://www.cdc.gov/legionella/index.html>

<http://www.cdc.gov/legionella/about/treatment-complications.html>

² <http://www.nyc.gov/html/doh/html/diseases/cdlegi.shtml>

³ The State's emergency rules originally were scheduled to expire November 18, 2015 but have been reissued, and permanent rules are expected.

§17-194.1 and rules adopted by the Department. Owners and operators of cooling towers must annually certify to DOB that their cooling towers have been inspected, tested, cleaned and disinfected and that a management and maintenance program has been developed and implemented in accordance with Administrative Code §17-194.1. Statewide, including in New York City, owners of all cooling towers must also comply with SSC Part 4, which includes registration with and reporting requirements to the State Department of Health.

This proposed new Chapter sets forth specific requirements for the operation and maintenance of cooling towers in New York City comply with and further those contained in Part 4 of the SSC. The Chapter's provisions that are equivalent to the SSC are noted below. This Chapter is organized differently than the SSC requirements; more terms are defined in this Chapter and more detailed instructions for management and maintenance are provided than those contained in SSC Part 4 to facilitate compliance with both the City and State rules and requirements.

Proposed Changes

The Department is proposing to add a new Chapter 8 to Title 24 of the Rules of the City of New York to include:

§8-01 Scope and applicability: applicable to all owners and operators of buildings and other premises that are equipped with cooling towers.

§8-02 Definitions: to facilitate compliance with and enforcement of these rules, more terms are

defined in this Chapter than in the corresponding sections of either Administrative Code or SSC Part 4.

§8-03 ~~Water Management Program~~Maintenance program and plan: the requirements of this section exceed those of SSC Part

4, including documentation of the plan's implementation, operation, water treatment program, and maintenance of the associated equipment. specific routine maintenance tasks; identification of persons responsible for various functions; identifying system components; and establishing a system risk management assessment to identify areas that may create problems and lead to proliferation of Legionella bacteria.

§8-04 Process control measures: this section establishes requirements for routine monitoring, to

be conducted ~~at least weekly~~ by a "responsible person" under the supervision – remote or on-site -- of the

~~"water treatment professional"~~ "qualified person" identified in SSC Part 4, and for compliance inspections, to be conducted at least every

90 days, by the water treatment professional~~qualified person~~. It specifies standards for maintenance, cleaning, and parts replacement;

and requires installation of high efficiency drift eliminators in all new and retrofitted cooling tower systems and in existing ones, where practicable.

§8-05 Water treatment: this section specifies requirements for automatic treatments, ~~use of chemicals and biocides, and~~ monitoring water quality characteristics/parameters, and establishes a minimum schedule for sampling for *Legionella* and other bacteria including requiring additional sampling when certain events occur. This section also mandates the use of certain qualified laboratories for analysis and requires reporting levels of *Legionella* at a certain magnitude to the Department within 24 48 hours of obtaining test results; and specifies corrective actions for various levels of bacteria. Although the New York City Plumbing Code Appendix C authorizes use of rainwater or recycled water as makeup water for cooling towers, it does not require disinfection for *Legionella* bacteria before use. These rules prohibit such use unless owners use additional control measures approved by the Department that protect against cooling tower system contamination since the Department believes that this water may not meet public health standards and may tend to support microbial growth.

§8-06 System shutdown and start-up; commissioning new cooling towers: this section sets

forth requirements for pre-seasonal cleaning and disinfection and for new cooling towers being placed into use.

§8-07 Records: this requires the maintenance of records of all activities and that such records be made available for immediate inspection by the Department at the premises where the cooling tower is installed.

§8-08 Modification: authorizes the Commissioner to modify the application of a provision of these rules where compliance imposes an undue hardship and would not otherwise be required by law, provided that the modification does not compromise public health concerns.

§8-09 Penalties: establishes a schedule of penalties for initial and subsequent violations within the limits set forth in Administrative Code §17-194.1.

Statutory Authority

This amendment to Title 24 of the Rules of the City of New York (“RCNY”) is promulgated pursuant to

Local Law 77 of 2015, and sections 556 and 1043 of the New York City Charter (“the Charter”). Section

556 of the Charter broadly authorizes the Department of Health and Mental Hygiene (“the Department”) to regulate all matters pertaining to the health of the City. Section 1043 grants the Department rule-making authority. Local Law 77 of 2015, enacted August 18, 2015, added a new §17-194.1 to the New York City Administrative Code (“Administrative Code”) requiring owners of buildings to clean and disinfect cooling towers and authorizing the Department to adopt rules to implement these requirements. Many of Local Law 77’s substantive provisions for inspection and disinfection become effective upon the promulgation of these Department rules.

The proposed changes are as

follows: Matter is

new.

“Shall” and “must” denote mandatory requirements and may be used interchangeably in the rules of this

Department, unless otherwise specified or unless the context clearly indicates otherwise.

Section 1. Title 24 of the Rules of the City of New York is amended by adding a new Chapter 8 (Cooling Towers) to read as follows:

CHAPTER 8

**COOLING
TOWERS**

§8-01 Scope and applicability.

§8-02 Definitions.

§8-03 Maintenance program and plan.

§8-04 Process control measures.

§8-05 Water treatment.

§8-06 System shutdown and start-up; commissioning and decommissioning cooling tower

§8-07 Records.

§8-08 Modification.

§8-09 Penalties.

§8-01 Scope and applicability. This Chapter applies to owners of New York City buildings or other premises in the City that are equipped with a cooling tower system.

§8-02 Definitions. When used in this Chapter, the following terms mean:

“ANSI/ASHRAE 188-2015” means sections 5, 6 and 7.2 of ANSI/ASHRAE Standard 188-2015 Legionellosis: Risk Management for Building Water Systems,” a publication issued by the American National Standards Institute (ANSI)/American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), final approval date June 26, 2015, at pages 4-8.

“Building” means any structure 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) using plate count agar, as measured in a water sample or by a total aerobic bacteria dip slide, or Adenosine triphosphate (ATP) which has been correlated to HPC or dip slides from the same system.~~

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

“Cooling tower” means a cooling tower, evaporative condenser or fluid cooler that is part of a recirculated water system incorporated into a building’s cooling, industrial process, refrigeration, 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 ~~the water treatment system, bioicide, anti-sealing and anti-corrosion chemical applicators,~~ valves, pumps, ~~interconnecting piping,~~ the 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 actions to be taken to return control values to within established limits when monitoring or measurement indicates the control value(s) is/are outside established control limits. These may include disinfection, cleaning, decontamination, flushing, filtering,~~ and other activities to remedy elevated bacteriological indicators, visible biofilm growth,

Legionella proliferation, or other system mechanical problems identified through water management program activities, monitoring, inspections, or other means as may be determined by the Department.

“Compliance audit inspection” means the documentation that the water management plan program is being implemented as designed, is effectively controlling the hazard, and is meeting or exceeding the minimum schedule for testing identified in inspection, testing and other activities that are required on a regular basis (at least every 90 days) in accordance with the maintenance program and plan and this Chapter, including the completion of a written or electronic checklist, and must be conducted and certified by a water treatment professional 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 stagnant water in the system.

“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.

“Disinfectant” means a chemical agent (biocide) used to kill or inactivate pathogens.

“Disinfection” means the process of killing or inactivating using one or more biocides at a defined concentration, under specific conditions and for an established period that will kill or inactivate pathogenic microorganisms.

“Drift eliminator” means a system of baffles or cells that cause separation of entrained water from cooling tower exhaust, and 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.

“ Legionella” means the genus of bacteria which are common aquatic bacteria found in natural and building water systems ubiquitous in aqueous environments, including the recirculated water of cooling tower systems, as well as in some soils that are not properly or regularly maintained. There are more than 50 different species of Legionella, some all of which have been identified as are potentially pathogenic. Legionella pneumophila serogroup 1 is responsible for the majority of infections in the US.

“ Legionella sample” means water or other sample, properly collected and shipped, to be examined for the presence of viable Legionella bacteria using semiselective BCYYCE 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” means a written set of measures 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 188-2015 and with the manufacturer’s instructions, and is developed by a qualified person.~~ Replace with Water Management Program definition.

“Makeup water” means water added to the cooling tower system on a regular basis to replace water lost by bleed, evaporation, drift or leakage and to maintain optimal system operation ~~and process control.~~

“Management and maintenance team” means the individual group or individuals designated by a building owner or designee to be responsible for developing, implementing, and maintaining the water management program ~~the continued effective and safe operation of a cooling tower system.~~

“Online Disinfection” means dosing the cooling tower water system with either a different biocide or a similar biocide at an increased concentration than currently used.

“Owner” means any person, agent, firm, partnership, corporation or other legal entity having a legal or equitable equity interest in, or control of the premises.

Process control measures “Process control measures” mean methods or procedures used to maintain the physical or chemical conditions of water such as actions that must be taken to evaluate internal functioning of the cooling tower system, including monitoring conductivity, pH, biological indicators activity and other parameters to within defined control limits, and observing phenomenon such as scaling, corrosion and biofilm.

~~“Qualified person” means a New York State licensed and registered 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 ANSI/ASHRAE 188-2015; 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 maintenance water management program and plan, and making recommendations for diagnosing anomalous conditions that require corrective actions, under the supervision of a water treatment professional ~~qualified person~~. The responsible person should be capable of conducting the on-site water tests and data logging included in the water management program which might ~~may include~~

but is not limited to: recording operating status, measuring makeup and recirculating water conductivity, calculating operating cycles of concentration, HPC testing, and logging other data and comments relevant to the water treatment system. 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 building water system, including a cooling tower system that may potentially contribute to the growth and dissemination of *Legionella* bacteria.

“Routine monitoring” means evaluation and other activities that must be completed periodically in accordance with the water management maintenance program and plan and this Chapter.

“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.

“System Decontamination” means thoroughly cleaning all debris from the cooling tower basin and then ~~while~~ circulating water through all cooling water circuits, dosing the recirculating water with appropriate non-oxidizing biocide and biodispersant or treating with an oxidizing biocide such as chlorine or bromine sufficient to maintain an equivalent 5-ppm free residual chlorine for six hours at a pH of 8.0 or less.

“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 system shutdown or idling for more than five days.

“Water Management Program” means the risk management plan for the prevention and control of legionellosis associated with building water systems, including documentation of the plan’s implementation, operation, water treatment program, and maintenance of the associated equipment.

“Water quality parameters” means specific analytes or measurements which have control limits identified in the water management plan program which might include: temperature, pH, ~~total dissolved solids (TDS)~~, calcium hardness, chloride, conductivity, oxidation- reduction potential (ORP), bacteriological indicator and other chemical and physical indicators of system

process control.

“Water Treatment Professional” means any person, either employed by the owner or an outside firm contracted to provide water treatment services for the owner, knowledgeable on the requirements for implementing a water management program for the applicable building water system(s) including the cooling tower.

§8-03 ~~Maintenance program and Water Management plan~~Program. For each cooling tower system the owner must have a ~~water management maintenance program and plan~~ program prepared by a ~~Management and maintenance team qualified person~~ in accordance with sections 5, 6 and 7.2 of *ANSI/ASHRAE 188-2015*, the manufacturer’s instructions, and the requirements of this Chapter. The ~~plan~~ program must be kept current and amended by a responsible ~~person or water treatment professional qualified person~~ as needed to reflect any changes in the management and maintenance team, system design, operation or system control requirements for the cooling tower system. The ~~water management maintenance program and plan~~ must be kept in the building where the cooling tower system is located and be made available to the Department for inspection on request. At a minimum, the ~~maintenance program and plan~~ ~~water management program~~ must include:

(a) *Management and maintenance team.* Identification, including names and contact information (mail and email addresses and telephone numbers) and description of the function of each person on the cooling tower system management and maintenance team, including:

(1) The owner of the building where each cooling tower system is located and any manager or other person designated by the owner as responsible for compliance with the requirements of Administrative Code §17-194.1 and this Chapter.

(2) Any person designated by the owner as a responsible person, as defined in §8-02 of this Chapter. (3) Every consultant, service company and ~~water treatment professional qualified person~~ who cleans, disinfects, ~~delivers supplies~~ chemicals or services the cooling tower system.

(b) *Cooling tower system.* Identification, specifications and description of each cooling tower system and all components located at a specific address, including:

(1) The number of cooling towers in the cooling tower system.

(2) The location of each cooling tower in relation to the building and the building address, block and lot number.

(3) The dimensions and characteristics of the cooling tower system including ~~cooling system total recirculating~~ water volume, cooling tower tonnage, ~~water treatment system~~ ~~bioicide delivery method~~, ~~spray~~ flow rate and other key characteristics.

(4) The purpose of the cooling tower system and seasonal or year-round operation including start and end date, if applicable. For systems with multiple cooling towers, conditional operation, such as

individual unit or cell cycling ~~or sealing~~, related to cooling demand, must also be noted.

(5) The New York City Department of Buildings registration number for each cooling tower. (6) The Cooling tower manufacturer, model number and serial number, if applicable.

(7) A flow diagram or schematic of the cooling tower system, identifying all of the principal components and appurtenances of the cooling tower system including makeup water and bleed or waste stream plumbing locations.

(c) Risk management assessment. The assessment must identify risk factors for Legionella proliferation and specify risk management procedures for all or parts of each cooling tower system, and anticipated conditions including:

(1) Any dead legs or stagnant water in the recirculation system.;

(2) Operating configurations and conditions that may occur after periods of extended inactivity (no flow) lasting more than ~~three (3) five (5) consecutive days, including idling or low circulation~~ while not being fully drained.

(3) System parts that require continual operation throughout the year making regular, periodic offline cleaning and disinfection difficult.

(4) Any components that may add additional risk factors for organic material buildup and microbial growth such as strainers and out-of-use filters.

(5) Sources of elevated organic contamination, including, but not limited to windblown debris, bird waste and plant material.

(6) Design configurations that present risk of direct sun exposure on basin, deck or

fill. (7) Ventilation intakes or other routes for human exposure to cooling tower

aerosols. (8) System components adversely affecting water quality management procedures.

(9) Other risk or limiting factors or constraints in the cooling tower system's design and functioning.

(d) Cooling tower operation

(1) Control measures, corrective actions, documentation, including a written checklist for routine monitoring, and reporting that comply with sections 8-04 through 8-08, of this Chapter and any routine maintenance activities recommended by the manufacturer's instructions, including performance measures, which may sufficiently demonstrate adequate implementation of the operation requirements described in the ~~water management maintenance program and plan~~. Where there is a conflict among the requirements of this chapter, Part 4 of the State Sanitary Code, section 17-194.1 of the Administrative Code, and the manufacturer's instructions, the ~~maintenance-water management program and plan~~ must reflect the most stringent requirement.

(2) Specific, detailed seasonal and temporary shutdown and start-up procedures.

(3) Notification and communication strategies among ~~water management program and maintenance~~ team members regarding the required corrective actions in response to process control activities, monitoring, sampling results and other actions taken to maintain the cooling tower system.

§8-04 Process control measures.

(a) Routine system monitoring. An owner must designate a responsible person as defined in §8-02 of this

Chapter to monitor each cooling tower system at intervals as specified in the ~~water management program at least weekly~~ while such system is in use.

(1) The responsible person must enter on a written or electronic checklist provided and maintained by the owner all visual observations of the cooling tower system and associated equipment.

(2) The responsible person must possess the skills and have the knowledge necessary to be able to monitor the system under the supervision of a ~~water treatment professional qualified person.~~

(3) All wetted surfaces, tower basins and drift eliminators must be observed during monitoring and the presence of organic material, biofilm, algae, scale, ~~accumulated~~ sediment and silt/dust deposits, organics (oil and grease), and other visible contaminants observed must be noted on the checklist.

(4) The responsible person must observe and note the condition of ~~water treatment system to verify that it is operating whenever system flow is occurring, maintaining prescribed cycles of concentration, and operating as detailed in the water management plan program. chemical dosing and control equipment and the bleed-off system, and determine if there is sufficient storage and delivery of treatment chemicals.~~

(5) Any system anomalies or problems must be recorded on the checklist and reported to the management and maintenance team for immediate corrective action.

(b) Compliance ~~audits inspections~~. An owner must retain a ~~water treatment professional qualified person~~ to conduct a compliance ~~audit inspection~~ at least once every ninety (90) days while a cooling tower system is in operation. The ~~water treatment professional qualified person~~ must complete and the owner must maintain a written or electronic checklist containing observations and findings with respect to any of the following:

(1) Presence of organic material, biofilm, algae, and other visible contaminants.

(2) General condition of the tower, the basin, packing material and drift eliminator. (3) Quality of water makeup connections and control.

(4) Proper functioning of the conductivity control.

(5) Proper functioning of all ~~water treatment equipment dosing equipment~~ (pumps, timers, valves, and others ~~strain gauges~~).

(6) Review of routine maintenance records to ensure proper implementation of required activities and corrective actions as needed.

The audit checklist shall be made available to the DOH inspector upon request without prior notice.

(c) Maintenance.

(1) Routine maintenance. Cooling tower systems must be maintained and operated in accordance with the ~~water management maintenance program and plan~~. Routine maintenance must address all components and operations, including, but 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.

(2) Replacement in kind. Any part or equipment used in a cooling tower system must comply with the

manufacturer's design and performance specifications and the New York City Construction Codes. ~~As applicable, replacement materials must be corrosion resistant and effectively prevent the penetration of sunlight.~~

(d) Cleaning. The cooling tower system must be cleaned whenever routine monitoring indicates a need for cleaning, ~~but no less than twice a year~~, as specified in the ~~water management maintenance program and plan~~, ~~but no less than once per calendar year~~. Cleaning must be conducted in accordance with the ~~water management maintenance program and plan~~. Water contact areas such as the basin, sump, fill, spray nozzles and fittings, drift eliminators, air intake louvres must be properly accessed or removed to facilitate cleaning.

(e) Aerosol and mist control. The cooling tower system must be operated at all times to minimize ~~the formation and~~ release of ~~entrained water droplets referred to as~~ aerosols and mist. Owners must install and maintain drift eliminators in accordance with the manufacturer's specifications and the NYC Construction Codes. ~~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.~~

§8-05 Water treatment. ~~Prior to changing an e~~Existing and proposed water chemical treatment systems must be reviewed as part of the ~~water management plan~~ program in conjunction with the ~~water treatment professional 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 ~~water management program must describe control limits and measures along with corresponding corrective actions required~~ ~~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.

(a) ~~Daily~~ Automatic treatment while in operation. Water in a cooling tower system must be treated at least once a day, when the system is in operation and such treatment must be automated, unless the maintenance program and water management plan program explicitly states how manual or less frequent biocide additions based on system retention time will provide effective control of *Legionella* growth.

(b) Recirculating system. A 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 maintenance program and water management plan program specifies in detail how the intended water treatment system will provide schedule will be carried out, and how effective biofilm and microorganism control will be achieved when the whole or a part of the system is idle for periods of less than five (5) days during the scheduled chemical injection.

(c) Chemicals and biocides. Chemicals and biocides must be used in quantities and combinations sufficient to control the amplification presence of *Legionella*, while minimizing biofilms, and prevent scaling and corrosion that may facilitate microbial growth.

(1) Biocide applications. Any person who cleans, disinfects, decontaminates 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 325, or a pesticide apprentice under the supervision of a certified applicator.

(2) Registered biocides. Only biocide products registered with the New York State Department of Environmental Conservation may be used to disinfect a cooling tower system.

(3) Records. 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; along and with application schedule date time and amount added. Records should include the container type and amount shipped to the building along with notes records indicating when individual containers are changed out.

(4) Chemical and biocide additions. Chemicals and biocides must be added in accordance with this section and the procedures described in the water management maintenance program and plan addressing, as applicable, feeding mechanism, feeding location, frequency, set timer, duration, triggering events, control procedures, and target biocide residuals. Water treatment chemicals and biocides must be used in accordance with the product label and manufacturer's direction.

(d) Non-chemical water treatment devices s-prohibited. Non-chemical treatment devices may not be

used in lieu of chemical biocide for decontamination or disinfection. Only biocide products registered with the New York State Department of Environmental Conservation may be used when decontamination or in disinfection are indicated by the water management plan program or Table 1 or Table 2 of this section.

(e) Makeup water. 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 water management program maintenance program and plan required by §8-03 of this Chapter, 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 on-going evaluation to eliminate any risk to public health.

(f) Water quality monitoring.

(1) Minimum ~~daily~~ water quality parameters shall be included in the water management plan program measurements. Water quality parameters, including but not limited to, pH, temperature and conductivity and biocide residual (free and total) must be measured and shall be recorded at least once each day with frequency as specified in the water management program when the cooling tower system is operating.

(2) Minimum ~~weekly~~ biological process control indicators shall be included in the water management plan program. A bacteriological indicator to estimate microbial content of recirculating water must be collected and interpreted based on the water management plan program, but not less than once per month 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 water management maintenance program and plan, that will be representative of water microbial content. Indicators may be taken at any time from water treatment system which are in constant operation while the cooling tower system is operating. chemical treatment systems. Indicators from systems that use intermittent or side-stream treatment systems, including biocide applications, must be taken before biocide application and reflect normal cooling tower operating conditions.

(3) Legionella samples. Legionella culture testing must be specified in the water management plan program and one test must be conducted during the May to September timeframe to validate the water management program. no less frequently than every 90 days during cooling tower system operation. A Legionella sample must be analyzed by a US Centers for Disease Control and Prevention ELITE Program certified laboratory, by the New York State Department of Health Wadsworth Center or other laboratory approved by the Department. Test results of all Legionella species at or above the magnitude of level 4 as indicated in Table 1 “High Risk” level as indicated in Table 2 of this section must be reported to the Department within 48 24 hours of receiving the

test results, but without any delay in taking the required action as specified in Table 1. Additional emergency *Legionella* sampling must be conducted if any of the following occur:

(A) Power failure of sufficient duration to allow for growth of bacteria; (B) Loss of biocide treatment sufficient to allow for growth of bacteria;

~~(C) Failure of conductivity controls to maintain proper cycles of concentration;~~

(D) 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.

(E) Any time two consecutive bacteriological indicator sample results are above Level 4 as indicated in Table 1 of this section; or

(F) Any other conditions specified by the Department.

(4) *Monitoring and sampling locations.* 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 the collection of samples.

(5) *Water quality corrective actions.* The ~~water management maintenance program and plan~~ must identify the procedures, responsible parties, required response time(s) and notification protocol for corrective actions and must include, at the minimum, corrective actions that must be implemented according to the bacteriological result levels in Table 1 or Table 2 of this section.

DELETE TABLE 1 AND REPLACE WITH THE NEW TABLES 1 & 2 THAT FOLLOW.

~~Table 1. Corrective actions required for specific bacteriological indicators.~~

<u>Level</u>	<u>Heterotrophic Plate Count Result¹ or Dip Slide Result</u>	<u><i>Legionella</i> culture Result²</u>	<u>Process Triggered by HPC or <i>Legionella</i> Test Results</u>
<u>1</u>	<u><10,000 CFU/ml</u>	<u><10 CFU/ml</u>	<u>Maintain water chemistry and biocide levels program</u>
<u>2</u>	<u>> 10,000 CFU/ml to <100,000 CFU/ml</u>	<u>> 10 CFU/ml to <100 CFU/ml</u>	<u>Initiate immediate disinfection by increasing biocide concentration or using a different biocide (within 24 hours), review treatment program, retest water within 3-7 days. Subsequent test results interpreted consistent with this Table until level 1 is reached.</u>

3	> 100,000 CFU/ml to < 200,000 CFU/ml	> 100 CFU/ml to < 1000 CFU/ml	Initiate immediate disinfection by increasing biocide concentration or using a different biocide (within 24 hours), reviewing treatment program, performing visual inspection to evaluate need to perform cleaning and further disinfection. Retest water within 3-7 days. Subsequent test results interpreted consistent with this Table until level 1 is reached.
4	> 200,000 CFU/ml	> 1000 CFU/ml	Initiate immediate disinfection by increasing biocides (within 24 hours). Within 48 hours perform full remediation of the tower with hyperhalogenating ³ , draining, cleaning, and flushing. Review treatment program, retest water within 3-7 days. Subsequent test results interpreted consistent with this Table until level 1 is reached. For legionella results at this level, notify Department within 24 hours of test result. ⁴

1. Performed by an appropriately accredited Laboratory (e.g. NELAP, AALA).

2. Performed by a CDC ELITE Laboratory, or NYSDOH Wadsworth Laboratory, or another laboratory approved by the Department. Combine all species of *Legionella* detected.

3. At a minimum, dose the cooling water system with 5 to 10 ppm Free Halogen Residual for 1 hour.

4. In a manner as specified on the Department's website.

REPLACE WITH THE FOLLOWING:

Table 1
Interpretation of Planktonic¹ Culture Results from Cooling Towers⁴

Microbial Control	Aerobic Bacteria², CFU³ /ml	Recommended Actions
Good	Consistently <10,000	<ul style="list-style-type: none"> Maintain treatment program
Requires review	Two consecutive samples show >10,000 or increase from baseline value	<ul style="list-style-type: none"> Implement precautionary online disinfection. Review current water treatment program. Re-sample after 30 days to verify effectiveness of disinfection and treatment.
Insufficient	Consistently >10,000	<ul style="list-style-type: none"> Implement precautionary online disinfection. Review maintenance program and plan. Modify the water management program. Re-sample 30 days after changes to maintenance and treatment program to verify effectiveness.

¹Planktonic bacteria are those bacteria found in the recirculating water

²Aerobic bacterial content may be analyzed directly using dipslides, petrifilm, or agar pour plate methods. Indirect methods, including ATP, may be used for trending and can be correlated to cfu/ml.

³ Colony forming units.

⁴ Note that Appendix 4-A does not apply to large scale cooling towers used for such applications as power production and

industrial processes located remotely away from the general population.

SOURCE: CTI, Legionellosis Guideline: Best Practices for Control of Legionella. Cooling Technology Institute, (2006).

Table 2
Interpretation of Legionella Culture Results from Cooling Towers

Risk Category	Lp SG1, CFU ¹ /ml	Lp SG 2-14 and Legionella non-pneumophila species, CFU/ml	Recommended Actions
Very Low	<10	<100	<ul style="list-style-type: none"> Maintain treatment program and validation of water management program.
Low	10-99	100-999	<ul style="list-style-type: none"> Consider precautionary online disinfection. Review current water management program.
Moderate	100-999	1,000-4,999	<ul style="list-style-type: none"> Implement precautionary online disinfection² within 30 days. Review current water management program. Re-sample after 30 days to verify effectiveness of disinfection and treatment.
High	> 999	> 4,999	<ul style="list-style-type: none"> Institute online system decontamination³ within one week. Re-sample 3-7 days after decontamination. Review water management program. Modify the water management program. Re-sample 30 days after changes to water management program to verify effectiveness.

¹ Colony forming units.

² Online disinfection means – Dose the cooling tower water system with either a different biocide or a similar biocide at an increased concentration than currently used.

³ System decontamination means - Clean all debris such as leaves and dirt from the cooling tower basin. While circulating water through all cooling water circuits, dose the recirculation water with appropriate non-oxidizing biocide and biodispersant or treat with an oxidizing biocide such as chlorine or bromine sufficient to maintain an equivalent 5-ppm free residual chlorine for six hours at a pH of 8.0 or less.

SOURCE: Legionella Report Interpretations and Recommendations, Cooling Towers, Environmental Safety Technologies, Louisville, KY

§8-06 System shutdown and start-up: commissioning and decommissioning cooling towers.

(a) Full system shutdown. Procedures to shut a cooling tower system must conform to the manufacturers’ recommendations. When shutdown, the system must be completely drained and protected from offline contamination.

(b) Full system startup. At a minimum, before cooling tower system start-up, an owner must clean and disinfect a cooling tower that has been shutdown or idle for more than five days according to

§17-194.1

of the Administrative Code. Cleaning and disinfection must be done no later than 15 days before the

first seasonal use of such tower. The ~~maintenance program and plan~~ water management program must include detailed seasonal and idle period startup procedures that include, at a minimum:

(1) Either fully clean and disinfect ~~on-line~~, drain to waste and ~~reestablish water treatment~~ ~~disinfect~~, or sufficiently ~~decontaminate~~ ~~hyperhalogenate~~ the recirculated water before startup; and

(2) Before the startup of a cooling tower system ~~which has not been fully drained per (a) above~~; after an extended shutdown of five or more days, obtain and analyze a *Legionella* sample and take appropriate actions as required by this Chapter.

(c) *Commissioning new cooling towers.* Newly installed cooling tower systems must be cleaned and ~~disinfected~~ prior to operation according to this section and the maintenance program and ~~plan~~, and be

registered with the Department of Buildings cooling tower registration system in accordance with § 28-317.3 of the Administrative Code.

(d) *Removal or permanently discontinuing use of cooling towers.* The owner of a cooling tower must notify the Department of Buildings electronically within 30 days after removing or permanently discontinuing use 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 in accordance with this section.

§8-07 Records.

(a) *Records.* An owner must keep for at least three (3) years in the building where a cooling tower is located a record of any maintenance, inspection, deficiency, corrective action, water treatment, test result, cleaning or disinfection performed on the tower;

(b) *Certification.* The owner of a cooling tower must file an annual certification each year as specified by the Department of Buildings, indicating that ~~a water management program has been developed and implemented as required by this Chapter and that~~ such tower was inspected, tested, cleaned and ~~disinfected~~ in accordance with the maintenance program and plan, as required by § 28-317.5 of the Administrative Code. The certification must document any deviations from compliance with the ~~maintenance program and plan~~ water management program and the corrective actions taken to address any deficiencies.

(c) *Posting.* The owner must post the Department of Buildings Cooling Tower Registration Number that has been assigned to that cooling tower on each cooling tower. The Registration Number must be posted on a sign or plate that is securely fastened to the cooling tower in a location that is conspicuously visible and must be constructed of a durable, weather resistant material.

(d) Enforcement. Failure to immediately provide a [copy of the water management program or a report or record required by this Chapter upon the request of the Department shall be considered prima facie evidence that an inspection or other required action was not conducted or performed.](#)

§8-08 Modification. The Commissioner or designee may grant a modification when strict application of any provision of this Chapter presents practical difficulties or unusual hardships. The Commissioner in a specific instance may modify the application of such provision consistent with the general purpose of this Chapter and in compliance with Administrative Code §17-194.1 and upon such conditions as, in his or her opinion, are necessary to protect the health or safety of the public.

§8-09 Penalties. The following penalties shall be imposed for sustained initial and repeat violations. All penalties, except for those alleging a violation of the State Sanitary Code, must be doubled if the respondent fails to appear to answer such violation and is found in default.

Section of Law	Description	Penalty: First violation	Repeat violation(s)
<u>24 RCNY §8-03</u>	<u>No water management maintenance program and plan</u>	<u>\$1000</u>	<u>\$2000</u>
<u>24 RCNY§8-03</u>	<u>Maintenance program and Water management program plan incomplete or not on premises</u>	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-04(a)</u>	<u>Routine monitoring not conducted, documented per the water management plan program at least once a week when tower is in use</u>	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY§8-04(b)</u>	<u>Compliance audits inspections not conducted, documented per 8-04 and the water management plan program at least once every 90 days when the tower is in use</u>	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-04(c)</u>	<u>Routine maintenance according to maintenance program and water management plan program not conducted or documented</u>	<u>\$500</u>	<u>\$1000</u>

<u>24 RCNY §8-04(d)</u>	Twice yearly or other required cleaning not conducted or documented	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-04(e)</u>	Aerosol control do not meet manufacturer's design specifications or drift loss reduction requirements in new or existing towers when required. Drift eliminators not installed per manufacturer's recommendations	<u>\$1000</u>	<u>\$2000</u>
<u>24 RCNY §8-05(a)</u>	Daily automatic or approved alternative water treatment plan not provided;	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-05(b)</u>	Cooling water system not continually recirculated and no acceptable alternative	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-05(c)(1)</u>	Use of an unqualified biocide applicator	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-05(c)(2)</u>	Use of an unregistered biocide product	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-05(c)(3)</u>	No records of all chemicals and biocides added	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-05(c)(4)</u>	Sufficient quantities and combinations of chemicals not added as specified in the maintenance program and plan	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-05(d)</u>	Using unacceptable alternative non-chemical water treatment device	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-05(e)</u>	Use of captured rainwater or recycled water as makeup water not in accordance with approved alternative water source plan	<u>\$1000</u>	<u>\$2000</u>
<u>24 RCNY §8-05(f)(2)</u>	Failure to collect, analyze or record weekly biological process control indicators	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-05(f)(3)</u>	<i>Legionella</i> samples not collected or analyzed, or results not recorded or reported to the Department as required	<u>\$1000</u>	<u>\$2000</u>
<u>24 RCNY §8-05(f)(4)</u>	Failure to monitor and sample from representative locations and times	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-05(f)(5)</u>	Required corrective actions not taken based on bacteriological results	<u>\$1000</u>	<u>\$2000</u>
<u>24 RCNY §8-06(a)</u>	Improper or inadequate shutdown procedures	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-06(b)(1)</u>	Improper or inadequate start-up procedures	<u>\$500</u>	<u>\$1000</u>

<u>24 RCNY §8-06(b)(2)</u>	<u>Legionella samples not collected, analyzed before system start-up</u>	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-06(c)</u>	<u>New cooling tower not or inadequately cleaned and disinfected prior to operating</u>	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-07(a)</u>	<u>Failure to document all inspections, logs, tests, cleaning, and disinfection in accordance with the maintenance program and plan</u>	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-07(a)</u>	<u>Failure to retain records for at least 3 years</u>	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-07(a)</u>	<u>Required records not kept at the cooling tower premises</u>	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-07(c)</u>	<u>Department of Buildings Cooling Tower Registration Number not posted as required</u>	<u>\$500</u>	<u>\$1000</u>
<u>24 RCNY §8-07(d)</u>	<u>Records not made immediately available to Department upon request</u>	<u>\$500</u>	<u>\$1000</u>
<u>State Sanitary Code Part 4</u>	<u>Miscellaneous provisions</u>	<u>\$250</u>	<u>\$250</u>

To: New York City Department of Health and Mental Hygiene

Date: 31 December 2015

Dolphin WaterCare has successfully applied non-chemical, environmentally friendly and sustainable water treatment systems on evaporative cooling equipment for close to two decades. Dolphin WaterCare water treatment systems are used at many locations in New York City and the surrounding metropolitan region.

- HPC and Dip Slide test results from these sites are all consistently less than the proposed City of New York Level 1 limit of 10,000 cfu/ml.
- We endorse the implementation of performance-based selection and evaluation of water treatment systems for evaporative cooling systems consistent with ASHRAE 188-2015.
- Legionnaires' disease has never been associated with Dolphin WaterCare treatment programs.

Dolphin WaterCare offers the following comments on the proposal to add Chapter 8 (Cooling Towers) to Title 24 of the Rules of the City of New York establishing rules for the maintenance of cooling towers to minimize potential contamination of legionella bacteria thus preventing outbreaks of Legionnaires' disease (Legionellosis).

Specifically we object to the proposed Section 08-5 Water Treatment, paragraph (d) that prohibits the use of non-chemical water treatment devices as an alternative to chemical biocides to control biological growth in cooling water systems.

Overview

Industry standard ANSI/ASHRAE 188-2015 was published in June of 2015. The standard establishes management requirements for all building water systems to minimize Legionellosis risk. Evaporative cooling systems are one of many building water systems and other factors that relate to Legionellosis. The standard directs owners/managers that have evaporative cooling systems in their facility to develop a Water Management Program. Water treatment is part of the Water Management Program. The standard does not prescribe any particular method of water treatment for cooling systems, nor does it exclude any particular treatment method. The choice of water treatment is left to the Program Team with efficacy determined by monitoring and validation of key quantitative water treatment attributes.

Non-chemical water treatment systems, including Dolphin WaterCare, have a long history of documented success controlling microbiological activity in evaporative cooling systems.

- Non-chemical systems reduce the potential for treatment interruptions which have been associated with liquid chemical biocide use.
- Non-chemical systems treat water continuously during periods of evaporative cooling operation and have no feed pumps that can fail or product reservoirs that can run empty.
- Prescribed use of chemical biocides does not guarantee improved microbiological control or reduced risk of Legionnaires' disease.
- The initial outbreak of Legionellosis this past summer was attributed to evaporative cooling systems reported to have chemical treatment, including liquid biocides, in place at the time of the outbreak.

Independent third party experts have authored technical papers that speak to the efficacy of non-chemical water treatment systems in controlling microbiological activity in evaporative cooling systems. These papers have been presented at prestigious industry organizations such as; American Society of Heating, Refrigeration

and Air-Conditioning Engineers (ASHRAE), Cooling Technology Institute (CTI), International Water Conference (IWC), National Association of Corrosion Engineers (NACE International) and American Society of Microbiology (ASM).

Given the documented success of Dolphin WaterCare non-chemical treatment programs in controlling bacteria concentration along with published technical success of others in the non-chemical treatment industry there is no technical basis to exclude non-chemical systems.

Non-chemical systems provide a meaningful practical advantage by reducing points of failure associated with chemical biocide treatment systems. Further, non-chemical systems, by their very nature, are an environmentally responsible and sustainable water treatment method. They reduce the volume of hazardous chemicals transported on city streets and highways. Non-chemical treatment systems reduce the concentration of hazardous chemicals contained in tower blowdown which is returned to the City of New York's sewer treatment plants. In addition, use of non-chemical systems contributes to a reduction in a facilities' carbon footprint and are complementary to Mayor Bill de Blasio's initiative to cut greenhouse gas emissions in the City of New York.

There appears to be no meaningful practical or environmental basis to prohibit the use of non-chemical treatment systems in New York City.

Summary

The current industry view of minimizing Legionellosis potential from building water systems is by execution of a written water management program to ensure a well-designed, maintained and operated system. Water treatment is certainly one aspect of a water management program. Monitoring and validation by quantitative performance based results proves the efficacy of a water treatment program. There is no technical justification to prohibit a non-chemical treatment system from being selected as the water treatment method. Non-chemical systems have shown that they can obtain microbiological control equal to or better than chemical biocide programs. There is no practical justification to prohibit non-chemical treatment systems. Non-chemical systems can reduce points of failure and treatment interruptions associated with a chemical biocide program. In addition, they provide an environmentally sustainable alternative to chemical biocides.

Requested Action

Dolphin WaterCare is supportive of many aspects of the Rules proposed by the Department. However, we do not agree, with the prohibition of non-chemical systems and respectfully request that the New York City Department of Health and Mental Hygiene remove the prohibition of non-chemical systems from Section 08-5 paragraph (d) of the proposed Rules. We also request that process control measures described within proposed Chapter 8 be modified so that quantification of residual chemical biocide concentration are only required when a chemical biocide is used. We further request that penalties associated with use of a non-chemical device be removed from the schedule.

Respectfully submitted by,

Mark Winter
Director of Engineering
Dolphin WaterCare

Can Total Bacteria Measurement Be Used To Predict Legionella Presence?

Janet E. Stout, Scott Special Pathogens Laboratory

Abstract

Microbiological growth in cooling water systems presents several challenges for water treatment providers. Culture methods such as heterotrophic plate count (HPC) and “dipslides” provide valuable information related to general microbiological water quality but require several days to produce results. Alternative methods using adenosine triphosphate (ATP) measurement provide faster results and have been applied when rapid water quality assessment is necessary. Our evaluation reviewed potential applications for ATP analysis in cooling water systems. We also assessed whether total bacteria measurement using culture methods or ATP analysis can predict the presence/absence using both experimental data and data collected from field observations.

Introduction

Standard culture methods have been used for decades to quantify microbiological populations in cooling towers. Monitoring cooling towers for excessive growth of bacteria is essential for verification that the applied treatment program is working successfully and for protection of system components from fouling and corrosion associated with microorganisms. Culture methods such as heterotrophic plate count and use of dipslides have been adopted by many water treatment providers for routine analysis of bacterial concentrations in cooling water.

While culture methods provide reliable information regarding bacterial growth in cooling water systems, results for these analyses require several days of incubation in order to achieve accurate results. An alternative method for enumeration of microbial populations in cooling water samples, adenosine triphosphate (ATP) measurement, offers results in a much shorter time period (≤ 1 hr) using a simple test method performed on-site. While ATP measurement offers faster results than culture methods, little data is available comparing this method with established culture methods. The data presented in this report evaluates the correlation between HPC concentrations and microbial populations as approximated by ATP analysis for cooling water samples.

Measurement of total bacteria concentrations in cooling towers using both culture methods and ATP measurement has been proposed for use as an indicator of Legionella presence/absence. This report includes an evaluation of the ability of each testing method (ATP analysis and HPC) to correctly predict Legionella positivity in cooling water samples. Additionally, the variability of each testing method was assessed to evaluate the usefulness of each method as an indicator of Legionella positivity.



Janet E. Stout

Materials & Methods

Sampling Locations

Sampling locations for this evaluation included two pilot-scale model cooling towers and the associated make-up water supply. Make-up water for each of the two cooling towers was dechlorinated using activated carbon and stored in four 125-gal. storage tanks. The maximum residence time of these tanks was approximately 48 hours, and the tanks were refilled with dechlorinated water daily.

Each of the two cooling towers operated at approximately 4-5 cycles of concentration with sump temperatures ranging from 95 – 105°F. The model cooling towers and make-up water supply evaluated in this study were previously described in Duda, Vidic, and Stout 2011.

Water samples were collected from two pilot-scale model cooling towers and their combined make-up water supply over an eight month period. One of the cooling towers (T1) remained untreated for the duration of the evaluation, while the remaining tower was treated sequentially with five non-chemical treatment devices. Devices evaluated during the investigation included magnetic, pulsed-power, electrostatic, ultrasonic, and hydrodynamic cavitation water treatment technologies. Each device was applied to the treated tower (T2) for a period of several weeks. A total of 54 samples were collected from the make-up water supply, while 108 samples were collected from the two cooling towers. All water samples were collected in sterile 250 mL HDPE bottles containing sodium thiosulfate for oxidant neutralization.

HPC Culture

HPC culturing of cooling water samples was done according to the Standard Methods for the Examination of Water and Wastewater pour plate method (9215B) using plate count agar (PCA). A series of four dilutions was prepared for each sample (10⁻² – 10⁻⁴ for make-up water samples, 10⁻³ – 10⁻⁵ cooling tower samples), plated on PCA, and incubated at 36°C for three days prior to enumeration.

ATP Measurement

Measurement of ATP was performed in accordance with the procedure provided by the test kit manufacturer. A volume of 50 mL was filtered for each sample analysis, and ATP extraction and measurement was performed within 24 hours of sample collection. The concentration of ATP in each sample was measured as relative light units (RLUs) using a photometer, and the concentration of bacteria present in the sample was estimated using the following equation:

$$c_{ATP} \left(\frac{MEQs}{mL} \right) = \frac{RLU_{sample}}{RLU_{standard}} \times \frac{10,000 \text{ pg ATP}}{V_{sample} (mL)} \times \frac{1 \text{ MEQ}}{0.001 \text{ pg ATP}}$$

Legionella Culture

Samples were cultured Legionella based on ISO Standards 11731:1997 and 11731:2004. Legionella spp. culture media was laboratory-prepared buffered charcoal yeast extract (BCYE) agar and a selective dye-containing media supplemented with glycine, vancomycin, and polymyxin B (DGVP) (Ta et al., 1995).

Statistical Analysis

HPC bacteria concentrations from samples were transformed to log 10 data and analyzed using a Shapiro-Wilk test to verify normal distribution. A paired t-test was used to compare ATP and HPC data from cooling water samples, and a p-value below 0.05 was considered statistically significant.

Receiver Operating Curves (ROCs) were prepared for all ATP and HPC data for evaluation of the relationship between total microbial concentration and Legionella positivity. F-tests for analysis of variability were performed for all data to determine which microbial measurement (ATP or HPC) demonstrated greater stability (i.e. lower variability).

Results & Discussion

ATP/HPC and Legionella Presence

All cooling water data for samples collected from model cooling tower sumps were combined and analyzed to determine whether or not a correlation between heterotrophic bacteria concentration (HPC) and Legionella positivity was observable. Statistical data are summarized in Tables 1 and 2.

An ROC curve area >0.5 indicates that the tests being evaluated (use of HPC or ATP concentrations to predict Legionella positivity) is valid, while an ROC curve area <0.5 indicated that the test is not useful. The data collected during this evaluation demonstrated an ROC Curve Area <0.5 and no statistical significance (p>0.05). Neither HPC nor ATP concentrations were predictive of Legionella presence in the model cooling towers.

Parameter	Cooling Water
HPC ROC Curve Area	0.28
HPC Geometric Log Mean (Positive for <i>Legionella</i>)	5.40
HPC Geometric Log Mean (Negative for <i>Legionella</i>)	5.80
p-value	>0.05

Table 1: Relationship between total bacteria counts as determined by HPC and Legionella positivity

Parameter	Cooling Water
ATP ROC Curve Area	0.44
ATP Geometric Log Mean (Positive for <i>Legionella</i>)	5.73
ATP Geometric Log Mean (Negative for <i>Legionella</i>)	5.83
p-value	>0.05

Table 2: Relationship between total bacteria counts as determined by ATP and Legionella positivity

ATP/HPC Measurement Variability

For all samples collected from the model cooling tower sumps, ATP had significantly lower variation than HPC (p = 0.026), indicating that ATP measurements demonstrated lower variability than traditional HPC culture methods.

ATP/HPC Correlation

Statistical analyses were performed to evaluate the correlation between HPC and ATP microbial concentrations measured in cooling water samples, and the results of these analyses are shown in Table 3. Correlation coefficients for samples collected from the model cooling tower sumps ranged from 0.52 – 0.54, demonstrating a

very weak correlation between the two measurement methods. A weaker correlation (coefficient of correlation = 0.38) was observed for samples collected from the make-up water supply.

ATP measurements demonstrated higher microbial concentrations than HPC measurements. Lower HPC values (<10,000 CFU/mL) were extracted from the cooling water sample data and analyzed separately. This analysis showed that the correlation between HPC and ATP measurement was stronger for HPC concentrations >10,000 CFU/mL than for concentrations <10,000 CFU/mL (coefficient of correlation = 0.64 vs. 0.43).

Data Source	Cooling Tower Make-Up Water	Cooling Tower 1	Cooling Tower 2
Number of Observations	54	53	55
HPC Mean (log[CFU/mL])	3.94	5.47	5.43
ATP Mean (log[MEQs/mL])	5.17	5.77	5.73
Mean Difference	1.25	0.3	0.3
p-value	0.050	0.002	0.002
Coefficient of Correlation	0.38	0.52	0.54

Table 3: Correlation between HPC and ATP was very low for samples collected from cooling tower sumps and the make-up water supply.

Field Observations

Field data collected from a cooling system serving a large healthcare facility were also evaluated as part of this analysis. The facility cooling system included a total of five cooling towers served by a common sump. The cooling system is treated with sodium hypochlorite and a polymer corrosion inhibitor, and the water treatment provider performs routine monitoring of microbiological growth using ATP analysis. ATP analysis was being performed as a surrogate for both HPC and Legionella culture. The ATP analysis test kit used for evaluation of this tower was produced by a different manufacturer than the test kit used to collect data presented in the previous section.

Upon evaluation, samples collected from each of the five cooling tower sumps for ATP analysis demonstrated unmeasurable levels of ATP. Subsequent evaluation of samples collected from the combined sump demonstrated the presence of Legionella pneumophila serogroup 1 at a concentration of 80 CFU/mL and an HPC concentration of 65,000 CFU/mL.

While these results are very limited in scope, they are indicative of the potential pitfalls associated with use of ATP analysis as a surrogate for culture methods. Routine monitoring of the towers consistently demonstrated undetectable quantities of ATP despite the presence of HPC concentrations in excess of 104 CFU/mL and Legionella pneumophila serogroup 1.

Conclusions

The data collected during this investigation did not indicate that there is a statistically significant correlation between HPC, ATP, and Legionella positivity in samples collected from the model cooling tower sumps. ATP measurement for cooling tower water quality analysis may be useful for fast evaluation of the efficacy of biocide application, but the weak correlation between ATP and HPC in cooling tower samples indicated that HPC may prove more useful for routine monitoring, particularly for regulatory compliance. Field observations where ATP was used as a surrogate for Legionella and HPC culture indicated that culture methods provide a better indicator of the microbiological quality of cooling water systems.

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December 31, 2015

New York City Department of Health and Mental Hygiene
42-09 28th Street, 14th Floor
Long Island City, NY 11101-4132
resolutioncomments@health.nyc.gov

Reference: Proposed Amendment to Add Chapter 8 (Cooling Towers) to Title 24 (Department of Health)

Dear Sirs,

The cooling tower maintenance regulations being enacted by New York City (NYC) and New York State (NYS) will be a landmark for years to come. Effective regulations that can be practically implemented across the wide range of facilities with cooling towers have the greatest potential to protect public health, and are more likely to be adopted on a broader scale. Overly prescriptive or unclear regulations that are difficult to implement may not be as effective, and will be harder to defend and enforce. Given the importance of these new regulations, we believe the following items in the proposed amendment to Title 24 (Department of Health) regarding cooling tower maintenance warrant further consideration:

1. Consistency Between NYC and NYS Regulations

The NYC and NYS emergency regulations passed in August are both based on ASHRAE 188 and have similar requirements for registration, inspections, testing, disinfections, cleaning, maintenance plans, documentation, and certification. However, the supplemental regulations proposed by the NYC Health Department are significantly more detailed and prescriptive than the NYS regulations. Some of the additional requirements will make it more complicated and costly for facilities located in NYC to follow the regulations, and for inspectors to enforce them. The differences will also make it more difficult for property owners with facilities located in both NYC and NYS to maintain consistent cooling tower maintenance standards, training, and procedures.

Recommendation: Align the NYC and NYS regulations as much as possible. Focus on regulating the key maintenance activities required by ASHRAE 188 with required corrective measures based on the results of routine Legionella testing. Remove the overly prescriptive requirements to simplify implementation. Modify regulations to make more practical for smaller facilities without full time HVAC system maintenance personnel to comply.

2. Daily Water Quality Testing (§8-05 f)

For some buildings, the requirement that daily water quality testing be performed by a trained responsible person will be difficult, costly, and impractical to implement by the March 1, 2016 deadline. This is especially true for facilities that currently do not test, do not have full time HVAC system maintenance personnel, and/or are not manned over the weekend. Test equipment will need to be ordered and delivered. Personnel will need to be trained. In some cases, new employees will need to be hired. Provisions will need to be made for covering this function over the weekend and during vacations.

Recommendation:

- a. Reduce the minimum testing requirement to three days per week. This is a more practical alternative to daily water quality testing, and similarly effective. If daily testing is specified, clarify whether this means 5 or 7 days per week.
- b. Remove temperature and pH as a testing requirement. These are informational tests that add additional time, equipment, and complexity to the testing requirements, not control parameters influenced by how the water treatment program is managed. Eliminating these tests will make it more practical for building owners to install water treatment automation equipment to satisfy monitoring requirements.
- c. Remove total chlorine (halogen) as a testing requirement. Free chlorine testing is the recognized standard for monitoring and controlling halogen biocide treatment levels, and specified in most governmental Legionella regulations. Total chlorine testing is unnecessary for routine monitoring by site personnel.
- d. Allow use of internet-enabled water treatment control equipment (SMART controllers) as an alternative to meet the water quality testing requirement. Where such equipment is employed, reduce the minimum water quality testing frequency to once per week. When connected to the internet, SMART controllers can provide continuous documentation of the key water treatment control parameters (conductivity, corrosion/scale inhibitor, ORP), and email notification of alarm conditions. This equipment can also be used to provide remote management of biocide feed rates by a certified pesticide applicator, reducing the need for costly site visits. This type of control equipment can significantly reduce the labor requirements associated with routine water quality testing as well as improve program control and documentation.
- e. Allow continuous ORP monitoring as an approved alternative for routine free chlorine testing, provided that ORP readings are correlated to free chlorine levels at least weekly, where internet enabled SMART controllers are used to meet the water quality monitoring requirements.

3. Startup Procedures for Seasonally Operated Cooling Towers. (§8-06 b)

Section 8.06 b states that an owner must clean and disinfect any cooling tower system that has been shut down or idle for more than 5 days. Cleaning and disinfection is also required no more than 15 days before startup of seasonally operated cooling towers. Given that cleaning and disinfecting a cooling tower takes considerable time and must be performed by personnel with the appropriate training and licensing, it is unrealistic to expect that this requirement can be met with 1,000's potentially starting up in a 15 day window.

Furthermore, this section requires Legionella testing before startup of any system that has been shut down or idle more than 5 days. Given that Legionella may not be present in the bulk water until after an idle system is started, and that it takes 10-14 days to receive the obtain Legionella test results, Legionella testing before startup may not provide useful information for disease prevention

Recommendation: Modify regulation to require cooling towers to be disinfected with a minimum of 10 ppm free chlorine for 6 hours (CTI standard hyperhalogenation procedure) before seasonal startup, and physically cleaned and disinfected within 90 days of seasonal startup. Require Legionella testing within 7-10 days of start-up with corrective measures applied as dictated by the regulatory guidelines.

4. Weekly Bacteria Testing and Corrective Measures (§8-05 f and Table 1)

Section 8.05 f requires weekly aerobic bacteria counts with corrective actions defined in Table 1. Full remediation of the tower with hyperhalogenation, draining, cleaning, and flushing is dictated whenever the bacteria count exceeds 200,000 CFU/ml. Legionella testing is dictated when two consecutive bacteria test results are above 200,000 CFU/ml. These requirements present significant implementation concerns.

Bulk water bacteria counts are an indicator of overall microbiological control, but it is well established that there is no correlation between bacteria counts and the presence of Legionella bacteria (see attached article by Janet Stout). Full remediation is an extreme and costly corrective measure for a bacteria count of only 200,000 CFU/ml (not an uncommon level), especially with no direct relationship to the presence of Legionella. Likewise, Legionella testing is an extreme corrective measure for two consecutive counts. To complicate matters further, dip slides, the most practical means for site personnel to meet the bacteria testing requirement, are not particularly accurate or precise. Dip slides must be visually interpreted, which is subjective. Interpretation is in factors of 10 (e.g. 1000, 10,000, 100,000, 1,000,000), which means dip slides cannot be used to measure the threshold count of 200,000 CFU/ml.

Recommendation:

- a. Remove full cooling tower remediation and Legionella testing from any corrective measures for aerobic bacteria counts.
- b. Provide realistic corrective measures for aerobic bacteria counts greater than 10,000 CFU/ml, with the most aggressive measures triggered by counts greater than 1,000,000 CFU/ml. All corrective measures must be reasonable and possible. Guidelines should be general with allowances for site specific response protocols. Validation of the cooling tower maintenance program effectiveness for Legionella control is determined by Legionella test results, not aerobic bacteria testing.
- c. Reduce the minimum bacteria testing requirement to monthly while the tower system is in operation. This will allow owners to obtain laboratory results for aerobic bacteria counts (HPC), which are much more accurate and objective measures. This will also provide smaller facilities flexibility to meet this requirement without on-site testing.

5. Legionella Testing and Corrective Measures (§8-05 f and Table 1)

Both NYC and NYS regulations require Legionella testing a minimum of every 90 days while the cooling tower system is in operation, with corrective actions and repeat Legionella testing until acceptable counts are achieved (< 10 CFU/ml). Given that Legionella testing is being mandated to validate program effectiveness for Legionella control, there is less need for tightly written and restrictive regulations.

The NYC and NYS Legionella response protocols should be effective, practical, and consistent. In both, the online decontamination protocol for > 1,000 CFU/ml Legionella (very high) is to maintain greater than 5 ppm free chlorine at least one hour, which grossly is inadequate for proper disinfection. The NYC protocol for this level also requires draining, cleaning, and flushing the tower, which can be impractical in some facilities especially during the middle of the summer. The NYS corrective actions also mandate a pH reduction to 7.0 – 7.5 during disinfection for 1,000 CFU/ml Legionella while the NYC protocol does not. This will typically require the addition of acid, which presents safety and corrosion concerns.

Recommendation:

- a. Review regulations and remove the more overly prescriptive requirements to simplify implementation. Streamlining the regulations will make them more practical for owners to implement and regulators to enforce.
- b. Modify disinfection protocol for systems with high legionella counts to specify greater than 10 ppm free chlorine for 24 hours, but remove the requirement to drain and clean the tower except for the required minimum of twice per year or where visual inspection indicates cleaning is dictated. This type of protocol should be a more effective and practical corrective measure for owners to apply.

- c. Review and modify NYC and NYS Legionella response protocols to make consistent. This will make it much more practical for property owners with facilities located in both NYC and NYS to develop and implement consistent cooling tower maintenance standards, training, and procedures.

These comments are respectfully submitted.

Sincerely,

A handwritten signature in black ink, appearing to read 'Allan Browning', with a stylized flourish at the end.

Allan Browning
Director of Technology and Marketing
Chem-Aqua, Inc.
allan.browning@chemaqua.com

January 03, 2016

Ms. Svetlana Burdeynik
New York City Department of Health and Mental Hygiene, Gotham Center
42-09 28th Street 14th Floor, Room 14-43
Queens, NY 11101-4132

Re: Use of Reclaimed Water in Cooling Towers

Dear Ms. Burdeynik:

Natural Systems Utilities (NSU) has reviewed the proposed new rules to Title 24 (Chapter 8: Cooling Towers). The purpose of this letter is to respond to *Section 8-05(e): Make-up water* and provide information about on-site water reclamation facilities and the use of reclaimed water within evaporative cooling towers. Our extensive testing indicates that these water reclamation facilities provide superior pathogen protection for cooling towers due to their on-site disinfection and continuous monitoring and that these water reclamation facilities should be encouraged as sources of supply for cooling tower make-up water.

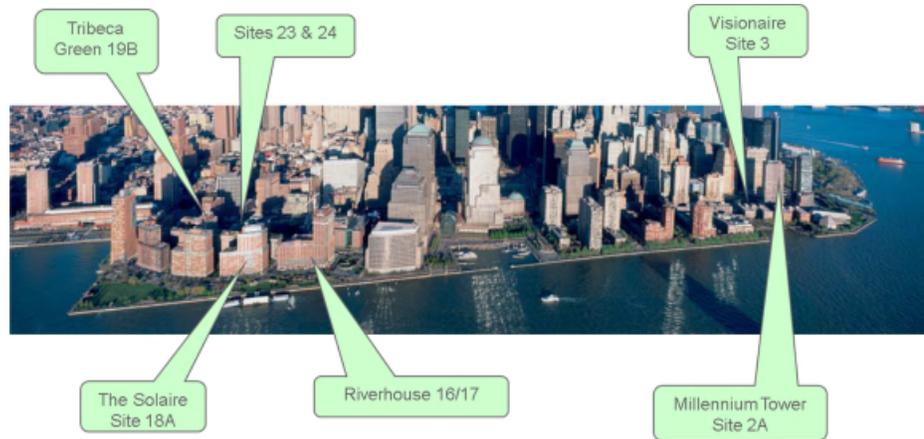
NSU (which now owns Applied Water Management (AWM) and has operated water reuse facilities in NYC under the AWM name) has been involved with and has extensive experience and knowledge about on-site water reclamation facilities within NYC. These facilities provide reclaimed water for evaporative cooling make-up within the buildings. Ed Clerico (NSU CEO Emeritus), along with others at NSU, were also involved with the creation of the original NYC DOH water reuse guidelines and the transition of these guidelines into the NYC Department of Building (DOB) Plumbing Code.

Background:

The installation of the on-site, in-building water reclamation system at the Solaire in Battery Park, NYC was completed over a decade ago. The Solaire was the first “Green” residential high-rise building in the U.S. and earned the United States Green Building Council (USGBC) LEED rating of Gold.ⁱ The project began in 1999 when the Battery Park City Authority (BPCA) selected the Albanese Development Corporation (ADC) to construct The Solaire. ADC selected AWM, now part of NSU, to design the recycling system, procure equipment, oversee construction and operate the facility.ⁱⁱ Construction paused from September 2001 to June 2002 due to the proximity of the site to the World Trade Center. The recycling system was installed in 2002 and the building was dedicated and opened in August of 2003. Since Solaire, water recycling systems have been added in 5 additional BPC buildings (**Figure 1 Below**) along with others in midtown Manhattan and elsewhere in NYC (The Helena, The New School University and others currently under design in Manhattan and Queens).

Figure 1: Buildings with on-site reuse systems in the Battery Park, NYC.ⁱⁱⁱ

The systems are a testament to the evolution of urban recycled water development in the last decade. The evolution has included changes in regulations, changes in project delivery methods, and changes in technology. Perhaps the most significant change that happened during



and as a result of the Solaire system is the broader acceptance of water recycling and the broader based institutional and public commitment to advanced technology, water conservation initiatives, a more modest carbon footprint and to the environment in general.

These projects have been a success in many ways, including, but not limited to: consistently high quality non-potable water produced, dramatic reduction in potable water demand, user acceptance, and many awards. Key ingredients that led to this success included the vision and dedication of the project proponents including a city authority with foresight, a dedicated project champion, a committed developer, and an innovative engineer.

The New York City Department of Environmental Protection (DEP) should also be credited for implementing conservation programs, after droughts in the 60's and 70's, that made water recycling systems such as the Solaire's more economically attractive during the original implementation. With increasing water and sewer costs, these reclaimed water systems are becoming more economically attractive today and are highly valued by many businesses in NYC^{iv}.

Key Facts Regarding the Use of Reclaimed Water within Cooling Towers

- Cooling towers use a lot of water and are a good end use for reclaimed water in both new buildings and existing system retrofits.
- Reducing or eliminating the use of reclaimed water within cooling towers would have a large impact on conservation initiatives within NYC and could extend beyond NYC if other cities' health agencies followed suit.
- Reclaimed water use in cooling towers has been in practice for over 10 years in NYC without any indication that this practice may increase the likelihood of legionella occurrence.
- NYC is a model of success for water reuse and to our knowledge none of the Legionnaire cases are associated with any buildings using reclaimed water within the cooling towers. None of the facilities operated by NSU are associated with any buildings reported.
- NSU water reuse systems include treatment and disinfection mechanisms that render the water equal to or superior to potable water supply for cooling tower make up water from a

microbiological perspective given that the disinfection occurs near the end use. A description for the water reclamation systems is included below and **Appendix A** contains water reuse reports for these systems which were submitted to NYC DOH for 2013 and 2014. **Appendix B** also contains specific Legionella test results performed at The Solaire and The Verdesian where reclaimed water is being used for cooling tower make-up. These lab reports show non-detect results for Legionella. It is also worth noting the total heterotrophic aerobic bacteria result of 10^3 CFU/mL is consistent with the Cooling Technology Institute (CTI) recommended target value of $<10^4$ CFU/mL.

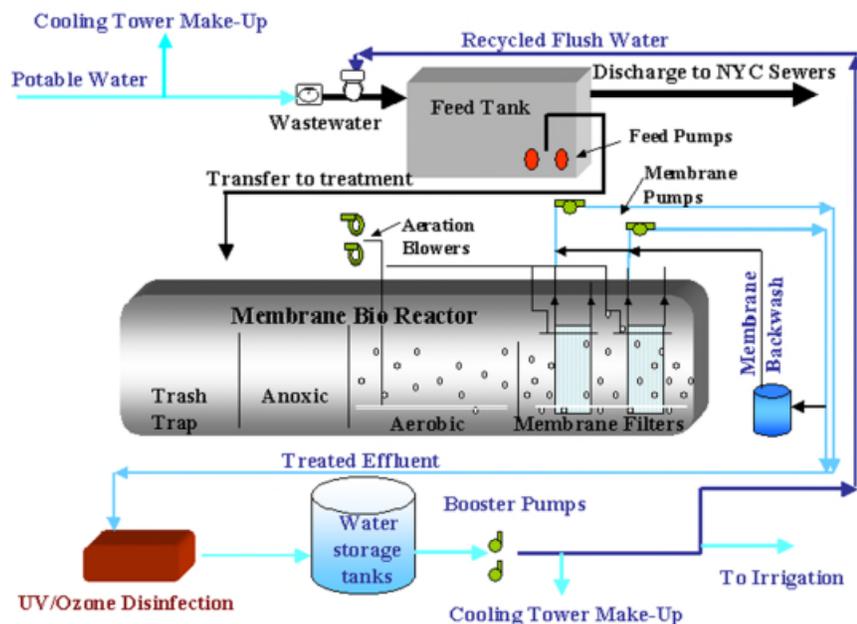
- Proper operation of a cooling tower is not hindered in any way by the use of reclaimed water and in fact, may be aided by the use of reclaimed water.
- Prevention of legionella outbreaks requires careful operation and maintenance of the cooling tower itself regardless of the source of water.

Water Reclamation System Description

Figure 2 is a schematic of the Solaire water recycling system which is consistent with the other reuse systems operated by NSU in NYC. It consists of a membrane bioreactor (MBR) system followed by a multiple barrier approach for disinfection. The bioreactor is an activated sludge system with membranes that have an effective pore size of 0.4 microns. The disinfection system consists of an ozone generation and contacting system, used for oxidation and color removal; followed by an ultraviolet light system for additional disinfection and sodium hypochlorite addition. Effluent water quality meets strict reuse standards established by the NYC DOH, which are similar to the highest level reuse quality requirements established by many states, and is reused for toilet flush water, cooling tower makeup water, laundry, irrigation and maintenance purposes (see **Appendix A** sample data).

Figure 2: Water Reuse Schematic Flow Diagram

Finished water in the storage tank is circulated through the ozone and UV systems to maintain the level of disinfection. Surplus raw wastewater and residual biosolids are discharged to the sewer system. Automatic potable water fill valves at the water storage tanks ensure an uninterrupted supply of water. In this way, there is a backup system to provide water service even in the event that the recycling system is out of service for repair or maintenance. A



computerized system automates control of the process including summoning operators when necessary.^v

The Next Decade

The consistent high quality effluent produced from these systems has convinced the NYC DOB to allow additional reuse applications including laundry cold water supply and sidewalk maintenance, increasing the opportunity to conserve potable water. Current research and enhancements at the Battery Park City reuse facilities is also focused on maximizing energy efficiency and optimizing the treatment process. Upgrades to existing facilities include thermal energy recovery systems which are projected to recover as much energy from the system as the system uses to treat and reuse water. These improvements are now being incorporated into designs for future systems in NYC. NSU is also working with NYC DEP to update and improve the NYC Comprehensive Water Reuse Program (CWRP) to increase and expand upon NYC's conservation initiatives. In the last 10 years NYC has been seen as a leader in water reuse with thousands of people touring these facilities. This is a testament to the contribution of all of the project participants which have been, and will continue to be, committed to the science and application of urban water reuse while at the same time maintaining public health standards.

Thank you for your careful and considered review of this information. Please do not hesitate to contact me at zgallagher@naturalsystemsutilities.com or 908.431.7006 should you have any questions or require additional information.

Sincerely,



Zach Gallagher, PE, LEED AP (NYPE No. 094813)
Vice President
Natural Systems Utilities

ⁱ U.S. Green Building Council Case Studies database,
<http://leedcasestudies.usgbc.org/lessons.cfm?ProjectID=273>, accessed 3/11/2012

ⁱⁱ U.S. Department of Energy, Buildings Database,
<http://eere.buildinggreen.com/overview.cfm?ProjectID=273>, accessed 3/11/2012

ⁱⁱⁱ Reuse Applications in New York and New Jersey, Presentation by A.J. Higgins, P.E., PhD, May 21, 2009.

^{iv} Water Reuse Rates and Charges, Survey Results, American Water Works Association, 2008

^v The Solaire, A Residential Reuse Case Study, Michael A. Zavoda, P.E., 2006

NATURAL SYSTEMS UTILITIES

Water ♦ Energy ♦ Naturally

Jim Huntington
Operations Manager
Applied Water Management
2 Clerico Ln Hillsborough NJ 08844

Alan Price P.E.
NYC Department of Buildings
280 Broadway New York NY 10007

RE: Natural Systems Utilities
Operational Activities for 2014, Battery Park

Mr. Price

Enclosed for your review is a summary of the wastewater reuse activities for the 2014 calendar year in Battery Park City NY. During the 2014 calendar year all operations remained normal throughout 4 of the 6 sites operated by Natural Systems Utilities (formerly AWM) the exceptions to this being Site 2A which sustained considerable damage during Superstorm Sandy the majority of the damage at Site 2A was centered around the electrical components. Currently the system remains operational although no flush water is being produced due to the damaged Ozone unit. The repairs are currently at 75% complete and full operations is expected by the end of August 2015 Once fully repaired, the system will be tested and compliance assured prior to reinstating reuse flow. At this time, the discharge from the membranes is being directed to the city sewer system and we continue monitoring the system performance to assure that everything remains fully functional. The Helena building (West 57th) was down for the entire 2014 calendar year due to upgrades to the membrane system as part of the overall reuse system designed for Durst's new building at 625 West 57th Street. Completion of this rehabilitation work is expected to be completed in July of this year and NSU will keep your office informed of the commissioning. A new reuse site has been commissioned at The New School University having passed all required sampling for discharge however no actual reuse water was produced in 2014 due to mechanical and programming issue it will be included in the 2015 report

Please feel free to contact me with any questions

Sincerely

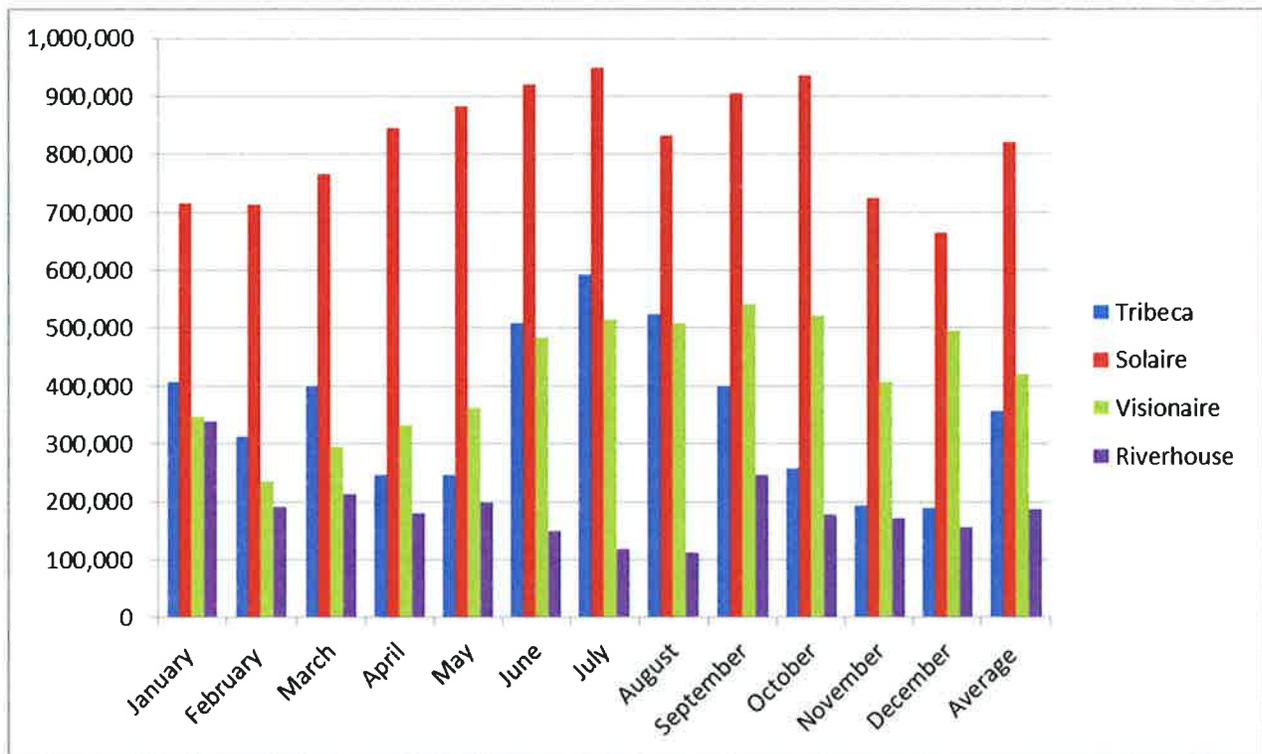


Jim Huntington
VP of Operations Northeast
Natural Systems Utilities
jhuntington@naturalsystemsutilities.com

NATURAL SYSTEMS UTILITIES

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2014 Reuse Flow by Site

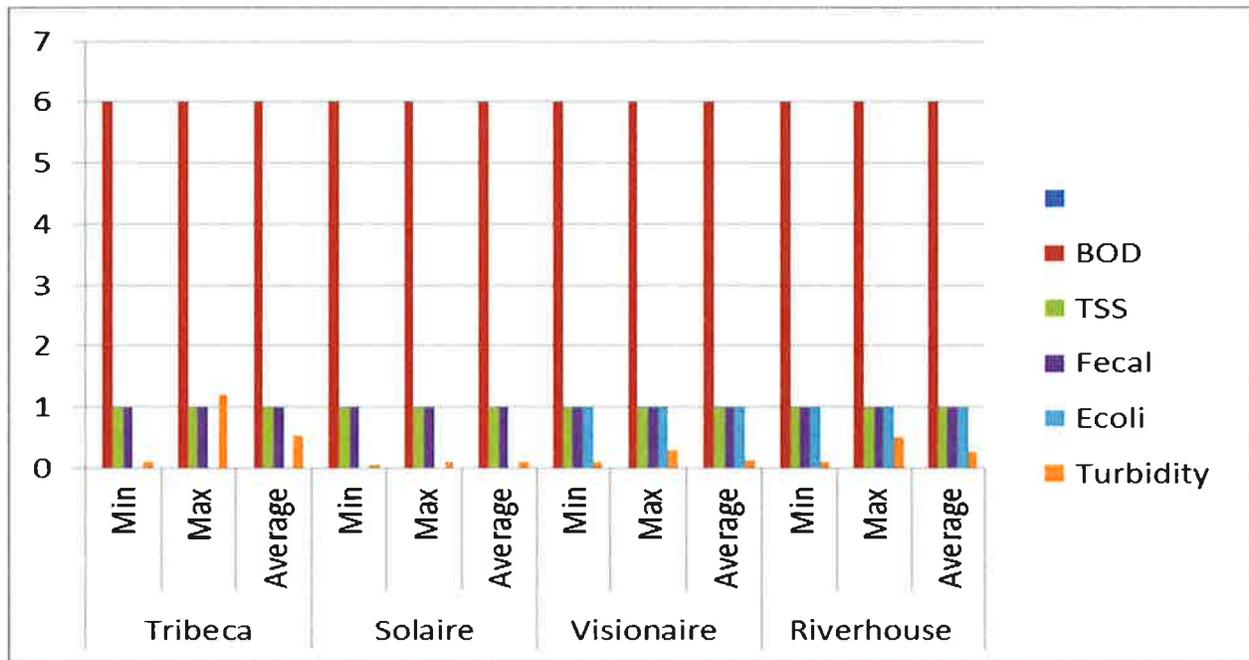


NATURAL SYSTEMS UTILITIES

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2014 Water Quality Results

Parameter	Tribeca			Solaire			Visionaire			Riverhouse		
	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average
BOD	6	6	6	6	6	6	6	6	6	6	6	6
TSS	1	1	1	1	1	1	1	1	1	1	1	1
Fecal	1	1	1	1	1	1	1	1	1	1	1	1
Ecoli							1	1	1	1	1	1
Turbidity	0.1	1.2	0.5458	0.05	0.1	0.0958	0.1	0.3	0.1333	0.1	0.5	0.2625



7/10/2014

Alan Price P.E.
NYC Department of Buildings
280 Broadway New York NY 10007

RE: Applied Water Management
Operational Activities for 2013, Battery Park

Mr. Price

Enclosed for your review is a summary of the wastewater reuse activities for the 2013 calendar year in Battery Park NY. During the 2013 calendar year all operations remained normal throughout 4 of the 6 sites operated by Applied Water Management.

The exceptions to this being Site 2A (Millennium Towers) which sustained considerable damage during Superstorm Sandy, the majority of which was centered on the electrical components associated with the ozone unit. The owner's battle with their insurance company was lost and they have begun repairs on the system with expectations that they will be fully operational by the end of May 2014.

Additionally The Helena (601 W 57th) was shut down for the full year due to the construction activities and the need to replace the membranes. This system is currently under review for upgrade, replacement and integration with the adjoining building being constructed at 625 w 57th street.

If you have any questions regarding the information contained in this summary please feel free to contact me.

Sincerely

Jim Huntington

Jim Huntington

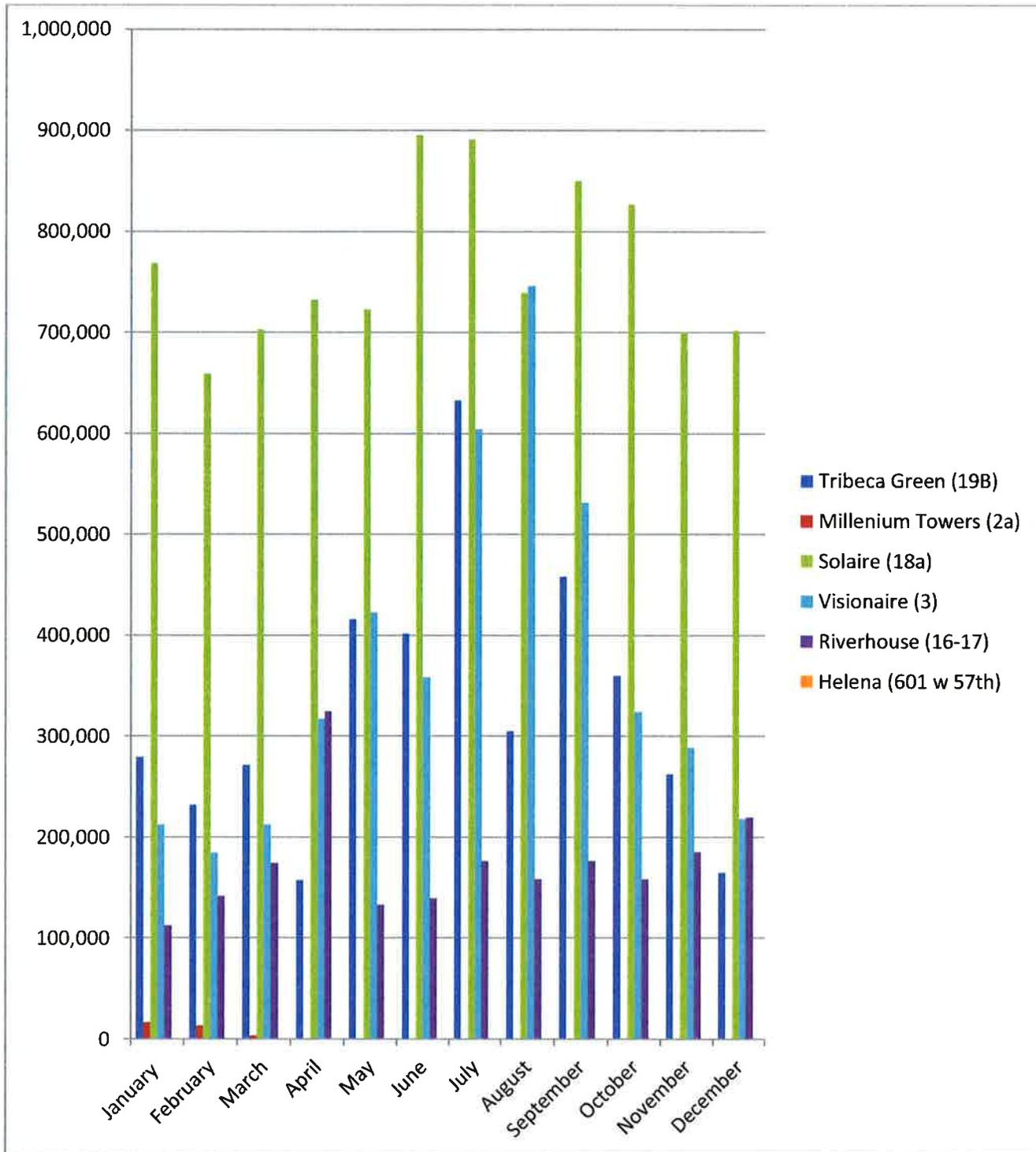
Operations Manager NY/NJ

Natural Systems Utilities

908-295-1041

jhuntington@naturalsystemsutilities.com

2013 Battery Park Reuse Water Production by Site




 NATURAL SYSTEMS UTILITIES

Battery Park Reuse Sampling Summary

Site	Visionaire (3)			Solaire (18b)			Tribeca (19B)			Riverhouse(16-17)			Helena (601 w 57th)			Millenium (2A)		
Parameter	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Ecoli col/100ml	1	1	1							1	1	1						
Fecal col/100ml	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TSS mg/l	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
BOD mg/l	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Turbidity NTU	0.05	0.15	0.1	0.05	0.15	0.09	0.05	1.1	0.21	0.1	0.55	0.2	0.05	1	0.52	0.05	0.55	0.28

Water Quality Data Summary



Applied Water Management

An NSU Company

Jim Huntington
Operations Manager
Applied Water Management
2 Clerico Ln Hillsborough NJ 08844

Alan Price P.E.
NYC Department of Buildings
280 Broadway New York NY 10007

RE: Applied Water Management
Operational Activities for 2012, Battery Park

Mr. Price

Enclosed for your review is a summary of the wastewater reuse activities for the 2012 calendar year in Battery Park NY. During the 2012 calendar year all operations remained normal throughout 5 of the 6 sites operated by Applied Water Management the exception to this being Site 2A which sustained considerable damage during Superstorm Sandy the majority of the damage was centered around the electrical components. Currently the system remains operational although no flush water is being produced due to the damaged Ozone unit. The discharge from the membranes is being directed to the city sewer system. If you have any questions regarding these systems please feel free to contact me.

Sincerely

Jim Huntington

Jim Huntington
Operations Manager NY/NJ
Applied Water Management Inc.
jhuntington@naturalsystemsutilities.com

Appendix B: Legionella Test Results



Location Identification: Solarie
 Name of Collector: John Nicolai
 Contact Email: jnicolai@chemtreat.com

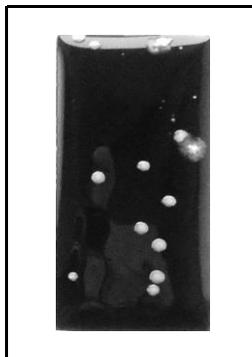
Phigenics Validation Test (PVT) Analytical Report

Method Used: TimeZero Method

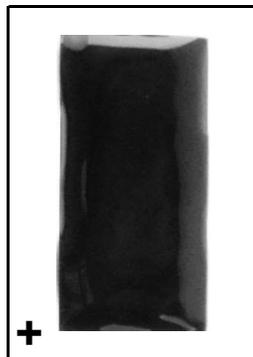
PVT Sample Information	
PASL #	100807
Date Inoculated in Field	2015/09/23
Date of Analysis	2015/10/05

Total Heterotrophic Aerobic Bacteria	
Total Heterotrophic Aerobic Bacteria	*** Score <u>10³</u> CFU/ml

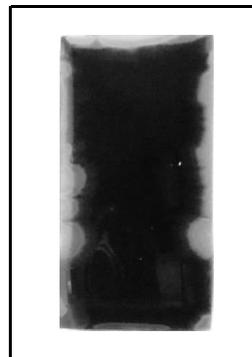
Legionella Test Results			
<i>L. pneumophila</i> serogroup 1	<u>0</u>	CFU	<u>ND</u>
			CFU/mL
<i>L. pneumophila</i> serogroups 2-14	<u>0</u>	CFU	<u>ND</u>
			CFU/mL
<i>Legionella</i> species	<u>0</u>	CFU	<u>ND</u>
			CFU/mL



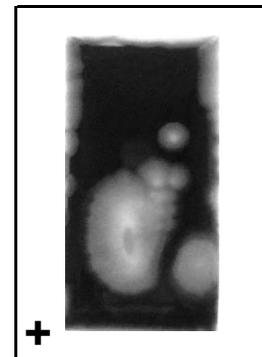
Growth media for viable total heterotrophic aerobic bacteria.



Growth media plus **antibiotics** to suppress non-*Legionella* bacteria.



Acid pretreatment to inhibit non-*Legionella* bacteria.



Acid pretreatment plus **antibiotics** to suppress non-*Legionella* bacteria.

Not Available

Notes: (+) indicates presence of antibiotics. ND indicates *Legionella* was not detected. Dipslide received intact. Colonies tested negative for *Legionella*.

Not Available

Notes: (+) indicates presence of antibiotics. ND indicates *Legionella* was not detected. Dipslide received intact. Colonies tested negative for *Legionella*.

Analyst Signature Carolyn John
 Date 2015/10/05

Reviewer Signature William J. M. Coy
 Date 2015/10/05

Disclaimer: Results from the PVT, or from any other analytical protocol for that matter, do not necessarily provide enough evidence to ensure that hazards from pathogenic microorganisms have been eliminated or controlled nor that risk of harm from such hazards has been reduced. Results from the PVT should only be interpreted within the context of properly designed and implemented water management plans. No guarantee regarding results is expressed or implied. THE PVT AND THE RESULTS IT PRODUCES ARE PROVIDED ON AN "AS IS" BASIS. YOU ASSUME TOTAL RESPONSIBILITY AND RISK FOR YOUR USE OF THE PVT AND PHIGENICS IS NEITHER RESPONSIBLE NOR LIABLE FOR ANY DAMAGES ARISING OUT OF YOUR USE OF THE PVT.



**Phigenics
Validation Test®**

PHIGENICS ANALYTICAL SERVICES LABORATORY

www.phigenics.com

A CDC ELITE Certified Laboratory

Facility Tested: NA

Date of Testing: 2015/09/23

Contact Email: jnicolai@chemtreat.com

Validation Criteria:

Potable Water - typically in well managed systems, the total viable heterotrophic aerobic bacterial concentration should be less than or equal to 10^3 CFU/ml. Per the OSHA *Legionella* Technical Manual, the viable *Legionella* concentration should be less than 10 CFU/ml unless the water system serves immunocompromised or higher risk users which require a more stringent level of *Legionella* control (less than 1 CFU/ml).

Utility Water (such as cooling water) - typically in well managed systems, the total viable heterotrophic aerobic bacterial concentration should be less than or equal to 10^4 CFU/ml. For closed recirculating utility water, the total viable heterotrophic aerobic bacterial concentration should be less than or equal to 10^3 CFU/ml. Per the OSHA *Legionella* Technical Manual, the viable *Legionella* concentration should be less than 10 CFU/ml.

- The facility **Water Management Team** should review all options for Validation Criteria and choose its specific criteria based on the specific systems and users.

Phigenics Validation Test (PVT) Report Summary

Method Used: TimeZero Method

Legionella Caution		Indicates <i>Legionella</i> was detected.
THAB Caution		Indicates total heterotrophic bacteria count exceeds the validation criteria (10^3 for potable, 10^4 for utility, 10^3 for closed recirculating utility).
NO Concern		Indicates results are better than the validation criteria.
		Indicates <i>Legionella</i> was not detected.

PASL Number	Date Inoculated	Date Analyzed	Collector	Location Identification	Category (Potable/Utility)	Category Detail	Total Bacteria	Lpn		Legionella Spp
								S1	S2-14	
							CFU/mL			
100807	2015/09/23	2015/10/05	John Nicolai	Solarie	Utility		10^3	ND	ND	ND



Disclaimer: Results from the PVT, or from any other analytical protocol for that matter, do not necessarily provide enough evidence to ensure that hazards from pathogenic microorganisms have been eliminated or controlled nor that risk of harm from such hazards has been reduced. Results from the PVT should only be interpreted within the context of properly designed and implemented water management plans. No guarantee regarding results is expressed or implied. THE PVT AND THE RESULTS IT PRODUCES ARE PROVIDED ON AN "AS IS" BASIS. YOU ASSUME TOTAL RESPONSIBILITY AND RISK FOR YOUR USE OF THE PVT AND PHIGENICS IS NEITHER RESPONSIBLE NOR LIABLE FOR ANY DAMAGES ARISING OUT OF YOUR USE OF THE PVT.



**Environmental Building
Solutions, LLC**

Environmental Building Solutions, LLC
494 Eighth Avenue, Suite 1403
New York, NY 10001
(646) 290-5925 Phone
(212) 867-9715 Fax

September 3, 2015

VIA EMAIL

Mr. Michael Gubbins
Solaire
20 River Terrace
New York, NY 10282

Re: Water Testing for Legionella Analysis – Cooling Tower

Dear Mr. Gubbins:

On August 17, 2015, a representative from Environmental Building Solutions, LLC collected one (1) water sample from the cooling tower at 20 River Terrace New York, NY. The sample was analyzed for *Legionella sp.* The table below summarizes the results of the sample collected on August 17, 2015.

Sample Location	Colony ID	Colony Forming Units Counted	Colony Forming Units/mL of Water
Cooling Tower	<i>Legionella</i> Bacteria	None Detected	Below Detectable Limits

No *legionella* was detected at this time. Environmental Building Solutions, LLC recommends no further action at this time.

Sincerely,
Signed for Environmental Building Solutions, LLC by:

Maggie Medrano

Maggie Medrano
Project Manager

Attachments: Analytical Laboratory Data Results

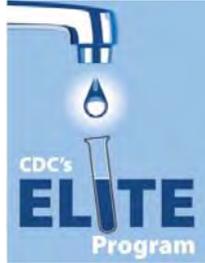
Project ID #: 16-198

Analytical Laboratory Data Results



228 Midway Lane, Suite B
Oak Ridge, TN 37830

Assured Bio Labs, LLC Legionella ViaScan Analysis



Phone: (865) 813-1700
Fax: (865) 813-1705

Inspector:	M. Medrano	Date Collected:	8/17/2015
Project:	Solaire-20 River Terrace	Date Received:	8/18/2015
Project Number:	16198	Date Reported:	8/28/2015
Assured Bio Identifier:	MM081815-25	Analyst:	C. Lively

Selected References

1. Barbaree, J.M., et al. "Protocol for Sampling Environmental Sites for *Legionellae*." 1987. Applied and Environmental Microbiology. Vol 53, No 7. 1454-1458.
2. Campbell, J. Bibb, W.F., Lambert, M. A., Eng, S., Steigerwalt, A. G., Allard, J. Moss, C.W., and Brenner, D.J. 1984. "*Legionella sainthelensi*: A new Species of *Legionella* isolated From Water Near Mt. St. Helens." Applied and Environmental Microbiology. Vol 47, No 2. 369-373.
3. Gubler, J.G.H, Schorr, M., Gaia, V., Zbinden, R., and Altwegg, M. "Recurrent Soft Tissue Abscesses Caused by *Legionella cincinnatiensis*." 2001. Journal of Clinical Microbiology. Vol. 39, No 12. 4568-4570.
4. Johnson, K.M. and Huseby, J.S.1997 "Lung Abscess Caused by *Legionella micdadei*." Chest: Official publication of the American College of Chest Physicians.
5. Macher, J., Ed. 1999. *Bioaerosols: Assessment and Control*. ACGIH, Cincinnati, Ohio.
6. Ta, A.C., J.E. Stout, V.L. Yu, and M.M. Wagener. "Comparison of Culture Methods for Monitoring *Legionella* Species in Hospital Potable Water Systems and Recommendations for Standardization of Such Methods". 1995. Journal of Clinical Microbiology.
7. Thomas, E., Gupta, N.K., Westhuizen, N.G., Chan, E., and Bernard, K. "Fatal Legionella maceachernii Pneumonia in Canada." 1992. *Journal of Clinical Microbiology*. Vol 30, No 6. 1578-1579.
8. U.S. Department of Health and Human Services, Centers for Disease Control. "Procedures for the Recovery of *Legionella* from the Environment". Jan. 2005.
9. Wadowsky, R.M., Yee, R. B. "Glycine-Containing Selective Medium for Isolation of *Legionellaceae* from Environmental Specimens." 1981. Applied and Environmental Microbiology. Vol 42, No 5. 768-772.
10. Wistreich G.A. *Microbiology Laboratory: Fundamentals and Applications*. 1997. Prentice Hall, Upper Saddle River, New Jersey.

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Methods of Analysis

Assured Bio Labs, LLC uses the following Standard Operating Procedures for the analysis of samples:

Controlled Document 165: Detecting Legionella In Environmental Samples via Culture

Reporting Limits

Minimum Reporting Limit: The American Industrial Hygiene Association defines this term in AIHA LQAP Policy Document – Module 9 as "The minimum concentration of an analyte that, in a given matrix and with a specific method, has a 99 percent probability of being identified, qualitatively or quantitatively measured, and reported to be greater than zero."

Reporting Limit: The American Industrial Hygiene Association defines this term in AIHA LQAP Policy Document – Module 9 as "The lowest concentration that can be detected by the method, based upon the amount or portion of sample analyzed."

Additional Comments and Method Limitations

The analytical data included in this report reflect only the conditions of the material sampled and submitted to the laboratory for analysis at the time of collection. The results included in this report may not be used for past or future environmental conditions.

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The results obtained from samples submitted to Assured Bio Labs, LLC depend greatly upon conditions at the time of culture. Conditions which have been found to effect sample results include, but are not limited to, temperature, humidity, growth media, unique growth requirements, sample volume, light exposure, incubation time, and sample overloading.

Assured Bio Labs performs Legionella testing using the CDC ELITE "Procedures for the Recovery of Legionella from the Environment Manual" methodology for the detection of presumptive Legionella in environmental samples. Any further determination requires Slide Agglutination Test, Direct Fluorescence Antibody, or DNA sequencing methods.

Any modifications to a method of analysis shall be discussed with the inspector prior to sample processing and shall be documented directly under the effected sample.

Sample Number: MM081815-25-1
Sample ID: Cooling Tower
Sample Condition: Intact
Minimum Reporting Limit: 1 CFU

Incubation Temperature: 40 ° C
Sample Type: Bulk - Water
Sample Volume: 200µL
Reporting Limit: 10 CFU/ml=CFU/ml

Colony Identifications:	<u>Colony Forming Units Counted</u>	<u>Colony Forming Units/Milliliter of Water</u>
<i>Legionella</i>	None Detected	Below Detectable Limits

Method Modifications: Sample was BELOW DETECTABLE LIMITS After 10 Days of Incubation.



Environmental Building Solutions, LLC

Environmental Building Solutions, LLC
494 Eighth Avenue, Suite 1403
New York, NY 10001
(646) 290-5925 Phone
(212) 867-9715 Fax

September 1, 2015

VIA EMAIL

Mr. Miroslav Salon
Building Manager, LEED AP
The Verdesian on the Park
211 North End Avenue
New York, NY 10282

Re: Water Testing for Legionella Analysis – Cooling Tower

Dear Mr. Salon:

On August 17, 2015, a representative from Environmental Building Solutions, LLC collected one (1) water sample from the cooling tower at 211 North End Avenue New York, NY. The sample was analyzed for *Legionella sp.* The table below summarizes the results of the sample collected on August 17, 2015.

Sample Location	Colony ID	Colony Forming Units Counted	Colony Forming Units/mL of Water
Cooling Tower	<i>Legionella</i> Bacteria	None Detected	Below Detectable Limits

No *legionella* was detected at this time. Environmental Building Solutions, LLC recommends no further action at this time.

Sincerely,
Signed for Environmental Building Solutions, LLC by:

Maggie Medrano

Maggie Medrano
Project Manager

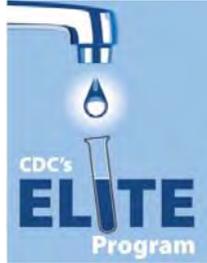
Attachments: Analytical Laboratory Data Results

Analytical Laboratory Data Results



228 Midway Lane, Suite B
Oak Ridge, TN 37830

**Assured Bio Labs, LLC
Legionella ViaScan Analysis**



Phone: (865) 813-1700
Fax: (865) 813-1705

Inspector:	M. Medrano	Date Collected:	8/17/2015
Project:	Verdesian-211 North End Ave	Date Received:	8/18/2015
Project Number:	16197	Date Reported:	8/28/2015
Assured Bio Identifier:	MM081815-24	Analyst:	C. Lively

Selected References

1. Barbaree, J.M, et al. "Protocol for Sampling Environmental Sites for *Legionellae*." 1987. Applied and Environmental Microbiology. Vol 53, No 7. 1454-1458.
2. Campbell, J. Bibb, W.F., Lambert, M. A., Eng, S., Steigerwalt, A. G., Allard, J. Moss, C.W., and Brenner, D.J. 1984. "*Legionella sainthelensi*: A new Species of *Legionella* isolated From Water Near Mt. St. Helens." Applied and Environmental Microbiology. Vol 47, No 2. 369-373.
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Sample ID: Cooling Tower
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Minimum Reporting Limit: 1 CFU

Incubation Temperature: 40 ° C
Sample Type: Bulk - Water
Sample Volume: 200µL
Reporting Limit: 10 CFU/ml=CFU/ml

Colony Identifications:	<u>Colony Forming Units Counted</u>	<u>Colony Forming Units/Milliliter of Water</u>
<i>Legionella</i>	None Detected	Below Detectable Limits

Method Modifications: Sample was BELOW DETECTABLE LIMITS After 10 Days of Incubation

From: [Janet Stout](#)
To: [Resolution Comments](#)
Cc: [Janet Stout](#)
Subject: Comments from Janet E. Stout, PhD on the Proposed Amendments to Title 24 of the Rules of the City of New York
Date: Sunday, January 03, 2016 11:53:08 PM

I am Janet E. Stout, PhD and I wish to submit the following comments on the “**Proposed Amendments to Title 24 of the Rules of the City of New York new Chapter 8 (Cooling Towers) to Title 24 of the Rules of the City of New York** to establish rules for maintenance of cooling towers to minimize potential contamination by *Legionella* bacteria to prevent outbreaks of Legionnaires’ disease, a type of pneumonia with a high case fatality rate”

As a microbiologist with over 30 years of experience in the study of Legionnaires’ disease, I commend the City of New York for proposing an aggressive approach to combating the transmission of Legionella bacteria from contaminated aerosols from the warm water used in water-based cooling systems such as cooling towers.

There are some microbiological changes that will make the Proposed Amendments more consistent with what is known about microbiological monitoring - both Heterotrophic Plate Count (HPC) methods for total counts and Legionella testing. The count in Colony Forming Units (CFU) per milliliter will vary widely depending on the method and culture media used to perform the test. It is well known that dipslides and the use of Plate Count Agar will underestimate the total bacteria present due to short incubation time and culture media. If another media is used such as R2A agar, higher counts will be detected due to media type and longer incubation. Each method can be used to monitor performance per the Standard methods, but the cut points in Table 1 would be exceeded on a regular basis with some methods. NOTE: the values often quoted in water treatment text such as from AWT or CTI were suggested values and have never been scientifically validated.

A serious concern is that Table 1 implies a relationship between these HPC values and Legionella test results when no such relationship has been demonstrated or exists. HPC values should be removed from the Table and replaced by text that allows the user/operator to select the HPC test method and to judge performance by changes in levels. It is the Legionella test results that are of concern.

Specifically, it would be preferable to use HPC to trend general performance of the program (not Legionella risk) and use these targets to corrective actions only when HPC counts increase by 2 orders of magnitude (100-fold) from normal baseline irrespective of the test method for HPC on consecutive tests.

Regarding Legionella testing –

The recommended 90 day testing interval is reasonable and will help guide biocide application and selection based on ability to control Legionella.

No outbreak of Legionnaires’ disease attributed to a cooling tower has been caused by any

Legionella species other than Legionella pneumophila serogroup 1. Therefore, it is more cost effective and scientifically valid to test specifically for Legionella pneumophila serogroup 1 and to base remediation on the presence of this bacteria and not all Legionella species.

If other species are detected, this does not mean Legionella pneumophila serogroup 1 will somehow magically appear, as some have suggested. It would be better to require another test if a species such as L. anisa is detected, rather than the more costly cleaning and disinfection. This approach is used in the Veterans Affairs Legionella Directive for building water systems –recognizing the lower pathogenicity of these other Legionella species, but verifying that their presence is not an predictor of the presence of L. pneumophila.

You are correct to have special provisions for the use of water not previously treated for potable use – such as rainwater or reuse water.

Similarly, you are also correct in restricting the use of non-chemical water treatment devices as the only treatment for microbiological control. In ASHRAE-sponsored research, such devices were not found to be effective in a model cooling tower. If such devices are used, Legionella testing should be performed to validate control. If control is not achieved, standard biocide treatment may need to be added.

Sincerely,

Janet E. Stout, Ph.D.
President & Director

Special Pathogens Laboratory
1401 Forbes Ave. Suite 209
Pittsburgh, PA 15219

P: 412-281-5335

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New York City Department of Health and Mental Hygiene
Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th Street, 14th Floor
Long Island City, NY 11101- 4132

Subject: Comment on Proposed Amendments to Title 24 of the Rules of the City of New York - Chapter 8 (Cooling Towers)

As a consulting engineer with extensive subject knowledge on the matter, we have the following comments to the proposed rule:

General Comments

- First, we commend the NYC Health Department for taking on the task of making up a rule for controlling Legionella bacteria and hopefully limit Legionnaires disease which has been a source of many deaths.
- We also commend them for making sure that if they follow this rule, facility owners and operators will recognize their critical role in managing water quality within their facilities.
- We also want to say that cooling towers are not the only source of Legionnaires disease. ASHRAE 188-2015 specifically addresses the other sources such as potable water, water features and water fountains and spas. The CDC has done many studies and cooling towers are not the most responsible sources of Legionnaire's disease outbreaks. (Potable water systems/ domestic hot water tanks are normally the most susceptible to the disease outbreaks. Thus we recommend that the Health Department also establish rules for building owners to examine all of their water systems as setup in ASHRAE 188-2015.

Specific Comments

- **Section 08-02 Definitions – Bacteriological Indicator** - means a biological process control indicator that estimates microbial content in the circulating water of a cooling tower system, such as HPC as measured in a water sample or by a dip slide. **Since there are other means besides dip slides such as Petri film, ATP and other methods we would eliminate the words dip slides and leave it as HPC. As a technical issue HPC has nothing to do with Legionella bacteria and we have seen systems with very low HPC counts that still have had some Legionella bacteria. A proper examination of a**

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cooling tower also looks at biofilm and other issues. We feel the inspection of the system should address this.

- **Section 08-02 Definitions – We recommend another term for “Alternate Sources of Make-up” – This would allow a definition for rainwater and reuse water and not confuse the word make-up as is seen in Section 08-05.**
- **Section 08-03 a) Management Team – 3) – “a qualified person who delivers chemicals” could be a truck driver or delivery driver who would not have any knowledge. We suggest the wording to be “supplies chemicals”.**
- **Section 08-03 a) Management Team – we recommend adding a number 4) Consultants or Professional Engineers and/or subject matter experts who serve on the committee to provide technical guidance and support to risk management or operations of the systems.**
- **Section 08-05 Water Treatment – (2) Registered biocides. Only biocide products registered with the New York State Department of Environmental Conservation may be used to disinfect a cooling tower system. We recommend that this also state that biocides also must meet all Federal EPA Standards under FIFRA guidelines including EPA approved labels for control of the system specified on the label.**
- **Section 08-05 Water Treatment – (e) Makeup water. 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 maintenance program and plan required by §8-03 of this Chapter, 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 on-going evaluation to eliminate any risk to public health. This is confusing and should say alternate sources of make-up. Most of these supply systems are contained in closed tanks and require repressurization pumps to supply a cooling tower. There should be no drift. There are air breathers to allow for the tank to operate, but this could have a piece of plastic screen to eliminate water issues. These types of systems should also have their own biological control systems along with filtration. Thus this should be specified under a separate section.**
- **Section 08-05 Water Treatment - (f) Water quality monitoring. Water Quality monitoring should also include corrosion monitoring. It is well know that when corrosion control is not viable and iron corrosion by-products are present in a system, increased Legionella counts are more likely. (Note: One of the matrix used to grow Legionella bacterium is based on an iron matrix). We recommend that ASTM test protocol D2688 be utilized on all cooling water systems and corrosion rates be maintained below 3 mpy.**

- **Section 08-06 System Shutdown – The addition of extra biocide prior to shutdown alleviates many issues with bacterial growth. It should be required that extra biocide be added before the system is shutdown.**
- **Section 08-06 System Shutdown – (2) Before the startup of a cooling tower system after an extended shutdown of five or more days, obtain and analyze a Legionella sample and take appropriate actions as required by this Chapter. This winter has shown us that up and down cycling of cooling towers is a very real possibility, especially for HVAC cooling towers. A building owner could be running a considerable amount of Legionella samples during a winter like this with frequent shutdowns for five days and restart ups. It would be wiser to state on short term shutdowns under 15 days that the system be dosed with double or triple the normal amount of biocides before the system is restarted.**

Again, as a technical engineer and subject matter consultant, I support this rule because it will all help make our workplaces and environment safer.

Respectfully submitted,



Jay Farmerie
Executive Consultant
support@cyrusrice.com
JJF:mcf



252 West 29th Street, NYC NY 10001
Ph: 212.967.3002
www.nca-i.com

My name is Nora Nealis, and I am the Executive Director of the NCA – a dry cleaning industry trade organization headquartered in New York City. I appreciate the opportunity to appear at this hearing and comment on this proposal regulating cooling towers. If it comes as a surprise to you that the dry cleaning industry has an interest in this proposal, you are not alone. Few people realize that in an effort to protect our water resources and to save money on water and sewer charges, some dry cleaners have invested in small, evaporative, recirculating towers to cool the environmental control features on their dry cleaning machines. It is this ‘outside the norm’ use of a water tower that I wish to address.

In this proposed rule it is stated that “Both Local Law 77 and the SSC §4.2(c) define a cooling tower as “a cooling tower, evaporative condenser or fluid cooler that is part of a recirculated water system incorporated into a building’s cooling, industrial process, refrigeration or energy production system.” The preamble to the proposal talks about the responsibilities of building owners in this regard. The operative word we would like to focus on here is ‘**building’s**’ because we believe this rule is not targeting a dry cleaner’s small evaporative cooling tower, but a larger scale system servicing a building’s evaporative cooling needs.

This proposal clearly has been promulgated with building owners’ tower use in mind, wherein they are relying on the large, and in most cases massive, towers used in the operational functions of the building (see side by side photos below), which often sit stagnant during the heating season and provide a fertile breeding ground for bacterial growth. The various maintenance requirements, design and engineering controls and the fines proposed in the rule look to address the conditions that prevail in the use of these large, complex systems.



The language used, as well as the design and operational protocols and ‘automatic’ maintenance mechanisms and fines referenced are not reflective of the tiny, little, cooling towers as found in the dry cleaning industry. In dry cleaning, the largest of these small towers’ storage tanks hold less water than the average 4 person hot tub (see tank specs below), and are used year long on a non-contact, recirculating basis to cool the environmental control systems incorporated into the eco-friendly dry cleaning machines. Industrial bacteriostats must be added by the fractional ounce, as opposed to the multiple gallons required in larger systems. And just as hot tubs are not covered by this proposal, so too we believe small dry cleaning towers should also be exempt.



Typical storage tank in use in dry cleaning industry

Storage Tank Capacity	
Tower Model T-2	Gallons
3-5 Ton	14 Gallons
8-10 Ton	27 Gallons
15-20 Ton	63 Gallons
25 Ton	93 Gallons
30 Ton	128 Gallons
40 Ton	133 Gallons
50-60 Ton	167 Gallons
70-80 Ton	252 Gallons
100 Ton	321 Gallons

When the Commissioner’s Blanket Order was issued last summer, dry cleaners using towers, found it impossible to get a return phone call for a quote, never mind a service call from virtually anyone on the list of qualified firms the City provided. The reason became clear when we learned that typically the ‘disinfecting’ processes being offered were priced anywhere upward from \$5,000 and the firms were well aware that this represented 50% or more of the purchase price of these small towers themselves! Keep in mind a small tower suitable for the needs of a dry cleaner might cost \$5,000- \$14,000, as where a typical building’s tower needs would be served by a tower costing over \$100,000 and climb upward with size. (see price list below) On a practical basis, the providers cannot be faulted for recognizing these small towers owners are not worthy of their services. They made a distinction, and so too should this proposal.

At a public meeting in the Bronx last summer, a “small tower: was described as one that was ‘only’ 500 tons. A typical dry cleaner’s tower is 90% smaller than that definition. Clearly, our industry’s use does not fit the mold used to build the requirements in the proposed Rule 77.

As a result, rather than adopt a proposal that would force the shut down of all these small towers, the National Cleaners Association would like a clarification in the rule that the small towers used in the dry cleaning industry are exempt from all the City’s requirements except registration and quarterly culture testing. This exemption would be based on the definition of cooling tower, the system size, the fact that it is used throughout the year and therefore is not subject to the conditions created by stagnant water, the cost, complexity and criteria of professional credentials for compliance with the proposal that would necessitate the shut down of these small units, discouraging water recycling, imposing an unnecessary burden on the City’s water supply and sewer system, and resulting in the awful waste of a precious natural resource. The public health would be protected because if culture testing indicated the need for corrective action a

Commissioner's Order could be issued. Of course, should the NYC DOHMH and the City Council wish to work with industry to craft a guideline that would better reflect the small tower users' experience and safeguards exposures, we would be more than happy to participate in such an endeavor.

As it currently stands, the adoption without exception of this proposal would result in dry cleaners decommissioning their recirculating towers, the concomitant waste of thousands, if not millions of gallons of potable water in the City and the added financial burden on small business of increased water and sewer fees. We urge that until such time as a small tower user guideline can be adopted, dry cleaners be exempted from this proposal.

In addition, we would like to comment that, since the New York State Department of Environmental Conservation law requires anyone disinfecting water cooling towers to use DEC approved treatment chemicals AND further requires such personnel to be 7-G Pesticide certificate holders, such certificate holders should appear on the City's "Qualified Person" list in Chapter 8.

We also believe water quality testing "daily" is excessive as defined in proposed Chapter 8, § 8-05 (c) (4) (f) (1) and should be eliminated.

The fine structure may be considered merely punitive for large real estate firms, but would be crippling to a small, struggling service business like dry cleaners, who often lack strong administrative and paper handling skills. We would suggest violations should be more focused on the result and public safety goals of the rule as opposed to paperwork. A more result- oriented violation could be based on the results of the required legionella culturing tests.

Thank you.
Submitted by:
Nora Nealis
NCA Executive Director
Ph: 212.967.3002




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Storage Tank Capacity	
Tower Model T-2	Gallons
3-5 Ton	14 Gallons
8-10 Ton	23 Gallons
15-20 Ton	63 Gallons
25 Ton	93 Gallons
30 Ton	126 Gallons
40 Ton	133 Gallons
50-60 Ton	167 Gallons
70-80 Ton	202 Gallons
100 Ton	221 Gallons
125 Ton	324 Gallons
150-175 Ton	406 Gallons
200-250 Ton	782 Gallons
300 Ton	797 Gallons
350 Ton	858 Gallons
400 Ton	1335 Gallons
500 Ton	1649 Gallons
600-700 Ton	2583 Gallons
800-1000 Ton	4046 Gallons
1250-1500 Ton	4721 Gallons



COOLING TOWER LIST PRICING

MODEL	FAN MOTOR HP	VOLTAGE/PHASE	TOWER WEIGHT	MOTOR WEIGHT	TOWER DIMENSIONS	LIST PRICE
T-23	1/6	110/220V/1	100	35	36 x 36 x 61	\$1,625.00
T-25	1/6	110/220V/1	120	35	36 x 36 x 63	\$1,660.00
T-28	1/6	110/220V/1	150	35	44 x 44 x 66	\$1,749.00
T-210	1/4	110/220V/1	150	45	44 x 44 x 66	\$2,187.00
T-215	1/4	110/220V/1	200	45	50 x 50 x 72	\$2,598.00
T-220	1/2	110/220V/1 or 220/440V/3	260	47	57 x 57 x 76	\$3,654.00
T-225	3/4	220/440V/3	295	50	57 x 57 x 84	\$3,873.00
T-230	1	220/440V/3	340	50	64 x 64 x 84	\$4,485.00
T-240	1.5	220/440V/3	425	70	74 x 74 x 88	\$5,247.00
T-250	1.5	220/440V/3	490	70	81 x 81 x 94	\$5,865.00
T-260	1.5	220/440V/3	570	100	81 x 81 x 94	\$6,650.00
T-270	1.5	220/440V/3	660	100	88 x 88 x 96	\$7,802.00
T-280	2	220/440V/3	710	120	88 x 88 x 96	\$8,391.00
T-2100	3	220/440V/3	1175/185	145	73 x 73 x 50 / 52 x 88 x 61	\$9,621.00
T-2125	3	220/440V/3	1300/230	145	72 x 85 x 50 / 56 x 97 x 60	\$12,197.00
T-2150	5	220/440V/3	1570/330		89 x 50 x 76 / 97 x 70 x 78	\$13,700.00
T-2175	5	220/440V/3				\$16,944.00
T-2200	5	220/440V/3	2150/400		86 x 90 x 51 / 98 x 71 x 75	\$18,908.00
T-2225	7.5	220/440V/3				\$20,371.00
T-2250	7.5	220/440V/3	2615/415		85 x 89 x 52 / 99 x 72 x 101	\$21,648.00
T-2300	10	220/440V/3				\$25,872.00
T-2350	10	220/440V/3				\$28,133.00
T-2400	15	220/440V/3				\$36,528.00
T-2500	15	220/440V/3	5342/475		89 x 93 x 55 / 99 x 76 x 105	\$40,749.00
T-2600	20	220/440V/3				\$45,320.00
T-2700	20	220/440V/3				\$54,450.00
T-2800	30	220/440V/3				\$68,321.00
T-3000	30	220/440V/3				\$71,489.00
T-3250	40	220/440V/3				\$109,241.00
T-3500	50	220/440V/3				\$115,338.00

* Prices are F.O.B. nearest stocking warehouse
 * T-23 through T-280 will be shipped assembled and packaged

From: [Matthew Farrell](#)
To: [Resolution Comments](#)
Cc: ["Dan Coday"](#); ["Jed Kelly"](#); ["Bill Madden"](#)
Subject: Matt Farrell's Comments at the Hearing today on Proposed Amendments to Title 24 of the Rules of the City of New York
Date: Monday, January 04, 2016 3:11:24 PM
Attachments: [image002.png](#)

Please find my comments below that were presented at today's hearing on the Proposed Amendments to Title 24 of the Rules of the City of New York.

The new rules do a good job of addressing best practices for routine inspection, operation, maintenance, and water treatment. However, there is no meaningful inclusion of minimum cooling tower design requirements that can eliminate much of the root cause feeding, breeding, and spreading of Legionella from cooling towers.

The message about including minimum cooling tower design feature regulations is as simple as 1-2-3:

1 - Tower design must have a feature that reduces the feeding of Legionella.

- Eliminating algae with a forced draft design or reducing scale with antimicrobial fill media and drift eliminators.

2 - Tower design must have a feature that reduces the potential for breeding of Legionella.

- Basin that is "flow through" (Tower Tech design), sloped to the sump, or has basin sweepers. Additionally, promote 304 or 316 SS and FRP construction with compatible piping materials to reduce corrosion.

3 - Tower design must contain drift emissions to 0.001% so the majority of spreading Legionella is eliminated.

Thank you for allowing me to present our comments earlier today.

Thank you,

Matthew Farrell

Mechanical Engineered Systems



Matthew Farrell
Mechanical Engineered Systems
Cell (203) 400-4658

From: [Drayton-Elder, Ava \(GE Power\)](#)
To: [Resolution Comments; Svetlana Burdeynik](#)
Cc: [Drayton-Elder, Ava \(GE Power\)](#)
Subject: Comment on Proposed Amendments to Title 24 of the Rules of the City of New York - Cooling Towers
Date: Monday, January 04, 2016 3:38:36 PM
Attachments: [Ava Drayton-Elder.vcf](#)
Importance: High

Resolutioncomments@health.nyc.gov

GE Betz, Inc. d/b/a GE Water and Process Technologies is providing the following comments on “Proposed Amendments to Title 24 of the Rules of the City of New York”:

See comments below

With copy to:

Ms. Svetlana Burdeynik
New York City Department of Health and Mental Hygiene
Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th Street
14th Floor
Long Island City, NY 11101-4132
Via E-Mail: SBurdeyn@Health.NYC.gov;

GE Betz, Inc. d/b/a GE Water and Process Technologies is providing the following comments on “Proposed Amendments to Title 24 of the Rules of the City of New York”:

In Sec 8-02: Definitions: “Qualified person”

The reference on line 2 to a “certified water technologist” should be broadened to incorporate development of maintenance plans; and also include clarification that “certified” includes completing a documented corporate cooling water training program within a company that specializes in water treatment services.

Additionally, the definition of “Qualified person” needs to be expanded to incorporate persons who have at least 2 years of experience working for a water treatment services company that specializes in the chemical treatment of cooling tower systems.

We propose adding the following language to the end of the definition as follows:

“...an environmental consultant who has (1) at least two (2) years of operational experience in water management planning and operation or (2) at least two (2) years experience in water services and treatment of cooling tower systems.”

Thank you for your consideration of our recommended changes.

Regards,
Ava Drayton-Elder

From: [Drayton-Elder, Ava \(GE Power\)](#)
To: [Svetlana Burdeynik](#); [Resolution Comments](#)
Cc: [Drayton-Elder, Ava \(GE Power\)](#)
Subject: Comment on Proposed Amendments to Title 24 of the Rules of the City of New York - Cooling Towers
Date: Monday, January 04, 2016 4:56:03 PM
Attachments: [Ava Drayton-Elder.vcf](#)

Resolutioncomments@health.nyc.gov

GE Betz, Inc. d/b/a GE Water and Process Technologies is providing the following additional comments to its other email on “Proposed Amendments to Title 24 of the Rules of the City of New York”:

See comments below

With copy to:
Ms. Svetlana Burdeynik
New York City Department of Health and Mental Hygiene
Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th Street
14th Floor
Long Island City, NY 11101-4132
Via E-Mail: SBurdeyn@Health.NYC.gov;

GE Betz, Inc. d/b/a GE Water and Process Technologies is providing the following comments on “Proposed Amendments to Title 24 of the Rules of the City of New York”:

Sec. 8.05 – Water Treatment

Footnote 3 in Table 1 suggests hyper-halogenation to a free chlorine residual of 5 -10 ppm. Unfortunately, compliance with this footnote could potentially disqualify some widely used biocidal agents such as solid hydantoin and stabilized liquid bromine. That is because the industry standard control for these compounds mandates the use of total residual halogen. In addition, the one hour contact time should be extended to six (6) hours. As such, we recommend footnote 3 be changed to read:

At a minimum, dose the cooling water system to achieve 5-10 ppm free halogen residual for six (6) hours or 15-30 ppm of total halogen, when using bromine containing compounds for six(6) hours.

Thank you for your consideration of our recommended changes.

Regards,
Ava Drayton-Elder

Ava Drayton-Elder

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**ACC Testimony Regarding Amendments to
Title 24 of the Rules of the City of New York
Adding a New Chapter 8 – Cooling Towers
Department of Health & Mental Hygiene
Long Island City, New York
January 4, 2016**

My name is Stephen Rosario and I am Senior Director, Northeast Region for the American Chemistry Council (ACC). Thank you for the opportunity to submit these comments regarding adding a new title to the City's Code dealing with cooling towers.

ACC is a national trade association representing chemicals and plastics manufacturers in the United States, including member companies in the state of New York. Our members are committed to the safety of their products and to the protection of public health. The U.S. Chemical industry invests more than \$16 billion annually in environmental, health safety and security programs. Our members are committed to the safety of our products and protection of public health.

Over 96% of all manufactured goods are directly touched by the business of chemistry, making this industry an essential part of every facet of our nation's economy. Chemistry provides significant economic benefits in every state including New York. Thanks to chemistry, our lives are healthier, safer more sustainable and productive than before.

The products of chemistry in New York are leading to cutting edge innovations in our state and across the country. The business of chemistry provides over 40,000 direct jobs in New York and generates an additional 88,000 related jobs making it New York's largest manufacturing sector.

As a result of the outbreak of Legionnaire's Disease in New York City in 2015 it highlights how important regulations such as these are for safeguarding the health and well-being of all citizens. Providing clear guidelines and standards around water treatment best practices relating to *Legionella* control have been lacking. Regulations such as these being proposed are important to help ensure operators have in place sound emergency management plans.

In particular, the proposed requirement to use US EPA-registered biocides and trained pesticide applicators supports current regulations. This will continue to help educate the community and improve accountability while maintaining a culture of safety. However, although the regulations are generally sound there are several areas of concern we would like to raise.

The first and foremost is the exclusion of non-oxidation biocides in favor of oxidation biocides – in effect limiting the choices of biocides available to professional water treatment operators. At a time when the health and safety of New York City residents is paramount shouldn't the professionals have the widest choice possible in making decisions relative to the appropriate application and management of the cooling tower?

While oxidizing biocides are clearly an important part of a water management plan, other non-oxidizing biocides are frequently used with oxidizing biocides. For example, the US EPA FIFRA label for some calcium hypochlorite-based biocides directly mentions the control of *Legionella* in cooling water.

A second area of concern deals with corrosion rates and chemical compatibility. These two factors are always important to consider when designing a water treatment program. A water treatment program that relies heavily on oxidizing biocides may be particularly susceptible to high corrosion rates or require extra corrosion inhibitors to manage corrosion in the system. The high corrosion rates are not by any means good for equipment and asset integrity, and higher than normal levels of corrosion inhibitors may have a negative environmental effect.

Therefore, to maximize the safety factor related to cooling towers we strongly recommend that the Department amend the regulations to include the use of non-oxidizing biocides for use by water treatment professionals.

Thank you again for the opportunity to submit these comments. If you have any questions or need additional information please feel free to contact me at steve_rosario@americanchemistry.com or (518) 432-7835.

Stephen Rosario, CAE
Senior Director, Northeast Region
American Chemistry Council
11 North Pearl Street
Albany, NY 12209
(518) 432-7835



From: [Wei Tang, Ph.D.](#)
To: [Resolution Comments](#)
Subject: Comments from Indoor Air Quality Association Government Affairs Committee on the Proposed Amendments to Title 24 of the Rules of the City of New York
Date: Monday, January 04, 2016 4:08:39 PM

On the behalf of the members of Indoor Air Quality Association (IAQA), I am submitting the following comments on the "Proposed Amendments to Title 24 of the Rules of the City of New York new Chapter 8 (Cooling Towers) to Title 24 of the Rules of the City of New York.

- (1) Cooling tower water is only one of the major sources of Legionella bacteria that cause Legionnaire's disease. Other sources including potable water system, especially in healthcare facilities and nursing home, should also be monitored and maintained under regulations.
- (2) Clear language need to be made that Heterotrophic Plate Count (HPC) criteria for different action labels are not substitutes for Legionella testing results in Table 1 because HPC and Legionella testing results do not relate to each other. Action levels need to be taken if either one of them exceeds the criteria.
- (3) Although HPC and Legionella testing results do not relate to each other, high HPC may indicate a failure in the maintenance program. Legionella sampling is needed after high HPC being detected as described in §8-05(f)(3)(E).
- (4) Using R2A agar and longer incubation time (5 to 7 days) is a more accurate analysis for Heterotrophic Plate Count (HPC) comparing to Plate Count Agar or dipslides.
- (5) ASHRAE Standard 188-2015 along with documents listed below are useful references. Referencing and/or adopting more relevant information from those documents are highly recommended for responsible parties to formulate maintenance plan details.
 - (i) Legionellosis: Risk Management for Building Water Systems (2015) ANSI/ASHRAE Standard 188-2015
 - (ii) Recognition, Evaluation, and Control of Legionella in Building Water Systems (2015) AIHA
 - (iii) Standard Guide for the Inspection of Water Systems for Legionella and the Investigation of Possible Outbreaks of Legionellosis (Legionnaires' Disease or Pontiac Fever) (2015) ASTM
 - (iv) LEGIONELLA and the prevention of legionellosis (2007) WHO
 - (v) Guidelines for Preventing Health-Care - Associated Pneumonia (2003) CDC

Sincerely,
Wei Tang, Ph.D.
Vice Chair of Government Affairs Committee
Indoor Air Quality Association
856-489-0011 (Office)
856-745-0770 (Cell)



Legionella Risk Management, Inc.

January 4, 2016

New York City Department of Health and Mental Hygiene Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th Street, 14th Floor
Long Island City, NY 11101-4132

Re: Comment on Proposed Amendments to Title 24 of the Rules of the City of New York

Dear Ms. Burdeynik

I've reviewed public responses to the NYC proposed code changes from large international entities including; major International Cooling Tower manufacturers, a large international water treatment company and a large international water treatment trade association. All responded to this code amendment by using the ASHRAE 188 standard as the basis of their comments. All recommended the NYC code be largely if not entirely based on the ASHRAE standard.

The first NYC code issued in 2015 was a reaction response to the Legionnaires' disease outbreaks in New York City. The code had no prescriptive requirements for testing and control of cooling towers, and, critically important, the code completely ignored the need to address other potential sources of Legionella. A new outbreak occurred within weeks of the code being issued – most likely from a building water system that was not in compliance with the ASHRAE 188 standard.

In the new proposed NYC draft code, the response pendulum has swung to the opposite extreme. The proposed draft code is overly prescriptive, including requirements that show the writers have significant misunderstanding of broadly recognized and accepted water treatment and Legionella control protocols. Perhaps, not surprisingly, such misunderstanding is common and pervasive when considering the best means to control Legionella. Public health frequently sees the issue of Legionella as a public health issue best addressed only by public health officials. Yet such officials may have little to no understanding of engineered systems, plumbing, water treatment, building operation, or building maintenance. Legionnaires' disease, a disease of engineered water systems, is best resolved by public health officials working in concert with engineering experts to address equipment and system related risks.

If the NYC public health department wants to develop a proactive, comprehensive solution to the Legionella issue, it should start by fully, without exception, codifying ASHRAE 188 – a standard developed over a decade by a cross-functional team of experts from plumbing, cooling towers, water treatment, engineering and public health,

including members of CDC. The city's adoption of ASHRAE 188 would achieve many significant impacts from this one simple action.

The impact of NYC Health Department codifying ASHRAE 188 include the following;

1) **Endorse and Codify International Expert Document**

The NYC health department would codify an existing standard that is a proactive document developed over a decade by international experts and with public comments from around the world.

2) **Eliminate Confusion and Concern from Unique Local Requirements**

NYC would be taking a leadership role by being the first health department globally to codify a standard that has already been accepted by equipment companies and water treatment associations as well as healthcare associations. Rather than requiring business owners and water treatment suppliers to learn new language and steps specific to use in NYC, the NYC health department would be endorsing a new International standard already quickly supported by water treatment associations, water treatment companies and equipment companies around the world.

3) **Act As A Catalyst for National Acceptance of This Engineering Code**

There were some significant missteps and resultant bad press after the three large Legionnaires' disease outbreaks that occurred between 12/14 and 9/15 in NYC. Rather than take additional significant missteps by developing a reactive standard by public health officials, the NYC Health Department should fully codify ASHRAE 188, this new international standard published in June of 2015. The health department would then be codifying an international standard developed by experts that will be continually updated by a standing project committee of experts.

4) **Address the Issues Associated with Other Building Water System**

By adopting ASHRAE 188, t NYC would be proactive and discuss all major sources of Legionnaires' disease outbreaks, and not simply focus on only one source, water cooling towers. Within weeks of the NYC 2015 Legionella code being issued with no prescriptive controls for cooling towers there was another large Legionnaires' disease outbreak. My guess is the last outbreak was caused by a cooling tower not in compliance with controls recommended in ASRHAE 188. If the next major outbreak in NYC city is due to a potable water system or an ornamental fountain, the public and the press will rightly ask why it completely ignored these other major areas of Legionella risk, especially when NYC health department had strong public support for comprehensive Legionella control regulations.

5) **Address the Significant Healthcare Facility Legionella Issue**

The NYC code if adopting ASHRAE 188 would be also placing a heavy focus on healthcare buildings. ASHRAE 188 has a whole section specific to healthcare

facilities that was developed with strong assistance from healthcare associations. Healthcare buildings, hospitals and long-term care facilities are not mentioned once in the draft NYC Legionella code. Over the years I've been involved in remediating and providing risk management services for many Legionnaire's disease issues across the US, including in the New York City area. My guess is the data NYC health department has for NYC-related Legionnaires' disease outbreaks reflects US national data and my own experiences; that is, most LD outbreaks are related to potable water systems – not cooling towers. The largest segment by far of potable water LD outbreaks is in healthcare facilities. A report by CDC stated that 67% of Legionnaires' disease outbreaks in community water systems occurred in hospitals or healthcare facilities.

Additional Specific Comments

Qualified Person

The existing code describes 'qualified person' to include Industrial Hygienist. Industrial hygienists, like many public health professionals as a norm, have no background in equipment, engineering, water treatment, cooling tower operation, cooling tower design, cooling tower maintenance or Legionella control etc. An environmental consultant who may be an Industrial Hygienist, is, by the NYC definition, required to have 2 years' experience in water management plan and operation while the definition assumes the Industrial Hygienist already has this specific competence. I recommend eliminating Industrial Hygienist completely as a qualified person. If an Industrial Hygienist has 2 years' experience in water management plan and operation, then they would fall under the environmental consultant criteria.

In addition to codifying ASHRAE 188 Standard, the NYC code should include the following limited prescriptive requirements.

Option 1) Oxidant Residual Control

- Manually test and log free oxidant residual three times a week; or,
- Manually test free oxidant residual once a week and test ORP either three times a week or with automatic monitoring.
- Test bacteria level twice a month using dip slides, ATP or lab culturing.
- Test Legionella and total aerobic bacteria levels once every 60 days using certified Lab and approved protocol.

Option 2) Nonoxidizing Biocide Program

- Test bacteria level weekly using dip slides, ATP or lab culturing.
- Test Legionella and total aerobic bacteria levels once every 30 days using certified Lab and approved protocol.

Additional Protocols

- Startup and Shutdown – (Follow ASHRAE 188) and

- ✓ For idle, undrained system with stagnant water for 15 days or more, disinfect with 5 ppm free chlorine for 6 hours with fans off. HPC levels should be below 100 CFU/ml.
- ✓ For idle drained system, fill with water and maintain 5 ppm free chlorine for 4 hours.
- Records – Maintain records of monitoring for control limits and disinfections.

From: [Cole Stanton](#)
To: [Resolution Comments](#)
Subject: Comments on Proposed Amendments to Title 24 RE: Legionella
Date: Monday, January 04, 2016 4:43:11 PM

We feel it is very important that when using disinfectants, sanitizers and antimicrobial surface cleaners, such products should have on the EPA-registered label a specific claim of efficacy for Legionella. Use of antimicrobials is governed by federal and state law, and it is illegal to use an EPA-registered product in a manner inconsistent with its labeling. Therefore if the purpose of a project is mitigation or prevention of Legionella, the disinfectant should be EPA-registered for Legionella.

We thank you for the opportunity to comment, and are available for your questions or to expound further at your convenience.

Best Regards,

Cole Stanton

Cole Stanton
Executive Vice President
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FIBERLOCK
TECHNOLOGIES

<http://www.linkedin.com/pub/cole-stanton/6/ab6/169/>



Memorial Sloan Kettering
Cancer Center

December 30, 2015

New York City Department of Health and Mental Hygiene
Office of General Counsel
Attn: Svetlana Burdeynik
42-09 28th Street, 14th Floor
Long Island City, NY 11101-4132

Dear Ms Burdeynik:

The following comments are offered with regard to the proposed New York City Department of Health and Mental Hygiene (DOHMH) amendments to Title 24 Rules of New York City (NYC) to add Chapter 8 (Cooling Towers). These comments are two each which are general in nature and four which are specific to the proposed language. First of the general comments is that Hospitals and Hospital Organizations should be listed in Chapter 8 as being exempt from all parts. Second, the DOHMH should strongly reconsider the proposed Chapter 8 structure and its risk of transitional **liability placed on DOHMH and NYC. First of the specific comments is the definition of “Qualified person” should be expanded to include individuals who possess greater operational experience** than those currently listed. Second, the treatment of rain and recycled water is unnecessary and excessive. **Third, water quality testing “daily” is unnecessary and excessive. Lastly, the fine structure associated with the proposed Chapter 8 penalizes for individual specifics of missing process or documentation instead of being performance based.**

Hospitals and Hospital Organizations should be listed in Chapter 8 as being exempt from all parts. Hospitals and Hospital Organizations are already heavily regulated by the Centers for Medicare and Medicaid Services (CMS), State and local Departments of Health (DOH) and either The Joint Commission (TJC) or DVN-GL. Each of these accreditation organizations ensures compliance that Hospitals provide a healthy, safe environment for patients, staff and visitors. Effective control of Legionella in ALL water systems, not just cooling towers, is part of the mandate. With conditional accreditation hanging in the balance for non-compliance the motivation to comply is considerably stronger than the fee structure associated with the proposed Chapter 8. At minimum Hospitals and Hospital Organizations are subject to on-site survey where all documentation is reviewed in detail ensuring compliance. This year's **outbreak in the Bronx had only one hospital's cooling towers, out of 18 sites, show positive for Legionella**; indicating successful compliance with the aforementioned organizations for the rest of the hospitals in the outbreak area. Plus, Hospitals and Hospital Organizations are ALREADY required to report any cases, nosocomial or community acquired, of Legionella diagnosed or found in patients while at their locations. For these reasons it is requested that Hospitals and Hospital Organizations be exempt from the proposed Chapter 8 based on redundancy with other authorities having jurisdiction.

The DOHMH should strongly reconsider the proposed Chapter 8 structure and its risk of transitional liability placed on DOHMH and NYC. The intent of the proposed Charter 8 is clear and certainly not without merit. But unlike past cooling tower maintenance and operations documents, including ASHRAE 188-2015, proposed Chapter 8 is very specific and carries specific fines for non-compliance; the document when adopted will become a specific directive and law and not simply a guideline. This

John T. Letson

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NCI-designated Comprehensive Cancer Center

fact transitions the liability from an individual entity to the DOHMH and or NYC, when the entity is fully compliant and provides full documentation and proof thereof, in the event the entity's cooling tower infects an individual and potentially that person expires. Conversely, if Chapter 8 was a recommendation or guideline the entity would bear full liability. Some more thought should go into the risk management components of Chapter 8 before being adopted to protect both DOHMH and NYC from litigation.

The definition of "Qualified person" should be expanded in the definitions section of Chapter 8 to include individuals who possess greater operational experience than those currently listed.

Individuals who are currently listed as qualified individuals may have little or no operational experience with cooling towers operations or maintenance. Additionally, this should not be a task which building owners are required to hire outside contractors to perform when they have qualified individuals already on staff capable of handling. Individuals who possess a current FDNY Certificate of Fitness (COF) as a Refrigeration Machine Operator (QO1) are well qualified to handle these tasks as are NYC Department of Buildings (DOB) licensed high pressure boiler operators. Also qualified to handle these tasks are New York State Department of Environmental Conservation 7-G Pesticide certificate holders. It is requested that these three certificate and license holders be added to the **"Qualified person" list in Chapter 8.**

Treatment of rain and recycled water is unnecessary and excessive as defined in proposed Chapter 8, § 8-05 (c) (4) (e). Rainwater and or recycled condensate from building steam systems and or air handler coil condensate has zero conductivity and is basically distilled water containing no bacteria. Rain water has minimal propensity from seeding from cooling tower drift. Even if trace amounts of bacteria were to enter the recycling system, when used as makeup water, the rainwater or recycled condensate water is combined and treated once it enters or is combined with the cooling tower water. This makes treatment redundant to that which occurs in the cooling tower system. Hence it is unnecessary and excessive and should be removed as in item in Chapter 8.

Water quality testing "daily" is unnecessary and excessive as defined in proposed Chapter 8, § 8-05 (c) (4) (f) (1). There is not any value to water testing any more often than weekly as outlined in proposed Chapter 8, § 8-05 (c) (4) (f) (2). Anything more is a waste of time, money and resources. As a result proposed Chapter 8, § 8-05 (c) (4) (f) (1) should be eliminated and this section renumbered starting with the current number (2).

The fine structure associated with the proposed Chapter 8 penalizes for individual specifics of missing process or documentation instead of being performance based. Chapter 8, § 8-09 poses specific fines but are strictly punitive based on missing process or administration of records. A more successful rule may be written based on the successes of the chemical water treatment program as monitored by the required legionella culturing every 90 days. While process, documentation and records can be manipulated to produce the desired results and avoid fines third party lab testing reports cannot. It is recommended that the fine structure be revisited to a more effective methodology to achieve the desired intent of this new chapter.

In summary please consider these comments and recommendations to make proposed Chapter 8 (Cooling Towers) a bit more workable, while still enhancing safeguards for the public. The approach we have proposed would be less costly for the many hospitals in New York City, and it would prevent the diversion of important dollars from patient care.

Sincerely,

John T. Letson

Walter Poznanski

Comment:

Is it necessary to create the double work: to register and to certified the same kind of work with DOB.... and with the Dept. of Health? In my opinion it's a bureaucratic and overlapping work. The new standard requirements for the cooling towers maintenance are rightfully set very high, and the public will be much safer from now on, without creating the same paperwork for 2 different agencies. Thank you. WP "Local Law 77 added a new Article 317 to Title 28 of the Administrative Code that required owners of cooling towers to register them with the Department of Buildings ("DOB") by September 17, 2015. Towers must be inspected, tested, cleaned and disinfected in accordance with new Administrative Code §17-194.1 and rules adopted by the Department. Owners and operators of cooling towers must annually certify to DOB that their cooling towers have been inspected, tested, cleaned and disinfected and that a management and maintenance program has been developed and implemented in accordance with Administrative Code §17-194.1. Statewide, including in New York City, owners of all cooling towers must also comply with SSC Part 4, which includes registration with and reporting requirements to the State Department of Health."

Agency: [DOHMH](#)

Diane Miskowski

Comment:

1) Using HPC dipsides may underestimate or overestimate HPC concentrations by an order of magnitude or more. Also every different HPC dipslide manufacturer uses different formulations of agar; some use different formulations of "nutrient agar" while others use BCYE agar for HPC counts. These dipslides are not supported by consistent manufacturing processes nor are they supported by scientifically sound method verification or validation. I suggest that the use of dipslides be eliminated and replaced by HPC culture tests following Standard Methods for HPC Testing using Standard Plate Count Agar and following Standard Method specified shipping/holding time requirements. 2) Please define what you mean by Legionella species. Do you want all Legionella species identified and enumerated? Do you want all Legionella species serotypes identified and enumerated? 3) CDC and other international health agencies have conducted research that documents that potable water is responsible for more cases of Legionnaires' Disease than cooling towers. Do you have any plans to expand testing of roof top potable water storage tanks beyond coliform testing to also include HPC and Legionella testing. Do you have plans to include remedial action levels for those potable water storage tanks as well?

Agency: [DOHMH](#)

Paul Errigo

Comment:

Part I Based on the proposed rules we believe the following should be added to prevent human error and fatalities:

- An integrated water treatment system should have a Fail-Safe redundancy of multiple levels.
- This is important for many reasons. Bacteria can build up a tolerance and immunity to chemicals biocides over time. Utilizing multiple forms of biocide treatment increase the effectiveness of controlling and eliminating bacteria in cooling towers.
- A Closed Loop side-stream filtration, either with Centrifugal Separators with micronic discharge filters or High Efficiency Multi-Media Filters, dedicated to clean the sump or basin of the tower and part of the Process Water. o This design returns filtered and treated water back to the system for water conservation as well. Particulates are collected in the Filter Bag Housing.
- Combine the above side-stream filtration with an Electronic Descaling Frequency Resonator that restructures water molecules. This is so the calcium and magnesium carbonates, the most common form of scales and bio-film in process water, may precipitate and be filtered. This device would remove existing scales in pipes, tubes and in plates. Scaling and bio-film become the habitat for bacteria even after cooling towers are drained. When cooling towers are drained the bacteria lies dormant and multiplies again over time. This is similar to cases we have heard about last summer after a full cleaning.
- Manifolded Basin Sweeper-Nozzles prevents stagnation of water in the basin and cleans majority of the basin area of particulates, sediments from the air and process water. In almost all cases bacteria is found lying in the stagnant areas of the cooling tower.
- Integrating these side-stream filtration, electronic descaling and basin sweeping with any two of the following disinfection systems would ensure redundancy and fail-safe operation of the cooling tower by preventing and controlling growth of bacteria, molds and algae. The system would work in conjunction with current chemicals being used, namely:
 1. Copper-Silver Ionization
 2. Ultra-Violet Light
 3. Ozonation

Part II Copper-Silver Ionization, Ultra-Violet Light, and Ozonation are non-chemical biocides recognized by regulating bodies and have been used by thousands building operators and industries. With the right sizing, application and dosing, these integrated water treatments could prove to be an effective tool in eradicating these problems in Cooling Tower operations and maintenance. At the same time the system would drastically reduce the chances of human error leading to fatalities originating from the cooling towers. Return on Investment (ROI) considering Water and Power Savings can be less than 5 years. These closed loop filtration with electronic descaling and basin sweeping systems could be retro-fitted with existing chemical treatment as a Hybrid System, making the non-chemical approach the fail-safe option to prevent fatalities.

This option can also reduce water consumption by more than 30% of the total water being used in a building. 1. Benefits of these integrated system are the following:

- Eradication of Bacteria, targeting Legionnaire's disease in particular
- pH balance with acceptable Langlier Saturation Index(LSI) and Ryznar Index(RI) for better corrosion and scaling control
- Increased Equipment Life
- Improved and Reliable System with Higher Efficiency
- Reduced Maintenance and Labor Costs
- Improved Chemical Control
- Safe Environment
- Water Savings of more than 30% in the building
- Energy Savings of more than 5% in a building
- 24/7 monitoring system with remote access that send indicators/markers of possible high bacteria These redundancies are justified by the resulting higher Cycles of Concentration that leads to balanced water chemistry with less make-up water, less bleed off and less sewer charges.

Part III References: 1. The use of Copper-Silver Ionization - Title 40 Code of Federal Regulations - US EPA Safe Water Drinking Act 2. CDC Updated Guideline and Best Practices for the Control of Legionella by Rand Corporation for Western 3. Pennsylvania, Oct 2014, Executive Summary, page X 4. ASHRAE/ANSI Standard 188-2015 Section 7 5. Cooling Tower Institute (CTI) Guideline: Best Practices for Control of Legionella, July 2008, Section IX 6. Legionella Exposure Control Plan, Sept 2013, Ohio state University EHS/OSIH Section 4.1 7. Dept of Energy, for Energy Consumption using Biofouling Thickness Chart and Savings calculation with the increase efficiency of heat transfer equipment. It is worthy to note that these references cited the alternative use of Copper-Silver Ionization, UV Lights, Electro-Magnetic Frequency devices, Ozonation with side-stream filtration. As a brief education on cooling towers: In a building envelope, the majority of cooling water passes through an open circuit cooling tower where used cooling water undergoes a thermal reduction of 10 degrees or more. A Cooling Tower operates like a wet scrubber that draws surrounding air that mixes with hot process water. It is through the contact of atmospheric air and cascading water inside the cooling tower that brings down airborne particles and waterborne debris, including dissolved solids to the water basin or sump. Because of inadequacies of water treatment in the majority of these buildings, the following hazards occur:

- Incorrect water chemical balance• Buildup of scales and/or corrosion
- Water stagnation, which breeds bacteria• Heat transfer becomes ineffective causing electrical draw to increase, thus decreasing efficiency• Clogged fills or tubes cause more water vapors drifting - more aerosols that may have bacteria that could affect air quality
- Dilution of highly concentrated solubilized chemically-treated water leads to higher water usage by increase in bleed off and make up water Submitted by: Green Crown Water Systems, LLC Fluidyne

This question is about the section in the proposed rules and regulations to exclude side stream filtration. To single out and exclude side stream filtration has no benefit and actually hinders the ability to increase safety. Side stream filtration allows for increased redundancy which actually decrease chances of fatalities exponentially. This is bc all fatalities from legionella came from human error in form or another. This could mean the correct chemical was not present, the chemical could have been diluted, staffing could have been on vacation and someone not as proficient was in charge. There also could have been a build up of scaling and bio - film that was present and created a habit for bacteria to lay dominant until the right conditions were present to multiply. Side stream filtration might not need to be a mandatory solution, however this engineered solution to add to the safety of an overall system should not be excluded. Many best practices in collaborative reports that have been done as recent as 2014 by RAND organization with CDC, ASHRAE, and Cooling tower institute sight side stream filtration and associated forms of bacteria control as a best practice. Side stream filtration also allows for water conservation and energy measures. This is a global concern but even more of a concern in NYC where the aqueduct will be shut reducing almost half of the in coming water supply into NYC. In most commercial buildings cooling tower make up water can be responsible for as much as 50 percent.

Agency: [DOHMH](#)

Dan Coday

Comment:

1) These amendments are helpful as they provide greater specificity on proper requirements for routine inspection, operation, maintenance, and water treatment. However, they lack a critical component of cooling tower Legionnaires' disease risk mitigation, which is the specificity on minimum cooling tower design requirements. There is no meaningful deviation in acceptable design features contained within this document compared to the cooling towers associated with the 2015 outbreaks, the same basic design still being installed throughout NYC on a daily basis. As reported by the New York Times on October 1, 2015, a new cluster of Legionnaires' disease took place in the Bronx less than two (2) months after the cooling towers were disinfected. Routine inspection, maintenance, and water treatment is not enough, and the root cause has to be addressed through minimum cooling tower design requirements. Cooling towers can feed, breed, and spread Legionella in an accelerated or limited manner, depending on their design. Readily available technology already commonly exists and is offered by the major manufacturers that substantially reduces the ability for the cooling tower to feed, breed, and spread Legionella. These design features that can help dramatically reduce the potential for a person to become infected with Legionnaires' disease from a cooling tower are rarely installed. This is because they cost slightly more, are not in "base" specifications, and are not required by building code. Not all cooling towers have the exact same design, and design features for significantly reducing the feeding, breeding, and spreading of Legionella vary by design. Design features that allow almost any manufacturer to immediately participate in substantially reducing the ability for Legionella to feed, breed, or spread include: 1) Feed – scale and algae are commonly present in cooling towers and are primary food sources for Legionella. Many forced draft cooling towers block 100% of the sunlight contact from the circulating water, and therefore eliminate algae. Induced draft cooling towers can be outfitted with antimicrobial fill media and drift eliminators that substantially reduce scale build up. Require either a design that allows no sunlight to contact the water so algae is no longer present or the use of antimicrobial fill media and drift eliminators for reduced scale build up to significantly help the effectiveness of routine maintenance and water treatment.

Comment:

2) Breed – cold water basins commonly have stagnant zones, making it easy for bacteria to breed. Increased water velocity and turbulence in the basin can be accomplished making it more difficult for Legionella to breed. Require either the use of a "flow through" basin, sloped basin, or basin sweeper system to significantly help the effectiveness of routine maintenance and water treatment. Corrosion can be a source for breeding. Many cooling towers are constructed from galvanized metal and susceptible to corrosion. Although this can be a more expensive upgrade, consider requiring a minimum of 304 stainless steel or FRP (with fire sprinkler system if FRP and over 250 ft² in base area) construction and compatible piping materials to reduce the possibility of corrosion to significantly help the effectiveness of routine maintenance and water treatment. 3) Spread – once Legionella feeds and breeds inside the cooling tower, it is spread from the cooling tower to the susceptible host through mist or drift.

Section 8-04.c.e. calls for drift losses between 0.005% and 0.002%. This is already the same drift loss percentage in most base specifications and likely the cooling towers that caused the 2015 outbreaks. It doesn't help. The major cooling tower manufacturers and OEM/aftermarket providers of drift eliminators promote drift eliminators with maximum drift loss of 0.0005%. Some variance may be needed for some designs based on specific applications. Require a maximum drift rate of 0.001% when operating at design conditions across the board for all cooling tower designs. This represents an average 71% reduction in the amount of mist or drift that's able to travel from a cooling tower to a susceptible host. With 5,000 cooling towers registered, there is a cooling tower being installed, replaced or rebuilt almost every day in NYC. There are many additional minimum design feature requirements that can incrementally reduce the potential for Legionnaires' disease from cooling towers. However, these are very simple and significantly meaningful requirements that can be added to building code now for new and replacement or rebuilt cooling towers to ensure a substantial reduction in the root cause feeding and breeding Legionella in cooling towers. When combined with 71% fewer emissions working in conjunction with Chapter 8 inspection, operating, maintenance, and water treatment guidelines, we hold the keys to substantially reducing Legionnaires' disease from cooling towers.

Steven Serrano, CWT

Comment:

The following commentary is specific for cooling towers that operate on a seasonal basis: The regulations state that a seasonally operated cooling tower should be inspected every 90 days (during normal operation). However, there is currently no requirement for an inspection to be conducted during the off season (prior to the tower's start up date). Not conducting a cooling tower inspection prior to start up, may prove to be counterproductive in achieving the ultimate goal: Providing consistent water treatment applications, which safeguard a cooling tower from the development and proliferation of Legionella Pneumophila. ⚖ There are a multitude of reasons why an off season inspection would benefit the building owner of a cooling tower. For this commentary, I will provide 3 reasons why it would be beneficial to conduct off season cooling tower inspections. 1st reason: A water treatment company may have no other alternative but to run their chemical tubing outside and then this same tubing drops into the cooling tower basin. Unfortunately, there is a high inclination for this tubing to freeze and then crack during the winter. All chemical tubing lines should be inspected prior to start up. 2nd example: There are hundreds of water treatment stations that are located outside (next to the cooling tower) in the winter. These water treatment stations, water treatment devices, cooling tower manifolds, and valves may freeze and then crack. All of these necessary water treatment devices must be fully operational prior to a cooling tower's start up. 3rd example: Ice may damage the plastic fill over the winter. If the fill is damaged, then this section of fill will need to be repaired/replaced prior to start up or this damage will leave the tower susceptible to more drift misting out of the eliminators. *** Taking into consideration the above noted commentary, it is highly recommended that the NY State and NYC law makers consider adding the following statement into the future rules: • One (1) off season cooling tower inspection should be conducted for seasonally operated cooling towers. This inspection should be conducted 4 – 6 weeks prior to the start up the seasonally operated cooling tower; this will allow enough time to correct problems found during the inspection. Steven Serrano, CWT President of Empire Cooling Tower Inspections and Services
Agency: [DOHMH](#)

paul lamarca

Comment:

Dear nycdoh, my family and I run a small FSE in Manhattan. Years ago the city started a water conservation program and we were told that all water-cooled refrigeration equipment would be required to use a water recirculation system in order to save water. We use water cooled equipment because it is more energy efficient, which it seems to be encouraged now by the city. Our cooling tower is the smallest (7 tons capacity) that was commercially available at the time, a little bigger than a standard refrigerator. We have always cleaned and maintained the system ourselves because it operates more efficiently when it is clean. The recent problems with very large Air Conditioning system cooling towers that were not being maintained in NYC has caused concern and we feel we are being unfairly included in this group. The nycdoh should realize that all cooling tower systems are not the same and should draft their new regulations accordingly, possibly by size and configuration, proximity to hospitals, ect. We understand the concerns of the nycdoh to protect the public from health hazards caused by improperly maintained equipment, but just as all restaurants are inspected and graded on their performance maintaining their cleanliness and food protection practices, so should cooling tower systems on their size, use and the realistic risk they could possibly pose to their immediate areas. Thank you for allowing me to comment on this ongoing issue, Paul LaMarca, plant manager, Lamarca Pasta Inc. 161 e 22nd st. NY NY 10010, 212 673 7920

Agency: [DOHMH](#)

Tory Schira

Comment:

LiquiTech Environmental has been successfully remediating and preventing Legionella bacteria in water for approximately 30 years. LiquiTech is proud to call most of NYC's top hospitals our client for the last couple decades, providing highly effective long term solutions that prevent the occurrence of Legionnaires Disease (LD) when the program is properly maintained. These facilities have proven that LD is a completely preventable public health problem when an effective disinfection program is effectively maintained by achieving the goal of no LD cases. We applaud the DOH for taking decisive action to address this significant public health concern. It is a good first step to improving public safety. We believe some important adjustments could make the regulation more pragmatic for building operators while simultaneously improving the outcomes by reducing the incidence of Legionnaire's Disease. Regarding the scope of exposure to Legionella, the causative agent. Historical records show that cooling towers account for less than 25% of Legionnaire's Disease cases. While this is an area of significant concern, greater consideration should be given to preventing Legionella in potable water systems. Potable drinking water systems have been identified as the source of many more cases of Legionnaire's Disease accounting for approximately 60% to 70% of overall cases and must be considered in order to reduce the overall impact of LD. Additionally, many experts believe that because cooling towers tend to result in larger clusters of cases they are historically more easily implicated in outbreaks. As testing for LD intensifies, it is predicted that we will catch more cases associated with potable water and cooling towers will account for even less of the overall cases of LD as a percentage. We are confident that the 323% increase from 2005-2014 is a result of greater awareness and better detection of a pre-existing problem, not that LD is actually occurring more, its just being detected more. Biocides should also be appropriately registered with US EPA Office of Pesticides Program for the effective control specifically against Legionella. Biocides without this registration have not met US EPA requirements under FIFRA and have not demonstrated an effective capability to control Legionella. Additionally, unregistered treatment methods are prohibited from making any claims against Legionella and cannot be installed for this purpose. Without an automated system, a daily testing regimen should be reconsidered as it is overkill from a monitoring control standpoint, may not be feasible for many facilities and will likely be too burdensome for others. Thank you for your time and consideration.

Agency: [DOHMH](#)

Eric Dlugosz

Comment:

I am in favor of cooling towers regulation. I believe treatment should be required, along with monitoring. However, after reading the extensive rules that have been proposed, I believe some modifications should be made. Unfortunately, the timing of the law and the limited window for public comment, would not allow for complete technical debate on the merits of each rule. I believe that some rules regarding the constant circulation of systems and/or extremely low bacteria levels (*Legionella* counts 10x lower than past OSHA recommendations haven't proven benefit). It will lead to increased doses of microbiocides and/or excessive electrical consumption. This will lead to both water and carbon pollution. It is approximately 20 pounds of carbon/ pump-horsepower to operate a circulation pump with some pumps requiring more than 50hp. This will add over 1000 pounds of carbon into the atmosphere for every extra day that this pump is required to run. For some system this is more than 100,000 lbs of carbon per year! I believe daily testing has many merits. However, some facilities are not staffed seven days a week. This will be quite burdensome on owners and operators.

Agency: [DOHMH](#)

Robert Hoffmann

Comment:

The following comments are submitted on behalf of Consolidated Edison Company of NY, Inc. ("Con Edison"): Con Edison owns and operates cooling towers that are part of the critical utility infrastructure. These units include providing cooling for underground power feeders and chilling for liquid natural gas storage. The continuous operation of these units is critical for reliable utility service. As such, Con Edison performs regular maintenance and water quality testing of these units. These units are currently registered with NYC and NY State. (1) Proposed Section 8-04 requires a weekly visual inspection of all wetted surface within the cooling tower. Con Edison operates a process cooling tower at its liquid natural gas (LNG) plant used for the chilling of liquid natural gas from April through November. Con Edison also operates cooling towers used for the cooling of underground electrical feeder cables. These units cannot be shut down for a weekly inspection without negatively impacting utility system reliability. A partial visual inspection can be performed by opening access doors, but not all areas within the towers are visible from the access doors. We request consideration in the regulation for critical utility infrastructure cooling towers that cannot be shut down on a routine basis.

(2) Proposed Section 8-05 requires the daily treatment of cooling tower water with a biocide registered with New York State DEC. This section also specifically forbids the use of non-chemical water treatment devices. Con Edison currently operates a cooling tower at its LNG plant that uses Residual Oxygen Species (Ozone) as the daily water treatment method. This is an accepted and well established water treatment method in the potable water treatment industry. ROS can persist in water for up to 20 minutes while the cooling tower in question has a turnover rate of less than 3 minutes, thus ensuring that there is residual ROS in the system at all times that it is in operation. We request consideration in the regulation for the use of this technology as an acceptable equivalent to the use of a DEC approved chemical biocide for daily water treatment. As described below, chemical biocide can be harmful to the LNG infrastructure and may reduce reliability of the system. In the event of a positive legionella test, a chemical disinfection of the unit would be performed. (2A) The unit serves multiple shell and tube heat exchangers of varying metallurgy. The introduction of harsh oxydizers into the system risks degradation of the metal and system failure. Many components of this system are custom made and have a replacement lead time in excess of 2 years due to engineering and fabrication requirements. A failure of one of these components would endanger system reliability by removing the liquid natural gas (LNG) storage from the system. The LNG storage is used to provide additional supply to the system during peak demand and is an emergency backup supply should one of the main gas supply lines into the city be disrupted.

(3) Con Edison operates a cooling tower at its LNG plant that is covered by a State Pollution Discharge Elimination System (SPDES) permit. The cooling tower discharges water directly into the ground. For this reason, the unit uses the Residual Oxygen Species (ROS) system described above to eliminate the presence of chemicals in the discharge water. We request consideration in the regulation for all sites that are

governed by a SPDES permit such that compliance with the proposed rule cannot violate the requirements of the SPDES permit. The SPDES permit holder can work with city and state agencies to determine an acceptable treatment method while maintaining compliance with all other regulations and permit requirements.

- (4) The definition for “Responsible Person” in proposed section 8-02 discusses required daily water quality treatment measurements. Proposed Section 8-04(a) discusses “at least weekly” monitoring. Proposed Section 8-05(f) “Water Quality Monitoring” requires a daily test of pH, temperature and residual biocide. We request that the requirement for water quality testing be set to “at least weekly” as a daily water quality test is unnecessarily burdensome. The incubation period for legionella is 2 to 10 days. In a routinely maintained system, a weekly test would be sufficient to detect any irregularities and take corrective action.
- (5) While the summary on page 3 of the proposed rule recognizes a difference between specifying new cooling towers with a drift eliminator and the difficulty of retrofitting a drift eliminator onto an existing cooling tower, proposed Section 8-04(e) “Aerosol and Mist Control” does not include this distinction. The addition of a drift eliminator onto an existing cooling tower requires an engineering evaluation to determine the feasibility of this modification without reducing the effectiveness of the unit to the point of eliminating its usefulness. If an engineering analysis determines that no manufacturer provided drift eliminator can be fitted to an existing unit without causing a significant negative impact on unit efficiency and effectiveness, then that unit would be exempt from the requirement.
- (6) Proposed Section 8-06(b) requires a Legionella sample be tested and analyzed prior to the startup of a cooling tower that has been shutdown for 5 days or more. It can take up to 2 weeks to obtain the results of a Legionella test. Con Edison operates utility system critical cooling towers. The delay of an additional 2 weeks before bringing a unit back into service will negatively impact utility system reliability. We request the ability to test and clean the cooling tower and bring the unit into service prior to receiving the test results. If a positive legionella test result is received, additional disinfection would be carried out as indicated by the result. (6) Proposed Section 8-06(b) requires a Legionella sample be tested and analyzed prior to the startup of a cooling tower that has been shutdown for 5 days or more. It can take up to 2 weeks to obtain the results of a Legionella test. Con Edison operates utility system critical cooling towers. The delay of an additional 2 weeks before bringing a unit back into service will negatively impact utility system reliability. We request the ability to test and clean the cooling tower and bring the unit into service prior to receiving the test results. If a positive legionella test result is received, additional disinfection would be carried out as indicated by the result.

COMMENTS TO NYC NEW CHAPTER 8, TITLE 24

These comments are submitted on behalf of Drycleaners in New York State that use evaporative cooling towers for non-contact cooling of production equipment. These Drycleaners are small businesses and the towers they use are much smaller in both size and volume of water than the large cooling towers that cool large buildings in NYC. The cooling towers used by these owners are counter-flow evaporative towers and are operated year-round. In all cases, the tower sump is fully drained into a reservoir tank located in the Drycleaning plant when the tower is disabled at night and on Sundays and/or holidays. In these plants, the owners operate and maintain the towers. Chemicals are normally added manually and dosages are extremely low ($\approx < 20$ oz./month). The owners of these towers recognize the need to clean, disinfect and operate their towers to minimize the possibility of Legionella proliferation. Towards this end, we offer the following comments:

8-04 (a) Routine system monitoring – for towers less than 100 tons, it is recommended that monitoring be conducted monthly when the system is in use.

8-04 (a) (3) All wetted surfaces must be observed ... – for towers less than 100 tons (without roof-top reservoirs or sumps), it is recommended that monthly monitoring may be accomplished by inspecting the equipment in the plant (tower reservoir, pump, piping) both during operation and after nightly shut-down.

8-04 (b) Compliance Inspections – for towers less than 100 tons, it is recommended that compliance inspections should only be performed only during temperature spans in which the Legionella may breed. It is recommended that the compliance inspection be performed once in the spring when the daily temperatures warm and once at the beginning of winter.

8-04 (e) Aerosol and mist control – Owners of towers less than 100 tons have no means to calculate drift. The best they can do is to operate and maintain the towers in accordance with the manufacturer's specifications. "Counter-flow cooling towers must achieve a reduction of drift loss to no more than 0.002%" should not apply to small towers.

8-05 Water Treatment

8-05 (a) Daily automatic treatment while in operation – for towers less than 100 tons, daily treatment is rarely needed. Owners of these towers will normally use less than 10-gallons of biocide per year. Automatic treatment or dosing is not practical for these small businesses. It is recommended that monthly treatment is adequate for sumps less than 150-gallons and that this treatment may be applied manually.

8-(05) (c) (1) Biocide application – For towers less than 100 tons, it is recommended that the owner may add the small applications of biocide in accordance with the manufacturer's specifications and in compliance with the OSHA 1200, Hazard Communication Standard (training, PPE, etc.).

8-(05) (f) (1) Minimum daily water quality measurements – Owners of towers less than 100 tons do not have the means to conduct daily measurements of ph, temperature, conductivity and biocide residual, nor, it is necessary. The total volume of water in the entire system is normally less than 200-gallons. Major changes in these parameters are rare in such small units. This testing should be limited to the compliance inspections.

8-(05) (f) (2) Minimum weekly biological process control indicators - Owners of towers less than 100 tons do not have the means to conduct weekly bacteriological indicators to estimate microbial content of recirculating water, nor, it is necessary. The total volume of water in the entire system is normally less than 200-gallons. Major changes in microbial content are rare in such small units. This testing should be limited to the compliance inspections.

8-(05) (f) (3) Legionella culture testing no less frequently than every 90-days – same comment as made for 8-(04) (b). Why test for Legionella when it is dormant in air temperatures less than 68°F.

The Association of Water Technologies (AWT) is an international trade association representing over 550 companies and vendors that specialize in industrial, commercial and institutional water treatment. Their expertise is in applying and managing water treatment programs for associated building water systems including HVAC&R (heating/cooling, boilers/cooling towers, etc.) and other industry segments.

In a Press Release, 16-Nov-2015, AWT announced the endorsement of the new ANSI/ASHRAE Standard 188-2015 (Legionellosis: Risk Management for Building Water Systems). AWT's President, Bernadette Combs, CWT, included "Managing the risk and liability of *Legionella* bacteria in building water systems is a key element for the water treatment professional." Ms. Combs further stated, "As an organizational voting member of the ASHRAE 188 Committee, AWT has provided input to the development of the *Legionella* standard. It is now incumbent to provide our members and the industry with the requisite training to comply with the standard in practice. AWT has some of the leading experts to address *Legionella* issues in these systems."

As AWT's liaison to ASHRAE and a voting member on the ANSI/ASHRAE 188-2015 committee for the past 10 years plus, I offer the following comment and concerns regarding the proposed New York City DOHMH amendments to Title 24 Rules of New York City with the new Chapter 8 for Cooling Towers.

Positive water treatment aspects of the new chapter:

1. Intent to control LB in cooling towers and prevent disease;
2. Requirement to use EPA registered biocide products;
3. Reference to the new ANSI/ASHRAE Standard 188-2015 and the need for a water management program for cooling towers;
4. Compliance inspections that include visual inspections for biofilm;
5. Legionella (LB) testing for validation of LB (hazard) control strategies.

Water treatment concerns with the new chapter – in short – overly prescriptive!

1. Water quality monitoring: minimum daily biocide testing and biocide testing parameters requiring both Free & Total residuals – FREE residual is all that is needed;
2. Bacterial control indicators (counts/dipslides/ATP/etc.): minimum weekly microbial testing.
3. The lack of any apparent risk management plan process and *Legionella* expertise as it pertains to the engineering and professional water treatment aspects of cooling towers. It appears that the public health department is treating this as solely a public health concern with predominantly public health expertise – I respectfully submit, more experience and expertise is needed.

The intent of the proposed (new) chapter 8 is clear and certainly with merit. However, it is written proposing some very prescriptive and specific directives that end up effectively precluding other viable technologies and approaches to successful cooling tower water treatment, operations and maintenance – including the control of *Legionella* bacteria. As well, if adopted as proposed, Chapter 8 becomes an exclusive and prescriptive directive that ends up replacing the important essence of developing and following a risk management process, such as is the ANSI/ASHRAE Standard 188-2015, to achieve the intent of the chapter. In addition, as a governmental set of rules, in essence the LAW, it effectively provides the building owner a possible legal relief from liability of a cooling tower disease causation claim, by making the case they were fully following the requirements of the NYC/DOHMH Title 24, Chapter 8 Cooling Towers rules.

ASHRAE, with a very robust, multi-disciplined, cross-functional committee of worldwide legionella, engineering, water treatment, health care and the like experts and professionals, spent more than 10 years developing Standard 188.

Specific comments on Section 8-05 / Water treatment: this section specifies requirements for automatic treatments, use of chemicals and biocides, and monitoring water quality characteristics/parameters, and establishes a schedule for sampling for *Legionella* and other bacteria including requiring additional sampling when certain events occur.

1. This section is overwhelmingly written around oxidizing biocides, including daily testing (measurement) of free and total oxidant residuals. There are literally dozens of different biocides available to the water treatment professional, many of which are classified as non-oxidizing biocides that are capable of controlling cooling tower microbial populations, including *Legionella*. Since testing for *Legionella* is being required, it should serve, and will serve, as the validation of LB control strategies in the cooling tower water management program.
2. There is concern for corrosion when strictly halogen (oxidizing) biocides are stressed, as well as generating elevated levels of halogenated disinfection byproducts. There is possible effect on waste water microbes if high levels of oxidizers are used along with the increased (high level) use of halogens for required remediation disinfections. As well, there are known incompatibilities with scale and corrosion inhibitor products at high use levels of oxidizers.

Recommendations:

Daily Oxidant Biocide Testing of Free and Total residuals: Testing FREE residual oxidant (chlorine) is important, as it measures the level of FREE “active” oxidant, available as a biocide. TOTAL residual oxidant, however, includes the combined form of an oxidant, which is not considered an “active” biocidal agent and therefore provides no real useful information for water treatment biocide feed/control. Cooling towers are not swimming pools where breakpoint chlorination is calculated from knowing the total, free and combined chlorine levels. For a cooling tower water treatment program, it would be an overly burdensome test without value.

Weekly Bacteria Testing: Monthly **minimum** should be the standard for the large variety of towers in NYC – along with the weekly **minimum** testing of biocide levels and quarterly testing for *legionella* (LB). The service frequency by the water treatment professional to the vast majority of these tower systems will be monthly – and provide additional microbial testing. Every two weeks is sufficient for trend analysis and to catch anything that is happening. Weekly is more than needed and not over kill, but should not be “regulated” as a minimum.

ANSI/ASHRAE Standard 188-2015: NYC public health can send a clear and simple message in order to prevent legionellosis associated with their cooling towers by codifying ASHRAE 188. The ASHRAE standard was developed by a cross-functional team of *Legionella* experts and professionals from plumbing, engineering, cooling towers, water treatment, academia, public health and healthcare.

NYC code/rules would be adopting a national ANSI/ASHRAE standard and not creating their own unique policy. Many of the affected building/facility cooling towers in NYC are either owned, operated or treated by National companies. Using a national standard would make it easier for the standard to be implemented and less burdensome than dealing, potentially, with multiple or conflicting standards.

ASHRAE 188 includes best practice recommendations and will be continually updated by a standing standard project committee (SSPC 188) of cross-functional subject matter experts. NYC does not have to worry about updating their code with the latest technology, if it codifies ASHRAE 188.

Along with codifying ASHRAE 188, NYC should develop no more than a few bullet points of additional prescriptive code and include them in a guideline, recommendations or options format, to be used in the otherwise formal water management program as required by ASHRAE Standard 188. The “Team”, as defined in ASHRAE Standard 188, is required and should be allowed to develop a water management plan for the cooling tower/s at a building or facility – taking into account the particular operating and engineering aspects of the cooling tower/s, hydronic water systems, water chemistry/quality, etc. with regard to *Legionella* control and disease prevention. In addition, the NYC code/rules can reference the CTI Legionellosis guideline among others.

Some recommended cooling tower water treatment prescriptions that are technically sound, flexible and easily adopted into a water management program are provided below:

Option 1 → Oxidant Residual Control

- Manually test and log **free** oxidant residuals three times a week – OR – Manually test free oxidant residuals once a week **along with** testing ORP three times a week, if not monitoring ORP automatically (continually).
- Test bacteria levels, minimum twice monthly – including testing done by the water treatment firm – using dipslides, ATP or lab culturing.
- Test *Legionella* and total aerobic bacteria levels once every 90 days using certified Lab and approved protocol.

Option 2 → Nonoxidizing Biocide Program

- Test bacteria level minimum weekly – including testing done by the water treatment firm – using dipslides, ATP or lab culturing.
- Test *Legionella* and total aerobic bacteria levels once every 60 days using certified Lab and approved protocol.

Additional Protocols

- Startup and Shutdown – (Follow ASHRAE 188) and
 - ✓ For idle, undrained system with stagnant water for 15 days or more: disinfect with 5 ppm free chlorine for 6 hours with fans off. HPC bacterial levels should be below 100 CFU/ml.
 - ✓ For idle, drained system: fill with water and maintain 5 ppm free chlorine for 4 hours.
- Records – Maintain records of monitoring for control limits and disinfections.

W.E. (Bill) Pearson II, CWT
ASHRAE SSPC-188 Member
AWT Liaison to ASHRAE & CTI
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During the summer legionella outbreak the issues that I have come across with the most was the lack of physical mechanical cleaning of cooling towers, poor or no water treatment in place and badly deteriorated or damaged cooling towers. Many locations emergency serviced during the outbreak have never had any water treatment in place, majority of building managers or operators felt it was not necessary. Cleaning was another major issue I frequently came across. Many of the cooling towers have never been physically cleaned or disinfected in not doing so these towers had excessive dirt , slime & algae a perfect breeding ground for bacteria growth. Cooling tower physical conditions are another problem, most locations have had issues with the structural integrity, cooling tower fill conditions and other critical components crucial to a proper running tower.

The following points are my opinion.

1- Frequent and proper cleaning of cooling towers should be a requirement. Cleanings should be based on seasonal operation and frequency time of cooling tower 2-4 times a year or depending on visual inspection. Mechanical cleanings should be performed by a professional company with experience in HVAC mechanical cleanings.

2 - Water Treatment , This should be a full requirement for all cooling towers. The importance of having proper water treatment to prevent bacterial issues such as Legionella is crucial. All facilities with cooling towers need to be treated. Water treatment service should be provided by a reputable company.

3 - Cooling tower integrity and operation, cooling towers should always be inspected for physical condition and running operations. Inspection of tower condition should include actual on line running observations, structural integrity, condition of fill, eliminators, louvers and other mechanical components. If towers require repair or refurbishing it should be noted on inspection visit reports and repaired accordingly.

4 - Legionella plan, a plan should be made for each system separate in a building or facility. If you have cooling towers your plan should include, Water treatment, cleanings, inspections, testing frequency and your remediation response to a high legionella or bacteria count. I do not believe in a general plan but instead a separate plan for each system. A cooling tower system should not be mixed in the same plan as a swimming pool, fountain or domestic water tanks this will only cause confusion. Plans should be set for each individual system not as a whole per building. Also what ever companies service specific equipment should create your plans for example your pool chemical service company should create a pool legionella plan and a cooling tower treatment company create its own plan for that specific cooling tower.

5 - I do not believe in the mandates plan to have building personnel conduct daily testing. Daily testing can cause time and financial hardship especially in smaller buildings or facilities. Testing for bacteria and legionella should be conducted quarterly or more frequently depending on the risk assessment of the cooling tower.

In closing I agree that proper cooling tower operations should be set but I also believe the reason for so many issues was caused by the deficiency in chemical water treatment, lack of cleaning and maintenance as well as deteriorated towers. Many of these things should be basic requirements that have not been followed or enforced in the past, if you enforce treatment, cleanings, tower inspections and quarterly testing this should be enough and at the same time

not cause a financial strain on the owners and operators of these units. Keep the steps basic but enforced , following solid basic requirements can have all cooling towers in compliance and with a responsive plan incase of high results.

Benny Castro
CSI



REBNY/BOMA NY Comments on DOHMH Proposed Cooling Tower Regulations

- Overall Comments:
 - The March 1, 2016 deadline for MPP implementation should be extended or the requirements should not be enforced until at least June 1, 2016, since neither the city nor state has approved their final regulations and the deadline is less than two months away.
 - The Proposed regulations are too restrictive in terms of acknowledgement and acceptance of innovation or advances in monitoring systems and alternative (less toxic) biocidal treatments, which may ultimately improve the environment while protecting public health.
 - For instance, advances in direct reading instrumentation and software that effectively quantitate process control measures and water quality parameters, in real time, are in existence or are currently under development. These systems can automatically override onsite chemical feed systems to correct chemical imbalances and provide the required daily documentation of a properly functioning cooling tower system via data logging on separate or existing BMS systems. Remote access may allow chemical monitoring and treatment from a central station rather than relying on operators on site.
 - The proposed regulations do not allow for any advances in less corrosive and less toxic biocidal treatments or technologies for legionella control.
 - The testing regime should be based on the level of cooling tower treatment, where towers with automated systems and contracted chemical maintenance have longer intervals between testing. There should be greater focus on systems with “informal” chemical maintenance (i.e., those with manual treatment systems and no specific scheduled treatments), where problems are more likely to occur.
 - The city and state should combine their cooling tower registries and reporting requirements into one comprehensive registry and remove all duplicative recordkeeping requirements and processes.
- §8-02 **Definitions**
 - Additional definitions should be incorporated to clarify “biocidal residual” and “oxidation reduction potential.”
 - The “dip slide” definition needs to be revised to distinguish it from a Heterotrophic Plate Count (HPC), which is quantitative and defined in Standard methods and described elsewhere in document.
 - An “electronic checklist” definition should be included to explicitly permit the automated logging of required information by building management systems.
 - A “water treatment” definition should be included to clarify that halogens and oxidizers are not the only permissible biocidal treatments
 - “Process control measures” and “Water quality parameters” should be more clearly defined and the differences between the two should be more clearly delineated.
- §8-03 **Maintenance Program and Plan (MPP)**

- (a)(3) This list should include and differentiate or distinguish between the functions of the “qualified person” for overall plan development and performance of MPP and to perform compliance inspections. The other functions listed in this section should be clearly defined maintenance team functions and performed by specific team members.
- (d) (1) An “electronic checklist” definition should be included to explicitly permit the automated logging of required information by building management systems.
- **§8-04 Process Control Measures**
 - C(2) – *Replacement in kind*. This is both unnecessary and very restrictive and could negate requirements in other sections such as (e) below.
 - (d) Reduce the requirement to clean cooling towers from twice a year to once a year or as needed.
 - Cooling towers should be cleaned once a year during the off-season when they can be taken out of service with minimum impact on building operations.
 - If the system shows signs of failure during peak cooling season (i.e. visible evidence of debris, algae or biofilm or reaches level 4 in table 1 “corrective actions required for specific bacteriological indicators”.. then it must be cleaned as per the regulations.
 - (e) Manufacturers’ tested values for maximum drift loss do not reflect real world locations or field conditions; operators may have no ability to keep calculated drift loss at maximum design water circulation below these thresholds.
- **§8-05 Water Treatment**
 - The regularity of treatment and monitoring should be determined by cooling tower system size; larger systems are more likely to be maintained and operated in a manner that would provide effective control of *Legionella* growth.
 - Many cooling towers operate year round and should not be required to perform testing when the water temperature is below 68°F. Bacteria are less active below this temperature. In addition, during the off-season months, cooling tower water is only circulated through the tower basin to reject heat, virtually eliminating any water mist.
 - The cost to automate chemical feed may be prohibitively expensive for small cooling tower systems.
 - Additional guidance should be released to illustrate acceptable ways to “explicitly state” that effective control will result in the context of crafting maintenance programs and plans.
 - Continuous water pumping 24/7 without chillers running would be a costly waste of energy; overnight idles should be explicitly permitted.
 - Non-chemical water treatment devices should not be banned; they are included in some multiphase systems and may be safer for our waterways than chemical treatments. The department should develop minimum efficacy criteria or monitoring standards that must be met as part of an overall approval process for these devices.
 - The minimum daily water quality measurements proposed will require buildings to purchase expensive equipment and to pursue advanced training and equipment use. It also requires an advanced knowledge of chemistry and microbiology for the responsible party.
 - Typical water treatment programs have monthly monitoring and onsite inspection as part of the contracted services and this standard has been effective at legionella control in the majority of Class A building stock throughout NYC. For owners who contract with chemical water treatment companies,. the daily and weekly testing requirement should be eliminated, unless the water treatment program proves to be ineffective.
 - The cost of quarterly *Legionella* culture testing for small cooling towers without specific bacteriological indicators may be cost prohibitive.

- Additional guidance should be released to illustrate the system monitoring and sampling locations that would be representative of various cooling tower systems.
- Non-oxidizing methods of disinfections that succeed in reducing *Legionella* culture results should be permitted in lieu of requiring hyperhalogenation of all towers subject to Level 4 corrective actions. The department should develop minimum efficacy criteria or monitoring standards that must be met as part of an overall approval process for these alternative methods and treatments.
- (e) *Makeup Water*. Given there are many instances of steam condensate reuse in cooling tower makeup in the city, this section should specifically address this, although water testing of any source, at least once, makes sense.
- **§8-06 System shutdown and start-up; commissioning and decommissioning cooling tower**
 - Additional guidance should be released to share permissible methods to protect systems from offline contamination. There is no practical way to protect cooling tower systems in large buildings from offline contamination, such as by covering them.
 - Additional guidance should be released to illustrate permissible methods to obtain and analyze *Legionella* samples after extended system shutdowns.
- **§8-09 Penalties**
 - The penalties proposed in section §8-09 should allow for a “cure period” during which no fine is imposed. Many of the minor record keeping infractions do not directly affect public health and therefore the proposed penalties may be too severe.
- **Questions**
 - Will a “Responsible Person” require a certificate of fitness?
 - Are the “Responsible Persons’ only tasks: measuring water PH; measuring temperature and disinfectant residual levels; and checking biocide storage container levels and other related tasks?
 - The Maintenance Program Plan prepared by a Qualified Person. Can the water treatment company be the “Qualified Person”?
 - What will be the format for the Maintenance Program Plan?
 - Will there be an annual certification fee?
 - Will the city and state provide lists of qualified labs?

January 4, 2016

Ms. Svetlana Burdeynik
New York City Department of Health and Mental Hygiene
Office of General Counsel
42-09 28th Street
14th Floor
Long Island City, NY 11101-4132

Via E-Mail: SBurdeyn@Health.NYC.gov

Re: Proposed Amendments to Title 24 of the Rules of New York City

Dear Ms. Burdeynik,

After review of the Title 24 Rules of New York City I would propose the following amendments.

1. Tower cleanings upon startup –As you know there are thousands of cooling towers in New York City. There simply is not enough water treatment capacity or resources to do the cleanings and disinfections within the prescribed timeframe. We request that this be modified that the cleanings will be done within 90 days of startup to allow the industry to build capacity.
2. Water Treatment Industry and Legionella experts have evaluated the correlation between total aerobic bacteria counts and Legionella and all the scientific data indicate there simply is not a correlation. We propose that the full remediation at 200,000 cells/ml, which is not uncommon in a cooling tower, be eliminated. Industry standards for high aerobic bacteria counts in which disinfection should occur is 1,000,000 cells/ml.
3. Most commercial building facilities do not have the manpower to test daily. Smart control automation systems that log the data daily and send alert if not in control are readily available and are reliable with recorded data for review online. We suggest that if these control systems are installed with ORP sensing that the testing requirement be a minimum of three times per week.
4. The rule implies daily dosing of biocides. We propose that this be modified to an industry standard of continuous treatment with an oxidizing biocide between 0.2-0.5 ppm free chlorine or equivalent with at least weekly non oxidizing biocide additions.

Respectfully submitted,

Allan J. Bly

Allan J. Bly
CEO
U.S. Water



Thank you for the opportunity to comment on the work your office has done on the proposed new Chapter 8 to Title 24 of the Rules of the City of New York.

The recent outbreak of Legionnaire's Disease in New York City highlighted how important regulations such as these are for safeguarding the health and well-being of all citizens. Clear guidelines and standards around water treatment best practices relating to *Legionella* control have been lacking. Regulations such as these are important to help ensure facility operators have in place sound emergency management plans and will encourage people to think about problems before they occur – and have steps in place to quickly address problems when they do occur.

In particular, the proposed requirement to use US EPA-registered biocides and trained pesticide applicators supports current regulations. This will continue to help educate the community and improve the accountability of people and products, thereby maintaining a culture of safety and responsible use. Also, compliance inspections – in particular the proposed requirement for visual inspection of the tower for organic matter buildup, biofilm, and algae – are key in the absence of industry-wide robust monitoring techniques for biofilm and algae.

Although there are many positive aspects of the proposed Chapter 8, I would like to note a few areas of concern.

Overreliance on Oxidizers

I am particularly concerned that the proposed rules are effectively narrowing the choice of biocides available to water treatment professionals. By requiring daily measurements of free and total residuals, water treatment professionals must use an oxidation reduction potential (ORP) probe, which is really only used with oxidizers. The only other alternative is to be physically on site daily, which is impractical. Furthermore, the requirement to set and maintain a target residual coupled with the requirements for daily automatic feeding and use levels to control *Legionella* effectively preclude the use of non-oxidizing biocides, which are frequently used in conjunction with oxidizing biocides as part of robust and effective water treatment programs.

Consequently, cooling tower operators will need to add relatively high use levels of bleach and other strongly oxidizing chemistries to their cooling tower. These chemistries can react with organic materials – such as windblown debris, bird waste and plant material, as identified in section 8-03 c5 – in the cooling water or in the subsequent waste water treatment facility to produce chlorinated or brominated byproducts. These byproducts are regulated with very specific discharge limitations. Importantly, when oxidizing biocides react with organic material, they can also reduce the level of available reactive molecules, thereby potentially reducing their effectiveness as a biocide.

Additionally, waste water treatment plants rely on a thriving population of microorganisms to break down many of the wastes that are sent to the waste water treatment plant before the water is discharged. The higher levels of chlorinated or brominated water entering a waste water treatment plant may negatively affect the beneficial microorganisms living there.

While oxidizing biocides are clearly an important part of a water management plan, other non-oxidizing biocides are frequently used with oxidizing biocides. Indeed, the US EPA FIFRA label for some calcium hypochlorite-based biocides including MINITABZ, PITTABS, and SUPERCHO directly mentions the control of *Legionella* in cooling water:

Calcium hypochlorite can serve an important role in control of *Legionella* bacteria in cooling water towers... *Legionella* bacteria can, however, survive chlorination when shielded inside amoebae, other

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protozoa or slime, so it is important to have an overall *Legionella* control strategy that includes controlling the growth of these other organisms and microbial communities and limiting the supply of micronutrients that sustain such microbial growth... These recommendations are based on best practices from the industry, but are presumptive in nature. Calcium hypochlorite has not been tested for effectiveness against Legionnaires Disease Bacteria (LDB). There is no evidence that chemical treatment will control the growth of LDB under actual operating conditions, reduce transmission of LDB, or prevent Legionnaires' Disease.

As the label states, an oxidizer alone may not be enough to control *Legionella* in a cooling water system, and the use of biocides does not guarantee the prevention of Legionnaire's Disease.

Corrosion Concerns

Corrosion rates and chemical compatibility are always important to consider when designing a water treatment program. A water treatment program that relies heavily on oxidizing biocides may be particularly susceptible to high corrosion rates or require extra corrosion inhibitors to manage corrosion in the system. The high corrosion rates are bad for equipment and asset integrity, and higher than normal levels of corrosion inhibitors may have a negative environmental effect. The increased level of corrosion products may also provide attachment sites for biofilm that are particularly difficult to treat. Additionally, oxidizing biocides may oxidize the scale and corrosion inhibitors, rendering them ineffective. While some scale and corrosion inhibitors are resistant to oxidation at lower use levels, they may not be fully compatible at the higher levels required to control *Legionella*.

Finally, I have a few other requests for consideration:

1. Your reference to *ANSI/ASHRAE 188-2015*, including the creation of a Maintenance Program and Plan or Water Management Program, is an excellent addition and meets the standard for industry professionals. However, in order not to confuse industry professionals, please consider referring to the Maintenance Program and Plan as a "Water Management Plan".
2. Please suggest testing the makeup water for *Legionella*, especially if there is a detectable *Legionella* level or a history of low level *Legionella* detection.
3. As *Legionella* becomes an increasing pathogen of concern, I expect that better detection methods will be developed. In the spirit of allowing for future innovation, please consider adding the option for future *Legionella* detection devices. The proposed language is below with the addition underlined.

Section 8-05-f3 "A *Legionella* sample must be analyzed by a US Centers for Disease Control and Prevention ELITE Program certified laboratory, by the New York State Department of Health Wadsworth Center or other laboratory or device approved by the Department."

4. Finally, regarding the language surrounding power outages, I encourage you to consider including a time period with the power outage that would trigger a requirement to test for *Legionella*. Such a testing requirement that could potentially trigger multiple cooling water systems to test simultaneously, which could have significant impact on testing labs. I would suggest that the power outage last for at least 24 hours before triggering the requirement to test for *Legionella*.

Thank you for your consideration of these issues and proposed changes.

Christine E. McInnis, Ph.D.

Jack Soost

Comment:

This is first of three comments. Ladies and Gentlemen, January 3, 2016 I offer the following comments relative to your November 20th notice proposing a new Chapter 8 (Cooling Towers) to Title 24 of the Rules of the City of New York. Your document for Maintenance of Cooling Towers appears to be well written and contains a great deal of useful information for Building Owners and Operators to consider and act upon. I do, however, believe that a few items need to be clarified and some sections deleted. You need to avoid the appearance of micro-managing and rely on the experience and qualifications of water treatment professionals. I offer the following:

1. The 1st, 3rd and 4th columns of Table 1 on pages 13 and 14 are quite similar to Appendix 4-A in the recent New York State Legionella regulations and the Legionella "Cooling Tower Control Strategy" guidelines as published by The Special Pathogens Laboratory (SPL). However, neither the NY State nor the SPL documents contain the bacteria testing data you show in your 2nd column. In fact, I have never seen such a comparison by anyone else. Please acknowledge your data source and validity for such data comparisons. All data I have seen shows very poor correlation between your Column 2 bacteria tests and Column 3 Legionella results. Also, on-site bacteria dip slides and laboratory HPC test results typically do not produce comparable test results with themselves or with Legionella. Bacteria dip slide manufacturers may use different formulations for their dip slide agar. Standard Methods for laboratory HPC tests can utilize different agars. Some tests may produce results in 2 days such as typical with dip slides whereas laboratory HPC tests may require 2 days or 5 to 7 days depending upon the agar used and testing objectives. In comparison to dip slides, laboratory HPC procedures can measure a wider range of bacteria types and can include biocide stressed organisms that can be cultured during the 5-7 day procedure. I recommend you consider deleting the 2nd column and let the water treatment professionals decide what bacteria tests they want to utilize to evaluate the effectiveness of their water treatment programs to best comply with your requirements for quarterly testing of Legionella.
2. Sections 8-04 (a) and 8-05 (f) (1) conflict. The first says "weekly" and the latter says "daily". If a cooling system is equipped with a conductivity monitor (as most all are), weekly testing is adequate. Also, the "water Quality Parameters" listed at the end of Section 8-02 are examples and much more extensive than needed. For example, conductivity is an indirect measurement of total dissolved solids (TDS). Depending upon the type of water, TDS may be about 80% of the conductivity. Unfortunately, TDS tests require the expense of laboratory analysis and a week or longer to get the test result. Temperature and pH will not vary for a given system. The water treatment professional anticipates and considers fluctuations when designing the treatment program. ORP is not needed unless the water treater is utilizing ORP to control the halogen biocide feed. Test procedures do not exist for many biocide chemistries. The water treatment service company will test many other chemistry parameters monthly or quarterly to best understand the treatment program for corrosion and scale control. Weekly

bacteriological indicator tests using dip slides should be adequate to estimate microbial content (as stated in Section 8-05 (f) (2)), but please do not incorporate this type of data in your Table 1.

3. Section 8-05 (e) Makeup Water includes the statement ...”must install a drift eliminator”.... I cannot envision how a drift eliminator would be installed or needed in a reclaim water tank being used for tower makeup. Your Section 8-04 (e) already requires drift eliminators in the cooling towers. Why mention it in Section 8-05 (e)?

Agency: [DOHMH](#)